



RURAL RADIOGRAPHY PRACTICE:
EXPLORATION OF EXPERIENCES OF
RADIOGRAPHERS IN GHANA

Thesis submitted for the degree of

Doctor of Philosophy

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~~This work has not been submitted in substance for any other degree or award at this or any other university or place of learning, nor is being submitted concurrently in candidature for any degree or other award.~~

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Dedication.

I dedicate this work to God Almighty for a successful completion of my programme.

Secondly, to my dear wife; Mrs. Gertrude Louisa Naa Odarkor Ashong and to my

wonderful children; McKayla Allison Naa Amuah Ashong and Gabriel McKayden Nii

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Abstract

Background

Globally, rural radiographers face challenges when providing routine radiographic services. Ghanaian rural radiographers work with limited imaging equipment/modalities, often without onsite radiologist services. Yet, rural radiography practice (RRP) in Ghana has received little attention to date. This thesis consequently explores radiographers' experiences and perceptions of RRP in Ghana and establishes the impact of working environment on their practices.

Study design

A qualitative single case study with nested units of analysis design was used to explore experiences of rural radiographers in Ghana. Sites and participants were selected purposefully to ensure maximum variation of rural settings across the country. Data were collected through semi-structured interviews, observations of the participants' working day and analysis of relevant and available official documents. Data was analysed thematically with data integration at the analytic stage.

Findings

The study produced three broad themes: Motivation/attraction/retention; Challenges & Impact; Interventions & Policy formulation. These revealed reasons why radiographers accepted rural postings and why they remain in their roles. The data revealed that Ghana lacks policy designed to attract and retain rural radiographers. Challenges encountered with RRP included: image reporting scope of practice breaches, shortage of staff, practice limitations/academic isolation/no career progression opportunities, discrimination against radiographers by management, issues with occupational health & safety, equipment, security & IT connectivity issues and shortage of radiographic consumables. However, the study identified crucial role that education and policy will play in the establishment of nationally recognised framework for RRP in Ghana.

Conclusion

This study contends that Ghana needs a policy to address the challenges identified and motivate/attract/retain radiographers in rural areas. Ghanaian rural radiographers need functional professional systems that offer opportunity for career development, particularly by gaining exceptional interprofessional skills and comprehensive knowledge of imaging pathology/pattern recognition to undertake extended roles such as radiographic reporting in the absence of radiologist provision.

LIST OF ABBREVIATIONS

GoG	Government of Ghana
GHWO	Ghana Health Workforce Observatory
GSR	Ghana Society of Radiographers
RRP	Rural Radiography Practice
RH	Rural Health
RM	Rural Medicine
HRH	Human Resource for Health
WPR	World Population Review
UNICEF	United Nations International Children's Emergency Fund
KBTH	Korle Bu Teaching Hospital
HCPC	Health and Care Professions Council
OECD	Organisation for Economic Co-operation and Development
NDPC	National Development Planning Commission
LMIC	Lower Middle Income country
GDP	Gross Domestic Product
MOH	Ministry of Health
SSNIT	Social Security and National Insurance Trust
AHPC	Allied Health Professions Council
NHIA	National Health Insurance Authority
NHIS	National Health Insurance Scheme
NHIL	National Health Insurance Levy
NHIF	National Health Insurance Fund
GHS	Ghana Health Service
THOSP	Teaching Hospitals
QGIH	Quasi Government Institution Hospitals
PHMHB	Private Hospitals and Maternity Homes Board
DTAM	Department of Traditional and alternative medicine

GHSP	Government Hospitals
PC	Poly Clinics
HC	Health Centres
MBP	Mission Based Providers
PMDP	Private Medical and Dental Practitioners
TMP	Traditional Medicine Providers
AM	Alternative Medicine
FH	Faith Healers
QC	Quality Control
QA	Quality Assurance
GSR	Ghana Society of Radiographers
CPD	Continuous Professional Development
CoR	College of Radiographers
SCoR	Society and College of Radiographers
RCR	Royal College of Radiologists
BARP	British Association of Radiology and Physiotherapy
DoH	Department of Health
CT	Computed Tomography
MRI	Magnetic Resonance Imaging
PET	Positron Emission Tomography
WHO	World Health Organisation
ED	Emergency Department
CTC	Computed tomography Colonography
IVU	Intravenous Urograms
A&E	Accident and emergency
NDPC	National Development Planning Commission
RDHS	Regional Director of Health Service
GMA	Ghana Medical Association
GAEC	Ghana Atomic Energy Commission
RPI	Radiation Protection Institute

PACS	Picture archiving and communication system
HeFRA	Health Facilities Regulatory Authority
TLD	Thermo luminescent dosimeters
NRA	Nuclear Regulatory Authority
NCTE	National Council for Tertiary Education
MDC	Medical and Dental Council
UN	United Nations

CHAPTER ONE

Introduction

1.0 Introduction

This study is centred on rural radiography practice in Ghana. This first chapter offers an overview and summary of the background to the study. The chapter then outlines why the study is being undertaken (the rationale for the study). It provides a brief review of current knowledge in the area and outlines the relevance of the study, as well as the study aims and objectives. The chapter then concludes with the provision of radiography services and the originality of the thesis section. The study was conducted in Ghana and therefore a summary about the country and sociocultural norms were also examined to enable the reader to gain an understanding about contextualising the Ghanaian situation in rural radiography practice topic.

There is a dearth of published literature about rural radiography practice in Ghana. This makes it so difficult for the radiography profession to identify and address problems or progress related to rural radiography practice. Although radiographers are in high demand across Ghana, their availability in rural areas is disproportionately low. 65% of the country's population live within rural areas, but only 32.1% of its health workforce reside and/or work in rural areas (Ghana Health Workforce Observatory, 2010). Government have not given much attention in dealing with issues of medical imaging particularly, within rural settings (Antwi 2017; Gawugah 2016). Nevertheless, the role of radiographers in delivering quality patient care and management cannot be overemphasised when their roles influence the timely diagnosis and treatment of life-threatening health conditions. But, these are the only situations where high quality radiography services are important particularly in rural areas, where there is difficulty in access to healthcare within many rural areas due to unavailability of resources, medical services or practitioners, large travel distances, and transportation problems as reported by studies over the last 15 years (Reilly 2021; Sunckell 2020; Zhu et al. 2019; Okwaraji et al. 2015; Beedasy 2010; Graves 2008; Brems et al. 2006). These challenges in rural practice have been indicated to have resulted in an apparent

unyielding deprived healthcare systems in most African countries including Ghana which has become a major concern (Yaya et al. 2017; Sulemana and Dinye 2014).

1.1 Rural Healthcare Practice

Rural health or rural medicine has been considered as an interdisciplinary study of health and health care delivery in rural environments (Gessert et al. 2015; Miller 2013; Du Plessis et al. 2001). According to the United Nations [UN] (2001), there is no international standard for defining rural areas, and standards may vary even within an individual country. Nevertheless, the most frequently used factors of categorisation are population-based and geography-based factors (Gessert et al. 2015; Miller 2013; Beedasy 2010; Pong and Pitbaldo 2001). More specifically, methodologies used for classifying rural areas/communities are based on their rural or urban status which include the size of the population/settlement size, population density/or economic growth in different ways, distance from an urban centre, settlement patterns, labour market influences and postal codes (Wineman et al. 2020; Pateman 2011; Pitblado 2005).

Rural healthcare practice definitions are essential for government functions related to rural policymaking, regulation, and program administration (Wineman et al. 2020; Gessert et al. 2015; Miller 2013; Bourke et al. 2004). There is no single definition that fits all needs related to rural healthcare practice (Wineman et al. 2020; Pateman 2011; Hays et al. 1994). Besides, different countries have varying definitions of “rural” for statistical and administrative purposes (Fisher 2019; Pateman 2011; Parsons et al. 2003). Typical rural definitions include areas with a low population density and small settlements and agricultural or forested areas (Fisher 2019; Pateman 2011; Parsons et al. 2003). Generally, a rural area or countryside is a geographic area that is located outside towns and cities: whatever is not urban is considered rural (Reilly 2021; Sunckell 2020; Zhu et al. 2019; Hays et al. 1994). Nevertheless, a remote area is a place that is distant from any people or activities or buildings usually with no nearby town, or it can be an area within a town that is distant from the rest of the town (Reilly 2021; Sunckell 2020; Wakerman 2004). However, rural health and remote health are often merged in the term ‘rural and remote health’, but doing so fails to distinguish the differences in practice in these two settings (Asamani et al. 2021; Zhu et al. 2019;

Parsons et al. 2003). Wakerman et al (2006) asserted that The Royal Australian College of General Practitioners (RACGP) defined rural health as medical practice outside of urban areas where the location of practice obliges general/family practitioners to have or acquire procedural or other skills not usually required in urban practice. Similarly, Studies in Australia have suggested that “rural” practice is practice in communities more than 80 kilometres (km) or one hour by road from a centre with no less than a continuous specialist service in anaesthesia, obstetrics and surgery as well as a fully functional operating theatre, while, “remote” medical practitioners are minimised sized as more than 300 km or 3 hours from support services (Wakerman et al. 2006; Humphreys et al. 2002; Hays et al. 1994). This current study therefore adopts the RACGP’s definition of rurality and/or rural radiography.

In some developing countries in Africa, it has however, been suggested that regional socio-economics are key with rural areas noted as deprived areas within the regions of a country (Ministry of Health Uganda 2005). This could also be relevant for Ghana, which falls within the developing country/low income scope along with many African countries. (United Nations Conference on Trade and Development [UNCTAD/LDC/2020]). Some of these rural areas are deprived of social amenities such as portable drinking water, electricity, good roads, functioning hospitals, stable internet connection (especially for tele-radiology), schools among other services (Delaney et al. 2002). Accordingly, the healthcare needs of individuals living in rural areas are different from those in urban areas, and many rural areas suffer from a lack of access to healthcare (Tsegaye 2010; WHO 2009; Ministry of Health Uganda 2004).

There are widening gaps between service demands and the availability of a radiologist in most rural areas across the world (KPMG 2009; Smith et al. 2009a). Consequently, the responsibility for interpreting radiographic images often falls provisionally to the referring clinician in the rural areas (Yawn et al. 2010). Nevertheless, most rural radiographers have generally taken over the interpretation of some plain radiographs, particularly in rural settings as part of role extension and expansion practices partly due to the increasing workload in X-ray departments and the shortage of radiologists (Howard 2013). Notwithstanding, studies have suggested that reporting of radiographs by radiographers are not only done within rural areas but also in some urban centres

in order to reduce patient waiting time and also to improve standard of patient care (Milner et al. 2016; Piper et al. 2005).

Also, Smith et al. (2009) indicated that in many countries including Australia, rural and remote clinical practice, where there is often no attending radiologist, rural radiographers can and/or should work closely with referring clinicians in image interpretation. Smith et al. (2009) further mentioned that the complementary role between radiographers and referring clinicians can reduce misdiagnosis and positively impact on patient care since teamwork has been shown to allay or even eradicate error. Therefore, radiographers' radiographic opinion especially in a rural setting is a valuable benefit to referring clinicians by assisting them in attaining a speedy and precise diagnosis which eventually would help improve patient care (McConnell et al. 2012; Smith 2008; McBrien 2005).

1.2 Development and implementation of policy for rural radiography practice in Ghana

Literature suggests that globally, a number of countries (both low and high resource) such as Cambodia, China, and Vietnam as well as India, Nigeria and some others have implemented at least some strategy such as medical education, financial incentives, and personal and professional support aimed at improving the retention of health workers in rural and remote areas (Zhu et al. 2019; Behera et al. 2017; Rajbangshi et al. 2017; Awofeso 2010). Also, Rourke (2010) had earlier indicated that WHO have recommended for all countries across the globe to adopt a strategy to improve health workforce recruitment and retention particularly within rural settings, but, there is no strategy in Ghana despite this recommendation. These strategies however demand rigorous assessment in order to be able to measure their effectiveness. Ghana lacks strategic retention policy specific to rural radiography practice and therefore it is not plausible to measure effectiveness of a non-existing policy/program. Consequently, there is a need to conduct a study which seeks to explore the practices and experiences of radiographers within rural settings in Ghana which could then inform policy development and implementation.

The practice of radiography generally has evolved with remarkable advancement particularly in the UK (Smith and Reeves 2009). It was therefore suggested that the radiographer's role over the past 20 years have seen much change due to development in practice (Smith and Reeves 2009). Studies have suggested that these developments have been largely driven by an increase in workload, compounded by a shortage of radiologists and government policy (Department of Health 2010; Royal college of Radiologists 2002; Department of Health 2000). Attraction and retention of health workers is a worldwide issue (WHO 2010). Notwithstanding, there is the need to reduce the inequitable distribution of health workforce between the urban and the rural areas in order to meet the WHO (WHA59.23) initiative of improving retention of health workers in the deprived areas (Ntangu 2014). Following the suggestion of early implementation of the WHO recommendations for the retention of health workers in remote and rural areas (Buchan et al. 2013), it was indicated that in order to ensure equitable distribution of health workers in the rural areas, there is the need for the fair implementation of the measures for retention and attraction of health personnel (Ntangu 2014). It is estimated that half of the world population lives in rural areas, despite this situation, attraction and retention of the health workforce in rural areas is a global challenge (WHO 2010). The situation to date is worst in 57 countries including Ghana with an extreme shortage of health workers (Asamani et al. 2021; Ntangu 2014). This impedes advancement aimed at achieving the millennium development goals (UNICEF 2014): (which represent the commitments of United Nations Member States to reduce extreme poverty and its many manifestations: *hunger, disease, gender inequality, lack of education and access to basic infrastructure, and environmental degradation*) and the fight for health for all (WHO 2010).

It has been suggested that the rural workforce strength of a country, without any retention and attraction policy for remote or rural workforce, could be affected as many healthcare workers are reported not to be interested in working within such communities due to associated challenges (Asamani et al. 2021; Ntangu 2014; Buchan et al. 2013). Unlike countries such as Cambodia, China, Vietnam, India, Nigeria, and Uganda who have specific rural retention policies for healthcare workers (Zhu et al 2019; Rajbangshi et al. 2017; Kawooya 2012; Awofeso 2010; Tashobya et al. 2010). Ghana currently has no specific retention and human resource for health (HRH) policy, which could potentially affect the retention and attraction of health

workers in rural areas in Ghana. With respect to radiography, there is no standard of operating procedure that governs the practice of radiography within a rural setting. However, anecdotally, within most urban centres in Ghana there are facility-specific protocols designed to manage the practice of radiography which are typically developed by juxtaposing standardised operating practice from the UK as a blueprint. However, the aforementioned protocols do not exist anecdotally in rural practice in Ghana.

Regarding the global shortage and imbalanced distribution of it's health workforce, Ghana has most of the radiography workforce in the urban areas, yet majority of the country's population live in the rural areas (Asamani et al. 2021; Mawusi 2020; Asamani et al. 2018; Ghana Health Workforce Observatory 2010). Report from the Ghana Society of Radiographers (GSR) estimated that, as of 2015, there were only 250 radiographers nationwide for a population of 26 million: a radiographer to population ratio of 1: 100,000 (GSR 2018). Comparatively, the number of medical radiographers in the United Kingdom (UK) between 2010-2020 stood at approximately 33,800 (Michas 2020) for a population of 68,390,701 based on worldometer elaboration of the most recent United Nations data (UK Population 2021): a radiographer to population ratio of 1: 2,023.39. Also, a country with similar socio-cultural patterns, such as Nigeria with about 1,318 registered radiographers, has a radiographer to population ratio of 1: 150,000 (Idowu and Okedere 2020).

1.3 Statement of the problem

Globally, reliable and satisfactory healthcare services rendered to patients within a particular facility can be considered quality service delivery (Nelson and Gingerich 2010). The provision of healthcare services without regards/attention to its quality is unethical and potentially dangerous (Adindu 2010). Access to quality healthcare services is the number one rural health priority among healthcare leaders and stakeholders in rural areas (Gamm et al. 2003; Nelson and Gingerich 2010). Many rural residents experience difficulty accessing health care due to unavailability of resources, travel distances, and transportation problems (Brems et al. 2006). Studies have suggested a rigid, underprivileged healthcare system in most developing countries, including Ghana, has become a major concern owing to the fact that

healthcare and quality are inseparably linked (Yaya et al. 2017; Sulemana and Dinye 2014).

Rural radiography practice and its quality in Ghana are poorly understood as there is a dearth of published literature about it. Studies have indicated a lack of health personnel in rural areas of Ghana, and suggested that imaging is less prioritised in rural settings compared to urban settings (Antwi 2017; Gawugah 2016). Anecdotally, issues facing Ghanaian rural radiography have been considered by those who have been in rural practice and/or are currently engaged in rural practice (i.e. personal accounts of issues) similar to most sub-Saharan African countries. This commonality is based on similar working systems, socio-cultural and economic patterns within other low resource countries neighbouring Ghana such as Nigeria.

Antwi (2018) in a presentation at a congress organised by the Ghana Society of Radiographers speaking on “The Challenges of Rural Radiography In Achieving the Sustainable Development Goals (SDGs)” also reiterated and outlined several practical challenges to rural radiography in Ghana, which include but are not limited to: lack of imaging equipment, imaging equipment being old and/or in poor functional state and a lack of reliable internet service. However, it is unclear whether or not Antwi’s assertions were based on empirical research data or something else (i.e. a presentation informed by secondary data such as data sources from other African countries, audit data or even feedback from GSR and/or Society of Radiographers (SoR) survey) as there was lack of publication on the specific assertions within the Ghanaian context, which meant that the rigour of the study could not be assessed. Besides, Antwi failed to explicitly describe his study setting, data collection strategy and how sampling and recruitment was done, thus the need for future research to focus on addressing this gap that was identified. Notwithstanding, the researcher felt Antwi’s assertions were very useful and valuable for this thesis as those assertions corresponds with evidence from other rural radiography studies in Sub-Saharan Africa (settings) in particular. But, the assertions need to be verified by a well-designed study that will be disseminated such as this current study, as there could be a possibility of differences in infrastructure, policy, education, population profile or other factors that may cast doubt on the assumption issues for RRP in Ghana are the same as other African countries. Correspondingly, Kawooya (2012) mentioned that imaging equipment in rural areas in most low resource countries in Africa particularly are less

sophisticated than expected per international standards and introduced the idea of academic isolation of rural medical imaging professionals, for example: barriers to attend CPD programs, (seminars, workshops etc.); lack of awareness of professional opportunities; impeded professional information flows; financial challenges; lack of professional/career progression support; lack of internet service; delays in equipment maintenance. Therefore, it is imperative that this current study rigorously explores and systematically reveals the actual challenges to rural radiography practice specific to the Ghanaian context. In order to provide accurate context specific accounts of rural Ghana radiography practice to inform government to manage practice effectively for best patient outcome.

Gawugah (2016) used a sequential explanatory mixed methods design to develop a framework of quality in radiographic service delivery in Ghana. Phase 1 - quantified participants' and service perspectives about the basic quality assurance and quality control procedures: reject film analysis and diagnostic reference levels. Phase 2 - used semi-structured interviews with six radiographers, six patients and three managers to further explore and explain the quality of service issues identified in Phase 1. This work revealed a frequent break down of radiologic equipment in most facilities particularly within rural areas in Ghana with most of the equipment beyond serviceable repair. An earlier study by Kawooya (2012) had suggested that nearly 50% of X-ray units and more than 40% of ultrasound units in resource-deprived countries aren't fully functional, often because it is has been speculated that they are donated by first world countries at the end of their lives and replacement parts are not available. even when the machines work, there may not be a stable three-phase electric power system to guarantee an uninterrupted supply of current. Antwi (2018) suggested that, "Getting three-phase to rural areas is a tremendous task," "With unreliable current, you run into shocks. This is a problem every day in developing countries."

It has been argued that ideally, rural radiographic practice can potentially enable radiographers to attain an additional and exceptional set of skills as they go about their duties and responsibilities that are crucial for high quality and effective practice, provided they are well equipped in a conducive working system (Mung'omba and Botha 2019; Myklebust et al. 2019; Squibb et al. 2016; McBrien 2005). This is indicated to be evident in an exceptional scope of knowledge that is acquired through shared

experiences of clinical practice in rural settings, specifically in how rural radiographers respond to both patients and referrers as well as how they perform autonomous radiographic examinations (Squibb et al. 2016; Squibb et al. 2013; Tsegaye 2010). Though it has been suggested that rural radiographer's technical expertise in image acquisition can become enviable, it has also been recognised that despite the challenges and barriers encountered, as rural radiographers navigate their way through their practice in the rural area, they tend to develop further additional and unique set of skills due to their autonomy of practice which helps with provision of high quality and effective practice (Yawn et al 2010; McBrien 2005).

1.3.1 Significance of the study

From the issues identified above, this study would be first of its kind in Ghana and would set a baseline knowledge on experiences and practices of radiographic services delivered in rural areas of Ghana. It is anticipated, to improve quality of practice/service for the future because of the awareness it would create among the radiographic service providers in the country. Once there is awareness of the overall framework of quality of practice and/or experiences among the radiographers within the rural setting, it would contribute to the provision of improved quality of rural radiographic service delivery in Ghana. Subsequently, it would help in the achievement of the goal of the Ministry of Health (MOH) to provide quality of care to the service users (MOH 2007a). Therefore, this may be the key to the development of rural; radiography policy which will improve patient safety, quality service delivery and performance of the imaging facilities within rural settings. The study aims to lay bare the experiences of rural radiographers with respect to their practices and roles. It also anticipates to reveal rural radiographers' perception about their practices and experiences with respect to occupational health and safety. Furthermore, it aims to develop a principal framework of rural radiography service delivery in Ghana and to promote activities that will provide rural radiographers with additional knowledge about issues in imaging service provision and patient care within the rural setting.

This study also anticipates to close the knowledge gap that may have existed within the professional drive towards the philosophy of rural radiography practice particularly, within the Ghanaian context. This could potentially be relevant as the findings of this study could potentially set the stage to recommend a nationally recognised framework

for RRP and/or the need for a policy implementation for attraction and retention of rural radiography workforce in Ghana as practiced in some other countries such as Nigeria (Awofeso 2010) to help manage RRP effectively within the Ghanaian context. The comprehensive approach in this study would also set a stage for future studies in Ghana and other developing countries aiming at addressing the challenges that are encountered in rural radiography practice. This is important as standards of service provision should become part of the culture and/or policy of the radiographic service delivery by rural radiographers in the X-ray facilities in Ghana. The study will also be beneficial as a recommended framework of rural radiography practice could be incorporated into the academic curriculum to ensure that radiography students are educated in all aspects of rural radiography practice which would eventually help improve future radiography service delivery in rural Ghana and/or attract workforce to those areas and potentially reduce attrition.

1.3.2 Why a study about rural radiography practice in Ghana?

The philosophies that drive remote and rural practice and the way services are delivered within these settings often vary from those applied within a larger metropolitan or urban setting (Mung'omba and Botha 2019; Myklebust et al. 2019; Squibb 2016; Squibb 2013). Most rural health research focusses on a wide-range of topics important to the delivery of rural medical services, the viability of rural healthcare facilities, and the health of rural people (Squibb 2013). Such research looks more generally at healthcare access, quality, and cost which according to literature may be driven by many things, such as: interests to determine the efficiency and quality of the healthcare system, practical problems a healthcare provider is trying to solve; such as how to best implement a service as well as an existing literature; which may identify gaps in knowledge or inspire additional questions. This consequently, seek to measure, or assess, the circumstances present in a specific community, organisation, or program which aims to identify needs or gaps in available rural health services, as well as assets and strengths (Yaya et al. 2017; Mung'omba and Botha 2017; Sulemana and Dinye 2014; Squibb 2013).

In rural Ghana, the low radiographer-to-population ratio is particularly concerning. The world population is rising at a quicker rate, necessitating the need for governments to

endeavour to satisfy the health demands of its residents (Bongaarts 2020). Anecdotally, it has widely been speculated by the radiography fraternity in Ghana led by the GSR, who suggested that to satisfy the health demands of an ever-growing population, there is an urgent need to increase the radiography workforce particularly in rural areas (GSR 2018). The study findings will help policymakers, local government agencies and training institutions to understand the “lived world” of rural radiographers in Ghana particularly looking at their experiences and practices. The study aims to contribute to knowledge as it would serve as a baseline for further studies as well as add to the existing knowledge in the field which may include but not limited to challenges to RRP such as internet issues, lack of workforce and equipment issues as literature suggests . Data generated from variety of sources based on the findings of this study (if there is a problem as noted with similar low resource countries as suggested by literature) could potentially inform recommendations to the government to develop policies that will see the attraction, retention, improvement, with experiences and practices of Ghanaian rural radiographers. There is therefore the need to conduct this study to seek to answer the question(s) which this study aims to address (*see section 1.6*) focusing on how the findings could impact policy and practice. Because the rationale of this study is that it aims to present a profound and more realistic account of the profession and its practices within a rural setting. Also, the theoretically informed research design anticipates to provide the field of rural radiography in Ghana with a new research framework that is appropriate for describing, interpreting and explaining the complex humanistic nature of rural radiographic practice. This is important as it would provide other researchers with a sound, theoretically informed research framework for examining Ghanaian rural radiographic practices in a way that recognises their essential humanistic dimensions.

As part of planning for this thesis, search and reviews conducted suggested that there is a paucity of empirical literature on rural radiography practice in Ghana which is in contrast to the amount of literature available in other countries and even in other clinical settings. A clear finding from the literature was that getting evidence into practice needs to be context-specific (Squibb 2013) and yet very limited or no research had been conducted into the rural and remote context in Ghana. Research was therefore deemed needed within the Ghanaian context about the practice world of rural radiographers in order to be able to recommend a nationally recognised

framework for rural radiography practice in Ghana which could help promote quality of healthcare and better patient outcomes in rural areas of Ghana.

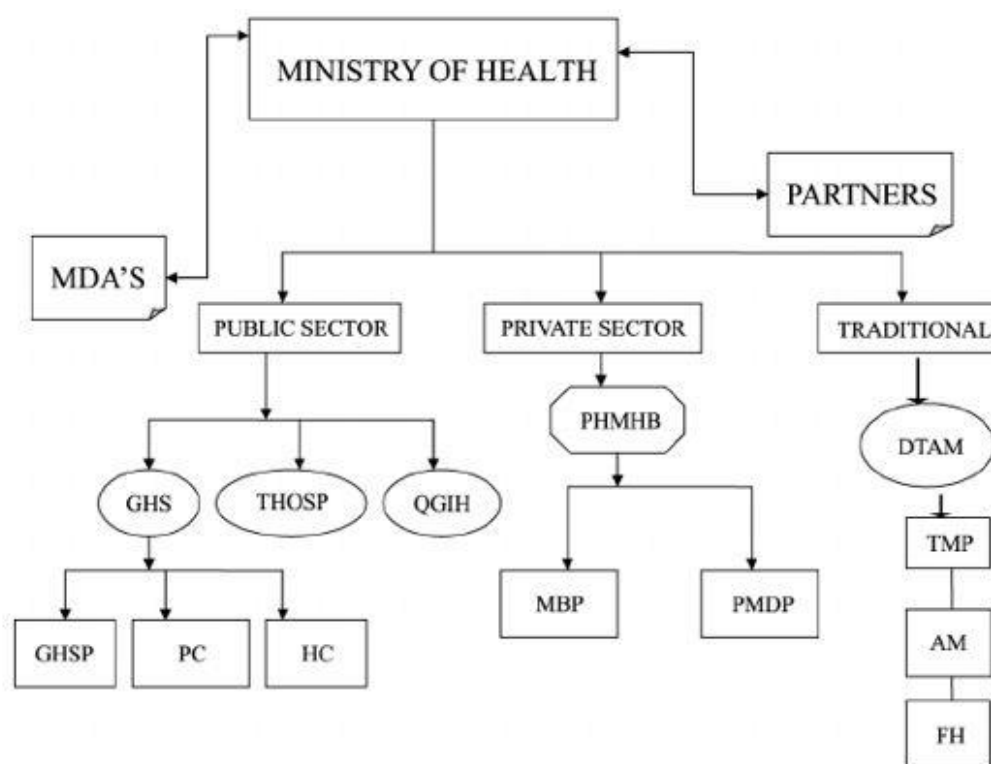
1.3.3 Information gathering visit that contributed to inform the study approach

An extensive discussion between researcher and supervisors was held to set out a data collection plan that would gather requisite information and knowledge to address the thesis objectives. It also served as a thought experiment pilot study that helped the researcher to determine which approach (design, methods and methodology) was most suitable. Accordingly, there was a collective agreement for the researcher to visit Ghana in April 2019 to develop feasible plans for subsequent field work in rural areas, establish what documentation might be available to the researcher and ultimately to develop the study design.

The benefits from the visit were numerous:

- Solicited additional funding from the researcher's sponsors for the actual data collection (Interviews and observations) in Ghana.
- Facilitated Ethical Approval from Ghana Society of Radiographers (GSR) for data collection with radiographers at their facilities across various rural areas.
- Visited radiography facilities within rural areas as potential study sites. This was important to establish personal connections and to see firsthand the specific contexts to rural radiography in different regions.
- Conducted an exploratory field study to inform the design and methods of the research project . The aim was to observe, and have an informal chat with people in rural practice in an attempt to understand their needs and challenges. Also to give the researcher specific areas to focus on with respect to literature review considering the objectives of the study.
- Researcher was able to establish and justify selected places (sites) for data collection.
- Evaluated the Radiographer workforce in rural Ghana (distribution of radiographers across rural facilities in Ghana)
- Established the approximate equipment distribution within rural areas of Ghana and confirmed the feasibility of mapping out the contextual factors to rural radiography practice.

1.4 Structure of the health sector in Ghana



Key:

MDA's – Ministries, Departments and Agencies
 GHS – Ghana Health Service
 THOSP – Teaching Hospitals
 QGIH – Quasi Government Institution Hospitals
 PHMHB – Private Hospitals and Maternity Homes Board
 DTAM – Department of Traditional and Alternate Medicine
 GHSP – Government Hospitals
 PC – Poly Clinics
 HC – Health Centres
 MBP – Mission Based Providers
 PMDP – Private Medical and Dental Practitioners
 TMP – Traditional Medical Providers
 AM – Alternative Medicine
 FH – Faith Healers

Figure 1.1: Structure of the health sector in Ghana

1.4.1 Provision of Radiography services in Ghana

Ghana is located in the West African sub region with a population estimated to be 30.10 million (World population review 2019) (increased from the official 2010 census figure of 24.2 million). Administratively, Ghana used to be divided into 10 regions,

which were also subdivided into 216 distinct metropolitan, municipal and district assemblies. All the then ten regions of Ghana have a regional hospital based in the regional capital. Currently, Ghana has a total of 16 regions with five of the regions having teaching hospitals with polyclinics attached, these are; Greater Accra, Ashanti, Volta, Northern and Central regions. The historical overview of the provision of radiography services in Ghana provides useful context to the current rural practices.

The introduction of radiological services in Ghana started around when Korle Bu teaching hospital was built in 1927 (Arthur 2016). There was a nationwide outbreak of tuberculosis, particularly in the mining areas two years after the establishment of the hospital. Consequently, the colonial government demanded the establishment of an X-ray Unit at Korle Bu Teaching Hospital for screening the citizens for early treatment. This was under the management of British radiographers or radiologists who later co-opted some nurses to train as their assistants.

A formal training School under the Ministry of Health was later established in the 60s at Korle-Bu Teaching Hospital, while a few people were sent to the United Kingdom to be trained as Radiographers (Arthur 2016). Graduates were awarded a Proficiency Certificate by the Ministry of Health and were then known as radiological technicians until a degree programme was introduced in the University of Ghana in the year 2000 (Antwi 2005).

Throughout developments there has been an absence of appropriate policies in healthcare delivery with regards to radiography practice in Ghana (Antwi 2017). Diagnostic imaging services provided by hospitals have been basic examinations with most of these X-ray departments being headed by a radiological technician who are mostly radiography training certificate holders (Antwi 2017). The teaching hospitals which are administered by Ministry of Health (MOH) are headed by a radiologist and a radiographer as a technical head. The imaging facilities available there are conventional radiography including fluoroscopy, CT, Ultrasound, C-arm fluoroscopy for theatre and MRI.

About 60% of districts within the regions have hospitals which are administered by Ghana Health service (GHS) with X-rays facilities and are mostly headed by a senior radiological technician with imaging system being general radiography (Antwi 2005). Most of the regional hospitals have general radiography facilities and fluoroscopy and

the department is usually headed by a radiographer mostly with no radiologists (Arthur 2016).

The situation in Sub-Sahara Africa, in particular Ghana, till date is very poor with respect to the number of radiologists available in the country compared to developed countries (Wuni et al. 2021; MOH 2010). It has been suggested that as of 2010, there were 256 imaging professionals (which may comprise radiographers, sonographers as well as radiologists) in the country (MOH 2010). In terms of their geographic distribution, 154 were employed in urban centers, and the rest in rural areas. Overall, 207 of the 256 imaging professionals in 2010 were employed in public health facilities, with 49 working in private institutions.

A recent study by Ashong et al. (2016) on radiographers in Ghana approximated the Ghanaian population to be about 26 million and radiographers registered to be 200. According to the study, the current ratio of radiographers and the population stood at 1:130,000 people (Ashong et al. 2016). However, currently, there are about 300 registered radiographers practicing in Ghana (Wuni et al. 2021). Comparing the Ghana statistics to the UK (population 64.6 million (Office for National Statistics 2015), a study on the UK workforce estimated there were 26,000 diagnostic radiographers and 3,100 therapy radiographers registered with the Health and Care Professions Council (HCPC) in 2014 (Dumbleton 2014) . As Ghana is increasing in terms of its population size, there will be increasing imaging workload pressure on Radiographers. Consequently, the number of radiologists and radiographers would need to be increased through training of more personnel to meet health care demands and reduce pressure on the imaging professionals.

According to Antwi (2017), MOH data gave an overview of the imaging professionals in Ghana which seemed to be inconsistent with the current number of registered members from the regulatory body [the Allied Health Professional Council (AHPC)]. According to the AHPC (2015), there are only 156 imaging professionals in Ghana. The reason for the disparity in figures according to Antwi (2017) could be that some of the radiographers were yet to register or submit their registration to the AHPC. Until recently it was not mandatory to register with AHPC, which started as a task force and only had its mandate to fully function as a regulatory body in 2013. Moreover, the

AHPC data provides no information about the geographic distribution of the radiographers unlike the MOH.

As Ghana has few radiologists, many images produced by radiographers leave the imaging department without a radiologist's report. This is especially the case in rural settings due to widespread absence of radiologist provision compared to urban which has some radiologist on site (Antwi 2017). Besides, the National Health Insurance scheme (NHIS), on which the healthcare delivery revolves, does not cover access to medical reports. Notwithstanding, persons living in Ghana are expected to be registered on the NHIS to cover them to access other treatment interventions (Blanchet et al. 2012). This has been the practice in Ghana for individual seeking a medical/radiological report for further management.

1.5 Originality of Work

This study is important because as a new area of inquiry in Ghana radiographic practice which explores the experiences, practices and challenges radiographers encounter during service delivery and in rural areas, to draw out policy and practice implications. .

The study will also aim to establish the scope of practice and the effectiveness of rural Ghanaian radiographers' aptitude towards their practice. The study further aims to establish why rural radiographers remain in their roles and the impact of the working environment on their practices. This aims to be achieved by examining the experiences and local standards of operating procedures to benchmark acceptable guidelines. Finally, the study anticipates to establish factors that need to be considered to develop a nationally recognised framework for rural radiographic practice in Ghana.

1.6 Study Aim

To explore experiences and practices of Ghanaian rural radiographers and to determine how the findings could impact on delivery of quality service to patients within rural areas.

1.7 Objectives

To achieve the aim of the study, the objectives will be to:

1. identify challenges/barriers to Ghanaian rural radiography practice in the rural setting;
2. map out contextual factors - i.e. radiographers, radiologists, equipment, IT connectivity, populations served (social, cultural, economic, geographical) - to rural radiography practice in Ghana;
3. establish the reasons why Ghanaian rural radiographers remain in their role;
4. explore Ghanaian rural radiographer's understanding of the actual extent of their current roles in relation to their formal scope of practice;.
5. explore specific professional occupational health and safety issues amongst Ghanaian rural radiographers;
6. integrate the research findings into recommendations when need be, to inform a nationally recognised policy for effective management of rural radiography in Ghana.

1.8 Outcome

The study focuses on comprehensively mapping out contextual factors to rural radiography practice in Ghana. It also anticipate to explore and establish Ghanaian rural radiographers experiences and practices. The study outcome will guide practice and curriculum development towards the possible implementation of impactful rural radiography practice.

CHAPTER 2

Literature Review

2.0 Introduction

This chapter presents a critical review of the literature relating to what was already known about rural radiography practice. The chapter principally outlines the literature available in the area of rural radiography practice globally, but with a focus on Ghana and developing African countries. The chapter identifies the gap in the evidence to justify the current study. Though there was little literature to identify issues directly related to rural radiography practice in Ghana, the review added depth to the researcher's existing professional knowledge on issues of experiences and practice of rural radiography generally.

The literature review was arranged into themes that supported the purpose of the current study. The themes for the literature review were identified based on relevance to the study objectives, which in turn were grounded in a wide reading of the literature that helped refine the study research question. The objectives were also informed by issues that the researcher was previously anecdotally aware of (i.e. from the researcher's own radiography practice, from meeting rural radiographers in Ghana at GSR events and during the information gathering visit undertaken by the researcher as well as from the researcher teaching radiographers in Ghana), for example patient safety issues in rural practice. Relevant issues identified in the literature and evidence relevant to a prior issue(s) were grouped together into categories which were then collapsed into overarching themes that together informed the research question. Consequent themes identified were Radiography workforce in Ghana and Beyond, Rural Healthcare Service Quality Frameworks, Occupational Health and Safety Issues, Rural Radiography Practice in developed and developing countries, Role of Culture in Accessing Healthcare Services in Ghana, Scope of Practice of Radiographers, Determinants of Motivation, Attraction and Retention to Rural Practice, Impact and Challenges in Rural Radiography Practice and Intervention for rural radiographic practice challenges.

2.1 Literature Search Strategy

A systematic search was conducted in order to critically appraise available literature on RRP. The aim of the systematic search undertaken was to explore all the relevant evidence on RRP worldwide and to identify evidence from the African and Ghanaian context. The review identified work that has been done on RRP to date which helped shape the current study.

2.2 Methodology of search

The Joanna Briggs Institute's critical appraisal frameworks were utilised for the systematic literature search because they contain a wide range of options to suit the methodology of the studies. Thus, systematic literature search that was conducted involved the following phases: identifying, assessing and selecting relevant literature. In the first phase, two key concepts namely “rural practice” and “radiography” were created and relevant synonyms and search terms to ensure comprehensive coverage of all the possible terms that are important to the aim of the study (see *Table 2.1 below*).

Table 2.1: Search Terms used for the two key study concepts

Concept 1	Concept 2
Radiography	Rural Practice
Radiography	Rural Practice
Radiographer	Rural
Radiologic technologist	Remote
Radiologic technician	Sub-urban
X-ray technician	Country side
Medical radiation technologist	Rural health
Radiologist assistant	
X-ray operator	

Manual searches were done widely across different platforms to retrieve papers relevant to the study and also via electronic data bases. The manual search examined lists of references from articles retrieved, policy papers and reports from Ghana government, and relevant documents from credible organisations such as the World Health Organisation. The electronic databases searched were Cumulative Index to Nursing and Allied Health Literature (CINAHL), SCOPUS, Medline via Ovid, Embase, Web of science, and Google scholar. These databases were selected based on the relevance of the scope of their catalogue to the current search areas. The search was not limited by date to enable the researcher to retrieve historical material about RRP as possible since this provided the literature needed to write the historical perspective section, as much of the current rural practice in Ghana is based on historical legacies. No geographic limitation was applied but the search was limited to papers written in English to avoid language barrier. The terms in each concept were combined using the Boolean 'OR' operator and then concepts 1 and 2 were combined using the 'AND' operator. The same terms were used across all databases.

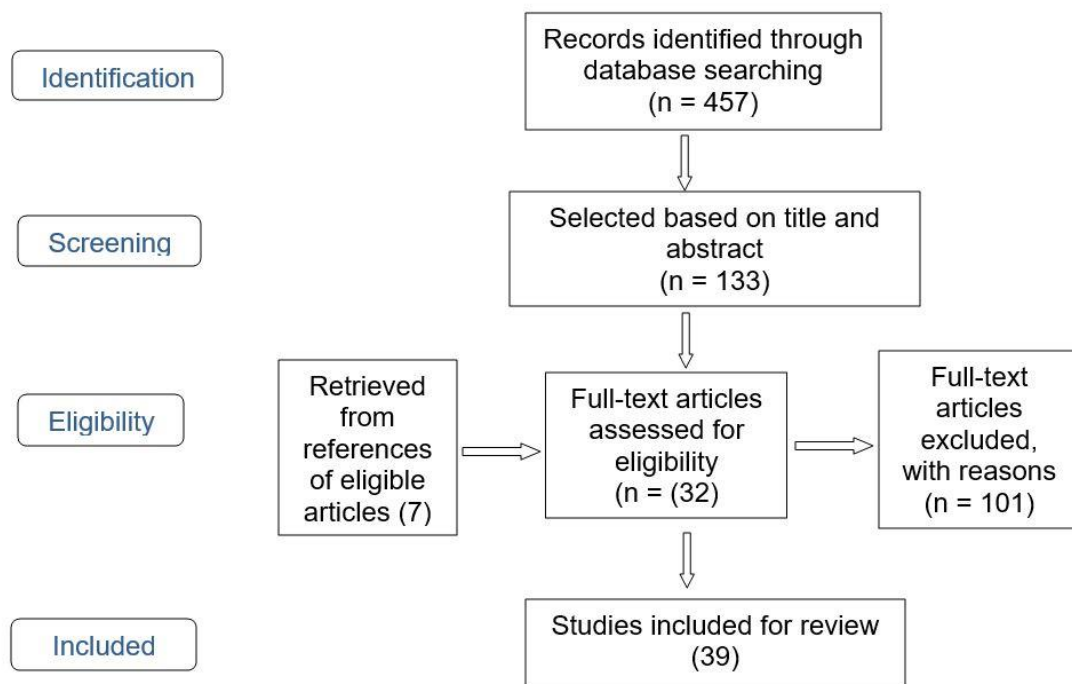
2.3 Assessment and selection of literature

Titles and abstracts of retrieved articles were read so that a decision of relevance to the study based on the objectives could be made. The criteria used to determine eligibility include: literature about scope of rural practice in radiography and factors that influence professionals' acceptance to work in rural areas, rural radiographer's role expansion practice, its impact on patient care, challenges with rural radiography practice and occupational health and safety in rural practice. It is noteworthy to reiterate that the aforementioned topics were selected to satisfy the objectives of the study.

The full text of all retained articles was retrieved. De-duplication of articles was done for articles that were found in more than one database. A total of 39 papers were finally retrieved; 32 of them were empirical, 7 narrative or policy papers (see *Figure 2.1 below*). Selected articles were critically appraised using the Critical Appraisal Skills Programme (CASP) tool (see *Appendix O for tabulated findings for articles appraised using CASP*), which has been designed to assist researchers in assessing the dependability, significance, and usefulness of clinical evidence (Long et al. 2020).

Furthermore, the Cochrane Qualitative and Implementation Methods Group has endorsed the CASP tool as the most often utilised instrument for quality appraisal in health-related qualitative evidence syntheses (Purssell 2020).

Figure 2.1: Prisma Flowchart of literature search



2.4 Radiography workforce size and distribution in Ghana and Beyond

Globally, the demand for radiographers is high, particularly with demand for more reporting radiographers due to an upsurge of shortage of radiologist according to a survey by the Royal College of Radiologists (The Society of Radiographers [SoR] 2021). In Australia, there has been a projected demand for the radiography workforce anticipated to double by the year 2030 (i.e. at least 4,200 radiographers) based on the estimated 2,098 radiographers in the year 2009 (Victorian Medical Radiation Workforce Supply and Demand Projections report 2010-2030). The reported shortage of radiographers was as a result of an ever-increasing number of facilities and population increases (Victorian Medical Radiation Workforce Supply and Demand Projections report 2010).

Similarly, the Ghana Society of Radiographers (GSR 2018) and Wuni et al. (2019) have reported an acute shortage of radiographers in Ghana. According to their figures, there were just 300 registered radiographers in Ghana, with about 75% of the total radiography workforce working in urban areas. The GSR also reported that the radiographer to population ratio in Ghana (2018) stood at a worryingly low 1: over 100,000 people. Correspondingly, Ghana Health Workforce Observatory (2011) indicated unwillingness of the health workforce, including radiographers, to accept rural posting, contributing to the Human Resource For Health Country Profile (2011) citing an imbalance in urban/rural distribution of health workforce in Ghana. (see *Table 2.2 below*).

Table 2.2: Urban/Rural Distribution Of Health Workforce In Ghana. Source: Ghwo: Human Resource For Health Country Profile, (2011)

Occupational Category/Cadre	Total	Urban	Rural	HW/1000 Pop. in Urban	HW/1000 Pop. in Rural
		%	%		
Generalist Medical Practitioners	1,945	70	30	0.13	0.04
Specialist Medical Practitioners	695	100	-	0.07	-
Medical Assistants (*)	712	30	70	0.02	0.04
Nursing Professionals	8,938	70	30	0.60	0.20
Nursing Associate Professional	8,197	30	70	0.23	0.43
Midwifery Professionals	4,929	40	60	0.19	0.22
Dentist	55	95	5	0.00	0.00
Dental Assistants and Therapists	102	95	5	0.01	0.00
Pharmacists	532	70	30	0.04	0.01
Pharmaceutical Technicians and Assistants	1,253	60	40	0.07	0.04
Environmental and Occupational Health & Hygiene Workers	600	20	80	0.01	0.04
Physiotherapist and Physiotherapy Assistant	100	100	-	0.01	-
Optometrists and Opticians	41	80	20	0.00	0.00
Medical Imaging and therapeutic equipment operators	256	60	40	0.01	0.01
Medical and Pathology Laboratory Technicians	923	70	30	0.06	0.02
Medical and dental prosthetic technicians	13	85	15	0.00	0.00
Health Management Workers/Skilled Administrative Staff	467	95	5	0.04	0.00
Other Health Support Staff	24,26	40	60	0.93	1.08
Trainees	25,279	80	20	1.93	0.38
TOTAL	78,757	67.89	32.11	4.34	2.47

Approximately 76% of Nigeria's radiographers are reported to live and work in the major cities (Okeji et al. 2014). According to Kawooya (2012), in Kampala (the capital city of Uganda), about 25% out of 188 radiographers and 5% out of 50 sonographers

practice in the rural area. Additionally, a cross sectional survey conducted by Okeji et al. (2014), using a sample size of 124 final year radiography students in Nigeria reported that only 27% of the respondents showed a strong willingness to work in the 'hinterlands'. Okeji et al. (2014) employed a researcher-developed questionnaire as the data collecting instrument, which might have called into question the questionnaire's validity and reliability if it had not been tested. But, the authors justified why they used that tool which was as expected validated by three experts enriching the questionnaire's reliability. The paper was deemed credible, reliable and relevant as the authors exhibited elements considered as a good research practice; which were justifying their sampling, sought ethical approval, presented their results using graphs, for clarity and also provided test for statistical significance between associations (i.e. association between willingness and age, gender etc). Nevertheless, the paper revealed some limitations as the final year radiography students were indicated not to truly represent the real life situation and as such may not be used to generalise for working radiographers. However, a small descriptive-exploratory study in Uganda by Mubuke et al. (2009) with a sample size of 31 student radiographers reported that 58% were willing to consider a career in rural radiography, but indicated the need for better conditions of service. The study was found trustworthy, reliable, and relevant because the authors demonstrated adequate evidence of components of good research practice such as justification of sampling, ethical concerns, and anonymity and confidentiality of participants' viewpoints. Mubuke et al. (2009) explicitly justified their research design by stating that they employed focus groups in addition to the questionnaire to acquire data triangulation in order to eliminate intrinsic biases that would occur from merely utilising the questionnaire.

This preference for urban working is not just an African problem; a cross-sectional descriptive study conducted by Borracci et al. (2015) which assessed factors affecting the willingness of 400 Argentine medical students to practice in the rural areas revealed that only 21% of the respondents expressed strong willingness to work in rural areas, whilst 57% and 21% showed weak willingness and unwillingness to work in the rural areas respectively. The Diagnostic Radiography UK Workforce report (2014) indicated that there was approximately 29,232 radiographers registered with the Health and Care Professionals Council (HCPC) at 2014. Yet, an imbalance in the distribution of radiographers particularly to the rural areas has been reported in some

advanced countries such as UK and Australia (Diagnostic Radiography UK Workforce Report 2016) as well as some countries in sub-Saharan Africa such as Nigeria and Uganda (Okeji et al. 2014; Kawooya 2012). However, the radiography workforce distribution in sub-Saharan Africa, particularly Ghana, is more severe compared to developed countries where radiologists, amongst other imaging staff are more plentiful (Wuni et al. 2019; Ofori 2011; Scarisbrick 2003). Ofori (2011) claimed that though radiography practice in Ghana has been around for a couple of decades, there are severe shortages of Radiography workforce needed to deliver efficient and effective radiographic services to meet national requirements.

2.4.1 General information about Rural Radiography Practice

Rural radiography practice has been defined as the provision of general diagnostic imaging services in the diagnosis and clinical management of patients in rural hospitals or healthcare facilities very isolated/remote from urban areas by radiographers (Mung'omba and Botha 2019; Myklebust et al. 2019; Mung'omba and Botha 2017; Squibb et al. 2016; Squibb 2013; Kawooya 2012). A study on Rural Definitions for Health Policy and Research conducted in America by Hart et al. (2005) indicated that rural areas are all areas that are simply outside urban areas which mostly have elderly and child dominated population mixed with higher poverty rates, higher unemployment as well as lower population densities. The study further established that rural areas are mostly engulfed with higher rates of chronic diseases, lower healthcare providers/facilities with limited scope of services and are predominantly economically unstable (Hart et al. 2005). Similarly, a study in Malawi on how to define 'rurality' in the teaching on medical demography was conducted by Muula (2007). The study reported that rural communities lacked access to adequate healthcare, has high mortality and morbidity rates and has an acute shortage of trained healthcare workforce (Muula 2007). The aforementioned situation is similar in Ghana where literature suggest that access to healthcare services within rural and deprived areas are inadequate and thus negatively impact the rural populace, particularly the poor and vulnerable (Adam et al. 2022; Sulemana and Dinye 2014; Ministry of Health Ghana [MOH] (2007).

There is evidence to suggest that medical imaging utilisation in some rural populations particularly in Ghana and South Africa is 85% of that of non-rural populations, which may be a marker of poor access to medical imaging in rural areas (Mung'omba and Botha 2017; Sulemana and Dinye 2014). Access to appropriate imaging services has direct implications for patient outcomes and for associated costs to the community in rural practice (Yaya et al. 2017). For instance, the use of ultrasound (US) in the trauma management pathway may guide decisions relating to patient management with respect to transfer of patients with blunt trauma from a rural area to an urban setting for further management (Barounis and Hart 2018; Sandström 2003). Additionally, computed tomography is associated with better patient outcomes for extradural haemorrhage (Hardy and Snaith 2006) which could be very valuable in determining better patients outcome within rural areas. However, anecdotally, this is quite complex as rapid imaging of the head may be beneficial, but only if neurosurgery is accessible. This has been a major issue even in the UK, even in metropolitan areas with no on-site neurosurgery. Nonetheless, such radiographic imaging modalities are lacking in most rural settings particularly in most African countries such as Ghana (Antwi 2018). Studies have projected shortfall of radiologists in many countries including developed countries such as Australia (Williams et al. 2020; Squibb 2013; Smith et al. 2009). This suggest inadequate quality of essential radiological services expected to be delivered by these radiologists in rural communities (Squibb 2013). In spite of the recognised clinical importance of radiology, and there being an awareness of issues surrounding the rural radiology workforce and access to services and equipment, there is a paucity of information assessing the adequacy of rural radiology services even in some developed countries such as Australia (Wakerman et al. 2006; Humphreys et al. 2002; Hays et al. 1994).

2.4.2. Rural radiography practice in some developed countries

Studies have suggested similar concerns (i.e. shortage of workforce, poor working conditions, poor incentives and no clear pathway for personal/professional development) with respect to the practice of rural radiography in many parts of the world (Akpan 1984; Hanson1988; Humphreys et al. 2002; Lin et al. 2009; Smith et al. 2009; Henderson et al. 2016; Williams et al 2020). In rural Australia, there is a widening gap between service demands and the availability of a radiologist (National Health

Workforce Taskforce and KPMG Consulting 2009; Smith et al. 2009). Smith et al. (2009) conducted a purpose-designed 'test-object' study that involved 25 cases compiled by a radiologist that was used to assess image interpretation accuracy. The study aimed to evaluate the influence of a continuing education program on the image interpretation accuracy of rural radiographers.

Smith et al. (2009) clearly had ethical approval, but they had a number of methodological limitations as they failed to indicate how 16 rural radiographers were recruited which could potentially raise the issue of bias, thereby questioning the reliability of the study (Long et al. 2020). However, the findings suggest that, there is widespread shortages and geographic dispersion which implies that a radiologist is not always on site in most rural facilities (Smith et al. 2009). Therefore, they recommended that short-term, intensive continuing education programs can improve the competency of radiographers in accurately interpreting plain musculoskeletal (MSK) radiographic examinations, particularly in the absence of radiologists (Smith et al. 2009). Nonetheless, it has been contended that scientific advances such as artificial intelligence (AI) and/or teleradiology allow for a radiologist to provide reporting from a site geographically separate from the medical imaging department (McConnell et al. 2012). Yet, there are reports of issues of electricity and lack of stable and/or no internet within most rural settings in Sub-Saharan Africa which teleradiology needs to function effectively (Antwi 2018; Kawooya 2012).

Smith and Jones (2007) conducted a qualitative case study on remote X-ray operator radiography interprofessional rural clinical practice. The aim of the study was to explore rural radiographers, nurses and GPs experiences and perceptions about remote X-ray operator radiography in New South Wales (Smith and Jones 2007). Diagnostic radiography is usually performed by radiographers who are allied health professionals specifically educated and trained for this role. Similarly, Smith and Fisher (2011) conducted a survey to gather background information about the New South Wales (NSW) remote X-ray operators and investigate their self-perceived need for continuing education. According to their studies, in these rural areas, the responsibility for interpreting radiographic images often falls provisionally to the referring clinician and there was therefore a strong suggestion for a need for continuing education in radiography and radiology for NSW remote X-ray operators as that offers opportunity

to develop a best practice model for supporting and endorsing limited X-ray licence holders and to create a national benchmark (Smith and Fisher 2011; Smith and Jones 2007). Also, an earlier report suggests that in some rural and remote locations in Australia in the absence of a radiographer due to unavailability, some general practitioners (GPs) and nurses perform radiographic procedures (Humphreys et al. 2002). These GPs and nurses who are referred to as remote X-ray operators or remote operators are given a role and licensed to perform limited range of examinations (Lin et al. 2009). O'Regan (1991) suggested that the non-radiographer practice was indicated to generate some inter-professional tension and conflict. A study conducted over 3 decades ago about the developing profession of radiography and the International Society of Radiographers And Radiologic Technologists (ISRRT) also indicated that non-radiographer radiography is also practiced in other countries, with tension also evident (Akpan 1984). According to the study there was an indication made by WHO that some 80 – 90% of rural radiography is performed by non-radiographers (Akpan 1984). The study, however, cautioned that the “end product” was often obtained through “radiation abuse and mishandling of patients”. Another study also conducted over 3 decades ago in the United States by Hanson (1988) reported in relation to “limited scope” X-ray licensing that, some radiographers consider it as degrading the radiography profession and places patients at greater risk. However, it was suggested that in the United States there was a need to train radiologist assistants in areas where there were shortages of professionals for patient assessment, management, fluoroscopy and other radiology procedures (Hanson 1988). However, these assistance were not allowed to interpret radiographs (The American Society of Radiologic Technologists [ASRT] 2002).

In Scotland, UK there was a vision about remote and rural healthcare delivery which brought about a policy which was endorsed by the Scottish Government in June 2008. This indicated that access to healthcare should be as local as possible, for the whole population of Scotland, no matter where they live (Henderson et al. 2016). There was a stipulation earlier about the radiography team within the Rural General Hospital which was anticipated to be flexible and consist largely of advanced generalist practitioners who combine plain film, CT and ultrasound imaging (Scottish Government 2007). There has also been a mention of the need for an opportunity to develop assistant practitioners where adequate supervision by radiographers can be

provided (Henderson et al. 2016). Studies have suggested that these policies and arrangements (to develop assistant practitioners) are suggestive of an indication for measures to improve quality radiography healthcare delivery in rural areas particularly in the developed world (Henderson et al. 2016; National Health Workforce Taskforce and KPMG Consulting 2009; Smith et al. 2009; Scottish Government 2007).

2.4.3. Rural radiography practice in some developing countries

A small body of evidence demonstrates related/common issues concerning rural radiography practice across most developing African countries (Mung'omba and Botha 2017; Kawooya 2012; Tashobya et al. 2010). Kawooya (2012) conducted a study with a purpose of reviewing and outlining the needs, challenges, and training interventions for rural radiology (RR) training in Sub-Saharan Africa (SSA). The study demonstrated that development in training for rural radiography is directed by a country's health policy, which ultimately establishes and addresses the disparity between services and population (Kawooya 2012). Regarding equipment usage within rural practice a report by MOH, Uganda (2005) indicated that, Uganda has a National Health Equipment Policy (a policy that Ghana lacks) which spells out the type and specification of equipment at each health level. As per the policy, Kawooya (2012) revealed that there should be an ultrasound machine at the primary healthcare level serving about hundred thousand patients, and one X-ray machine at the level of a general hospital, serving about 200,000 – 300,000 patients. Tashobya et al. (2010) conducted a study about health systems performance assessment in low-income countries learning from international experiences. The purpose of the study was to develop a set of characteristics for a quality health system performance assessment (HSPA) framework from literature and experiences in different contexts in order to adopt those identified characteristics/qualities to form a structured approach in low-income countries (LICs). Accordingly, the study revealed that the routine practice is to couple equipment supply and rural health units with a training component (Tashobya et al. 2010). It was also suggested that with that arrangement, over 300 non-physician health workers from rural areas were trained in ultrasound and about 25 in plain X-ray film reporting at a private health training institution (*ibid*).

In Tanzania, major developments in training for rural radiography have partly been through foreign private initiatives (Kawooya 2012). Assistant medical officer radiologists were trained in ultrasound for rural Tanzania, other countries such as Kenya, Rwanda, Sudan and Zambia also had rural radiography training done through government projects (Kawooya 2012). However, it was noted that these trainings could not be sustained as it ends or significantly ebbs at closure of the project (*ibid*). Notwithstanding, literature suggest that rural radiography practice within these developing countries are generally similar with shortage of radiologists and non-radiographer professionals performing radiography duties within rural areas due to non-availability of radiographers (Tashobya et al. 2010; Kawooya 2012). Similarly, studies have noted that rural radiography in South Africa (SA) also mentioned reliance of non-radiographers in delivery of radiographic procedures due to unavailability of radiographers (Mung'omba and Botha 2017; Kawooya 2012). According to Mung'omba and Botha (2017) issues of acute shortage of radiologists was also evident in rural SA. Nonetheless, it was noted that there was lack of literature with respect to rural radiography practice in rural SA generally, however, previous studies, had focused more attention primarily on other rural health professionals such as doctors and nurses leaving a research need in the field of rural radiography practice (Mung'omba and Botha 2017). Consequently, their study focused on the additional competencies that may be required for rural radiographers in order to propose a continuous professional development strategy aimed at rural radiographers. As previous studies had suggested rural radiographers engagement is additional responsibilities (role expansion) as indicated by Mung'omba and Botha (2017). Anecdotally, the aforementioned issues are similar about RRP within the Ghanaian context, which also calls for a research need in the field of RRP in Ghana. Furthermore, Mung'omba and Botha (2017) in their study revealed that there were a number of additional core competencies which are required by rural radiographers which include, but not limited to, teamwork, ability to do basic obstetric ultrasound scans, leadership, management and reporting on plain radiographs.

2.5 Role of Culture in Accessing Healthcare Services in Ghana

Ghana has a culture with rich values and legacy (Danso et al. 2019; Dennis 2018; Gyekye 2003). It has been noted that since 1957 when Ghana gained her

independence, there have been stability in the country and significant development in her natural, human and cultural resources (Gyekye 2003). Ghana has over 75 ethnic/linguistic groups with common values/beliefs and perceptions representing the shared national heritage of Ghanaians (Gyekye 2003). It has been indicated that every ethnic group in Ghana is identified by its distinct cultural characteristics, beliefs and traditions which offers the people with the needed reverence (*ibid*). There are varieties in culture in various forms such as religious association, traditional beliefs, gender inequality, languages/dialects, tribal groups, socio-economic condition and geographical location of the people (Campinha-Bacote 2002). Yet, the beliefs/values that influences an individual's behaviour is often born in that person's cultural folktales which are then transferred through family health and healing practices irrespective of the ethnic origin (Campinha-Bacote 2002).

Studies have revealed that cultural beliefs/values and heritage norms influence a person's decision to access or use a particular healthcare service in Ghana (Akuoko 2015; Gyekye 2003). For example, certain cultures only permit a healthcare professional to speak to a female patient through her husband (Akuoko 2015).

A report produced by Akuoko (2015) sought to evaluate/bring to light some Ghanaian cultural practices and beliefs that affect healthcare. It was indicated that though healthcare in Ghana have offered considerable contribution to the socio-economic growth of the country, culture has an influence on healthcare usage (Akuoko 2015). However, Akuoko (2015) further noted that healthcare should be a topmost priority in every nation as it is considered as an essential element in promoting the general physical, mental health and well-being of the people. Furthermore, it was noted that in the northern part of Ghana, for instance, there are cases were female patients due to cultural belief systems, would only want to be attended to by female healthcare professionals. These female patients are reported to completely refuse to be attended to by any male healthcare professional. However, the study recommended the need for Ghanaians to adopt a new cultural competence model (CCM) in healthcare delivery in light of the era of globalisation and modern-day scientific challenges (*ibid*). The CCM consist of four major components: awareness, attitude, knowledge, and skills, adopted to advance a set of core cultural competencies that aim to support and safeguard the growth and delivery of suitable healthcare and population healthcare services for varied population, particularly for those presently medically underserved (Acosta

2010). Similarly, Campinha-Bacote (2002) indicated that most places globally, have adopted a model of cultural competence in healthcare delivery, which challenges the healthcare workforce to constantly try to accomplish the competence to efficiently work within the cultural context of every client (patient/community).

2.5.1 Demands/impact of culture on radiography practice in rural Ghana

Literature indicates that patients from multiple ethnic, language and cultural backgrounds benefit from radiographic services provided by radiographers across Ghana on a daily basis (GSR 2018; Gawugah 2016). A systematic review of the literature was undertaken by Williamson and Harrison (2010), to establish the definition(s) of the concept of culture and what recommendations have been made regarding the provision of culturally appropriate care, to individuals from indigenous and/or ethnic minority backgrounds. According to the review evidence, culture plays an important role on healthcare in most settlements, but particularly in remote and rural areas where some **individuals** hide their cultural practices and beliefs for unestablished reasons, while others clearly and easily have distinguishable and cultural characteristics/beliefs. Consequently, healthcare professionals, including radiographers, are advised to aim to offer competently safe and culturally sensitive patient-centred care/services (Williamson and Harrison 2010). However this may be challenging in practice where the impact of culture on healthcare service delivery is deep and in the case of rural radiographers in Ghana, it can be very difficult for radiographers to easily recognise the cultural and ethnic beliefs and practices of each patient who visits the X-ray department (Gawugah 2016). Furthermore, a qualitative exploratory study was conducted by Williams et al. (2020) using non-participant observations and semi-structured interviews to explore the experiences of radiographers working alone in remote locations at two Far North Queensland (FNQ) hospitals in Australia. It was recommended that radiographers working in distant hospitals must be culturally competent in order to traverse local native/indigenous languages/dialects (Williams et al. 2020). As a result, these radiographers apart from possessing a thorough understanding of radiographic pathology as well as great interprofessional abilities, they ought to be culturally sensitive in communicating and/or conveying results particularly to referrers (ibid).

The previous literature suggests that diverse cultural values/beliefs and behaviours represent a great challenge to healthcare service providers in most developing countries such as Ghana (Antwi 2018; Gawugah 2016). Professionals will therefore need tailored training and/or education to be able to practice effectively. From the perspective of the patient needing to navigate the health system it has been reported that in order to safeguard access to quality healthcare, patients who have extremely strong cultural views/practices have been advised and supported by the healthcare system/service providers to soften their stance regarding their beliefs/values/traditions, which may be unsafe and disadvantageous to their health (Hunt 2010). Notwithstanding, Hunt et al. (2012) conducted a systematic review on organisational culture and performance in healthcare for older people. The study established that seeking and engaging patients' cultural values/beliefs and opinions ought to be an essential factor/focus of patient-centred healthcare service delivery.

2.6. Rural Healthcare Service Quality Frameworks

According to the Organisation for Economic Co-operation and Development (OECD 2020), the framework of quality service in healthcare remains a focus for development across the globe, as many institutions/organisations are keen and interested in measures to improve the quality of healthcare service delivery. Studies have indicated that quality service is key in ensuring that an institution/organisation gain competitive advantage over other companies (Auka et al. 2013; Zineldin 2006), as quality of service has been identified as a significant determining factor of competitiveness (Ghobadian et al. 1994). Thus, service quality delivery in an organisation such as an hospital is considered a vital model crucial to patient wellbeing and also guarantees the sustainability of that facility (Seawright and Young 1996). Nevertheless, healthcare service quality delivery has been indicated as a multi-dimensional framework which determines whether or not service delivery to patients are deemed most suitable/appropriate that would provide a better patient outcome (Fuentes 1999). Consequently, it has been suggested that it is important for institutions to execute quality programmes as a management method to guarantee that health service providers offer quality healthcare services to patients (OECD 2020).

Furthermore, OECD (2020) claimed that there are imbalances in service provision in most rural areas, yet, rural health is considered a vital element of a high-performing health system. There are higher prevalence of chronic diseases in rural areas, therefore most of the residents are noted to have relatively shorter life spans as they live less healthy lifestyles and are exposed to threats to health status and performance mostly due to increased abject poverty and unemployment (*ibid*). Also, it has been established that quality healthcare services delivery in rural areas are not only challenged by a larger majority of ageing inhabitants, but also by inadequate social determinants of health, barriers to system access and problems of attraction and retention of qualified healthcare professionals (OECD 2020). Rural healthcare facilities also are challenged with financial difficulty from low economies of scope and scale, therefore there is inadequate balance between access and efficiency (Mosadeghrad 2014). Consequently, implementing effective policy framework is key and ought not to only depend on recognising the health issues confronting rural populations but also how rural health fits new health systems organisation and measurement trends (Yarimoglu 2014).

A discussion paper about developing a framework to support the institutionalisation of quality assurance (QA) was conducted by Silimperi et al. (2002). The authors developed a framework which consists of eight essential elements and a 'roadmap' to support the process of institutionalisation of quality assurance (QA) within the healthcare industry. The framework according to the authors have been introduced in a number of countries in Latin America and Africa; with the conceptual model being used to support strategic planning and guiding Ministry of Health work activities, and also as a means of improving and maintaining QA (Silimperi et al. 2002). The study further established that globally, there have been numerous models used to ensure quality of healthcare service delivery to patients and that QA activities are deemed essential in guaranteeing in safeguarding patient safety (*ibid*). To ensure quality service delivery in a diagnostic radiologic facility, Ramlaul (2010) indicated that it is essential to sustain a thorough quality management framework through QA and quality control (QC) programmes in the department. In a grounded theory approach study conducted by Goodridge and Duggleby (2010), which sought to explore the opportunities and issues affecting the provision of high-quality palliative care from the perspective of nurses employed in two rural health regions, indicated that adopting the

use of a quality framework to assess rural palliative care was paramount and served as critical foundation for enhancing the quality of rural palliative care.

2.6.1 Occupational Health and Safety issues

According to the WHO (2020), Occupational Health and Safety (OHS) consists of systems/procedures, regulations/guidelines and practices that promotes and safeguards the safety, welfare, health and wellbeing of an individual engaged in work or employment. The Health and Safety Executive (2009) suggested that the general purpose of any health and safety program is to establish the best safe working environment and to lessen hazards, injuries and accidents at work. Studies have indicated that OHS also focuses on the protection of the health and wellbeing of clients, any facility user as well as the general public/anyone who may be affected by a specific working environment (WHO 2021; Golovkova et al. 2018; Ladou 2006). It has been advised that it is employers' responsibility/legal duty under the Workplace (Health, Safety and Welfare) Regulations 1992, to ensure, so far as is reasonably practicable, the health, safety and wellbeing of all workers during service delivery (Health and Safety Executive 2009). Thus, it is expected that institutions are able to identify occupational hazards, evaluate the risks from those hazards and carry out the needed management procedures in dealing with those risks as defined in law under the Management of Health and Safety at Work Regulations 1999 (Health and Safety Executive 2009).

According to International Labour Organisation (ILO) Set of Fact-Sheets: Geneva (2000), an estimated number of about 2.3 million people lose their lives yearly from occupational related accidents and diseases. It was also noted that around 317 million individuals encountered significant non-fatal injuries while 160 million fall ill from occupational related causes. According to the report, majority of the aforementioned individuals live in rural areas of developing countries (ILO 2000). However, Clarke (1990) argued that due to a lack of appropriate response and suitable preventive measures, there have been massive under-reporting of the occupational health and safety hazards confronted by most rural workers. Accordingly, Shengli and Possenti (2013) contended that due to the perennial lack of education and information

confronted by rural communities, they fail to respond appropriately to the health hazards and risks they encounter. Consequently, the need to establish a preventive culture of OHS in rural areas as indicated by Shengli and Possenti (2013) cannot be over emphasised. Thus, the need to establish an integrated approach to rural workers' health and safety has been noted as a vital element of rural development policy and initiatives at both local and national levels (*ibid*).

Notwithstanding, Clarke (1990) had long ago indicated that majority of rural folks in most workplaces are faced with poor and hazardous working conditions combined with a lack of social protection. However, it has been contended that there have since been consolidated approaches to promote rural workers' health and safety, which safeguard good and useful lives and thus improves rural development (Shengli and Possenti 2013). Furthermore, Shengli and Possenti (2013) argued that working in rural areas generally comes with unsafe working conditions as well as other adverse factors which include, but are not limited to, remote locations, precarious housing, poor general health and wellbeing, lack of access to portable drinking water, lack of social amenities as well as high incidence of diseases. According to Leipert and Anderson (2012), most rural workers have limited access to medical support or advice in the event of occupational or other health problems, but ironically, most healthcare professionals often work alone within rural areas, particularly Ghana with potentially dangerous equipment (Antwi 2018). This is certainly relevant to diagnostic radiographers who are accustomed to the use of a number of radiographic techniques and advanced equipment to produce high quality radiographs of an injury/disease (Carroll 2007), using ionising radiation, where exposure is dangerous if the dose is not minimised and regulated (RCR 2000).

Accordingly, Shengli and Possenti (2013) recommended the need to develop a knowledge base and capacity building regarding OHS, encourage consistent and applicable guidelines as well as suitable national OHS policies that could be incorporated into national rural development policy. Similarly, the Ministry of Health/Ghana Health Service in partnership with the World Health Organization (WHO) commissioned the development of policy and guidelines on OHS of health workers (MOH, GHS and WHO 2010). This was done by virtue of the considerable personal threats posed to Ghana's healthcare workforce in the process of rendering

their services to the populace (MOH, GHS and WHO 2010). A more developed example is from the UK NHS, which has an increasingly robust focus on evidence-based medicine which reinforces policy making that advances a culture of workforce assessment and education (www.england.nhs.uk, n.d.), which could potentially serve as a blueprint and thus, could be juxtaposed to the Ghanaian context. In the context of the UK radiography profession, radiographers ought to be cognisant with the current developments of practice management, which includes quality assurance (QA), clinical audit, risk assessment, continuous professional development (CPD) as safeguards which ultimately guarantee dose minimisation for patients and staff (Bushberg et al. 2002). Thus, studies have argued that radiographers have a role to play in compliance with ionising radiation regulations to help safeguard radiation usage in diagnostic imaging (Avadanei et al. 2011; Starkiewicz et al. 2006; Society and college of Radiographers (SCOR) 1998). Further to the radiation protection and dose minimisation measures, it has been argued that radiographers ought to insist that employers provide them with personal protective equipment (PPE) such as lead jackets/skirts/aprons, gonad shield as well as immobilisation devices (Avadanei et al. 2011). However, radiographers on the other hand also have a duty/responsibility to ensure the use of these PPEs provided by their employers during service delivery (Chadder et al. 2012; St John 2009; Church 2004). A study using mixed methods with a sequential explanatory design under two phases was conducted by Gawugah (2016) to develop a framework of quality in radiographic service delivery in Ghana. Gawugah (2016) identified a major limitation of the study being that the study was conducted in just one setting, which could not be said to be representative of the Ghanaian medico-socio-cultural system. However, the study was comprehensive and detailed, and it found that OHS within most medical imaging facilities in Ghana was poor which as a consequence had impacted on the quality of service delivery. Therefore, the study contributed to service delivery theory by developing a unique quality framework that potentially provide policy-makers and managers a practical understanding of factors that impact quality of radiographic service delivery (Gawugah 2016).

2.7 Scope of Practice of Radiographers and Some Role Extension Issues

The UK Society and College of Radiographers (2013) issued a policy statement regarding the scope of practice of radiographers. The purpose of the policy statement

was to validate the existing scope of practice for the professional workforce for diagnostic imaging and radiotherapy. It also aimed to revise an earlier statement published in 2009 and follows a survey of the scope of radiographic practice in 2012 (The Society and College of Radiographers [SCoR] 2012). The statement also included guidance on the scope of practice in medical ultrasound which was published in 2009 (SCoR 2009) and nuclear medicine practice in 2007 (SCoR 2007). The statement also provided a distinction and guidance regarding the registration and regulation by a statutory regulatory body of the radiography workforce. This policy has so far been good and effective model as it has been successful of the years. Comparatively, a lack of a formal scope of practice for radiographers has been indicated in most developing countries, including Ghana (Wuni 2019; Antwi 2018; GSR 2018; Gawugah 2016). Thus, since there is no official scope of practice for radiographers in Ghana, most Ghanaian radiography facilities generally depend on and/or adopts and juxtapose the scope of practice used in other jurisdiction such as the UK to the Ghanaian context (Antwi 2018).

Preceding the 2013 statement, a survey was conducted by the Society of Radiographers (SoR 2012) with the purpose of the need to revise/review the scope of practice 2008 report. The study was conducted by employing the use of online questionnaires to recruit radiographers (both diagnostic and therapy) of different seniority, included managerial grade across the UK. Majority (67%) of therapy radiographers responded while only 11% of their diagnostic counterparts responding. The results from the study demonstrated a continuous expansion of the scope of practice in both diagnostic and therapy radiography pathways (SoR 2012). Additionally, there was an increase in the execution of career progression structure by 29% in various centres with advanced practitioners and a 7% increase for those with consultant practitioners from 2008. Furthermore, since 2008, there have been 12% more therapeutic radiographers engaged in the quality assurance accreditation system (*ibid*).

Areas of expansion of scope of practice of diagnostic radiographers included advanced practices such as the provision of written reports particularly in ultrasonography, performing fluoroscopic examinations as well as interventional procedures, in selected radiographic departments. In comparison to the 2008 report, the 2012 study revealed a significant increase in the number of research

radiographers; an area that needed attention per the 2008 report, however, there was a 9% decrease (42% to 33%) in the number of radiographers with roles in clinical education and a decline in the number of departments that had radiographers carrying out intravenous injection or cannulation, and radiographer-led intravenous urograms (IVUs) (SoR 2012).

Over the last 25 years there has been constant advocacy, at least, for the UK radiography workforce to take advantage of opportunities for developing their roles within an increasingly dynamic healthcare environment (The College of Radiographers (CoR 1996). Recently, similar suggestions about role extension opportunities have been recommended for radiographers particularly rural radiographers in Ghana (Wuni 2019). This has been as a result of technological advances following changes with radiography practice which was instigated as a consequence of shortages of radiography workforce within the healthcare system (Irving 1996). Radiographers have thence developed and taken up additional roles; these added tasks according to Irving (1996) is known as skill-mixing or role extension. Skill-mixing implies “the utilisation of radiographer’s skill and expertise to complement or increase the expertise available to patients in order to improve the provision of health care to patients” (CoR 2005). Additionally, Hardy (2006) defined role extension as “post-qualification acquisition of skills, responsibilities and resultant associated additional professional accountability”. This suggests a fundamental change to the current professional practice of radiographers. A UK radiologist; Swinburne (1971) suggested that radiographers had the potential to comment on images. However, other radiologists were pessimistic and contended that notion which resulted in debate for several years. But, it was revealed that a perilous shortage of radiologists led to several initiatives to determine image interpretation skills of radiographers (McLauchlin et al. 1997). Saxton (1992) had suggested that the significance of radiographer reporting could only come about through careful design, control of education programs, and close collaboration between radiologists and radiographers. Therefore, non-medical personnel are not projected to offer a medical interpretation without suitable training. There was an initial initiative of implementation of a radiographic abnormality flagging system, called the red dot system (where a radiographer would physically place a red dot on a radiograph to show that a likely abnormality may be present), but that also came with its own limitations (McConnell and Webster 2000).

Williams (2006) conducted a study aimed to draw attention to the key aspects regarding professional role extension by referring to the experiences offered by other countries. The study noted that globally, radiographers have taken and are continuing to take up responsibilities which were previously not within their domain, but mostly which was within the scope of practice for radiologists (Williams 2006). There is evidence to suggest that in the absence of timely radiologists' reports at remote/rural locations, culturally competent radiographers are able to pursue reporting roles to help with patient management (Williams et al. 2020). Earlier studies have suggested that the development of role extension in the UK became research focused with a notable interest on radiographers' reporting abilities in musculoskeletal trauma (Piper et al. 2005; Robinson et al. 1999). Accordingly, Brealey et al. (2005) in their study found that radiographers compared well with the reference standard, reporting plain films with 92.6% and 97.7% sensitivity and specificity respectively. Following that, reporting duties extended to other modalities such as: ultrasound, mammography, nuclear medicine, chest radiography, and limited computed tomography (CT) and magnetic resonance imaging (MRI) studies.

Radiography role extension worldwide suggest to point at a similar direction were the radiographer can become registered image interpretation practitioner and/or radiologist assistant if he/she practices within his/her scope of practice after gaining competence in accredited training and education (Hardy 2006; ASRT 2002). Nonetheless, scope of practice for radiographers differs from country to country. However, with respect to the statutory role of the regulatory body in any country generally is to protect the public and guide professions (Hardy 2006). Nevertheless, with regard to role extension, it is essential to have a full understanding of the definition and responsibilities, as an additional qualification falls within the scope of practice for which the practitioner is registered and/or may fall outside the scope of practice for which one is registered (Williams 2006).

It has been suggested that there should be a need for collaborative process with respect to training and education for radiography role extension (McConnell and Webster 2000). Accordingly, it was recommended that all stakeholders within the healthcare system should be actively involved in the course design, academic support, clinical mentoring and the assessment of advanced programs (Piper et al. 2005). Williams (2006) suggested that higher education institutions should ensure that

advanced skills programs are supported by appropriate theory: There must be a clear connection between academic learning and clinical assessment of competence. Consequently, a formal structure should be identified for education and training with approved clinical protocols defining professional scope. However, consistent reviews after completion of such an advanced skills program should ensure that quality assurance of clinical competence would be maintained (CoR 1996).

Role extension in developing countries are far more different to that of the developed world with peculiar issues/challenges such as personnel shortages (Williams 2006). Similarly, South Africa (SA) is also experiencing acute personnel shortages within the healthcare sector. Particularly, radiologist shortage was mentioned during a conference held in Cape Town with an highlight of the negative effect that the shortage of radiologists had on the healthcare system (Williams 2006). Furthermore, similar acute shortage problem was experienced by Kenya a country with a population of 32 million who had only 80 radiologists (*ibid*). Accordingly, it is possible that Kenya, SA and for that matter Ghana all representing Africa could be experiencing similar if not worse problems than the UK and/or other developed countries, where role extension was found to be need driven (Hardy 2006). Thus, it is essential within the African context particularly Ghana to reflect on needs, to be responsive to the challenges facing the healthcare system, and to strive towards improving service delivery to all patients (Antwi 2018).

2.7.1. Duties, Roles and Responsibilities of Rural Radiographers

Globally, in rural areas, radiographers are often concurrently triaging patients in addition to their duty to produce radiographs (Mung'omba and Botha 2012). Triageing includes evaluating a patient's clinical status based upon the identified radiographic abnormality (Hardy and Snaith 2006). Radiographers are indicated to face ethico-legal dilemmas regarding when and to whom they should communicate image information when they identify abnormalities that require medical attention (Squibb 2013). The uncertainty with professional responsibility for interpretation, communication and general practice of radiographers according to Mung'omba and Botha (2012) is suggestive that their practices are not well defined in the rural setting. These problems are exacerbated in rural practice where radiographers are stipulated to be mostly working alone due to geographic location and lack of radiologist, hence they are

unsupported in their decision making in interpretation and communication of their opinion about radiographs (Mung'omba and Botha 2017). Accordingly, the practice of rural radiography has been suggested to involve much more than a set of technical skills (Mung'omba and Botha 2019; Squibb 2013), though it does absolutely require this (Bourke et al. 2004), being more akin to a generalised specialism.

There is evidence to suggest that the introduction of radiography services in some rural communities has led to increased use of facility-based health services (Kawooya 2012; Kimberly et al. 2010; Bashour et al. 2005). Studies have also revealed that high quality diagnostic radiography/imaging provides enhanced diagnostic accuracy which then drives medical decision-making and management, yet there are reports on several challenges for radiology in resource-limited (remote/rural) settings (Mung'omba and Botha 2019; Kawooya et al. 2011; Stein et al. 2008). Many countries in Sub-Saharan Africa have few or no radiologists with the majority of these professionals located in main cities and metropolitan areas (Kawooya 2012). In rural and remote clinical practice, rural radiographers work closely with referring clinicians in image interpretation (Smith et al. 2009). However, studies have demonstrated that the responsibility for interpreting radiographic images often falls provisionally to the referring clinician (Kawooya et al. 2012; Yawn et al. 2010). It has been suggested that radiographers in Ghana with appropriate training could potentially take over the interpretation of some plain radiographs as part of role extension and expansion practices partly due to the increasing workload in X-ray departments and the shortage of radiologists, in order to reduce patient waiting time and also to improve standard of patient care (Wuni et al. 2019). An effective complementary role between radiographers and referring clinicians can reduce misdiagnosis and positively impact on patient care since teamwork has been shown to allay or even eradicate error (Piper et al. 2005). Therefore, radiographers' radiographic opinion especially in a rural setting could be a valuable benefit to referring clinicians by assisting them in attaining a speedy and precise diagnosis which eventually would help improve patient care (Wuni et al 2019; McConnell et al. 2012; Smith 2008; McBrien 2005).

2.7.2 Perception about Rural Posting/working in rural areas

A cross-sectional and a mixed-method exploratory studies from diverse geographical areas in Indian have revealed an upsurge in the negative perception held by healthcare professionals and students about working in rural areas, particularly those with urban backgrounds (Choudhary et al. 2018; Gupta et al. 2017). Evidence says that this perception directly affects their decision to accept any rural posting/job offers (Choudhary et al. 2018; Gupta et al. 2017; Dutt et al. 2014). Ossai et al. (2015) conducted a descriptive cross-sectional study on specialty career preferences among final year medical students. The study adopted the use of self-administered semi-structured questionnaire to a total of 457 students with a response rate of 86.7%. Findings suggest that students feel there are a host of socio-economic challenges within rural areas, such as inadequately equipped healthcare facilities, poor remunerations/financial incentives as well as a lack of social amenities.

A similar study (cross-sectional) conducted by Choudhary et al. (2018) reported perceptions held by medical students which could potentially hinder them from accepting rural health practice: lack of career progression, poor salaries, unavailability of primary facilities and poor working conditions. Shankar and Thapa (2012) assessed medical students' perception about working in rural Nepal after graduation. The study used a semi-structured questionnaire in recruiting 200 students with a response rate of 92.5% (i.e. 185/200). Responses revealed that the participants feared/academic isolation, security challenges, inadequate remuneration, poor facilities, poor equipment, isolation from family, illiteracy of the rural population, political concerns and associated hindrances prevented them from accepting rural posting (Shankar and Thapa 2012).

Furthermore, a study conducted in India by Gupta et al. (2017) to assess feasibility and acceptability of rural posting among medical students used a mixed-methods study design among 163 medical undergraduate students from the three major medical colleges of Delhi. Respondents commonly stated a severely inadequate infrastructural development in most rural communities plus further reasons, including security challenges, cultural differences, low social incentives, lack of professional opportunities and political reasons were a barrier to them accepting rural postings (Gupta et al. 2017). These findings agree with aforementioned findings of the studies conducted by Shankar and Thapa (2012), Ossai et al. (2015) and Choudhary et al.

(2018) which highlight perceived lack of opportunities for personal and professional development, unwanted cultural challenges, lack of professional guidance and/or lack of prior exposure/experience/knowledge of specific rural areas as well as a perceived high workload (Dutt et al. 2014; Shankar et al. 2014).

2.8 Determinants of Motivation, Attraction and Retention to Rural Practice

WHO (2010) have suggested measures in dealing with the negative perceptions of rural health working and hence the issue of inequitable rural-urban distribution of health workforce. According to the report, political commitment and policy interventions are the major factors that can be used to address the aforementioned challenges. Specifically, in order to enhance the quality and increase the number of the rural healthcare workforce, governments need to develop interventional policies and strategies with the purpose of resolving the local challenges which affect attraction and retention (WHO 2010). Thus a clear understanding of local problem(s) is required to develop such interventions or policy particularly in rural Ghana.

A review of relevant literature, drawing specifically on a range of systematic, narrative and scoping reviews conducted by Lehmann et al. (2019) had the aim of identifying system requirements for effective large-scale community health worker programmes that promote universal health coverage. The study findings demonstrated that purposive recruitment and training, incentives and compulsion were the main reported interventions. Interestingly, the interventional strategies suggested to ultimately address issues related to living conditions were less highlighted (Lehmann et al. 2019). Thus, the study, and the current literature search, found a dearth of literature/evidence on the interventional strategies that successfully deal with poor management and working conditions within rural areas (*ibid*).

There are published intervention strategies designed to attract and retain healthcare workforce to rural areas within sub-Saharan African countries (Lehmann et al. 2019; Lesotho retention strategy 2010; WHO 2010). These attraction and retention interventions have been thematically grouped into working conditions, financial incentives, living conditions, personal development and recruitment related (Lesotho retention strategy 2010). Additionally, Lehmann et al. (2019) classified the strategies for the attraction and retention of health workforce in the rural areas into recruitment

and training related, incentives and compulsory service, working conditions and living conditions. Alternatively, WHO (2010) categorised attraction and retention strategies into four major themes: education related, regulatory, financial incentives, professional and personal support (see *table 2.3 below*). Studies have suggested various factors that determines motivation, attraction and retention of healthcare workforce to rural practice which are grouped into; individual background, value and self-sacrifice, financial motivations, personal development, living conditions and working conditions (Ntangu 2014; Okeji et al. 2014; Agyei-Baffour et al. 2011; Lehmann et al. 2008).

Table 2.3: Interventions for attraction and retention of health workforce in rural and remote areas. Source: WHO (2010) p.17.

Category of intervention	Examples
A. Education	A1 Students from rural backgrounds
	A2 Health professional schools outside of major cities
	A3 Clinical rotations in rural areas during studies
	A4 Curricula that reflect rural health issues
	A5 Continuous professional development for rural health workers
B. Regulatory	B1 Enhanced scope of practice
	B2 Different types of health workers
	B3 Compulsory service
	B4 Subsidized education for return of service
C. Financial incentives	C1 Appropriate financial incentives
D. Professional and personal support	D1 Better living conditions
	D2 Safe and supportive working environment
	D3 Outreach support
	D4 Career development programmes
	D5 Professional networks
	D6 Public recognition measures

2.8.1 Individual Background Motivation For Rural Practice

A systematic review by Ntangu (2014) explored factors that affect attraction and retention of health workers in rural areas in Tanzania. The study indicated that an individual's personal origin story has a major influence on his/her preference of rural practice. Thus, an individual who grew up and was educated in a rural area will be more likely and more willing to accept rural posting than a person with urban background (Ntangu 2014). The aforementioned agrees with the findings of an earlier systematic review conducted by Wilson et al. (2009) on interventions to redress the inequitable distribution of healthcare professionals in rural and remote areas. They reported that rural origin determines/influences the decision to practice in a rural area. Contrarily, a study conducted by Agyei-Baffour et al. (2011) which evaluated the willingness of medical students in Ghana to accept rural practice considering the rate of intrinsic against extrinsic professional motivations, suggested that personal origin (rural origin) was not associated with willingness to work in rural areas. This finding

suggests that, while most Ghanaian medical students are motivated to study medicine by the desire to help others, that does not translate into willingness to accept rural postings (Agyei-Baffour et al 2011). Also, the Agyei-Baffour et al. (2011) study and a quantitative cross-sectional survey conducted by Okeji et al. (2014) revealed that females professionals were less likely to accept rural practice in comparison with their male counterparts. Studies in Niger and Nigeria have also indicated that security was a main concern, particularly in the rural and remote areas where women are at high risk of insecurity (Belaid et al. 2017; Ebuei and Cambell 2011).

Furthermore, a study done by Cheunkongkaew et al. (2016) on the attitude of medical students towards rural practice in five countries in Asia demonstrated that gender, background (origin/residence during high school and parents residence) were strongly associated with participants' attitude towards rural practice. Yet, the study further revealed that non-financial incentives such as job satisfaction, love for the patient, accommodation, and opportunities for CPDs were (less strongly) associated with willingness to work in a rural area (Cheunkongkaew et al. 2016). The majority of healthcare workers are motivated to serve the poor in various rural settings, as a result of their compassion and the fulfillment in knowing they have positively impacted lives (Ntangu 2014; Okeji et al. 2014). Value for human lives, particularly effectively supporting patients to recover, is a major factor reported as motivation for rural practice amongst nursing students after graduation (Lori et al. 2012). A comparison of qualitative findings from Burkina Faso, Ghana and Tanzania conducted by Prytherch (2013) indicated that major decision to accept rural postings by medical students was not related to remunerations, but for service to the poor i.e. self-sacrifice was involved. This was related to the findings of medical doctors accepting rural practice work being significantly inspired by the religious beliefs (Snow et al. 2011; Kruk et al. 2010b).

2.8.2 Financial Motivations

Okeji et al. (2014) conducted a cross-sectional survey to assess factors associated with radiographers' willingness to practice in rural and underserved areas in Nigeria. The study found that remuneration topped all other motivating factors with 71% strongly associated ($p < 0.05$) with willingness to practice in rural and underserved areas (Okeji et al. 2014).

They further suggested that adequate remuneration and a rural allowance should be added to the overall pay package of radiographers in order to motivate them to accept and remain in rural practice (Okeji et al. 2014). Remuneration is a major motivating factor in medical students' willingness to accept rural practice has been reported previously in low and middle income countries (Lehmann et al. 2008). Similarly, inadequate compensation or incentives is a major motivation for the emigration of the Nigerian health workforce to developed countries (Ebuehi and Campbell 2011). According to GSR (2018), the aforementioned could partly explain why about 75% of the few radiographers in Ghana are concentrated in the major cities. Indeed, poor financial incentives and low salaries were reported as major issues affecting the attraction and retention of health professionals in the rural areas (Belaid et al. 2017). However, a descriptive correlational study conducted by Adzei and Atinga (2012) sought to explore the impact of financial and non-financial incentives on motivation and retention of health workers in Ghana's district hospitals. The study reported that suitable legislations backing salary supplements, commitment-based bonus payments with a set of transparent internal guidelines and governance were essential to pursue workforce retention in district hospitals (Adzei and Atinga 2012).

2.8.3 Working Conditions

According to WHO (2010), the state of healthcare facilities and availability of medical equipment determines the effectiveness of patient management particularly in rural areas. Healthcare professionals within rural areas are able to perform at their best when they are happy with the medical equipment and their immediate working conditions (WHO 2010). A mixed-method study was conducted in Tillabery region, Niger by Belaid et al. (2017) using in-depth interviews, documentary analysis, and concept mapping. The purpose of the study was to identify the factors that influence the attraction and retention of health professionals working in rural areas in Niger. The study found that working conditions such as poor infrastructure, inadequate equipment and supplies influenced doctors' decision to remain/leave practice in rural areas (Belaid et al. 2017). Hence, the study concluded that intersectoral (i.e. health and other government sectors, as well as representatives from private, voluntary and non-profit groups) policies are required to enhance living/working conditions in rural areas (*ibid*).

Wood et al. (2013) explored factors that affect retention of public sector midwives throughout their career in Afghanistan through semi-structured in-depth interviews and focus group discussions. The study revealed that midwives are more likely to accept rural practice provided medical equipment essential for their practice is available (Wood et al. 2013). A case study was designed by Ebuehi and Campbell (2011) to establish factors that will attract and retain rural and urban health workers to rural Nigerian communities. A cross-sectional survey element revealed that the availability of equipment, flexible working hours, staff relationships, among other factors, as motivations to accept a rural posting (Ebuehi and Campbell 2011). Additionally, a quantitative study conducted by Abdulai et al. (2017) in the northern region of Ghana sought to bridge the inequitable distribution of physicians in Ghana. The aim of the study was to examine the physician-population ratio in the three Northern Regions of Ghana and the factors that clinical year medical students and House officers will consider in their acceptance of postings to the three northern regions of Ghana. The study revealed that both work and geographical infrastructure as well as housing, allowance, waiver of student loans, financial incentives and career progression were the most important motivating factor for physicians to accept rural posting (Abdulai et al. 2017).

2.8.4 Living Conditions

Using a policy analysis framework, Ditlopo et al. (2014) analysed the implementation of rural allowance in hospitals in North West Province in South Africa. The study revealed that medical students who were denied decent accommodation refused to stay in the rural areas after their compulsory service. Their colleagues who were given improved accommodation remained and practiced in rural areas (Ditlopo et al. 2014). Similarly, Okeji et al. (2014) revealed that accommodation as a major reason why student radiographers considered to accept rural postings in very remote areas in Nigeria. Living condition has also been indicated as a major motivating factor to rural practice in Zimbabwe (Nyandoro et al. 2016). Their findings demonstrate that acceptable accommodation and free amenities influenced retention. However, inadequate salaries and incentives, insufficient, and obsolete infrastructure, unsatisfactory career progression, poor living conditions, transportation issues and lack of basic recreational amenities were reasons why healthcare workers refused to

accept rural practice in the first place (Nyandoro et al. 2016). Conversely it has been noted that the cost of living within most rural settings is relatively low, which can be an economic benefit to professionals accepting rural postings (Ditlopo et al. 2014; Okeji et al. 2014). Kruk et al. (2010a) recounted that male doctors in Ghana preferred free and decent accommodation in order to accept rural practice. This is in agreement with a study conducted by Hanson and Jack (2010) using a sample size of 642 doctors and nurses in Ethiopia which also suggests that accommodation was a key determinant of healthcare workers accepting rural practice.

2.9 Impact and Challenges with Rural Radiography Practice

According to Choudhary et al. (2018) personal and career development as well as minimal career choices in rural and remote areas are some major factors that affect healthcare workforce attraction and retention decision. Similarly, personal development and career progression was reported as major factors that determines Ghanaian healthcare workers decision to accept and remain in rural area (Gyambrah et al. 2017). Studies have suggested that opportunities for continues professional development(CPD) was reported as the key motivating factor for healthcare workers to accept rural healthcare practice (Haskins et al. 2017; Okeji et al. 2014; Ebuehi and Cambell 2011).

Medical imaging in Ghana has been confronted with challenges which (eventually) impact on the quality of service delivery. Gawugah (2016) reported major issues that threatens effective healthcare delivery in Ghana include, but are not limited to, constant power (electricity) fluctuations, lack of IT connectivity, lack of radiographic consumables such as X-ray films, disinfectants, syringes and occasionally X-ray envelopes, exposure to ionising radiation to facility users due to an absence of radiation quality control and quality assurance programmes (Gawugah 2016). These issues are likely to be more pronounced in rural settings but there is little published evidence to conform this, but a number of challenges encountered in rural radiography practice in other countries have been reported (Mung'omba and Botha 2017; Kawooya 2012; Tashobya et al. 2010). These challenges are summarised in the following sections:

2.9.1 Rural problem of inequity of access

Access to health facilities and services is a basic service irrespective of one's geographical and socio-economic circumstances (Kawooya 2012). However, the situation in the Ghanaian context has been poor in this regard, particularly for the rural dwellers. This was revealed by a study conducted by Sulemana and Dinye (2014) using qualitative and quantitative approaches to gather data through household survey, key informant interviews, focus group discussions and observation. The study, which did not capture rural radiography practice, found that the factors inhibiting access to health facilities and services by the rural populace are multidimensional and somewhat interrelated. They ranged from physical accessibility problems, to high illiteracy levels and economic and technological barriers,. The net effects of this situation included complications during child birth, increased infant and maternal mortality, teenage pregnancies and high rates of social vices (Sulemana and Dinye 2014). The previously reported alarming shortage of radiographers in Ghana exacerbates the accessibility problem. Moreover, the imbalance in the distribution of radiographers in rural and deprived Ghana. Persistence of inadequate access to radiography services for rural inhabitants is likely to contribute to poor health care management and high mortality rates in rural settlements in Ghana. Therefore, there is an urgent need to establish evidence based assertions and recommendations about access to radiological services in rural Ghana.

2.9.2 Inequity of quality of care

Unyielding deprived healthcare systems in most African countries including Ghana, particularly within remote and rural areas, is a major concern because quality healthcare could be potentially compromised (Yaya et al. 2017; Sulemana and Dinye 2014). The provision of healthcare services without regards/attention to its quality is unethical and potentially dangerous (Adindu 2010). Quality of care within a rural area can be compromised, for example delays in seeing patients due to the fact that a particular radiographic modality may not available and/or professionals may not be legally qualified to perform certain procedures (Kawooya 2012). Therefore, the need to identify how Ghanaian rural radiographers actually deal with such issues when encountered during daily service delivery. As any unprofessional conduct by these

rural radiographers could potentially lead to medico-legal transgressions (Dimond 2002).

Radiographers are indicated to face ethico-legal dilemmas regarding when and to whom they should communicate an information when they identify abnormalities that require medical attention (Squibb 2013). It has been suggested that some patients may question the radiographer on what is seen in the X-ray (Dimond 2002, p.172) and radiographers are unsure of what information they should disclose to patients. However, radiographers have been suggested to be unsure of the information they should disclose in such interactions (Lewis 2002). This clearly indicates that some rural radiographers may be operating within unclear professional boundaries that consequently place both themselves and patients at risk. Therefore, it is justifiable to ascertain what practices are be happening in rural Ghana and to consider their Medico-legal implications.

2.9.3 Academic Isolation and Disparity of knowledge and resources

Kawooya (2012) indicated an academic isolation of rural medical imaging professionals. This is evidenced by barriers to attending CPD programmes (professional seminars, workshops), lack of awareness of such opportunities because of poor information flow and financial challenges as well as lack of support more generally from the rural working culture. general practitioners in rural and remote location, experienced this isolation, in relation to lack of time and locum cover, and poor information technology infrastructure (Yaya et al. 2017; Sulemana and Dinye 2014).

This African experience contrasts with the UK, NHS with a strong focus on continuous professional development (CPD) and the advancement of a culture of assessment and education. For example, radiographers awareness of dose minimisation practices, quality assurance (QA), clinical audit, risk assessment, all aimed at effective, safe quality care delivery (Bushberg et al. 2002). Accordingly, it is significant to identify commensurate challenges in the Ghanaian context since there is currently no empirical data to inform changes.

2.9.4 Inequity of equipment and technology

Studies have suggested that there is poor equipment functionality, inadequate internet and IT services as well as the lack of trained operators in rural areas of Ghana. Imaging is even less prioritised in rural settings (Edzie et al. 2020; Antwi 2017; Gawugah 2016). Kawooya (2012) characterised imaging equipment in rural areas as less sophisticated and/or a lack of imaging equipment, equipment being old or in a poor functional state as well as delays in equipment maintenance. He also alluded to lack of stable internet service as well as failure to maintain radiological equipment can result in detrimental effects of radiation exposure as equipment may be accidentally experiencing radiation leakage (Avadanei et al. 2011). Yet, routine quality management, assurance and control activities to avoid such radiation risks to all facility users (Bosnjak et al. 2008). For example: equipment commissioning tests are important to establish in documentation the baseline values against which future test values are compared, consequently helping to formulate acceptance limits within which the equipment is regarded as functioning properly regarding patient dose and image quality (Engel-Hills 2006). However, radiographers ought to ensure routine checks are performed to detect changes with the efficiency and output of equipment as it ages (Papp 2002). Anecdotally, such tests and checks are lacking in rural and therefore, it is important to ascertain these encounters Ghanaian rural radiographers face in their workplaces.

2.10 Interventions For Rural Radiographic Practice Issues

Studies have suggested that role extension development programs in rural healthcare have contributed to quality service delivery and enhancement of the radiography profession in most countries (Okeji et al. 2014; Kawooya et al. 2011; Stein et al. 2008). This have been reported as one of the key interventional strategy in dealing with rural radiography practice in most countries (Okeji et al. 2014). Similarly, literature suggests that most countries have benefited from various interventional policies for rural practice (Mung'omba and Botha 2017; Kawooya 2012; Ditlopo et al. 2011; Tashobya et al. 2010). According to Ditlopo et al. (2011) most government have focused on rural policy formulation and implementation in order for policies and frameworks gain the anticipated impact. Thus, appropriate rural policies contribute to the interventional approaches for rural radiography practice challenges (Wilson et al. 2009). Studies

have indicated that in order to overcome the rural radiography practice challenges; government, policy makers and all stakeholders are encouraged to help develop a policy on education and training which ought to be an accredited training programs (Antwi 2018; GSR 2018; Gawugah 2016; Okeji et al. 2014; Wilson et al. 2009). As that would ensure that rural radiographers are provided with the necessary training in order to meet the demands of their work within the rural facilities (GSR 2018).

2.10.1 Education, Regulatory and Policy Implementation

Literature suggests that employers owe it a duty of care to ensure that every employee is duly qualified, possess the needed training, skills, resources and support (WHO 2010). Studies have also indicated that recruitment and retention strategy ought to focus on the retraining of healthcare workers particularly in rural areas (Okeji et al. 2014; Ghansah 2011; Wilson et al. 2009). According to Ministry of Health and Social Welfare [MOHSW, Lesotho retention strategy 2010], Government of Lesotho (2010), policy on education and training has a remarkable impact on the performance of healthcare workers as well as their willingness to accept rural practice. It was further suggested that mostly young healthcare workers are reluctant to accept rural postings due to perceived lack of career development opportunities in these areas (MOHSW, Lesotho retention strategy 2010).

However, in order to increase the attraction and retention of healthcare workforce in rural areas, WHO (2010) advised that enhanced education and training as well as recruitment of students from rural background as useful interventional strategy. The aforementioned assertion agrees with the MOHSW, Lesotho retention strategy (2010) which also recommended these interventions as efficient. Additionally, Wilson et al. (2009) revealed a strong correlation between rural origin and rural practice. Furthermore, Wilson et al. (2009) noted that curriculum/syllabus content that reflects rural practice and clinical experience could potentially affect the choice of medical students to accept rural practice after they graduate. Abdulai et al. (2017) contends that since the establishment of rural community service in the University for Development studies in Ghana, students have had the opportunity to be exposed and experience rural practice. This have been suggested to boost their chances of accepting rural practice after graduation (Abdulai et al. 2017).

Notwithstanding, it has been suggested that many countries including Ghana have employed some regulatory intervention strategies such as the compulsory rural service (Abdulai et al. 2017). Yet, WHO (2010) have reported earlier that initial interventional strategy seems to be ineffective. Compulsory rural service has been described as unreasonable and unfair as it only focuses on healthcare professions, whereas other professionals are usually not involved (Wilson et al. 2009). Nemutandani (2006) suggested that in Thailand, medical students who successfully finished their compulsory rural service remained and practice in those rural areas. Also, it was revealed that medical student who received support from some district hospitals returned to serve in those facilities after they graduated (Wilson et al. 2009).

2.11 Summary and Conclusion

This chapter reviewed relevant literature about rural radiography practice and arranged it into themes to inform the objectives of the study and the design of the study. Review of the themes established experiences, practices, challenges and reason for retention as well as attraction of radiographers to rural areas.

Radiography has been suggested as a profession confronted with risk of being disregarded due to uncertainty about the professional responsibility for radiographic practice, specifically within rural areas. This is because rural radiography practice is unknown and/or rarely discussed as a distinct area of practice, particularly within developing countries such as Ghana (Gawugah 2016; Okeji et al. 2014; Kawooya 2012). Therefore, it is essential to explore the experiences and practice of rural radiographers as a large proportion of rural radiographic practice is not well described and thus missing from the evidence base. It has been argued that whenever there is a gap in an evidence base, healthcare professionals including radiographers are compelled to find alternate approaches to obtain the knowledge to inform their decision making; which may not be the best practice (Gawugah 2016).

Accordingly, this literature review chapter has provided relevant findings about RRP contexts, such as practice challenges (which includes but is not limited to scope of practice breaches, equipment functionality issues, and career progression issues), strategy for recruitment and retention and opportunities for extended roles for rural radiographers. Thus, the review has helped the researcher to comprehend and

synthesise existing research regarding RRP. Consequently, it has enabled the researcher to determine what is unknown (i.e. specific rural radiography practice issues/challenges/experiences) within the Ghanaian context and establish the research goal, which is to explore the Ghanaian rural radiographers' experiences and practices in rural areas, identify why they remain in their roles and anticipates to explore challenges during service delivery (study objectives outlined on page 17). Thus, this review informs all subsequent sections of this thesis first through selection of an appropriate design to address the research question and ultimately to use study data to establish recommendations needed for development of a nationally recognised framework for effective rural radiography practice in the future. The next chapter examines the methodology and the philosophical underpinnings applied in this study.

Chapter 3

Methodology

3.0 Introduction

The previous chapters examined the background of the study, the cultural context within which the study was conducted and a critical evaluation of appropriate literature examining issues of rural radiography practice. This chapter covers the methodology, (philosophical perspectives which include the epistemological and ontological assumptions on which the study was based). Therefore, the methodology chapter informed by the ontology leaning on the epistemological stance taken by the researcher which informed the research questions, aims and objectives of the study were examined. This also informed the methodological approach (epistemology) guiding the selection of the method used in the current study. More specifically, it proposes the use of social constructivism philosophy using qualitative case study approach which involved observational work, examination of documents and interviews in exploring the perceptions of Ghanaian rural radiographers about their practices and experiences within their natural environment. This was developed to explore the experiences of Ghanaian rural radiographers in their dealings with issues of practicing radiography in rural hospitals of Ghana.

3.1 Theoretical framework of the study

This study required a theoretical framework which allows the complexity of rural radiographic practice to be explored and examined. In order to achieve the in-depth information needed for the inquiry a qualitative case study approach was taken; where multiple sources of data (an in-depth semi-structured interviews, observations and documentary review) was employed. These data collection methods generate information and to provide as it were, as stipulated by social constructivist; accounts of rural radiographic practice from radiographers currently practicing in rural areas of Ghana. This supports Silverman (2013) who indicated that constructivists tend to use interpretive methods in exploring social constructions which is often concerned with the 'what' and 'how' questions which this study anticipates to answer. Accordingly, the

methodological approach adopted by this study which comprised observational work, documentary review and interview is useful for making sense of what rural radiographers in Ghana understand by their scope of practice and how they recognise the impact of their responsibilities during service delivery in rural practice. It also aimed to give theoretical and practical understanding of why rural radiographers remain in their role, as well as their involvement in other extended roles in addition to their traditional roles and responsibilities.

According to Kafle (2011), epistemology is about 'how we know what we know' and it relates to knowledge and the insight that the study is required to contribute to knowledge itself. It also relates to the steps by which the researcher makes the knowledge claim (Hartley 2006). Thus, it enabled the researcher to predict how and what type of data was required to answer the research question of this current study. Mingers (2003) asserted that ontology and epistemology talk about truth while axiology concerns values and ethics. The principles for evaluation of epistemological and ontological assertions for this current study were offered by these values (Kafle 2011). For the purpose of this current study, the research philosophy is essential to the research exercise because failure to ask the right questions about the reality that this study seeks to explore could render our knowledge of the reality or phenomenon shallow and poor. This according to Clark et al. (2008) could potentially result in a study that is not satisfactorily justified and/or lacks broader credibility/trustworthiness and internal coherence. Consequently, the ontological, epistemological and axiological stance adopted for this current study ensures an in-depth exploration of the reality in order to satisfactorily answer the questions that this study seeks to explore.

Constructivism is an epistemological position that claims that people develop their intelligence and construct their knowledge through action, in situation, and by reflection on their actions and the results of those actions (Hyslop-Margison and Strobel 2008). Constructivism, deals with the question of the construction of knowledge without referring explicitly to the social dimension, although it is always present (McKinley 2015). Thus, in considering rural radiographers experiences and practices, it was imperative that their socio-cultural involvements ought to be explored. Hence, the researcher considered a philosophical approach that could capture the socio-cultural experiences of these rural radiographers. Individuals apprehend and

understand new situations drawing on their previous knowledge and adjust what they already know to adapt to the new situation (Choi and Lee 2002), which as a consequence gradually increases and improves their previous knowledge and thus allows them to deal with progressively complex situations.

Constructivists argue that people develop their own understanding based on their individual experiences and by an interaction with a specific environment (McKinley 2015). Thus, constructivist attempt to understand reality as constructed or built by an individual based on his/her interaction with a situation/condition (Ajjawi and Higgs 2008). Constructivists tend to have a positive perception about a person focusing on that individual's capacity to reason consciously and rationally, to regulate their natural needs and to attain their full potential (Ajjawi and Higgs 2008). It is on this premise that the rural setting where diagnostic radiographers practice their radiography, and generally how radiography has advanced over time influences how these professionals respond to the multifaceted humanistic aspects of their practice. These social, cultural and historical aspects that impact on the practice of radiography are not commonly found in radiographic literature, according to Squibb (2013). The basis for the philosophical stance on which this study was built is influenced largely by the aforementioned assertion.

3.2 The Philosophical Approach Guiding the Study

The philosophical approach guiding the research draws extensively from social constructivism using a qualitative case study methodology and perspectives.

Studies have demonstrated that from an epistemological viewpoint social constructivism approaches to research are based on a paradigm that draws extensively from the personal knowledge and subjective experiences of the study participants (McKinley 2015; Boudry and Buekens 2011; Hyslop-Margison and Strobel 2008). Social constructivism approach attempts to gain insight into experiences and the reasons or meanings behind perceptions held by people within a particular context (Duffy and Cunningham 1996). Particularly, McKinley (2015) mentioned that social constructivism studies tend to highlight the significance of personal perception and understanding as a way of gaining insights into people's behaviours and actions which can be achieved in this context by the interpretation of the data gathered (interviews,

observational work and document review). This study anticipates to reveal the importance rural Ghanaian radiographers give to their experiences in order to expand our understanding of the rural world of these professionals in their interactions with other staff, their patients and the general public within their local environment.

Qualitative research has been suggested as a multi-method type of research that uses an interpretive and realistic approach towards its subject matter as well as an emphasis on the qualities of entities (i.e., processes and meanings occurring naturally) Topping (2010). Besides, it has been indicated that qualitative research is applied when investigating an occurrence within an environment where it naturally emerges which is reinforced by social meaning from the persons who experienced the occurrence (Topping 2010). Thus, for the purpose of this current study, a qualitative approach that anticipates the exploration of Ghanaian rural radiographers as they go about their daily duties in their natural environment (rural settings) was best fit. Yet, Reiners (2012) suggested that holistic understandings of reality ought not to be limited to just a few variables. Additionally, it has been suggested that qualitative research could be adopted when attempting to answer questions regarding how social experiences are created and given meaning (Flood 2010). This according to Flood (2010) anticipates to establish illustrations of the experience within a given environment (i.e. rural setting) which intends establish/reveal that experience.

Consequently, in considering the questions which this study intends to answer; conceivable qualitative methods that the researcher initially considered were phenomenology, grounded theory and ethnography. Nonetheless, the researcher engaged in further extensive reading and search, in order to select the most suitable approach and eliminating the least suitable method. Hence, the adoption of qualitative case study approach informed by social constructivism philosophy.

3.3 Constructivist and constructivism approach to knowledge generation

Constructivist approach to knowledge generation propagates that reality exists independently of human existence (Choi and Lee 2021; Moulat 2012; Choi and Lee 2002). Constructivists focus on how things are interpreted by others than themselves (Mertens 2005). Thus, constructivists are of the belief that reality is constructed by the subjective experience of an individual: reality is thus subjective and experienced, and

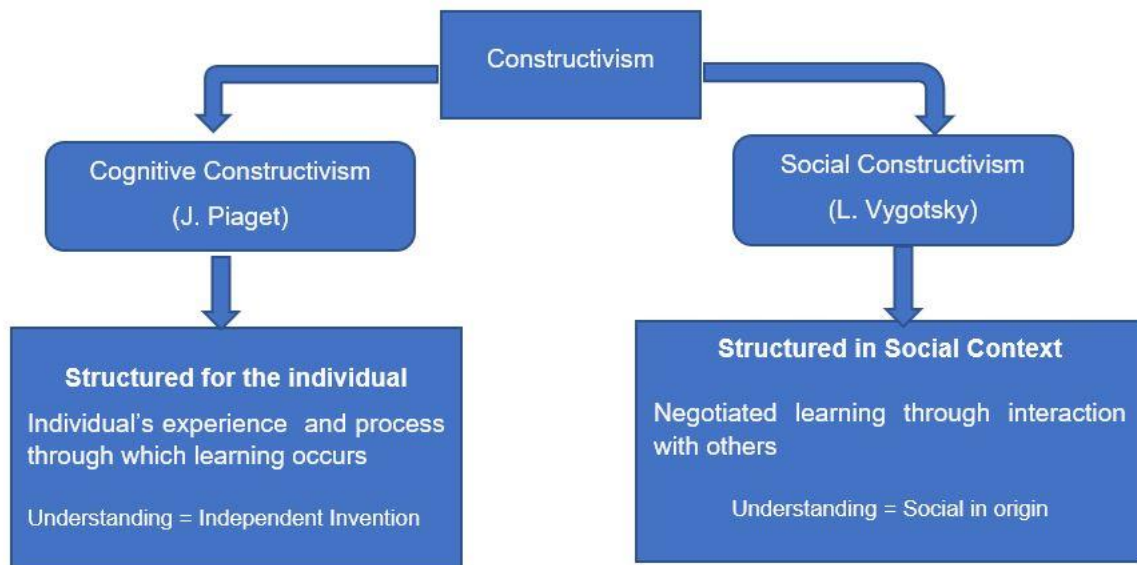
can be known through the individual's interpretation of it (Mertens 2005). Therefore, a constructivist approach could have been a methodological consideration in establishing the subjective experience and practices of these Ghanaian rural radiographers. However, constructivism approach was most suitable in exploring the reality of these rural radiographers.

Accordingly, the constructivism theory, speculates that knowledge can only exist within the human mind, and that it does not have to match any single real-world reality (Hyslop-Margison and Strobel 2008). Hence, Driscoll (2000) suggested that learners will always attempt to construct/develop their own individual mental model of the real world from their opinion of that world. Thus, Constructivism may be more suitably mentioned as a theory of knowing (as active) rather than a theory of knowledge (as passive), since action is what drives cognitive development (Hyslop-Margison and Strobel 2008). By and large, constructivism is predominantly concerned with knowledge in action, that is, in knowing. To answer the question: "What does it mean to know?", constructivism asserts that to know is to adapt to the new, it is a matter of acting intelligently with respect to new situations (Hyslop-Margison and Strobel 2008). Intelligence is adaptation to new situations (Thus, an individual adapts by actively experiencing the environment). Suitably, the researcher settled on the constructivism theory based on its characteristics in exploring the experiences and practices of these Ghanaian rural radiographers.

3.3.1 Constructivism or Social Constructivism?

The researcher explored the main theories of constructivism (cognitive constructivism and social constructivism) and established their respective relevance to this current study.

Figure 3.1: **Differences between constructivism and social constructivism.**
Adapted from Duffy and Cunningham (1996).



According to Liu and Matthews (2005) there are two main schools of thought on constructivism. While Piaget (1973) was indicated to have developed the cognitive constructivism view of learning, Vygotsky (1978) was noted to develop the social constructivism view of learning (Terhart 2003). Piaget's theory of constructivism stipulates that an individual is believed to produce knowledge and form meaning as a result of his/her experiences (Liu and Matthews 2005). Thus, Cognitive constructivism focuses on individual's reaction to the experience and to the process through which understanding are formed (Duffy and Cunningham 1996). Piaget's theory has been indicated to cover learning theories, teaching methods and education reforms.

Vygotsky's theory of constructivism asserts that knowledge is co-constructed and that individuals learn from one another (Liu and Matthews 2005). Thus, Social constructivism focuses on interaction with others; knowledge is seen entirely as a negotiated human construct (Duffy and Cunningham 1996). Vygotsky's theory has been indicated to be known as a social constructivist theory as Vygotsky asserted that the learner ought to be involved in the learning process (Liu and Matthews 2005). Thus, the fundamental role of social interaction is noted in the development of thought (Vygotsky 1978), as he affirms that community contributes significantly in the process of making meaning; which was important to this study as the study involved interaction of the researcher and the professionals in their environment. Therefore, placing the above assertions into this current study, a reliable and most suitable approach was

needed as the reality about the practices and issues within rural radiography as it where; were explored by the interaction of the researcher with the study participants due to the obvious negotiated human construct as indicated (Duffy and Cunningham 1996). Thus, these radiographers are working in a particular environment; that is a specific rural setting which may have some commonalities and some differences to other rural settings. But, there may be an associated social environment; which may be working with colleagues from other professions, working alone in an isolated setting and/or may be practicing with varied patient population.

Furthermore, Terhart (2003) suggests that constructivism presumes that knowledge is constructed through action and reflection on action, while social constructivism highlights the social character of circumstances and settings that has an influence on the construction of knowledge by an individual (Liu and Matthews 2005). Constructivism has been noted as an epistemological position that assumes that an individual develops intelligence and construct his/her knowledge through action, in situation, and by reflection on their actions and the consequences of those actions (McKinley 2015). Constructivism has been suggested could be more suitably denoted as a theory of knowing (as active) relatively than a theory of knowledge (as passive), because action is noted to motivate intellectual growth (Varela et al. 1993).

Accordingly, it has been indicated that constructivism principally is concerned with knowledge in action (knowing). Thus, in answering the question; "What does it mean to know?", constructivism suggests that to know is to adjust to the new, which assumes an individual to act rationally at new situations (Adams 2006). Therefore, intelligence is adaptation to new situations such as this current new enquiry (study about rural radiography practice) within the Ghanaian context; which presupposes that an individual adapts by actively experiencing the environment (Tam 2000). Notwithstanding, it has been asserted that though there are always the presence of social dimensions in the construction of knowledge, constructivism fails to explicitly encompass that social dimension (Terhart 2003). However, social constructivism on the other hand in the construction of knowledge, points out the significance of the social dimension (Kukla 2000). Therefore, this places social constructivism approach as the most suitable choice for this study as the researcher aims to explore amongst other objectives, why Ghanaian rural radiographers remain in their roles irrespective of socio-cultural and professional challenges and/or barriers they may encounter.

Social constructivism has been indicated to have been advanced from constructivism and shares principally the same theory of knowledge, nonetheless it highlights its social nature and the importance of social interaction (McMahon 1997). Social constructivism has been conceptualised as a philosophy and indicated as an umbrella term comprising both a philosophical undertaking and a diversity of research methodologies (McKinley 2015).

The major aim of social constructivism is to focus on how people see the world in which they live and how they understand it while focusing on the life encounters experienced within the environment they live (Langdrige 2007). Consequently, there is a highlight of the social nature of interactions between the subject and the object, however, it does not mean that thinking and knowing are not personal, but are just socially marked (Yager 1991). Accordingly, in deciding which approach to take (constructivism or social constructivism), the researcher also focused on the socio-cultural aspect of the experiences and practices of the study participants and resolved that social constructivism was the most appropriate approach for this research.

3.3.2 Social Constructivism Philosophical Approach

The social constructivism approach, according to Boudry and Buekens (2011) when making an inquiry into a subject, permits considerations for both social structures (the pattern of interconnected statuses and functions present in a community, forming a largely constant set of social interactions such as the rural community groups, family, religion, cultural activities/festivals etc) as well as people (rural community folks, workforce, tradesmen etc). This phenomenon fits well with the aims of this research, which was the key reason that it was the philosophical approach chosen for this study. Besides, this study explored a comparatively poorly explored research area in Ghana, hence qualitative data collection methods – which explored matters, established experiences and also validated different opinions as a part of the reality explored or knowledge generation (Richardson 1994) – were suitable to answer the research question(s).

The role of the researcher, therefore, was to establish a collaborative relationship with the participants, in order to gain an understanding of their practices as well as their experiences within rural Ghana from their socially-constructed reality. The results

generated therefore attempt to appreciate the experiences and practices of rural radiography in Ghana and how radiographic services that are rendered by these professionals' impact on patient care from the views of the participants who have experienced rural living in many ways.

Hyslop-Margison and Strobel (2008) indicated that scholars who work within the social constructivists' traditions use the qualitative method to gain some understanding into the phenomena under study by exploring how they are seen by individuals in that specific situation. The existence of multiple realities which can be subjected to several analysis has been suggested (Driscoll 2005). The researcher agrees with Elliott et al. (2000) who asserted that Constructivism is 'an approach to learning that holds that people actively construct or make their own knowledge and that reality is determined by the experiences of the learner' (Elliott et al. 2000, p. 256). Thus, knowledge is not derivative of scientific analysis but could be achieved by sharing common meaning of mutual history, culture and language. The researcher also agrees with Giamattista Vico an ardent social constructivist who lived between 1668 and 1744 who stated that "*... a known truth owes its existence to the mind that knows it...*" (Kukla 2000). Accordingly, relativism approach which according to Silverman (2016) deals with the exploration of experiences of participants by an interaction with the researcher was employed for this study.

Social constructivism philosophical stance focuses on people's accounts of their experiences and how learners defines what the reality is based on their experiences/observations within a particular context (Kukla 2000; Elliott et al. 2000), in this case the social construction of rural radiography practice in Ghana. More importantly social constructivism studies tend to emphasise the importance of personal perspective and interpretation as one way of gaining insights into people's behaviours and actions (Polit and Beck 2012).

There are other methods that might have addressed the questions in this study. Nonetheless, given the absence of any data on Ghanaian rural radiographers the research design for the study, including data collection and analyses is grounded in qualitative case study informed by social constructivism epistemology. This approach allows multiple sources of data focused on a phenomena to be collected (Stake 2005), as in the case of this current study, and equally informed and shaped how the gathered data would be analysed (Braun and Clarke 2013). This was to enable the researcher

to gain more insight into radiographers' shared experiences of their practices but within their specific rural context.

Social constructivism epistemology is concerned with sociocultural theory (Vygotsky 1978) and has been indicated to be more correctly an epistemology or philosophical explanation about the nature of learning, which is one of the main reasons it was chosen for this study (Hyslop-Margison and Strobel 2008). Besides, it has been indicated that social constructivism epistemology has been noted to be related with revealing meanings as against debating an issue or constructing theories (Flood 2010). Thus, among many other issues, this present study evidently relates to revealing meanings into practices and experiences of Ghanaian rural radiographers, rather than debating any topic or constructing any theory.

3.4 Methodologies

Creswell (2013) asserts that there are two main research paradigms namely; quantitative and qualitative designs which are the main methodologies associated with the positivist and constructivist paradigms to research. Creswell (2013) indicated that quantitative research tends to be more associated with the positivist paradigm whilst qualitative is mostly aligned to the constructivist paradigm. Thus, Positivism is usually associated with quantitative research methods that involve measures of quantity, frequency or intensity of occurrence (Denzin and Lincoln 1994), whilst relativism is associated with qualitative research methods that deals with and/or go beyond the exploration of experiences of participants by an interaction with the researcher (Braun and Clarke 2013).

According to Silverman (2016) there are two different positions with respect to paradigms of knowledge: Positivism and Relativism (Interpretivism/Constructivism). The differences of the two positions according to Silverman (2016) are but not limited to the following:

Table 3.1: Difference between positivism and relativism. Adopted by Silverman (2016)

POSITIVISM	RELATIVISM
With respect to reality; positivism indicates that there is one reality, which is observable. Thus, reality as observable and measurable.	Relativism suggests the existence of multiple realities, which can be experienced. Thus, reality as social construction.
In knowledge enquiry; Obtaining of a single truth is usually presented in the form of a universal general law. Thus, knowledge generated by observation and measurement of facts.	In knowledge generation, relativism presents a more informed construction or understanding of the truth. Thus, interpretations created in interaction between researcher and participants.
With positivism, the researcher relates to the participants (the researched) by being objective and independent of them (the researched).	With relativism, the researcher is subjective and is not independent of the participants (the researched).
Positivism deals with experimental methodology involving testing of hypothesis.	Relativism deals with studying issues in their natural environment.

From the above assertions, studies have reiterated that quantitative research design usually has large sample size, grounded on numbers and numerical values which are measured/calculated by means of a known predetermined method, which can be analysed using statistics (Creswell 2013; Polit and Beck 2012). Polit and Beck (2008) indicated that quantitative research is typically objective in nature and anticipates to generalise its results to a group aside the participants. Qualitative research design on the other hand, is typically focused on the experiences centered of participants which are established by collaboration with the researcher, as with this current study (Creswell 2013). Data for this current study were informed by a strong feature of the case study approach which had a characteristic of interplay of people/role and environment which were accessible via multiple elements of data collection that is observation, documentary review and also by interviewing the informants, which formed a rich narrative largely constituting rich in-depth expressive/descriptive

interpretation of experiences of the rural radiographers which then enabled the researcher to generate comprehensive data (Christensen et al. 2015). Themes were then formed from the analysis which were obtained from the narratives before conclusions were drawn (Bowling 2014). Qualitative research usually places emphasis on individual's experiences, typically adopts a small sample size (as with this current study) and are commonly not widely generalisable (Bowling 2014).

As advised by Silverman (2016); qualitative approach was generally preferred because little is known about the topic (RRP) within the Ghanaian context. Thus, this study used a qualitative approach to allow the experiences of the participants to be explored in an in-depth way. Additionally, qualitative approach was considered the appropriate choice as it permits for experiences of participants to be explored. Kirkman (2002) asserted that results from qualitative research frequently have been stipulated of being 'only preliminary' and implies research should contain random samples, standardised instruments, statistical tests and precisely calculated levels of significance. However, it has been argued that narrative research, by retaining an emphasis on the linguistic reality of human existence, operates in an area that is not limited by formal systems and therefore has more rigour (Kirkman 2002:34).

The positivist theory is that social life can be examined as reality as in natural science. Qualitative inquiry has been indicated effortlessly in agreement with the interpretive paradigm which is created by the principles that, in order to understand human behaviour, there should be a relationship/interaction between individuals in the world that they live (Topping 2010). There should be appropriate methodologies and techniques which would provide enough room to allow interpretation of things as they are particularly with a research that anticipates to understand the social actions and social practices of people in their natural environment (Topping 2010). Thus, learning about reality by examining data beyond the reported experience of individuals, for example by observing what they do.

It has been indicated that qualitative researchers do not usually always explicitly start their studies with a theoretical framework, whiles quantitative researchers commonly start theirs with a theory with an attempt to test a hypothesis in order to validate their theories (Creswell and Plano 2011). Consequently, quantitative researchers mostly

use measurements and statistical methods in testing their hypothesis, while qualitative researchers focus on in-depth understanding of a social phenomenon (Christensen et al. 2015). It is worth mentioning that, Christensen et al. (2015) indicated that either approaches (quantitative or qualitative) have contrasting views and thoughts about the nature of reality. Besides, Bowling (2014) suggested that both paradigms do not share the same truth in the analysis and interpretation of social human behaviour. Thus, qualitative scholars contend that reality is grounded in how people ascribe meanings to their experiences and their world (Bowling 2014).

Therefore, it has been asserted that qualitative scholars argue that truth ought to be described by multiple meanings rather than a single entity (Topping 2010). According to Topping (2010) qualitative methods aim to establish the existence of multiple interpretation of reality and suggest that humans differ as well as societies and norms of individuals in their natural environment. Also, it has been suggested that qualitative inquiry is significantly reliant on what is happening (in this context the real situation of rural radiography practice in Ghana) rather than what the researcher expects (Polit and Hungler 2013). Accordingly, qualitative approach was considered central to the current study in order to understand what was happening in the world of Ghanaian rural radiographers' in relation to their experiences and practices based on the use of an interpretative approach.

Mostly, researchers who work within the social constructivism traditions use qualitative method to offer some insights into the phenomena under study by examining how they are perceived by the actors in that specific situation (Polit and Beck 2010). They contend that the constructivist, is generally, faced with the quest to answer what the meaning and/or importance of a particular phenomenon is as experienced by the actors and to establish the meanings of those realities (McKinley 2015). Le Vasseur (2003) asserted that the essential insight of social constructivism is that awareness is continuously premeditated and inseparable of the intentioned object and consciousness cannot exist independently of the objective world. Several social scientists from a number of disciplines (psychology, education, and health) have adopted social constructivism approach to define a research stance different and in contrast to the more positivistic forms of inquiry (Connelly 2010). McKinley (2015) stipulates that social constructivism inquiry is opposite and/or in contrary to the positivistic approach and functions within the humanistic traditions with its focus on

interpretation. Consequently, social constructivism methods are particularly effective at establishing the experiences and perceptions of persons (Ghanaian rural radiographers) from their own viewpoints as well as the experience, thought pattern and perception of the researcher in order to better understand the human experience as described by participants in establishing the reality (McKinley 2015; Polit and Beck 2012).

The goal of the current study was to observe, establish and construct the meanings Ghanaian rural radiographers placed on their experiences and practices. This viewpoint was used to explore the experiences of a sample of rural radiographers in Ghana on the question of helping to safeguard the practice of radiography within rural settings in Ghana. Ugwu et al. (2008) indicated that three qualitative research methods are generally recognised in radiography literature: grounded theory, ethnography and historical approach. However, radiography practice is a critical area because of the practice encounter with all manner of patients including patient's relations. Radiographers encounter several people, professionals and situations in healthcare and these encounters could be studied using social constructivism (Ng and White 2005). Though limited, compared to nursing research, some studies in radiography have been conducted with social constructivism approaches.

In order to gain an understanding of the issues that this study sought to explore; it was essential to gain an understanding of the participants' experiences as they construct it in their own context. Therefore, it was vital to discuss the comparative methodologies to allow the reader to compare the current social constructivism study with others. In using qualitative case study approach, researchers chose from diversity of methodologies and which one to choose depends on several factors. Initially, thorough reading of the various qualitative methodologies especially the three main methodologies (grounded theory, ethnography and phenomenology) was undertaken based on the research questions. The three methods respond to different research questions and they originated from diverse disciplines. An appraisal of these approaches revealed that qualitative case study approach informed by social constructivism philosophy was the best methodology to use for this research. A synopsis of the three approaches and a discussion of its appropriateness for various studies are discussed in this thesis.

This study is focused on healthcare professionals and how they go about their work in their natural environment with a consideration of possible challenges and how they deal with them. The study therefore required the use of an approach that could generate an in-depth understanding of the issue in its real context to be able to answer the research question. Qualitative methods create room for the researcher to explore real and actual levels of reality, however, it has been stipulated that its focus is mainly on human agency data due to its commonly used constructivist ontology (Layder 1997). Nonetheless, the basis of this current study needed a qualitative method that could combine both human agency as well as structural factors. Agency factors are principally naturally subjective at an individual level in a specific context (Layder 1997). This, according to Giddens (1994) involves establishing experiences of an individual in the real world with the notion that social activity contributes essentially in determining the productive capacity of a person.

Layder (1997) argues that the impact of social life on an individual's experience could be reduced to the lowest which may cause the development of idiosyncratic theories when an approach is only reliant on agency factors as noted by Eisenhardt (1989). According to Schwandt (1997) structural factors apply an extensive variety of research techniques primarily dwelling on power, symbolism, language, communication and myths. It has been asserted that being reliant on only structural factors could result in disregard to local experience and factors (Lincoln and Guba 1985). Notwithstanding, it has been advised that combining both agency and structural factors means connecting 'human activity and its social context' (Layder 1994:5), an approach deemed suitable for this current study. Porter and Ryan (1996) asserted that ethnography is one such method that gathers both structural and agency data. Similarly, case study can also be used by a social constructivist approach for the same purpose (Lauckner et al. 2012; Baxter et al 2010).

It is worthy to note that there are detailed account of case study approach as well as other methodological considerations (grounded theory approach, phenomenology and ethnography) initially considered for the current study (*see appendix N*).

3.4.1 Case Studies Approach

Case studies was classified into three categories namely; descriptive, experimental and selective (Hakim 1992). Case studies was also given six classifications by Burns (2000) who categorised them into; historical case studies, oral history, situational analysis, multi-case studies, observation and clinical case studies. Contrarily, Yin (2009) contends that case studies can be classified into three categories; explanatory, exploratory and descriptive. Explanatory case study deals with the explanation of fundamental associations in real life settings, exploratory case study deals with the exploration of a real life situation with no single conclusion, while descriptive case study deals with the description of a phenomenon in real life situation (Yin 2003). Therefore, it alludes that case studies can be categorised in several diverse ways.

The researcher of this current study adopted the Yin approach as the study sought to explore the experiences and practices of Ghanaian rural radiographers within their natural setting, which is a real life situation. Consequently, can best be described as an exploratory case study. Additionally, this study can best be labelled as an exploratory case study as it is not explicitly about prevalence which agrees with Yin (2017) who asserted that generally, “what” questions can either be exploratory in nature or about prevalence which usually necessitates the review of archival records. Stake (2006) indicated that case studies could either be single or multiple cases. But, some disciplines according to Stakes (2006) such as political science and public administration have argued about the need to differentiate between the two types, as a consequence adopts the term; comparative case study in an effort to suggest it as a distinguishing form of multiple-case study. However, Yin (2017) posits that single and multiple case studies are merely variations of the case study design. Accordingly, this study is a single case with multiple sites.

It has been argued that the case in a case study approach ought to be explicitly defined, case selected, data collected, analysed and the findings reported (Crowe et al. 2011). Nonetheless, Yin (2003) contrarily suggested that there are three stages in case study design which are; defining the case, selecting the case study design and being guided by theory in the design. Furthermore, Yin (2003) indicated that it is vital to triangulate data from the various sources to demonstrate the robustness of the study since the case study approach for this current study permits collection of data from multiple sources (interviews, observations and documents). Additionally, Yin (2003)

advised the need for a protocol in order to be able to guide the study and explore rival explanations for issues. However, Yin (2003) contends that a case study protocol is not a must, yet, he argues that it is important to develop a 'mental framework' of questions for the research which guarantees that the researcher stays focused throughout the study. Thus, the researcher ought to keep an open mind and explore conceivable rival explanations and adopt the use of various scenarios and techniques akin of a crime investigator, as this increases the reliability and transparency of the study.

Ethnography and case study methodologies can both be applied by social constructivists for their data collection from both structural and agency factors (McKinley 2015). Stake (1995) indicated that case study is generally defined by a given focus of interest within a natural setting, where the research is bounded by that focus and is explored through multiple perspectives, however, ethnography is focused on implicit knowledge of the culture of the participants and not a particular phenomenon. Notwithstanding, Stake (1995) indicated that it is important to note significant associations between case study and ethnography, but are both reliant on the epistemological assumptions made by the researcher. The study was conducted in the natural settings of the participants to explore their experiences and practices and also captured their way of doing things which may have been affected by their environment and culture. However, the study focused on a bounded and specific phenomenon of rural radiography practice in Ghana and how it impacts on patients. Hence, the need for a detailed exploration of specific bounded phenomenon of rural radiography practice, therefore, case study design was deemed the most realistic choice for the study.

3.5 Justification for Research Approach

The theoretical position offers a context for the research and informs the methodology (Mason 2010). Consequently, it is essential to explain the theoretical position of the research and the supporting framework used to explore what can be known about the phenomenon and how it can be known as that is indicated to address the aims of the study (Mason 2010). A quantitative approach could have been considered for this study as it has been indicated to have a simplified way of collection of numerical data

for data analysis in order to make inferences (Creswell 2009; Punch 2006). As in some occasions, numbers are anticipated to give more information than words and also in an attempt to understand a phenomenon, there is a need to periodically give approximation of how much one variable is related to other variables or how different one is from another variable (Creswell 2009). However, considering the aim of this study, though a quantitative approach could be used, a qualitative approach was best suitable.

Focusing on methodology and methods that are best able to answer the primary and secondary questions, there was a need to outline the research questions, aims and objectives of the study. There was then the need to examine the epistemology guiding the selection of the method used in this current study. More specifically, it proposes the use of social constructivism method in exploring the practice of radiography in rural context. This was developed to explore the experiences and practices of Ghanaian radiographers in their dealings within rural settings in the hospitals. McKinley (2015) indicated that the main goal of social constructivism is to pay attention to an individual's learning that takes place because of his or her interactions in a group. Social constructivism as a philosophical approach has been suggested that "the natural world has a small or non-existent role in the construction of scientific knowledge" (Boudry and Buekens 2011). The guiding principles of social constructivism has been suggested that knowledge is constructed through human activity and also individuals create meaning through their interactions (McKinley 2015).

Accordingly, a qualitative case study research design, using a social constructivism methodology is considered for this study. This method was chosen because it will enable practitioners (radiographers) to give detailed personal views about rural radiography practice and the perceived scope of practice currently adopted within rural clinical setting in Ghana. A different approach such as interpretative phenomenology could have possibly been used. However, the researcher aimed to focus on social constructivism approach because of its ontological beliefs (multiple realities are constructed through our experiences and interactions with others), its axiological beliefs (individual values are honoured and negotiated among individuals) as well as its epistemological beliefs (reality is co-constructed between the researcher and his researched and shaped by individual experiences) as indicated by Creswell (2013). Another reason is because of social constructivism learning theory concept that

highlights support through self-guided exploration, reflection, and evaluation (Green 2002) and its methodological beliefs (more of a literary style of writing used; use as an inductive method of emergent ideas (through consensus) obtained through methods such as interviewing, observing, and analysis of texts) (Creswell 2013).

The adept knowledge and learning theory concept of social constructivism allowed the researcher and the participants to make a choice that is controlled by their clinical experience under discussion; the adept knowledge gave the researcher the skill required to conduct the research (Green 2002). Besides, social constructivism approach which promotes diverse viewpoint, suggests that it aims to offer insights into how a given person, in a given context, makes sense of a given phenomenon as indicated by Boudry and Buekens (2011). With respect to this current study, the researcher's focus was to explore the experiences and practices of Ghanaian rural radiographers. Besides, the questions that the study seeks to address could best be explored using social constructivism approach.

The strength of the chosen design (case study) was however based on its flexibility in interpretation of the data collected generally, particularly narratives provided by the participants. A social constructivism approach according to McKinley (2015) has widely been used, as it gives an understanding of experience from the perspective of the individuals. Social constructivism as a qualitative research process, therefore, allowed a personal examination of participants' experience by detailing their experiences (McKinley 2015).

Consequently, in keeping with this assertion, and in situating this current study in the appropriate theoretical perspective, social constructivism ideas would be considered based on its epistemological and ontological stance. Walters (1995) indicated that a methodology should connect a specific philosophy to suitable research methods and should link philosophical concepts to realistic and appropriate research procedure. Given that this study is purposefully centred on an area (rural radiography practice) where little is known in the Ghanaian context, and no study conducted, a social constructivism approach with a qualitative case study research design is considered suitable.

3.6 Summary

A philosophy and method that was deemed suitable for this current study was social constructivism qualitative case study approach. In developing a social constructivism framework to support an exploration of Ghanaian rural radiographers' experiences and practices, the above philosophy and methodology were adopted. The epistemological orientation of the study was discussed and linked to qualitative case study approach informed by social constructivism as the appropriate research method and philosophy. The chapter also discussed the rationale for adopting the philosophical and methodological approaches of the current study. Social constructivism was used to explore the reality (construction of knowledge), particularly social dimensions of the experiences and practices of rural radiographers in Ghana.

Generally, the methodology chapter thoroughly clarified and justified all of the researcher's research design decisions, which then determined the pace for and/or informed the methods chapter (Golding 2017). The methodology chapter provided the philosophical perspective that informed the researchers' understanding of what ought to be done as knowledge about the Ghanaian rural radiography world was generated. Therefore, the current study's research design as indicated above was informed by the philosophical principle of social constructivism, which allowed the researcher to explore the experiences of participants through interaction with the researcher and has flexibility in interpreting the narratives provided by the participants (Golding 2017). The methodology was the plan/design that reinforced the selection and use of specific procedures, which connected the selection and application of methods to intended research outputs. Thus, literature suggests that a methodology chapter offers opportunity for the researcher to discuss the philosophical underpinnings/conceptual basis of the research as well as the particular research design decisions the researcher may have made (*ibid*). The next chapter takes the reader through the research methods for the study.

CHAPTER FOUR

Methods

4.0 Introduction

This chapter describes how the previous methodological thoughts and considerations contributed in the selection of a case study design. This chapter further discusses how the case was defined and selected. It also discusses data collection approach as well as data analysis processes adopted for this study. Furthermore, it has a section that described how the trustworthiness/credibility of the study was achieved. It also discusses ethical considerations as well as other ideas such as reflexivity that ensures quality in research.

4.1 Research design used for the study

It is worth noting that all decisions were taken with the main aim of answering the overarching research question. Thus, this study adopted a qualitative case study design using social constructivism philosophical approach. There are two main types of research paradigm: quantitative and qualitative (Silverman 2006). However, Tashakkori and Teddlie (2003) argued that there has been the emergence of a third approach called the mixed method which combines both qualitative and quantitative methods. Although Sandelowski (2000) contended that research paradigm is not tied to methods, Silverman (2005) and Bell (2010) indicated that every research topic is best investigated with the best method that will help achieve the aim and objectives of the study. Qualitative design is mostly centered on experiences of participants that are explored by an interaction with the researcher. Data are usually collected by interviewing the participants, the data generated from these interviews forms a rich narrative which creates rich in-depth description of experiences which then allows the researcher to get detailed data. Data are analysed and themes formed from the analysis and findings can then be drawn from these analyses (Silverman 2001).

The aim of this study was to explore experiences and practices of Ghanaian radiographers within the healthcare system in the rural setting. Therefore, in order to achieve the aim of the study, it was imperative to review various approaches that were

most appropriate (as discussed in the previous - methodology chapter). Thus, the strength of the chosen design was however based on its flexibility in interpretation of the narratives provided by the participants. Accordingly, a case study approach was considered best fit for this study. Thus, an exploratory case study design was used for this study with the purpose of exploring and providing insight into the case (rural radiography practice). The said approach permitted various aspects of the case to be examined in order to gain an appreciation of the phenomenon. This aside offering an opportunity to undertake in-depth interviews with study participants, also enabled their observation by the researcher as they go about their usual duties. The observations were beneficial as it offered the researcher an opportunity to observe the perceived uncertainties with reality of living in rural area, more particularly issues of scope of practice of radiographers within rural setting regarding the extent of their role(s) (ranging from image interpretation to other additional roles and responsibilities). Besides, a case study approach is widely used in healthcare delivery research, as it gives an understanding of experience from the perspective of the individuals (Cohen et al. 2000) which this study sought to achieve.

4.1.1 Case Study Approach overview

In order to get an understanding of the issue that this study sought to explore, it was essential to get an appreciation of the experiences of the participants as constructed in their own context. It was therefore imperative to have applied the knowledge gained about the case study approach in the design of the methodological framework for this study in order to establish why the indicated approach was deemed the best fit. The current study followed the considerations suggested by Yin (2003), which were defining the case first and foremost, then selecting the case study design and the data sources.

Schoch (2016) posits that case study research entails a thorough and rigorous analysis of a specific event(s), situation, organisation, or social unit. Yin (2018) contends that a case study is a detailed inquiry of a contemporary phenomenon within its real-life context. Literature suggests that the case study is particularly suitable if the context is relevant to the phenomenon (Yin 2018; Schoch 2016; Miles et al 2014). A case study usually has a defined space and time frame: *“a phenomenon of some sort*

in a bounded context" (Miles et al. 2014, p.28). Thus, case study depends on multiple sources for its evidence, as the boundaries between a phenomenon and its context are not always clear (Yin 2018, p.15). Notwithstanding, Miles et al. (2014, p.28) asserted that a case could be a person, a role, an organisation, a small group/group of people, a community, or even a nation. Schoch (2016) indicates that case studies are best suggested by the bounded phenomena of interest and not by specific methods. Therefore, various studies could be conducted under the broad umbrella of case study approach.

4.1.2 Case definition

It has been advised that it is important to be careful when defining the case as the research question reflects the boundaries and definition of the case (Schoch 2016). According to Crowe et al. (2011), case definition by researchers could be informed by their research question(s), which are expected to be carefully planned/formulated by an existing literature and/or by previous understanding/awareness of theoretical issues and setting(s) (George and Bennett 2005; Stake 1995). Eccles (2006) posits that a theory motivated method in defining the case could help produce information that could possibly be transferred to a variety of clinical settings and behaviours.

This study conformed to the above suggestions regarding the case definition. Consequently, the case of this study was rural radiography practice; a professional practice situation that have resulted in perceived assertions about rural radiographers' unique sets of challenges (Williams et al. 2020) as well as an unknown reality of their (rural radiographers') practices and experiences within their own rural setting. The concern underlying this enquiry was about if/how they ensure the provision of quality services for better patient outcomes, irrespective of the purported shortage of these professionals revealed in literature (Ghana Health Workforce Observatory 2010). It was also important to note that the boundaries of the case are the rural radiographers within the three selected sites of the study (i.e. in Upper West, Ashanti and Central regions) and exploring their practices and experiences within the specific rural setting where they live and work.

The case is bounding as these group of professionals have been indicated (Mung'omba and Botha 2017) to have distinct characteristics and practice

environments (known to work at various remote geographical locations) with varied cultures, languages, patient populations, equipment and amenities and many unknown living/working conditions across the country. It was important to include radiographers from these different parts of the country to ensure that every aspect of the case under study was explored effectively. This boundary definition also served as a means of getting data from diverse geographically rural environments, as well as obtaining data from varied sources to enable the data triangulation that boosts the robustness of a complex case study (Salkind 2010).

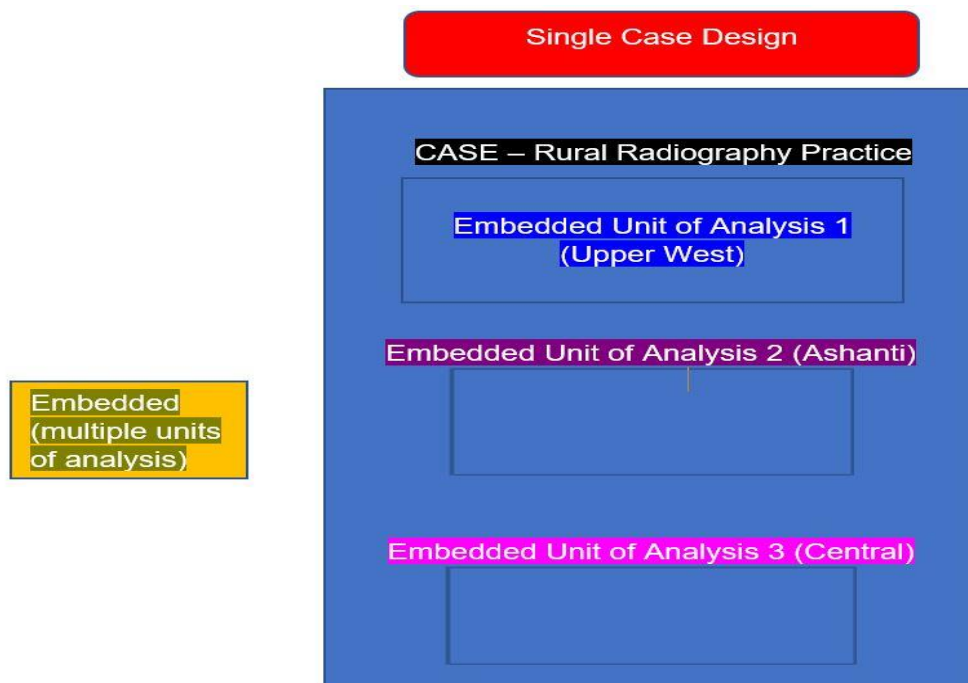
4.1.3 Case Selection

According to Stake (1995), it is essential to think and reflect carefully before making the choice of selecting the case(s) to study. To guide this selection, it has been asserted that there ought to be initial plans/propositions (here objectives of the study) to serve as a blueprint to guarantee focus and thereby simplify a hugely complex situation (Yin 2003). So outlining the study objectives at the start of a study ensures that the scope of the study is limited and focused (Baxter and Jack 2008). The proposition of this study as indicated in this chapter guided every phase in ensuring that the overarching research question and objectives in previous chapter were addressed. There was the need for an approach that could give an in-depth understanding of the rural radiographer world from various viewpoints in its natural setting. The qualitative approach provided an in-depth study of a phenomenon in a specific context (Silverman 2001). Due to the complexity of the phenomenon of interest (rural radiography practice), there was a need to carefully select data and subsequent analysis which would reveal and/or establish an understanding of the phenomenon. This was because of variations in populations and cultures, languages, as well as socio-economic conditions between and even within rural settings. Accordingly, as the issue of rural radiography mostly would have been an overly wide scope to explore considering the timeline planned for this study, the objectives of the study safeguarded the research focus.

According to Baxter and Jack (2008), case studies can be done using either single or multiple cases and each can have embedded units. A single case study with embedded units permits the researcher to explore one extreme case, whilst multiple

case studies with embedded units permit the researcher to explore a number of cases in order to understand the similarities and/or differences between the cases (Stake 2005; Baxter and Jack 2008). According to Yin (2012a) sites selected for study should provide the researcher with the persons, institution, documents, processes and all that makes up the required units of analysis of the study. These sites should be accessible and the cases selected should be open to investigation. Yin (2012b) suggested that when selecting sites for case study, it is important to anticipate to explore varied data in order to fully establish/identify the phenomenon under study.

Figure 4.1: **Flow diagram of a single case study design adopted from Yin (2009)**
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This study adopted the use of a single case study (rural radiography practice) with three nested (embedded) cases to explore the individual real life experiences of rural radiographers in clinical practice. Thus, a single case study with multiple sites (i.e. discovering the practices and experiences of rural radiographers who may have similar working patterns but different languages, socio-cultural practices amongst other differences). The sources of data were semi-structured interviews with participants, direct observations of participants, as well as the researcher’s reflective diary and also review of available documents with relevance to the study objectives (as indicated in chapter 1 of this thesis). These four sources of data were triangulated, thus increasing

the robustness of the study as indicated by Yin (2003). Purposive selection was used for both the study sites and the embedded units (Ames et al. 2019). This was done to ensure that sites and units selected had rich information (Ames et al. 2019) about rural radiography practice., as each site comes with its own conventional practice environment, culture, languages and socio-economic characteristics. The case was selected based on its description and the researcher's interest in wanting to explore experiences and practices of rural radiographers in as diverse sites as possible. Diversity, availability and the prospect for learning play a very significant role in purposive sample selection (Rolls 2015).

4.2 Sample Selection Procedure

4.2.1 Study Setting

The research was conducted within selected rural settings in Ghana a West African country which shares borders with Cote d'Ivoire to the west, Burkina Faso to the north and Togo to the east. The southern part of the country is the Gulf of Guinea and the Atlantic Ocean. Administratively is divided into sixteen regions.

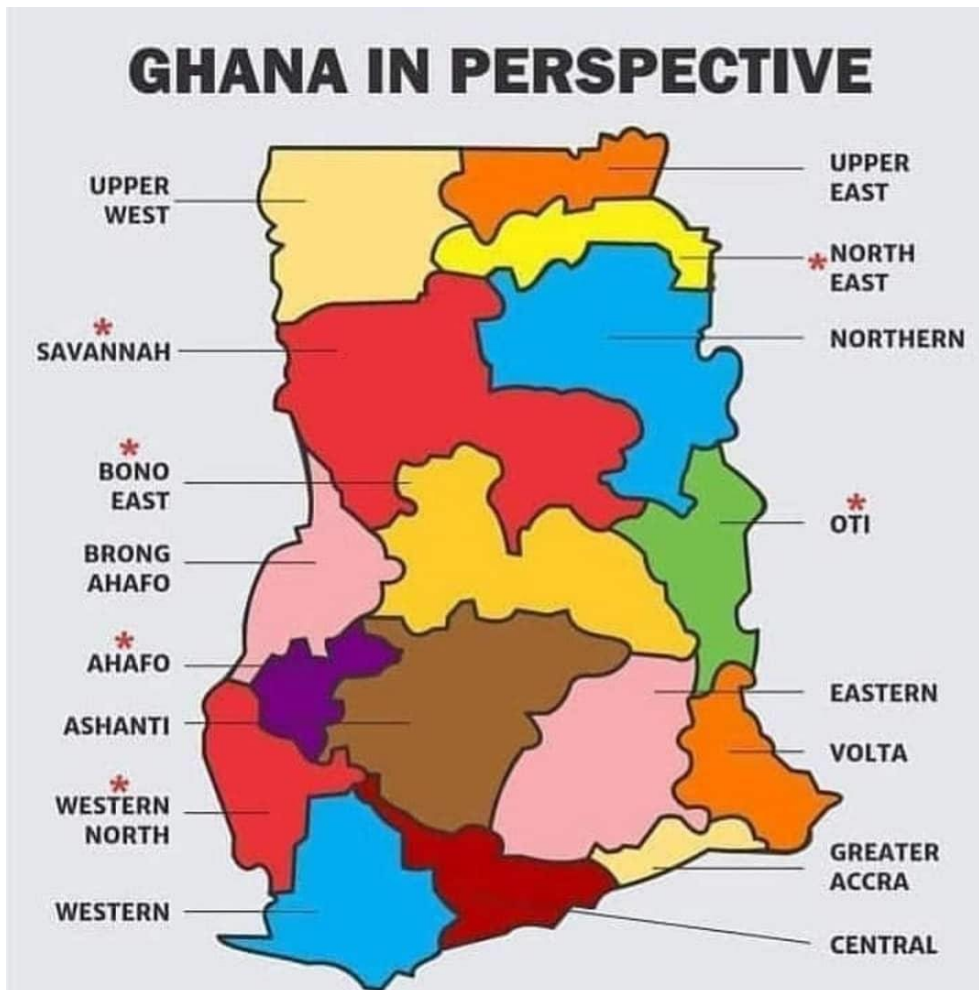


Figure 4.2: The figure above is a map of Ghana showing its 16 regions
 Source: Ghana Statistical Services, Geographical Information Systems (GIS) Section

As indicated earlier the interviews and observations were conducted at three sites, Upper West Region (Wa), Ashanti Region (Kumasi) and Central Region (Cape coast) (as shown in figure 2 above). The selection of these rural towns was to include farming and fishing communities which are most prevailing environmental features of rural communities in Ghana. Most importantly, the sites selected are located at different geographical areas with differences in extent of remoteness/rurality, different populations, varied culture, various socio-economic conditions as well as different levels of infrastructure. It also covers the geographic north of the country which is the poorer part and as such attracts fewer professionals and the geographic south which is much relatively wealthier and has better living conditions which is therefore generally comparatively more attractive to professionals.

4.2.1.1 Upper West

Wa is the capital of the Upper West Region, it is in the north of Ghana (upper belt) and with mostly farming activities. It is considered the most poorest rural area which is relatively unattractive to professionals. Wa has acute shortage of radiographers and no radiologist. In Wa the study recruited radiographers for both observations and interviews. Additionally, other radiographers also consented to participate and were interviewed only. The criteria for selection of radiographers in Upper West was the same as for Central and Ashanti.

4.2.1.2 Ashanti Region

Kumasi is the capital of the Ashanti Region of Ghana, located in south Ghana (centrally located in the middle belt) and is third largest of 16 administrative regions (formerly 10). It is considered a mix of farming and industrial community and known for its major gold bar and cocoa production. Ashanti (Kumasi) has both radiographers and radiologists more than Wa and cape coast. In Ashanti the study recruited radiographers for both observations and interviews.

4.2.1.3 Central Region

Cape coast (lower belt) is the capital of the Central Region of Ghana. The region's economy is dominated by mining and fishing. It has both radiographers and radiologists more than in Wa. In central the study recruited radiographers both for observations and interviews.

4.2.2 Sampling Technique

A purposive sampling method was used as qualitative study requires an information rich sample as indicated by Patton (2002). This method is appropriate when there is the need for participants to have certain unique characteristics (i.e. performing diagnostic radiographic procedures without onsite radiologists' services, etc) that are critical to the research so that they can provide the needed information for the research. The participants were radiographers, specifically working in District or Regional health facilities in rural areas of Ghana.

There are two main groups of sampling: probability and non-probability. Tashakkori and Teddlie (2003) defined probability sampling as the method where every member

of the population has an equal chance of being selected, and non-probability method as the sampling method where participants are selected deliberately, or by convenience. Bowling (2005a) further indicated varieties of non-probability sampling including purposive, quota, and snowball samples. The study adopted purposive (where participants are chosen by the judgment of the researcher) and snowball sampling (where existing study participants recruit future participants from among their colleagues). Accordingly, participants were purposively selected for interviews as advised by Carter and Henderson (2005) who suggested that for a study to reflect some specific qualities of the population of interest, purposive sampling should be adopted. This was because the radiographers under study had similar training and also work under similar working conditions but with some levels of variations within the rural setting. Purposive sampling was appropriate for this study because it helped gather the needed data from the target sample and to gain opinions of the population which is projected to answer the research question(s) (Portney and Watkins 2009).

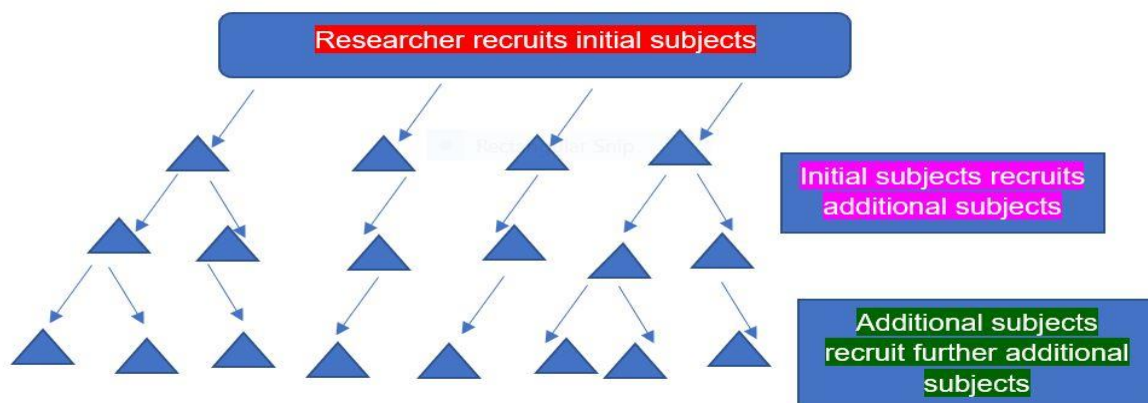


Figure 4.3: **Flow diagram of snowball sampling**

The researcher aimed to approach persons within the 3 sites who fell within the inclusion criteria (see section 4.2.5.1). Also, persons who agreed were asked to invite anyone who was willing to participate in the study (snow ball approach) in order to increase participation of appropriately knowledgeable people. (Naderifar et al. 2017).

4.2.3 Size of sample

The sample size of any research is primarily determined by the study objectives, research question, and subsequently the research design (Onwuegbuzie and Collins 2007). Qualitative research mostly has smaller sample sizes compared to quantitative studies because qualitative research generates in-depth data that is used to understand the experiences of the study participants and often results in a large amount of data to be transcribed and analysed (Kirkman 2002). The sample size however varies with qualitative research depending on the research design. Usually, the sample being investigated is quite small, especially when compared with probability sampling techniques (Vasileiou et al. 2018). Sample size in qualitative studies is mostly not predetermined by rigid rules as with quantitative studies (Christensen et al. 2015; Holloway and Wheeler 2013; Namey et al. 2013). Also, it has been indicated that, participants in a qualitative study are not necessarily representative of a broader population (Namey et al. 2013) because the aim is getting an in-depth understanding of their reality (Dworkin 2012). Thus, in this case exploring the experiences and practice of rural radiographers by having an in-depth engagement with each participant.

There is no agreed sample size for case studies, with variation as the study could be a single case or a multiple case study (Vasileiou et al. 2018; Yin 2009). Emphasis is placed on the quality of data from multiple sources rather than on the sample size (Yin 2009). Notwithstanding, Schoch (2016) posits that case studies usually have small sample sizes comparable to most qualitative researches. Therefore, the use of a small sample size to quickly meet the requirement of qualitative research analysis is recommended (Yin 2009). Furthermore, Schoch (2016) indicated that the choice of sample and cases to use are straightforward and clear. This is as a result of the distinctiveness of the individual/group and/or by reason of specific plan/arrangement or to access the case (Schoch 2016). This study sampled all radiographers (approximately 10 at each site) working within the three selected sites that fell within the inclusion criteria so as to have diverse views. This supports the claim by Burns and Grove (2003) who suggested that it is advised that the whole population is included in a study when the population is small. Accordingly, this current study recruited and interviewed a total of 18 radiographers from from 9 centres (3 centres in each of the 3 regions).

4.2.4 Sampling Procedure and Recruitment Process

Creswell and Piano (2011) indicated that purposive sampling involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest. Other authors have suggested the importance of availability and willingness of participants to participate, besides participants' knowledge and experiences, and the capacity to communicate experiences and views in a coherent, open and insightful fashion (Bernard 2002; Spradley 1980). Purposive sampling relies on the judgement/decision of the researcher when it comes to selecting the units (e.g., people, cases/organisations, events, pieces of data) that are to be studied. Therefore, not all radiographers within rural areas in Ghana were recruited for this study. The study participants were only recruited from the 3 sites (Wa, Kumasi and Cape coast) chosen out of the 16 regions of Ghana. The rationale for these site selection was key and justifiable as these selected sites were deemed to represent the upper, middle and lower belt (regions) of the country. Hence, they provided a fair representation of different and/or vivid description of diverse geographical areas (farming, industrial, mining and fishing communities), with different populations, dialects, culture, socio-economic conditions, infrastructure and extent of remoteness/rurality from the main capital cities where major healthcare facilities are sited with relatively superior conditions and services. Besides, these sites were settled on due to an initial information gathering visit the researcher embarked on prior to the start of the study which strengthened his direction and approach (*see chapter 1, section 1.3.3*).

The rural radiography workforce within the selected sites anecdotally is approximately 80 radiographers. The study aimed to invite all radiographers working within the three selected sites. The Ghana Society of Radiographers have a list of all registered members, their respective places of work, their contact details and how long they have been in service. The list however does not include personal details. The list acquired was only used for the purposes of this study and no copies were kept after the study. Participants were invited/contacted by an invitation email sent out by the GSR, which interested persons were asked to contact the researcher directly. Contact details of the researcher were sent along with the information about the studies and interested

participants were required to contact the researcher for further discussions about the study. After GSR invitation, the researcher used a snowballing sampling technique to reach other interested participants who were not reachable at the initial stages of recruitment. Participants who agreed to take part in the study were contacted by the researcher and an agreement on a convenient date, time and venue for interview were arranged. This study adhered to the need to leave a clear audit trail as that is deemed essential in increasing trustworthiness and transparency (Bryman 2012). Also, in line with the recommendation by Rubin and Rubin (2011), this study adopted the use of protocol that has been recommended as method of guaranteeing rigour/trustworthiness.

Recruitment of study participants required that the researcher made the effort to have participants who were reliable and fulfilled the inclusion criteria. First of all, as noted; permission was sought from the stake holder mentioned above in order to involve its members in this study. Those who were willing to participate in the study voluntarily were invited for interviews. But, this was done prior to a thorough discussion with the individual participants selected aiming to reach an agreement and arrangement of convenient venue, day and time for the interview(s).

The participants were each given a participant information sheet (*see Appendix F*), The information sheet had content that explained the purpose of the study, indicated the right to withdraw at any point even after consent had been given and without having to provide any reason. Participants rights were explained and were made aware of what they would need to do if they consented to take part in the study by the researcher. They had two weeks to consider whether or not they wanted to be part of the study, however due to the Covid-19 pandemic an extra week was provided as participants had changes in their clinical work schedule. Those who were interested were then contacted by telephone for further discussion and to answer any questions they might have. Following that, a suitable date and time for observation and interview was agreed. All the face-to-face interviews were held in the offices of the participants within the X-ray unit. All participants signed a formal consent form (*see Appendix G*) and granted verbal consent which was captured on audio tapes before the start of each interview.

4.2.5 Eligibility criteria

Eligibility criteria for this study were framed to include rural radiographers in Ghana located within the selected regions.

4.2.5.1 Inclusion criteria

This study sought diagnostic radiographers engaged in clinical practice within rural areas in Ghana. The participants were all state registered radiographers practicing within the selected rural towns (Wa, Kumasi and Cape coast). It was anticipated these are radiographers who are expected to have the necessary familiarity about rural radiography practice. Bowling (2005a) advised that questions regarding knowledge of a topic should be asked only when respondents are believed to be in a position to have the necessary responses. These radiographers are believed to be aware of living and working conditions about rural radiography practice as they have stayed and work long enough within the rural setting. Therefore, they are expected to be in the position to tell whether or not they are faced with challenges and to express their opinions with respect to their experiences and scope of practice within the rural setting.

4.2.5.2 Exclusion criteria

Those excluded were non-clinical radiographers, intern radiographers, student radiographers, non-registered radiographers and those unwilling to provide consent were also excluded in the study. Similarly, radiographers in the capital cities or urban areas and student radiographers on placement were also excluded. This was because they were deemed not to have adequate and/or current practical experience within a rural setting. Therefore, they were not considered very experienced of the research setting and so were not expected to provide more reliable information about rural radiography practice.

4.3 Materials and tools for data collection

The approach/method that anticipates to generate the needed data is informed by the choice of data collection methods employed (Ritchie and Spencer 2003). Thus, this study adopted multiple tools for data collection: participant observations, in-depth interviews, review of relevant and available official documents as well as researcher's reflective diary. In order to answer the research question and to enhance the

robustness/depth of this case study, the tools used guaranteed that data from different sources were explored and triangulated.

4.3.1 Interviews

The choice on which data collection method to use is reliant on the method that is more likely to produce the required data as suggested by Ritchie and Spencer (2003). In order to explore the practice world of the rural radiographer; semi-structured in-depth interviews was best suitable. As indicated, qualitative interviews were the main method of data collection. Interviewing has been described by Burgess (1984:102) as 'a conversation with a purpose'. Interviews were considered as part of the research design because this study sought to gain in-depth knowledge from the participants about the phenomenon under study. The semi-structured interview approach was flexible and included every new theme that emerged during the interviews. Studies have indicated the need for the use of a guide for interviews that covers broad topics based on the research questions in order for an interview to be neutral, sensitive, open ended and unambiguous to the interviewee (Patton 1997; Riessman 1993). Therefore, an interview guide was developed for the participants with open-ended questions and follow-up probes which were based on the research objectives.

The interviews involved radiographers working in a rural area. Each interview was expected to last between sixty and ninety minutes. The interview guide and probes were piloted in Ghana for clarity and understanding (*see Appendix H*). The interviews were conducted at the workplaces of the participants. This was to make them comfortable and avoid them spending time travelling for the interviews. The interviews were estimated to cover a period of three months which started from March 2020, however, there were undue delays (which resulted to about an additional two months) due to issues with the Covid-19 global pandemic which resulted in relatively brief nationwide lockdown including travel restrictions.

4.3.1.1 Planning the interview schedule

A successful interview begins with a detailed plan that is in line with the aim of the research question(s). Developing a suitable interview schedule, or semi-structured interview can help achieve a good conversation with the participant. This helps the

participant to give a comprehensive explanation of the experience at the focus of the study as advised by Edwards and Holland (2020). The planning process involved identification of a broader area of the research topic that the participants were expected to cover during the interview; then the researcher decided on the questions that the interview was to cover, the question were arranged chronologically.

In an unstructured or semi-structured interview, the order of the question is not necessarily to be followed (Bryman 2012). In developing the interview guide, difficulties like the phrasing of the complicated question, discussions of sensitive topics, handling of therapeutic support and managing reserved participants may arise. Therefore, plans were put in place to care for these situations (Edwards and Holland 2020). Namey et al. (2013) additionally suggested a need for a discussion of the interview guide with potential participants, co-researcher or supervisor before commencing the interviews.

Qualitative research interview questions are open-ended, clear, neutral and sensitive. Also, is based on behaviour or experience, opinion or value, knowledge, feeling, sensory experience, demographic or background details (Patton 2002). Generally, it is a good practice to start the interview with easy questions, then move to more difficult or sensitive questions (Bryman and Cassell 2006). Language that was understandable and appropriate to the interviewees were used and leading questions avoided (Bryman and Cassell 2006). To solicit detail information from the participants, analytical notes were also taken in order to be used for probes or prompts.

4.3.1.2 Analytical Notes

During the interview, brief notes were also taken where/when possible either for probing or a reflexive concern or also to note down observations. Brief notes as part of the interview process is believed to allow the researcher to describe the setting and the various activities encountered (Bryman and Cassell 2006). The notes were helpful for the familiarisation stage to record the main issues without letting these dominate the decontextualisation of the data. This process of reduction is a vital part of performing qualitative analysis for the source of themes to remain rooted in the data, and also prevents the participant's reality disappearing by simply overlaying themes from the researcher's perspective as indicated by Ritchie et al. (2003).

4.3.1.3 Probing

According to Holloway and Wheeler (2013), probing gives room for views of interviewees to be explored further than expected. Probes such as 'How did you feel about that?' and 'Can you tell me more about that?' allowed a further explanation and elaboration of important points that had been discussed. However, prompts were only needed for more complex or abstract questions (Namey et al. 2013).

Edwards and Holland (2020) advised that inexperienced researchers have to develop their interview skills by listening repeatedly to an interview and transcribe it before the next interview. This approach according to Edwards and Holland (2020) affords them the chance to know when responses and probes ought to have come. This approach further helps to identify if any question is confusing or misunderstood by the participants, hence the need to change or re-write the interview guide. Additionally, seeking comments and advice from supervisors or other researchers will help the novice researcher to develop his or her interview skills as recommended again by Bernard (2000). It was further explained that participants should be prepared to understand the interview will be audio-recorded as for future transcription as well as advice about the time commitment expected (Bernard 2000). The information sheet and consent form can help in this regard. It was also suggested that a copy of the interview schedule should be given to the participants before the interviews commence (Namey et al. 2013).

The environment where interviews are conducted is of importance as it affects the data collection process. The interview is best done at a time and place of convenience of the participant's, a relaxing location that is devoid of interruption is encouraged (Namey et al. 2013). Usually, interviews done in the participant's home may be more relaxed and place the participant in the control seat (Holloway and Wheeler 2013). Nevertheless, household activities and family commitments may cause some interference and disturbances. Therefore, a neutral place can be more suitable (Holloway and Wheeler 2013). Accordingly, the researcher learnt the interview schedule before the interview, in order not to interrupt the participant at any time when referring to the schedule which may also affect the flow of the conversation. A well-prepared researcher obviously would be focused, listen carefully and respond

correctly in the interview. The responses and the explanations of the participants allowed the researcher to answer the research question (Edwards and Holland 2020).

4.3.2 Observation

Observation was defined as listening, watching and sometimes questioning the actions and inactions of the participants (Kawulich 2005). Observation is a method that can be used in the data collection process. This method provides some level of perception and offers an understanding of the experiences of participants that might have been otherwise missed (Spradley 1980). This method is commonly used in case studies as part of data collection when considering the use of multiples methods of data collection. Observations can be done with the active participation of the observer, or as non-participation. These two techniques of observation are not mutually exclusive and can be combined in a single study (Kawulich 2005). Studies have described these techniques as participant and non-participant observation (Holloway and Wheeler 2010; Hammersley and Atkinson 2007;). Hammersley and Atkinson (1994:249) suggested that: *“all social research is a form of participant observation because we cannot study the social world without being part of it”*.

Observational methods are faced with some challenges. According to Polit and Beck (2004) there are two key challenges; observed and observer relationship and possible observer bias. They asserted that the presence of someone observing what is being done could lead to a behavioural change from the norm. They also raise the issue observer bias. The observer could make errors, misunderstand the activity or could miss the activity totally. They argue that objectivity in observations is hard to accomplish. Making use of a knowledgeable insider comes with the added advantage of being able to recognise the significance of subtle interactions but can also lead to failure to note significant patterns. Hammersley and Atkinson describe this (1995:227) as a non-observing participant. Angrosino et al. (2000) indicated that if the researcher is familiar with the research environment, it is important to reflect on their ‘taken for granted’ assumptions and possibly look out for cases that might challenge that assumption. A technique were a researcher follows a participant over a period of time as they go about their normal duties as been described as shadowing (MacDonald 2005). It involves observing and asking questions on their activities. These questions

turn to prompt in the one being shadowed to explain concepts and activities. Shadowing sort of provides a link between observations and interpretation.

Adler and Adler (1994) indicated that observation as a method of data collection has been criticised for not being transparent. They opine it is not open for external scrutiny as a recording or transcript of an interview can be. Consequently, they suggested the use of multiple observers so that findings can be compared. This solution is however being questioned by Coffey (1999) who indicated that that observation is not a neutral act but experiential and sometimes emotional meaning different observers will generate different data. Nonetheless, trustworthiness is dependent on the ability of the researcher to reflect on his or her influence on the data collected.

Observational research in studying of roles played by different groups and how they relate is very important (Mays and Pope 1995). It was used by Strong and Robinson (1990) in their case studies examining the introduction of general management roles in the National Health Service (NHS) in the UK.

This study however made use of both participant and non-participant observation.

4.3.2.1 Who was observed?

This study sought to observe rural radiographers. Those who were interviewed were the same people who were observed over a two-day period of an eight hour shift daily (7am – 3pm) as they go about their normal duties for each participant.

The radiographers were observed as they practice within the radiology department and if they have to perform any other duties outside of the department they were still followed and observed.

4.3.2.2 What was observed?

Deciding what to observe and what not to observe can be an overwhelming task and it is not possible to observe everything (Mason 2002). Observation therefore involves the researcher's discretion on what and who to observe and the role the researcher plays in the observation is vital.

In this study, the researcher sought to observe the everyday practice of the selected rural radiographers. The study sought to observe how they go about their practice,

what additional roles they are taking up beyond their scope of practice at registration and the extent to which they are supported/supervised when performing additional roles, they have taken up beyond their scope at registration. The observations also focused on how they interacted with and related to other professionals (medical officers, nurses etc), and whether or not their opinions are needed by other professionals on the images they produce. A focus was also on any other activities relating to radiography practice within the rural setting that might be of interest to the study. In all cases questions were asked if there is the need for clarification.

4.3.2.3 How long was the observation?

The study sought to observe each of the participants for a full shift (8 hours) for two days (16 hours). This included reporting to the facility before the time the participants started their work and following him or her around throughout the period of their shift for the whole day till they closed. When participants went on lunch break was also part of the observation as it was possible to ask questions during such breaks of incidents that might have happened.

4.3.2.4 Analysing and reporting the observation data

The findings were reported using field note extracts and following the people, place and events framework proposed by Spradley (1980). Extracts were used to explain the issues that arose in the interviews and to clarify points during the interviews themselves as necessary.

4.3.3 Documentary review

Official documents have been indicated to have an added benefit of being written without prior knowledge that they will be used for a study (Bryman 2004). These documents gave information about the organisational cultural and technical practices. Marwick (2001) indicated their utmost importance in case studies as they represent an additional view point irrespective of how they are presented. The process of selection of documents for review for the study was a rational one. As it was based on availability and relevance.

These documents included Ghanaian Health policy documents on ideal staffing levels for rural radiography, government documents, and/or online reports on new roles and rising health demand, as well as other documents available and of relevance to the study. The availability was based on which documents were publicly available and what officials were willing to provide. This is because at the time of the study there was no explicit laws in Ghana regarding right to information which would have persuaded public officials release the needed documents available as requested. Relevance was mainly considered based on the objectives of the study. Thus, study objectives informed the criteria in identifying sources of documents which included; GSR, Allied Health Professions Council (AHPC), Nuclear Regulatory Authority (NRA), Ministry of Health (MoH), Ghana Health Service (GHS), World Health Organisation (WHO). Nonetheless, websites of a number of organisations were also searched to retrieve any relevant document to the study. In order to gather information regarding the staffing levels within the Ghanaian health sector, the website of the National Development Planning Commission (NDPC) (www.ndpc.gov.gh) was searched. This website was accidentally chanced upon in a published thesis which indicated the staffing levels within the health sector in Ghana. This was after a search from GHS, Rad-Aid Radiology Ghana Report, MOH, AHPC as well as GSR did not readily provide the needed document at the time of the study.

Notwithstanding, GSR provided some very essential documents after requesting from the GSR secretariat. A comprehensive analysis of the documents were undertaken simultaneously with the interviews suitably, presenting an opportunity to follow up on documents with the study participants. List of documents retrieved for review with their titles and dates is appended in this thesis. Bowen (2009) asserted that the main purpose for doing a documentary analysis was to additionally include data from another source to the interview and observation data.

4.4 Triangulation of Data

Triangulation entails the use of various sources of data or multiple approaches to analysing data in order to increase the reliability of a research (Salkind 2010). It has been argued that triangulation helps bring together various viewpoints which helps in achieving a more thorough understanding of the phenomenon of interest (Salkind

2010). Accordingly, data from interviews, observations, documentary review and researcher's reflective diary were put together to produce a more coherent report. Each data source contributed one way or the other in ensuring that the research question was answered. The interview data gave room to reveal the views of the participants, observation data gave the opportunity to examine the participants directly as they went about their normal practice. The documentary data offered how rural radiography issues were managed in Ghana and also laid-bare policy situation within the Ghanaian context. The researcher's reflective diary presented an opportunity in reflecting on every aspect or stage in the developmental process of this study. It also ensured that steps were taken to eliminate personal bias to the best of the researcher's knowledge.

Triangulation involved cross referencing and evaluating data from the various sources for corroboration and/or disagreement/conflict. For instance, during the interview one participant indicated that they provided verbal comments on radiographs when they are approached by referrers during their course of work. This assertion was supported by the observation made by the researcher (it was observed that medical officers, nurses and other healthcare professionals walked into the X-ray unit to sought radiographer's opinion about the radiographs that were produced). It was also observed that radiographers were performing tasks/duties beyond their scope of practice as defined by Scope of Practice at Registration document from the AHPC. Similarly, participants during interview asserted that there was shortage of radiographers as professionals do not accept rural postings due to discrimination as other healthcare professions were offered incentives. This view was supported by official documents (correspondence between GSR and the Director General of the GHS) regarding postings of biomedical engineers to rural communities due to the shortage of radiographers. Review of the documents further revealed that various health facilities were directed to engage unqualified persons to operate the X-ray equipment instead of offering incentives to radiographers to attract them. Whiles, in the case of the medical officers, the GHS offered incentives to attract them to the rural areas. Radiographers had also indicated in interviews that they were not granted permission by management to attend CPD programmes. However, a sensitive issue captured by the researcher in his reflective diary during an informal interaction with some of the participants during the observation phase; revealed that permission was

granted to other professional group such as the medical officers by management to attend CPD programmes. This was not however disclosed in either interviews or documentary reviews. Such information would not have been picked up but for the reflective data. The incorporation of data from all the sources in this way gave a more coherent and complete understanding into the issues of rural radiography practice in Ghana and offered ways of providing the needed support to address them. A diagrammatic presentation of how triangulation was achieved is provided in Appendix of this thesis.

4.5 Data analysis

Data analysis has been indicated as a vital research process which contributes to an original understanding of phenomena depending on how thorough the data analysis was conducted (Pope et al. 2000). Thus, the findings once circulated/distributed or published could be critically appraised which could result in further studies and eventually bring about change and/or impact practice. Yin (2017) have stipulated that there are a number of analytic approaches employed within case study research and one of such within and across case analysis. It is imperative to note that in case study design identifying the appropriate themes is vital as the researcher ought to consider themes that are relevant in individual cases and those that cut across cases as it plays a crucial role in data analysis (Ayres et al. 2003). This also guarantees that the researcher clearly defines which set of themes are specific to some participants and which themes are relevant to all participants (Ayres et al. 2003).

In case study methodology, importance is placed more on the quality of data analysis than interview format or sampling (DeWalt and DeWalt 2002). This is because the methodology makes use of various sources of data which are all important once suitably integrated into the analysis. Data were collected from interviews, observation, documentary reviews and a reflective diary. The interviews were transcribed from each interviewee. For validity and reliability, the interviews were transcribed verbatim by the researcher, and re-read repeatedly while listening to the recording for spelling mistakes and any other errors; the anonymized transcript were imported into NVivo 12 pro for coding, analysis, and interpretation. Analysis was guided by the study

objectives, but did not overlook the emergence of new themes from the data that could potentially challenge or alter the focus of the study.

Development of thematic networks by which data is linked at different levels is commonly used (Attride-Sterling 2001). Thematic analysis has the potential of providing a complex, detailed and rich account of data (Braun and Clarke 2006). According to Alholjailan (2012), thematic analysis has widely been stipulated as the best choice for researchers who are attempting to explore people's opinions, knowledge, experiences or values from a set of qualitative data (i.e. interview transcripts, survey responses and review of documents). There are different approaches to thematic analysis, thus Javadi and Zarea (2016) advised that once a researcher decides to use thematic analysis, then there is a need to consider which approach will be appropriate for his/her study. Braun and Clarke (2006) indicated that amongst the various thematic analysis approaches extensively used, there are distinctions between each of the approaches. Braun and Clarke (2006) mentioned a number of approaches which includes: inductive, deductive, latent and semantic and gave the distinction between them. A semantic approach requires analysing the explicit content of the data, while latent approach entails reading into the subtext and assumptions underlying the data (Braun and Clarke 2006). The inductive approach allows codes and themes to be developed based on the content of the data (*ibid*). A deductive approach which allows codes and themes to be developed based on a preconceived ideas/themes, framework and/or theory or existing knowledge. Yet, Nowell et al. (2017) advised that, researchers ought to reflect on whether or not their theoretical framework presents them with a robust concept/theory of the kind of themes they expect to find in the data (deductive), or consider whether or not they are planning to develop their own framework based on what they find (inductive).

Gale et al (2013) indicated that in qualitative studies a framework method of analysis has been used widely for over four decades. Gale et al (2013) further indicated that a set of codes organised into categories that have been jointly developed by researchers involved in analysis that can be used to manage and organise the data. The framework creates a new structure for the data (rather than the full original accounts given by participants) that is helpful to summarise/reduce the data in a way that can support answering the research questions (*ibid*). Another framework suggested is a five stage

'framework' analysis system developed by Ritchie and Spencer (1994) in their quest to attempt to make the process more systematic and transparent. This system was used to bring all data from the different sources across the case studies as one unit of analysis. This system is both inductive and deductive in its approach to generating themes and identifies previous knowledge, but also allows new themes to develop. Ritchie and Spencer (1994) framework have five stages namely; familiarisation, theme identification, indexing, charting and mapping and interpretation.

Braun and Clarke (2006) provided a six-phase framework through which thematic analysis should go. Accordingly, this study predominantly applied inductive approach as well as some elements of deductive approach as indicated by Braun and Clarke (2006). This was as a result of the fact that the objectives of the study (which may be considered as a preconceived ideas/themes, framework and/or theory) informed the observation process as well as the relevant document needed for documentary review. Therefore, in analysing such data there was a sort of reflection and some level of expectation by the researcher about what kind of themes he expected to find in the data (deductive). The researcher after deciding the suitable thematic analysis method for analysing the gathered data, then settled with the six-phase framework developed by Braun and Clarke (2006). The researcher knew he had a sufficient sample by identifying the commonalities that develops during the data analysis and thus, noted that there was data saturation. Data saturation refers to the time in the research process when no new information is discovered in data analysis, and this redundancy informs researchers that data gathering may be discontinued (Guest et al. 2020). The six-phase framework developed by Braun and Clarke (2006). involves the following steps below

4.5.1 Stage 1 Familiarisation

The first step was for the researcher to get to know his data. It was important to get a thorough overview of all the data collected before starting analysing individual items. This involved transcribing audio, reading through the text and taking initial notes, and generally looking through the data to get familiar with it. Thus, the researcher familiarised himself with the data by immersing/engaging himself in the details of the interviews to get an overview of vital issues and recurring themes that emerge.

The need to see data analysis as an iterative process that guide data collection, writing up and further data collection rather than as a distinct stage is highlighted by Coffey and Atkinson (1996). The researcher therefore commenced the data analysis process whilst collecting data by ensuring that each interview was transcribed before the next one. A strategy supported by Lofland and Lofland (1995). The researcher gained familiarity by personally transcribing each interview and the emerging themes were identified during the thematic analysis of the transcripts (*see Appendix K*). The data was stored, organised, and coded using NVIVO 12 computer software.

4.5.2 Stage 2 Coding

The next step was to code the data. The coding involved highlighting sections (phrases or sentences) of the text in the transcribed data. After which labels or codes were developed to describe the content of the data. An extract from one of the interviews is presented in appendix of this thesis. The extract highlights various phrases in different colours representing different codes with each code describing the idea and/or feeling expressed in that part of the text. The researcher was thorough at this stage in going through the transcript of each of the data gathered and highlighted everything relevant and of interest that evolved.

Also, phrases and statements that matched the identified codes were similarly highlighted with new codes being added as the researcher went through the transcribed data. The next stage after going through the text was to collate and bring together all the data into groups identified by code. These codes allowed the researcher to gain insight of the entire data and was able to give summary of the main points and common meanings that repeat throughout the data.

4.5.3 Stage 3 Generating themes

This step focused on looking over the codes that were created with an identification of patterns among them. The researcher then started developing themes from the data. These themes are generally broader than the codes as indicated by Braun and Clarke (2006). Generally, a number of codes were merged into single theme. An example of turning the codes into themes is presented in the appendix of this thesis.

The researcher at this stage decided which of the codes were unclear and/or not relevant enough and thus discarded them. However, other codes became themes in their own right as it brought out an idea/concept about the data for the purpose of answering the research question.

4.5.4 Stage 4 Reviewing themes

At this point the researcher had ensured that the themes were useful and accurate representation of the collected data. The researcher at this stage revert to the set data and evaluated the themes against it to ascertain whether or not he had missed anything. That was also done to determine whether or not the established themes were actually present in the data and finally to evaluate changes that needed to be done to ensure the themes work better.

4.5.5 Stage 5 Defining and naming themes

As the final list of themes were ready, the researcher then decided to name and define each of them. The definition of themes involved formulating precisely what each theme meant and considering how the researcher appreciated the data.

4.5.6 Stage 6 Writing up

This is the final step which focuses on writing up the analysis of the data. It has been recommended that writing up a thematic analysis requires an introduction to establish the research question, aims and approach that were employed (Alholjailan 2012). It was also advised that a methodology section indicating how data were collected and describing how the thematic analysis was done ought to be produced (Alholjailan 2012). Furthermore, it is expected that the results/findings section typically focused on each theme in turn (Braun and Clarke 2013). At this stage it has been advised that there is a need to describe how the themes emerged and what they represent/mean with provision of examples of statements from the data as evidence (Boyatzis 1998). The final aspect is the conclusion which expounds the main issues and demonstrates how the analysis has answered the research question.

4.6 Issues of quality in research

According to Long and Johnson (2000) when researchers fail to make available proof of methodological trustworthiness, the research findings could be considered inadequate and ambiguous which could potentially result in wasted research time and effort. It has been indicated that in quantitative studies, validity and reliability are considered paramount for the credibility of the study's outcome (Mill and Ogilvie 2003). Also, with qualitative studies, trustworthiness, and rigour are essential for the depth, reliability, credibility and validity of research findings (Streubert and Carpenter 2011); Vivar et al. 2007). Besides, it has been asserted that trustworthiness ought to be distinguished in all stages of qualitative studies including data collection, analysis and descriptions (Holloway and Wheeler 2002; Mill and Ogilvie 2003).

Notwithstanding, Hammersley (2007) opined that the issue of showing the quality of research has been a challenge for qualitative researchers. There are different theoretical views by various researchers with each presenting their own thoughts and positions about what rigour means (Hammersley 2007). However, rigour has been linked with validity and reliability for many years. In other to ensure rigour, Yin (2003) who was with a positivist perspective, recommends the use of comprehensive set of rules in case study design. However, Stake (1995) contends that the flexibility of case study design allows the researcher to obtain profound understanding which is deemed beneficial over a standardised protocol/set of rules. Yin (2003) with a positivist stand, proposes the use of a comprehensive set of rules in case study design, to ensure rigour. Some authors like Stake (1995) argue that the flexibility of case study design allows the researcher to obtain profound understanding which is an advantage over a standardized protocol.

Yet, it has been suggested that constructivists ought to have a benchmark for assessing the quality of research which is considered unique from the conventional approach used by social science (Lincoln and Guba 1986). Furthermore, Lincoln and Guba (1986) recommended the use of credibility in place of internal validity, transferability as a substitute for external validity, dependability for reliability and confirmability instead of objectivity. Lincoln and Guba (1986) additionally proposed that by combining all the alluded features/characteristics settle the issue of trustworthiness that was noted by Eisner (1991), which according to Morse et al. (2002) is considered similar or the same as rigour. Therefore, considering the design

and philosophical foundations upon which this study was grounded, the researcher was resolutely persuaded to implement the position of Lincoln and Guba (1986) of using credibility, transferability, dependability and confirmability has that was best fit for this study. This was because of the traditional view of linking reliability and validity with the quantitative research stance, but this study employed the qualitative research paradigm.

4.6.1 Credibility

According to Korstjens and Moser (2018) there are a number of ways of exhibiting the credibility of a research study. It has been proposed that credibility can be demonstrated when the findings of a study can be evidently connected to the reality and as a result establish the truth of the findings of the research (Korstjens and Moser 2018). Triangulation or member checking are ways in which credibility of research can be increased (Lincoln and Guba 1986). The triangulation of data in this study facilitated in the analysis of data from a number of different positions which enhanced the trustworthiness of the study as some related opinions/threads were found. It has been suggested that member checking is a quality control procedure that is primarily used in qualitative research methodology, which researchers engage in to enhance the accuracy, credibility and validity of data collected particularly with recorded interview data (Lincoln and Guba 1985). Studies have demonstrated that the study participants either agree or disagree with the researcher/interviewer's summary of what seem to reflect their views/feelings/experiences, and if participants agrees/affirms the summary is a reflection of their thoughts, then the study is said to have credibility (Lincoln and Guba 1985; Creswell et al 2007). Accordingly, in the context of this study, the researcher during the interview reiterated and/or reviewed information provided by participants and then asked questions to determine accuracy as recommended by Creswell (2007) and Lincoln and Guba (1985). Furthermore, peer debriefing (which was achieved by constant engagement/review of study by the researcher and his supervisors as well as other PhD candidates) was employed during the course of the study which provided an essential guide although it did not substantiate credibility. As noted; the findings of the study and their interpretations were regularly subjected to peer debriefing particularly by discussing them with supervisors and other colleagues as a way of increasing credibility.

4.6.2 Transferability

Lincoln and Guba (1985) propose that transferability illustrates the procedure of using the findings of a research study in one situation to other similar situations. 'This is *the extent to which the findings of qualitative research can be generalised or transferred to other contexts or settings*' (Schwandt 2007). In order to achieve transferability, it has been asserted that readers ought to know to a large extent the original research situation so they could ascertain whether or not it is similar to their own (Lloyd-Jones 2005). Therefore, it has been recommended that researchers ought to provide a very well comprehensive account of their research situation and methods (Lloyd-Jones 2005).

Transferability within the context of this study was simply accomplished by theoretical generalisation as the study did not seek to provide data for statistical generalisation. Literature suggests that generalisation is an act of interpretation that requires the drawing of comprehensive inferences informed by specific opinions/observations (Polit and Beck 2010; Davydov 1998). Generalisation is generally recognised as a quality standard in quantitative research, but is more controversial in qualitative research (Davydov 1998). Nonetheless, Yin (2010) argued that most qualitative studies are not to generalise, but more accurately to provide a rich, contextualised insight of some aspect of an individual experience through the rigorous examination of specific cases. This can be achieved by forecasting/predicting the probable transferability of findings from an assessment, informed by a theoretical analysis of the methodological approach and the impact of the context (Yin 2010). Thus, analytic generalisation evaluates the findings of a case study to a previously developed theory (ibid). The type of the design and method of this study yielded rich descriptions which have resulted in the production of in-depth data extracts. These extracts are within a context which provide very rich data/evidence which is deemed transferable to other cohorts. This position was as a result of some patterns that were common amongst participants and that boosted the likelihood of transferability.

4.6.3 Dependability

“How can one determine whether the findings of an inquiry would be consistently repeated if the inquiry were replicated with the same (or similar) subjects (respondents) in the same (or similar) context?” (Guba 1981, p80).

Studies have described dependability as the consistency and reliability of the research findings and the extent to which research methods are documented; permitting someone else not originally part of the study to follow, audit, and critique the research process (Sandelowski 1986, Polit et al. 2006, Streubert 2007). Moon et al (2016) posit that the theory of dependability, proposes that the researcher ought to provide a comprehensive report/account for the ever-changing context within which the research occurs. Thus, the researcher is accountable for explaining the changes/adjustments that arise in the setting and how such changes impacted the direction and/or approach of the study (Moon et al. 2016).

Accordingly, Korstjens and Moser (2018) assert that triangulation and integration of data from various sources enhance dependability. The researcher ensured that data analysis conducted for this study demonstrates that every single material was coded in the same way. Consequently, there was a possibility of replicating different types of data within the findings/results for each code employed for the study participants. The reports produced by the researcher were presented to the supervisors for discussion. There was a limitation with feasibility of using inter-rater reliability (IRR) in this study as there was only one researcher. IRR has been stipulated as an approach adopted by researchers in safeguarding the trustworthiness of the study when multiple researchers are engaged with coding. (McAlister et al 2017). Also, due to time and financial constraints this study did not use an external audit process.

4.6.4 Confirmability

Moon et al (2016) assert that qualitative research has a tendency to assume that each researcher comes to a study with a certain distinctive view. Korstjens and Moser (2018) indicate that confirmability suggests the extent to which findings of a study could be confirmed or corroborated by others. They further noted that there are various approaches for enhancing confirmability (Korstjens and Moser 2018). It was suggested that the researcher is able to document the procedures for

checking and rechecking the data during the course of the study (Moon et al. 2016).

Also, it was argued that another researcher could assume a “*devil’s advocate*” role regarding the findings of the study, and that process could be documented (Moon et al. 2016). They further opined that the researcher could robustly examine and explain *negative occurrences* that disagree with earlier observations. After which, at the end of the study a *data audit* that seek to examine the data collection and analysis procedures is conducted in order to draw conclusions on the potential for bias or distortion (ibid). Accordingly, this study was driven by the use of a protocol to plan and execute it. The study therefore has an audit trail which establishes the fact that the study was planned and executed. Reflexive analysis has also been suggested a useful tool in ensuring that the researcher is aware of his or her influence on the data (Braun and Clarke 2006). Therefore, the researcher bias was reduced by setting up procedures that promoted researcher reflexivity which guaranteed confirmability of the research findings.

4.7 Reflexivity

Studies have indicated reflexivity as an important feature of qualitative inquiry (Holloway and Biley 2011; Bryman 2008). It has been noted that reflexivity offers qualitative researchers an opportunity to examine/analyse and reflect on the entire research process (Woolgar 1988). Langdridge (2007) posits that reflexivity also allows researchers to review/examine their questions, methods and how their position could possibly influence the psychological knowledge generated in their study. Nonetheless, it was asserted that these considerations (questions, methods, positions etc) are essential prior to, during and after the study (Langdridge 2007). As aside demonstrating reflexive activity, also makes room for potential changes to be made to the study design/approach when necessary (ibid).

Accordingly, prior to the start of the study, the researcher engaged his supervisors and deliberated on the issues relating to the study as it’s a new area of enquiry within the Ghanaian context. Therefore, there was a need for an information gathering visit (see *chapter 1 section 1.3.3*) that helped in establishing the rigour of the research (the researcher spoke to people which helped him decided and concluded on the most

suitable approach). The visit further helped in determining the suitable approach in generating knowledge and consideration in having an insight into the knowledge generation (i.e. how the researcher understands and how he could try to get the understanding of the participants to establish the reality) as indicated by social constructivism.

Studies have indicated that interpretative researchers consider data has been considered generated rather than discovered (Silverman 1993; Mason 2002). Stake (1995) also contends that researchers have influence on how data is generated by virtue of who they are and/or how it is disclosed. The researcher's values and professional position were therefore recognised as something that could potentially influence how the research was done and what was valued in the findings of the research. The researcher was both a radiographer and an academic, and appreciation of this was essential in attempting to ensure that the researcher minimised the introduction of personal biases into the study. Most of the participants (radiographers) were colleagues and were aware that the researcher (apart from being a radiographer) who had once worked with them in different hospitals, had also taught and supervised a few of them as students.

The researcher's professional role and position as indicated suggested that **he** was an insider in radiography, and that conceivably would have affected the interviews and observation sessions (both ways; either from my side or theirs). Dwyer and Buckle (2009) argued that compared to someone seen as an outsider, when a researcher is considered an insider, there is a tendency of ease of access, trust and frankness from the participants. However, Stanfield (1994) noted that the data collection and interpretation process could still be potentially influenced irrespective of being an insider or outsider. Therefore, Silverman (1993) recommends the need for qualitative researchers to critically reflect on their identity. However, Bonner and Tolhurst (2002) posit that when the researcher is part of the social group under investigation, there is often a good rapport between him/her and the participants. Thus, the participants open up to the researcher and this could potentially lead to what would usually not be accessible to an outsider (Bonner and Tolhurst 2002).

Given the points above, the following measures were taken to address the aforementioned: The researcher ensured that the environment was friendly and non-intimidating through interactions and exchange of greetings, jokes and laughter during

lunch breaks and/or when there was the chance to speak to them before the data was collected. This stance, taken by the researcher, was vital as commonly in the Ghanaian culture, individuals address a male or female superior with a formal 'Sir' or 'Madam' respectively. This formal hierarchy potentially generates some sense of tension and/or intimidation to the subordinate and create some unhelpful sense of power/authority and self-importance of the superior. The researcher prevented such situation by requesting to be addressed by either his first name (Gabriel) and/or surname (Ashong). But, participants chose to use his surname and the necessary salutation (Mr Ashong) as that is culturally the norm in Ghana. It is the norm in Ghana to call people by their surnames instead of their first name as pertains in the UK.

The researcher also further explained to them that the entire study was for fact finding and mentioned the benefit and outcome of the study. Following that, participants were then keen in contributing to the study. Notwithstanding the measures taken above to ensure a pleasant environment during data collection, it was imperative to address any misperceptions/misunderstanding carried by the participants concerning the researcher's role/position in the study (Ensign 2003). Studies have suggested the need to avoid situations where study participants would see the researcher as one of their own (i.e. a radiographer) (Houghton et al. 2010; Walls 2010). As this could potentially distract them from why they were invited to voluntarily participate in the study. This was a major consideration as studies have suggested that in some situations (i.e. when studying peers) there are possibilities of participants giving socially desirable answers to impress instead legitimate responses (Haber 2010; Armour et al 2009). This could potentially negatively impact the outcome of the study with respect to strength/depth and significance (Haber 2010). The researcher explained his role and the purpose of the study in his quest to address the possibility of this happening as advised by Orb et al (2001). This was done in order to separate the professional self as a radiographer/academic and as a result assume the persona of a researcher seeking information.

In addressing the possibility of this happening, the purpose of the study and the researcher's role were explained in accordance to the views of Orb et al. (2001) to create a distance from the professional self as a radiographer/academic and as a result assume the persona of a researcher looking for information. Furthermore, the researcher's recognition of possibility of personal bias and perception was an

approach employed to limit any possibility of bias in this study. As advised by Dwyer and Buckle (2009), in order to manage personal bias the researcher ensured he had an open-mind, was truthful, was interested in participants' opinions and was committed to reporting their thoughts/feelings accurately and truthfully. On the whole, the researcher considered the importance of seeing how social constructivism played out from his thoughts and that of the participants in helping to achieve the purpose of the study.

Furthermore, the researcher adopted the use of a reflective diary which was useful in providing an account of his work progress, but more importantly offered an opportunity for reflection on the learning experience of the entire research journey. Thus, during data collection, the reflective diary served as means of recording what was going on shortly after it happened which enabled the researcher to return to it and reflect. It was useful and beneficial as researcher was able to record events/activities/issues that would otherwise be forgotten.

In order to fulfil the ethical process, participants were each given an information sheet and provided with the aims of the study. Participant's right to participate or withdraw from the study without notifying the researcher was made clear on the information sheet. Participant information sheets were then given to all the participants before the study was done. This according to (Orb et al 2001) would reduce any erroneous expectation that participants were carrying about ..., and instead guaranteed that participants provided genuine rich data required by the study and not data that could satisfy the researcher. Participants agreed voluntarily to participate in this study without any coaxing or influence, regardless of the familiarity with some of the participants recruited. Therefore, those who gave their consent to participate did so willingly and voluntarily.

4.8 Ethical considerations

Ethical approval was sought and granted by the Ethics and Review Committee of the School of Healthcare studies Cardiff University (see *Appendix A*). This study sought to solicit information from rural radiographers about their experiences and their scope of practice(s) within the rural setting towards health and safety, their needs and challenges with rural radiography practice. Seeking opinion from these groups of

people required ethical approval in Ghana. Accordingly, ethical approval was sought from Ghana Society of Radiographers (GSR) in order for its members to take part in this study which was granted. Thus, permission was granted to the researcher after an application was made to the Ghana Society of Radiographers to allow its members to participate in the research. The GSR usually gives permission based on the decision of school's research and ethics committee.

The researcher then requested a list of its members specifically those working in rural areas and which facilities they worked. This was to give the researcher a fair idea of the specific towns he was likely to visit within the three regions selected for data collection. The society has the mandate and responsibility to protect data of its members and as such only released the list after the researcher was granted ethical approval for this study. Once the possible participants were identified from the list, they were invited by email to take part in the study by GSR. The participant information sheet (*see Appendix F*) was given to them and consent sought after interested parties contacted the researcher as directed. For the purpose of confidentiality and anonymity, all participants as indicated were asked to sign a written informed consent form. They were reminded of their right to withdraw their participation if they so wish as that was intended to expose and eliminate any discomfort often associated with health researches such as this. Participants were re-assured of confidentiality and anonymity. The data acquired from the study was stored safely on the personal computer of the researcher which is safe, secured and password protected and was used for the purposes for which it was acquired only. The study only commenced after ethical approval was granted. Thus, all forms of data collections (observation, interview and documentary review) were done after the researcher gained ethical approval.

4.9 Participants' consent

The study was explained to each participant and the participant's information sheet was given to each of them explaining the processes involved. Each participant was also made aware that they can withdraw at any point during the study without being affected either professionally or legally. They were allowed a period ranging between a week or two weeks to consider participation within which period all queries could also be raised and answers provided accordingly. However, additional week was given

by the researcher due to the issues that came up with the Covid-19 pandemic. Consent was sought before the interviews were recorded.

4.10 Data protection, confidentiality and anonymity

Protection of privacy was of utmost importance in this study. The information provided by the participants did not reveal their identity and interpretation of the data also did not reveal their identity. Interviews were audio recorded with the consent of the participants, data was anonymised and securely stored with a password with access limited to the researcher. The researcher guaranteed that access to all records and electronic data was password protected. This was to safeguard uncompromising commitment to the Data Protection Act of 1998.

Additionally, all personal data were securely held to prevent accidental loss or unauthorised access. It was also ensured that all data were secured throughout the process of the research. Thus, the researcher ensured that confidentiality was maintained throughout the study period and the data at the point of collection was saved in a password protected folder on the personal laptop of the researcher which was also password protected. The researcher returned to the UK when data collection was completed. Furthermore, strict adherence was ensured to the university's procedures for management and data storage of research records (Cardiff University 2018).

Participants were made aware that data would be shared with supervisors and the final report would be shared with the Ministry of health, Ghana Health Service as well as other stake holders within the Ghana healthcare sector. Participants were also informed that findings could be presented at national and international conferences and published in professional journals.

4.11 Risk Assessment and management of hazard

To address the issue of researcher's safety; risk assessment was carried out as the researcher was likely to travel to what might be dangerous parts of the country particularly at the time of COVID-19 pandemic. Hence, all Covid-19 safety protocols as provided by the Ministry of Health and Ghana Health Service were adhered to by the researcher. Accordingly, the researcher usually leaves his contact with his people

in Accra (where he resides) so he was able to communicate to them wherever he gets to as he travels far and wide to collect data. He communicated to them promptly and often so that they know the hotel and his location and whereabouts as well as what he was doing at each moment in time which ultimately ensured his own safety. The researcher also arranged for a location which was suitable for both the researcher and the participants for the interview to be held most preferably the participants place of work. When the interviews were done at the place of work of the participants, the researcher was able to assess the venue for the interview for potential risk that existed and action were taken to avert it.

The participants were assured of confidentiality before the start of each interview, they were also cautioned that if in the process of the interview they disclose any unresolved unprofessional or unethical conduct that they might have been involved in, the researcher will report the conduct to the appropriate authorities for action to be taken.

The researcher also notified the professional counsellor of all the sites taking part in the study that if their services were needed in the cause of the interview, they would be called in to help. This was needed if any of the participants was emotionally or psychologically affected by the interview. They were further informed that if such issue arose, the interview would immediately be stopped and they would be supported by the researcher and they would be asked whether or not they would be willing to continue. A professional counsellor would then be invited to step in when the need be.

4.12 Conclusion

The chapter shows the development, design and how the study was conducted and demonstrates the epistemological position and justifications for that stance. That is; shows how previously established position was operationalised and influenced methods choices. Case study methodology was used to conduct the study. The choice of a case study approach was primarily to facilitate the establishment of in-depth and comprehensive study of a phenomenon within a context. The chapter also presented an empirical mode of enquiry and offered various explanations regarding every approach employed. Issues of sampling and selection of sites were explicitly stated and justified, informed by the study objectives. The study sites were selected to represent different rural areas with various economic and geographic conditions.

The chapter also examined methods of data collection which involved multiple sources using various tools such as interviews, observations, reviews of available relevant documents as well as researcher's reflective diary. Data from these sources were analysed using thematic analysis. NVIVO 12 computer software was used to store/organise and code the data. The chapter also discussed how ethical issues were addressed with ethical clearance from the ethics committee of the School of Healthcare Sciences of Cardiff University and the GSR before starting the study. The chapter also describes how participants were assured of confidentiality and anonymity as well as how anonymity and confidentiality were ensured throughout the research process. Issues of quality in research were also described. Efforts were made for readers to be able to determine the credibility and trustworthiness of the study, as the chapter provides an audit trail of how the objectives of the study informed the methodological design. The next chapter discusses themes developed from data analysis (coding of the data).

Chapter 5

Findings

5.0 Introduction

The purpose of this chapter is to present the results of the study which explored the experiences and practices of rural radiographers in Ghana. The results chapter describes themes identified from the data (generated from interviews, observations of study participants, documentary review and reflective diary of the researcher).

Six major themes were generated during the data analysis from the coding categories.

The six themes are stated below:

1. Motivations for Rural Practice
2. Rural Practice Experiences
3. Challenges in rural radiography practice
4. Impact of challenges in rural radiography practice
5. Education and training
6. Policy and planning

5.1 Identification of themes and sub-themes

Themes	Sub-Themes
Motivations to Rural Practice	<p>Voluntary reasons Professional status Autonomy of practice Personal Reasons Economic Experience A new challenge Prevent quarks Feel of rural environment</p> <p>Involuntary reasons Compulsory Posting Marital reason</p>
Rural practice experiences	<p>Living condition Standard/cost of living Socio-cultural issues Lack of social amenities Lack of entertainment</p> <p>Working condition Workforce Scope of practice/job description Occupational Health and safety issues Radiographic modalities/equipment</p>
Education and training	<p>Radiography education for indigenes Staff training programmes/workshops Extended practice opportunity Preparatory training for prospective rural radiographers Official training for rural radiography practice</p>

Table 5.1A: Themes and Sub-themes developed

Themes	Sub-Themes
Challenges in rural radiography practice	<p>Personal challenges Family ties Distance/Proximity issues Language barrier No career progression/ Lack of CPD Practice limitations/limited practice</p> <p>Institutional challenges Discrimination against radiographers Academic isolation Political influences Equipment issues Security issues Shortage of staff IT connectivity issues Persistent power (electricity) outages Shortage of radiographic consumables (films, disinfectants, syringes and sometimes packets or envelopes for radiographs) Lack of quality control, and quality assurance programmes.</p>
Policy and planning	<p>Development of framework/policy for Rural radiography practice Extended practice /Role extension Ethical and legal framework Ideal Rural Practice Education policy Equipment procurement policy</p>
Impact of challenges in rural radiography practice	<p>Demotivation due to discrimination Lack of attraction Job dissatisfaction Low patient through-put Extended scope of practice Skills loss Lack of academic and personal progress</p>

Table 5.1B: Themes and Sub-themes developed

5.2 Motivations to rural practice

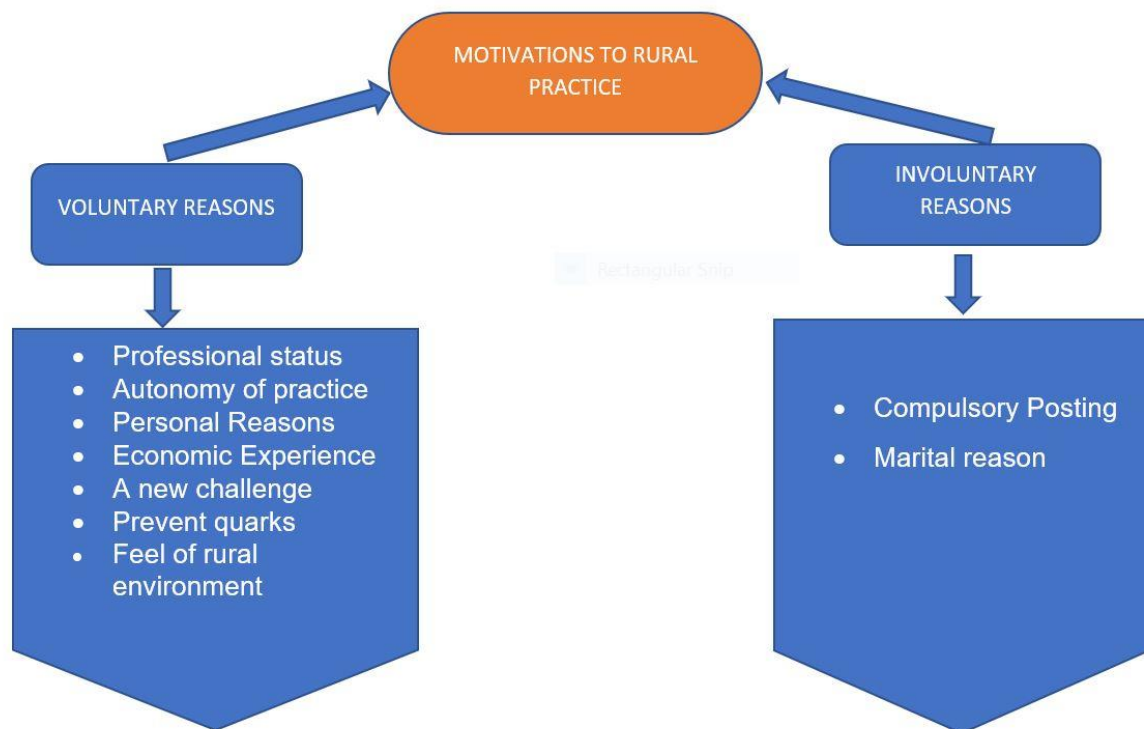


Figure 5.1. Theme structure for motivations to stay and work rural practice

Figure 5.1 above shows the sub-themes derived from the theme "motivation to rural practice". This theme was supported by interviews and documentary review data only, there was no observational data to support this theme. The study revealed varied opinions from the participants when they were questioned about what attracted them to rural practice. There were also varied views regarding reasons why rural radiographers in Ghana remain in the roles irrespective of the numerous challenges they claimed they faced. Their views about motivation to rural practice were grouped into two major categories (voluntary and involuntary reasons). The categories identified under the sub-theme 'voluntary reasons' were: Professional status, Personal Reasons, Economic experience, Autonomy of practice, Prevent quarks, A new challenge and Feel of rural environment. Whiles the other category identified under the sub-theme 'involuntary reasons' were: Marital reasons and compulsory postings (which included national service postings, postings by virtue of shortage of radiographers as well as postings by reason of imbalance in distribution of professionals within rural areas).

5. 2.1 Involuntary reasons

5.2.1.1 Compulsory Posting

The study revealed that involuntary reasons for motivation for practice in rural areas were predominantly postings which were due to shortage of Radiographers within rural areas. Most of the participants suggested that they were posted to rural area to work and that they did not voluntarily opted to work there by themselves:

“Well there was no attraction, it was the postings made by the system that took me to rural practice. So I did not specifically choose to do rural radiography, but I was sent here after I completed and qualified as a radiographer.” (Rad 2)

“No there was no motivation or any attraction, it was just professional reasons that brought me here. The fact is I was posted here, the reason was not personal at all. But what can you do?, just stay, work and get use to the system. So, I am use to it now. Afterall I have been here literally all my life.” (Rad 9).

According to the participants, National service placements was another reason for postings done to deal with an imbalance of staff distribution of Radiographers across the country to man government arranged installed equipment within rural areas. A document inviting stakeholders to a meeting in order to address issues of radiographer shortage serves as evidence to the issue of shortage of radiographers. Stakeholders were invited to a meeting to find solutions to a situation where X-ray equipment had been installed with no radiographers in place to operate them within various rural centres. The title of the document read: “Invitation to a meeting to address shortage of radiographer. Excerpts of the document is seen below:

“Ministry of Health, Ghana Health Service and the Dutch Government through ORIO have installed X-ray machines in forty-eight hospitals across the country. Unfortunately, most of these X-ray machines are not used because there are no Radiographers to operate them. These unused X-ray machines are in addition to some X-ray machines which were installed earlier under different projects. In 2017, Ministry of Finance issued a Financial Clearance to Ghana Health Service to recruit forty-five Radiographers. Only eight radiographers accepted to work with

the service of which two have reported to their assigned duty post since January 2018.” (Document)

One participant indicated that he was posted to rural area and he didn't personally choose to work there. However, he agreed to go when he was posted as he also felt there need to experience what it feels like working in a rural area:

“Well not that there was any particular reason that attracted me here but that was where I was first posted to practice and you had no choice. You had no choice to refuse your national service postings, that's why I accepted to work here. Errrrm!!! But, I also wanted to taste the rural practice okay!, so I wasn't much worried when I was ask to work in a rural area....” (Rad 13)

5.2.1.2 Marital Reasons

A female participant revealed that she only accepted her postings to rural area due to marital reasons:

*“Well, I will say; I accepted rural postings because of my husband. He was a missionary here, so when we got married and was posted here, I accepted to move and join him here. Sincerely, there were no professional reasons for accepting to work as a rural radiographer. It is mainly because of marriage that is why I am here”
(Rad 11)*

5.2.2 Voluntary reasons

5.2.2.1 Personal reasons

The study revealed that some of the participants were motivated to practice radiographer within rural settings due to a number of personal reasons:

“Yea I was motivated to move to rural practice, there were quite a number of errrrm personal reasons and this included my willingness to serve the rural community okay? I know this rural community will need a professional touch so I decided to come along....” (Rad 1).

Another participant also suggested that his motivation of becoming a rural radiographer was due to a past experience he had had about a challenge his family member who needed the services of a Radiographer encountered within a rural community:

“Yes, I will say that, errmm!!! My motivation to practice radiography within a rural town was due to a past experience. My grandfather use to stay at the rural area and there was a time that he needed an X-ray urgently but there was no radiographer available at the time in his community, so they had to transport him from the rural area to the city before an X-ray was done for him. So, his medical condition became complicated and we were told by the medical officer that if the X-ray had been done for him in the rural area earlier, they would have been able to do a lot and he wouldn't have been in such severe condition. So, because of that I made up my mind that I needed to go to the rural area. Wherever they have an X-ray setting or radiological setting I will go there and work.” (Rad 12)

5.2.2.2 Professional status

A number of participants revealed that they were motivated to rural practice due to professional reasons. But, one participant indicated that the cost of living within rural setting was also a motivator for him particularly since he is an indigene and is very much aware of the rudiment of living conditions within rural setting:

“I know when you treat them in a professional way as a qualified radiographer they will feel much more relieved happier and so this was the reason. Besides, because I'm an indigene in the area errmm!! the lifestyle over here; I'm more used to it so that is not much of a problem for me and also the low cost of living in the region is also a factor. Say you are able to save a lot of money because the standard of living here is not as high as compare to other places in the cities.” (Rad 1).

Another participant felt he was experienced enough to provide quality diagnostic services within the rural area. Consequently, felt his services was more needed by the rural folks in order to serve them better and save lives. However, he indicated his services would motivate others to join rural radiography so he can also get the opportunity for postgraduate studies.

“Hmmm! I have quite a number of experience. So, I would say that I want to save lives because I can say for a fact that not every radiographer would like to work in a rural area. So, if you also decide to leave or not to accept to work here, who will attend to the rural people? So, I decided to come, stay on and work in order to motivate other people to probably go to school, return and join me so I can also have chance of going back to further my studies.” (Rad 7).

The study further revealed that a participant indicated he was motivated to rural radiography practice due to his belief about service to humanity. He was of the opinion that those living in rural areas also require standardised practice and equal accessible healthcare delivery:

“Yea, it’s service to mankind because that is me, the fact that it’s a rural place doesn’t mean they should not have better services. They do deserve my service, you know service to mankind, okay?, so I will just put it simply like that because I have parents who are in the rural areas who may need to be attended to in the same way when they are sick okay? So offering my service to rural communities is a joy despite its attendant challenges.” (Rad 13).

Furthermore, a participant revealed that his motivation to rural practice was due to the acute shortage of radiographers and imbalance in distribution of radiographers across the country. Also, he indicated that the more pressing issue was to deal with the issues of quarks noted in rural practice:

“Errmm! we all know it is a fact that there is very low or acute shortage and distribution of radiographers in Ghana most especially to the rural areas. The numbers are very low and so, as a radiographer I decided to u know add up to the numbers within the rural areas by joining in the rural practice. Secondly, there had been issues of quarks in the country errmm people who are not qualify and they are practicing in various facilities within most rural areas, so once I join I am helping get rid of them. Hmmm! even quite recently there were some issues of quarks in rural areas and Radiographers were urged by our mother association, you know; that’s the GSR and then the department of radiography, University of Ghana to encourage new qualified radiographers to go fill up those spaces so as to do away with quarks in order to see the profession thrive”. (Rad 1)

5.2.2.3 Economic experience

Economic experience and relatively low cost of living was a determinant for rural radiographers accepting to practice within a rural setting. A participant felt it was economical to live and work in the rural area and also opined that it was fulfilling offering professional services to the people of the community as they turn to appreciate good and quality services:

“Okay ermmm, first of all, the standard of living in the rural area as compared to the urban centers is very low, the standard of living is low so ermm I’m able to save a lot while I carry on with my duties as a radiographer and also I have experienced you know how people appreciate it when they feel the professional touch on them and so it’s a kind of fulfillment I think and so I wish to continue to serve my people and to see them also happy.” (Rad 4)

Additionally, a participant indicated that though he was posted he did not consider refusing the postings because he felt it was a good place to start life:

“Oh Yes I was posted but was very determined to practice in a rural setting , I felt that if you wanted to start life, at times it is also better to start in the rural areas, where economically you will not spend much, accommodation is cheaper and socialising with the people is also easier. You get to know each other very well so your safety is even secured, and ermmm! food is not a problem in some of these areas, so if you are in such places you see that you can at least save towards the future, okay? Now!! that was why I didn’t refuse the posting.” (Rad 13).

Notwithstanding, a rural Radiographer made some thought provoking assertion about his motivation for rural practice and his regrets since choosing rural practice. He felt it was economical living and working within rural and that motivated him to work in a rural setting. But got disappointed as things were not what he felt they were:

“Yes, I thought if I go to the rural area things would be cheaper than the city or the urban areas. But, I realised it wasn’t like that, but is same like the cities. I thought food would be cheaper but food wasn’t cheap as expected. In terms of

accommodation I thought the health facility would provide accommodation for me but it wasn't like that, I had to rent my own accommodation". (Rad 12)

5.2.2.4 Autonomy of practice

The study revealed that the motivation to rural radiography practice for some of the participant was to have autonomous practice. Were he can manage and/or have the authority to make decisions and the freedom/leverage to act in accordance with his professional knowledge base, experience and exposure:

"You have that opportunity to work as a lone radiographer which gives you an opportunity to be exposed to and be able to handle various kinds of conditions and situations alone which makes you more experience. Handling of RTA cases among others alone makes me experience and confident in carrying out my duties as a radiographer." I would say working here has actually exposed me to manage cases alone which has helped me gain the needed experience. So, it is indeed a motivation for me to remain in this role" (Rad17)

5.2.2.5 Prevent quarks (Unauthorised/unlicensed practitioners)

The study also revealed that a radiographer's interest to accept to work within a rural area was as a result of wanting to prevent quarks and bring best practice to the rural setting:

"Yes, we have people who were trained on the job who were not entitled to practice but, because the machines are there and the radiographers are scarce in the country they allowed those people; that is the quarks to also work. So I decided to go there and do the best practice and also help reduce and eliminate all the quarks within the rural areas." (Rad 8)

5.2.2.6 A new challenge

Another motivation for rural practice was for a new professional challenge. A participant felt the need to move to rural practice in order to have a new challenge:

“I needed a new challenge, I’d wanted to experience how working in rural area would be”. “I’d wanted to be exposed to a new terrain with respect to the profession. However, *I do not think there were major professional reason why I accepted to practice as a rural radiographer as I did not have any professional knowledge or information about working in rural area, so I just wanted to try and see how it will work out.*” (Rad 17).

5.2.2.7 Feel of rural environment

Similar to the need for a new professional challenge as a key determinant for rural practice; the study further indicated that another reason for motivation for rural radiography practice was to have a feel of the rural environment:

“Well, it was just personal reasons, I just wanted to have a feel of how living and working in the rural area would feel like. There were no particular professional nor social reasons though” (Rad 18)

5.2.3 Why Ghanaian Rural Radiographers remain in role

Participants were asked why they remained in their roles despite their varied opinions (voluntary and involuntary) expressed regarding their motivation to rural practice. The study revealed quite a number of varied opinions why participants remained in their roles as rural radiographers:

“I have always considered the services that I render to the people of this community. I feel like leaving often times but I get motivated to stay because I feel my contribution to the health and wellbeing of the people is assuring enough. It is difficult but again I have lived here for all these years and have started business and family here too. So, leaving gets difficult. But overall, helping the people is my only motivation else I could have already moved from this place long time before now.”
(Rad 9)

“Well at the end of the day I look at how I am contributing to the betterment of the people in terms of the diagnosis services I render, that is what is keeping me

motivated in rural radiography, other than that I could have already moved from this place.” (Rad 2)

However, the study revealed that participants indicated they will want to move and gave varied reasons. Quite interestingly, one participant who mentioned that he was an indigene indicated he wanted to remain, and even retire as a rural radiographer:

“I think that errmmm! I cannot move to the urban center. No!!, I cannot leave because as said earlier; I’m the only qualified radiographer in the area and if I move hmmm! there wouldn’t be any one left and that will be a challenge in the area. Also, because as I am in the rural area I have the vision that in the next few years we should be able to have some other modalities; specialised modalities and also some development here and there. So I am encouraged to stay. if we have another radiographer or radiographers in the facility I think it’s going to ease the work load and we could even run shift and so there is no reason leaving, I just have to stay and help my people and will probably retire here. (Rad 1)

The participant was further probed in order to ascertain whether or not all the things he indicated earlier were things that could be readily available in his current practice at the rural setting:

“Currently most of the things I have mentioned are not here but errmm!! as I said earlier I have made a decision to stay and help my people and the community. Errmm! Honestly, I would love to advance in radiography and as I indicated earlier the more I advance, I do that to help the people in the rural communities and I continue to pray that things will get better and we can serve also better the rural communities so I think I may retire as a radiographer in the rural community.” (Rad 1)

A female participant indicated strongly that she wanted to move and that she was still in rural practice due to her husband who is a missionary. She vehemently indicated that she will leave when her husband is transferred:

“I am still here basically because my husband is in the region and that is why am still practicing here. Look!! the day my husband is transferred and leaves I will also leave.” (Rad 11)

Another participant claimed he wanted to move but due to professional reasons he considers to stay. But when probed further he revealed he intends leaving rural practice definitely and further justified reasons for him wanting to leave rural practice.

“I really want to move, but looking at the people and knowing that I came here purposely to work and help them by providing them with radiological services I try to remain here. Particularly, knowing that there are no Radiographers around I choose to stay on in order to help.” (Rad 17).

“Hmmm!! I’m considering a lot of things, it’s difficult but I will definitely leave, because I have family in the southern sector. I will definitely leave one day” (Rad 17).

“Number one what will push me to go away is the services and conditions of service over here. Because Radiography is developing, right now we are moving from manual to digital. There is PACS which is currently used widely. But we don’t have all these things here. So, these are some of the things that will cause me to move away from here to the urban area. And also, familywise; I have to get closer to my family. The distance is so far. Sometimes you come back from work and you don’t have anyone to talk to. Getting leave is also so difficult as you won’t have a replacement when you are gone. So, you can’t get the chance to go on leave. (Rad 17).

Additionally, few other participants also revealed their intentions to leave rural radiography practice with varied reasons:

“Yes, I will move to an urban centre one day. Hmmm!, I will move once I have a replacement. I need to explore my full potential as a radiographer but I am limited here” (Rad 9).

“Really leaving rural practice is something that always comes to mind because when I get frustrated of the frequent breakdown of machines and I hear of colleagues who are doing well in terms of their machines, their output are good it demoralises me. So, what happens is that sometimes these issues comes or brushes through my mind then I feel it is time for me to move to the bigger city.” (Rad 2).

“It comes to mind to leave rural practice, but there are pull and push factors; well!!! I will want a change of environment, I will also want to get into the practice and fully benefit out from it because in the bigger cities I will be coming into contact with diverse machines with a whole lot of joy because at the end of the day I will be leaving deteriorating frequent breakdown of machines in rural communities where even if it breaks down and you report it promptly it doesn’t get fixed on time.” (Rad 2).

“I plan leaving rural practice because where I am it is difficult to go to school to upgrade yourself because I am the only radiographer here. Any time you ask for permission to go to school it becomes difficulty but in the cities we have more than one radiographer at a facility running shift hence there is a way to upgrade yourself. More so there is no benefit of being a rural radiographer because accommodation is a problem, there are no allowances, lack of proper education for your kids and so on.” (Rad 11)

A participant made a shocking revelation of how he feels and the reason for wanting to leave rural radiography practice:

“It’s a yes!!! I will definitely leave rural practice. The reason is that, I completed school with colleagues who are now done with their Masters, others currently pursuing their PhDs and so on. But, I am still here for so many years still having a diploma certificate. Meanwhile if I want to go to school and I tell management there are issues. Anytime I make an attempt of going to school, the hospital will ask of a replacement from me. My question is where will I get a replacement from? Is it my responsibility to get a replacement or recruit a member of staff? So, if I find myself in

the city. I would be considered for a study leave to upgrade myself just like my other colleagues in urban practice. (Rad 12)

Furthermore, the study revealed some daring stance of some participants who indicated they will never return to rural practice if they get the opportunity to leave. One person indicated when asked whether or not he will return in an instance where his management decides to grant him a study leave; will he consider ever returning to rural practice after his school?

“I don’t think I will ever return once I get the opportunity to leave. Because if I come back, I will still be doing the same old and one way of doing things. Because in my place now we don’t have CT scan, MRI and so on and will not be expose to the new technological trends and advances in medical imaging. So, I will prefer being in the city to be exposed to MRI, CT scan procedures with other specialty in fluoroscopy, PET scan and the rest.” (Rad 15)

Yet, the study revealed that a participant’s reason of wanting to leave rural radiography practice was due to lack of management support. He further indicated that he wanted to move to urban practice in order to have the best of everything:

“It comes to mind often to move to an urban centre especially when hospital management frustrations get too much. I get frustrated when there is frequent breakdown of machine which are not readily repaired, I also get demoralised as most of my school year mates are now either pursuing their masters or PhD, yet management always turn us down when we attempt for a study leave.” (Rad 9).

“Hmmm, I need a change of environment, I also need to upgrade myself. I need systems that are working, better equipment functionality, motivated human resource and the likes. You know what I mean? I think salary increment and other incentives are all to be considered. These are the pull and push factors in my opinion.” (Rad 9).

A participant suggested that he had to move to urban centre as he felt he needed to upgrade and sensed that staying would not had allowed his career progression and he never regretted leaving rural practice as he had yielded the full benefit of leaving:

“Yea I had to leave rural practice, that was when I finally decided that no!!! not anymore, I have to upgrade myself, go for further studies and so I started planning to leave the rural area. So I had to go to Accra, complain to my bosses those who can influence my transfer from the rural area to the urban area okay?, Because I had done my part having serve the rural areas for over 4years and that was enough so somebody too should be sent there so that I can also have the opportunity that lies ahead for me as a radiographer. And fortunately when I did that, I got the transfer and came to urban area, I then had a scholarship to do this further studies at a university at south Africa and then to UK for my masters and PhD.” (Rad 13).

“...it was good I left rural practice because so many things go on in the urban areas that we do not even hear as rural radiographers. We don't know about it okay, that is one big challenge, so many things you don't get to know because you don't get to hear. And that is because there was no proper effective telephone system there even for you to call your colleagues somewhere for you to know what is happening, so it was as if we were shut out totally, we were in darkness. Hmmm!! I feel it was good I left.” (Rad 13)

Finally, with regards to what motivates rural radiographers to either remain in their roles and/or wanting to leave rural radiography practice; some participants suggested varied opinions:

“Okay I think one thing that will push away the radiographers from the rural setting is errmm! the rural background; most of them don't have any experience in the rural areas and so they will not feel happy being in the rural areas. Some of the things that will pull them to the rural areas errmm may include free accommodations to radiographers who agree to be posted to the rural areas, internet is also another factor most of us need internet for research and other things. Security is also a problem, most of this rural areas were ethnic conflicts are you know bound to happen; these areas are were most radiographers may not like to go. Equipment is also one thing that may pull radiographers to the rural areas; if there are more equipment radiographers can put their hands on different types of equipment and not just do one procedure every day. I think they will attracted to rural areas. (Rad 1)

5.3 Rural practice experiences

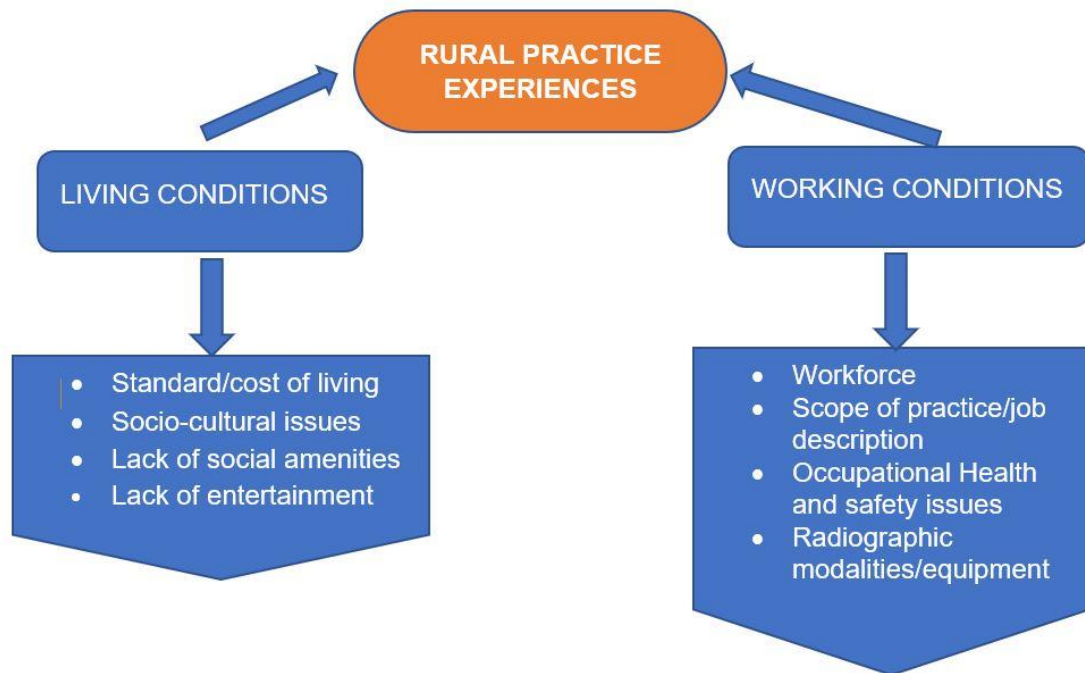


Figure 5.2. **Theme structure for rural practice experiences**

Figure 5.2 above shows the sub-themes derived from the theme "rural practice experiences". This theme was supported by interviews, documentary review and observational data. The study revealed varied opinions from the participants when they were questioned about their experiences and practices within the rural setting. Similarly, various items were observed and some documents reviewed also reflected some of the rural radiographers experiences and practices. Their views about rural practice experiences were grouped into two major categories (living and working conditions). The categories identified under the sub-theme 'living condition' were: Standard/cost of living, Socio-cultural issues, Lack of social amenities, Lack of entertainment. While the other category identified under the sub-theme 'working condition' were: Workforce, Scope of practice/job description, Occupational Health and safety issues, Radiographic modalities/equipment.

5.3.1 Living Condition

The study revealed cordiality among the people living within rural setting. However, various challenges which impacts their social and living conditions were identified:

“In fact the social aspect of the people living here is interesting. In the sense that because they are small community is like they are one big family. They know each other so well that they help each other in everything ranging from funerals, whatever festivals and those things, marriage ceremonies. In fact, whatever ceremony it is; you see them all coming together to help. But you know they have their own challenges such as water and electricity problems which affects the economic conditions of the people living within rural communities. (Rad 13)

“Erhmmm!! living in a rural community its quite erhmm!! let me say; I will describe it as very normal, it is a good place to live. But the only thing is fear and insecurity within us because the area being previously war-torn area. We have had a lot of conflicts in the area, that is tribal or ethnic conflicts in the area and so these causes fear sometimes but generally I think the living here is normal” (Rad 1)

Notwithstanding, some of the rural radiographers felt living conditions were not favourable considering their background and lack of experience and exposure with rurality:

“is not easy , especially considering where I was before moving here ,the weather here is different. Sometimes it’s extremely hot at times too it gets cold. Because of the weather the community usually and in fact is currently battling with cerebrospinal meningitis. The culture is also new to me, I find it different. The food they eat too is far different from where I came from.” (Rad 11)

The study further revealed that a radiographer indicated coping irrespective of the challenges encountered when he first arrived in rural practice:

“The reality is they have different culture in terms of food, their way of life, transportation etc, living and working here at first was not easy but am used to now” (Rad 17)

5.3.1.1 Standard/cost of living

The study revealed that living cost within rural areas were relatively low and comes with some benefits. However, some revealed some challenges they are faced with,

yet, most of the participants suggested they were coping in rural practice as they spend less compared to life in the cities:

“Well, living in rural community has its good side and bad side, so the good side is you are known to the people and you are respected by the rural folk because you are an healthcare personnel. Then socialising with people is easy and interesting and at the same time the rural areas if you are interested in farming they are ever ready to give you land to farm, okay, so these are some of the benefits in living in the rural area....” (Rad 13)

“....professionally we are limited with a number of challenges but we try to cope always, but in terms of lifestyles here ideally things here are very moderate as compared to the bigger cities. Living here in the rural community, Hmmm!! what I like about it is the expenses are moderate, you don't spend that much and we have a very stress free environment, no traffic as compared to our radiographers who are in the bigger cities and life in general is cool in this part of the country”. (Rad 2)

The study further identified the standard of living of the people within the rural communities and their economic standings:

“Okay erhmmm, first of all, the standard of living in the rural area as compared to the urban centers is very low, the standard of living is low so erhmm I'm able to save a lot while I carry on with my duties as a radiographer...” (Rad 1)

“....also the low cost of living in the region is also a factor say you are able to save a lot of money because the standard of living here is not as high as compared to other places in the cities. Besides, once this town is close to the boarder it is a major trading center so most of the people here are traders, market men and women, and some are farmers at the same time and so they basically do their farming, they do their trading and all that.” ” (Rad 18)

“Majority of the population here are famers , and others too are unemployed. We have few teachers and health professionals and some politicians who usually only visit their constituents and go back to the big cities. But overall, I will say about 90% of the population here are poor farmers” (Rad 11)

“The people here are petty traders and small scale farmers and as such they are not well to do economically in terms of finance. At times in my facility if a patient comes without a National Health Insurance, payment of hospital bills becomes a problem as such the management of the hospital sometimes have to take a decision on whether or not to do an X-ray for a patient who can’t afford but needs the X-ray.” (Rad 7)

“...They are poor, poor farmers mostly because in this community’s ermmm!! apart from the hospital and then maybe basic schools that are available you don’t find any actual public job or institution okay? So say about 90% are doing peasant farming and how much do they get from that? Most are farmers who produce plantain or whatever and almost everyone is also producing the same thing so even getting market is a challenge. So usually people traveling along the road to the cities, that’s if you are fortunate get to buy their items and then get some money. Other than that all of us have farms so going to buy someone’s food item is rare so that makes the majority of the people poorer” (Rad 13)

5.3.1.2 Socio-cultural issues

The study demonstrated varied socio-cultural propositions amongst the rural folks:

“Okay, most of the people who are served here I will say are Muslims. The community itself is Muslim dominated but there are also quite a number of Christians as well as traditionalists. This community has other forms of religious groups with so many different cultural practices. Generally, the people are very sociable even though they are from diverse tribal lines.” (Rad 1)

“... I think the people are very sociable, they are very easy to move with once they get to know you. Some of them if you understand their language they tend to crack some little jokes and you laugh together whiles doing your procedures. Generally, most of them are very friendly I will say.” (Rad 9)

“ They are various cultural practices here, there are times for festivals and you get to see so many rituals and activities going on during that time. People are believed to

possess magical powers. Over here there has been an instance of cases where people come and have certain kinds of traditional talismans and other things on their waist and on their necks and you will want to take them off during X-ray procedures because they are artifacts. But, they will be saying oh no this one I can't take it off as that is their so called powers and all that. And so these are some of the cultural aspects.” (Rad 2)

5.3.1.3 Lack of social amenities

The study revealed a lack of social amenities within rural areas.

“...but the community or the area has a water problem that is they barely have normal pipe borne water or boreholes, electricity is also a problem....” (Rad 13)

“Most rural communities lack so many things that you can easily find in the urban centres. Basic social amenities like water, sanitation and even food is a problem. As for better education and access to proper health, hmmm!!! the least said, the better” (Rad 2)

It was also observed that buildings and infrastructural facilities such as playgrounds, community centres or even better roads, as well as public toilets which are to be shared and to become convergence spots for the local and surrounding communities were lacking. The basic social amenities essential to the wellbeing of the people within the rural communities which includes but not limited to: proper shelter, hygienic food, portable running water, electricity, access to quality health, education as well as other vital services were also not available. (Field notes).

5.3.1.4 Lack of entertainment

The study identified an interesting situation encountered by some radiographers who found themselves living within rural settings:

“There are no other activities to engage in aside your radiography job. There are no many social places to visit and spend some time, basically no entertainment and if you don't take care you may end up in a drinking bar okay? You end up joining friends and you will be a drunkard or alcoholic because that is the only thing that could make you

happy. You can't remain in-doors after work always you know. So that is a big challenge and that is why some radiographers don't want to come to the rural areas because once you are posted there it's like you are forgotten...." (Rad 13)

Again, it was observed that majority of radiographers spend most of their time in their respective work places. Most of the radiographers stayed on at their work places even after close of work for couple of hours and indicated they get bored when they go home right after close of work, as they do not have anywhere going. (Field notes)

5. 3.2 Working Condition

The study showed some peculiar working conditions across the rural settings. Most of the rural radiographers revealed some challenges which affects their working life:

"Internet and network connectivity is a major issue within rural practice. Even mobile phone networks are very poor so communication is very bad and even landlines are also not so efficient". (Rad 13)

"Practicing rural radiography as I said is very interesting, it puts me in a very limited role in the sense that I am not able to do whole lot of things I was thought when I was in school in the bigger city. Reason is that some of the cases that come to me I will maybe need a radiologist assistance to carry them out. Some are special cases, example IVU, barium meal, barium studies and all those things. We are not able to render them because we don't have a radiologist who is going to comment on what we do. So what generally rural radiography brings is that we just render general X-ray services and then the special ones are limited and referred to the bigger cities. So we can't do special cases because we don't have the full scope of professionals who are going to get themselves involved in the specials, so that is one of the limited ways in rural radiography which affects us as radiographers. But, I can do all the special cases that are requested which are referred." (Rad 2)

".... Because there is water problem which affects everyone in the community. There is water problem everywhere, even within the department at times you will not get water flowing and that doesn't help when using dark room processing. When there is no water, chemicals used for processing the X-ray films become contaminated which

affects the quality of the images that are produced. Electricity too at times is not stable throughout and this communities don't have generators to support and generate power supply within the hospitals, so when there is power outage no work.

The other aspects or working condition experience of being in the rural area is maybe carrier progression and access to some information that you need, and also within the rural practice too you are limited to a small area of the professional practice okay, that is worrying so when you stay there for a long time it's like ermmm !! you don't have any opportunity to upgrade yourself in any form you know, you forget about some of the other things you were trained on". (Rad 13)

Again, it was observed that most radiographers working within rural setting do not have assistant to help. There were no supporting staff and most are lone radiographers who multitask; there was no division of labour as seen in urban centres and that affected patient waiting time. It was further observed that most of the radiographers looked exhausted as there was no free time or break time. Most facilities had just one radiographer who receives request forms, perform procedures, produce the radiographs, enters the log book and/or computer and also dispatch the radiographs that are produced. (Field notes)

When the rural radiographers were asked to give their opinions regarding what involved in working in rural area as a radiographer they made quite interesting assertions:

"Okay, working in my community I think it's a good feeling, to me working in my own community as I am originally from this town, serving my own people, not only my own people but people from different backgrounds ermmm people from Burkina Faso, Togo and other places are been served in our facilities here and so though the workloads are high there is some kind of fulfillment seeing that I am able to help people from all walks of life in such a small rural facility is great." (Rad 1)

".....we have limitations in a sense that some of the cases that come to us, we are machine constrained, when our machine breaks down it takes several days or weeks before our machines are repaired by the engineers. And so if we have our machine broken down it means work has to halt and it takes longer time before engineers arrive at our place and so it makes our job not very interesting. The system in place

is also not motivating others who may come with fresh ideas to help us in the rural radiography. All of them are centered in the bigger cities” (Rad 9)

The study further shown that a radiographer indicated an improved services within rural setting irrespective of some initial difficulties encountered when he moved to rural practice:

“.....From a professional point of view before I started we were using dark room, the machine can break down and it will take a longer time before the engineer comes in to fix it. At times it can take between 2-3 months before the machines are fixed because the engineers would have to come from Accra to the Northern part of Ghana. Sometimes we run out of logistics and all that. Initially it was tough but with perseverance over the years we have managed to acquire a digital machine. Therefore the aspect of machine breakdown is somewhat solved for now, things are gradually getting better now.” (Rad 11)

The study further identified varied opinions of radiographers regarding their general experiences in working in rural area:

“It is challenging, it forces you to learn more which is good. But, the challenges have negative effect because you are unable to catch up with what is going on in the urban cities such as advanced modalities like CT scan, MRI etc which is not found in the rural area so you are stacked with general radiography only” (Rad 18)

“Working in this community is difficult than where I was because in the northern sector of Ghana we lack a lot of medically trained professionals as such some vital departments are managed by Nurses which shouldn't be so generally working here is very stressful.” (Rad 2)

“Okay, okay hmmm!! in fact practicing radiography in the rural area let me say it's not very easy as some people may think. Ermmm!! the work load especially where I am, sometimes we could do about 80-90 cases in a day and you can imagine” (Rad 1)

One radiographer made some conflicting assertions which was quite interesting regarding radiographic working conditions within rural practice. He did mention of how long they had to stand in doing specials such as HSG with a specialist which as a result makes them close rather very late. Meanwhile, he had earlier indicated a

lack of specialist/radiologist within their facility. That gave room for suspicion about which professional carries out the HSG exams as indicated by the said radiographer.

Consequently, the researcher probed further by asking the kind of specialist who help with the special examination as it has been indicated that so far mostly in rural practice they only do general cases (Reflections of researcher)

“You have to stand from morning till evening about 4-5 and sometimes when you have special cases like the HSG you have to spend extra time with the specialist to do those cases and you may end up closing somewhere around 6 in the evening and so that is ermmm!! the work load is mostly high over here” (Rad 1)

“Yes we do general cases, the lumber, skulls, the extremities and all that but ermmm!! at certain point errrrrr!!! we book some certain cases for HSG and the fact is that Tamale Teaching Hospital is far away from us and people are not able to go very far distances for special radiography services and so we collaborates with the gynecologist in the facility to do not fluoroscopic HSG but let me say it’s something I will say it’s a blind procedure that we do but ermmm I will say the benefit mostly out ways the risk and we do sometimes, hmmm!!! we do them perfectly let me say.” (Rad 1)

However, some of the rural radiographers revealed that they experience less pressure and stress during service delivery within rural radiographic practice:

“.... professionally after you have closed from work you have more time to yourself because the cases are not huge as compared to the bigger cities. So the place could be described as a stress free environment so working in this environment offers more time for relaxation which gives us more time for ourselves and then our families” (Rad 2)

“From the professional point of view work here is less stressful as compared to the city because in the city you have to attend to about forty (40) cases a day .But here it’s around 10 to 15 a day unless may be there is a tragic accident that may increase the cases for the day....” (Rad 11)

5.3.2.1 Workforce

Workforce across rural communities in Ghana is not encouraging in that there is acute shortage of professionals reported across various healthcare disciplines. A 2007 Ministry of Health, Ghana document on human resource policies and strategies for the health sector 2007 – 2011 indicated that health workforce projection by 2011 should have about 7,000 radiographers across the country. However, sadly as at 2020 radiography workforce across Ghana is not even up to 500. A document; RAD-AID Country Report on Ghana: by Julia Hitchins on October 2018 focused on radiography workforce in Ghana. Excerpts from the document is as follows:

“It is difficult to establish exact numbers regarding the numbers of different radiology professionals, including radiation technologists and therapists, radiologists, radiation oncologists, medical physicists, radiology-specific nurses, radiation safety officers, imaging device engineers and radiology educators. According to the GHS Facts and Figures report (2016), in 2015 there were 97 radiographers in Ghana; and the Ghana Society of Radiographers (GSoR) (2018) reports a little over 100 radiographers in public service, with 250 in the country that are certified. Due to the small number of radiographers compared to the size of the population, many radiographers work well over the required 40 hours per week, as is most likely true of the radiologists and other members of the radiology workforce as well”. (Document)

Again, it was observed that there was shortage of radiographers across the rural settings. Most facilities had just a lone radiographer and most no radiologist within the entire district and/or region. There were also stations/facilities which had X-ray equipment but there were no radiographers to man them. (Field notes)

This was also revealed in a document addressed to director general of Ghana health service from GSR regarding shortage of radiographers. Excerpts of the letter reads:

“ORIO TB CASE DETECTION PROJECT - The National Executive Council (NEC) of the Ghana Society of Radiographers (GSR) writes to remind you of the proposal reached in a stakeholders meeting held on the 11th of April, 2018 at the Ghana Health Service (GHS) Head Office Conference room. The main purpose of the meeting was to address the issue of shortage of Radiographers and how to get Qualified Radiographers for the operation of the X-Ray machines installed under the ORIO-TB Case Detection Project in the country”. (Document)

The study further revealed varied opinions of participants regarding workforce within rural settings:

“Hmmm!! we all know that it is a fact that there is very low or acute distribution of radiographers in Ghana most especially in the rural areas, the numbers are very low...” (Rad 1)

“Yea the workforce I think is generally low, it is the same for most of the professional groups. There are few nurses, at times just one doctor and the auxiliary staffs and that’s it. So the workforce isn’t that large within the rural setting, yea in the hospitals very few professionals. Hmmm!!, there are lots of experiences that I could talk about regarding workforce, because in the rural community, ermmm!!! in the rural areas we don’t have radiologist, already in Ghana you know generally radiologists are few so most of them are located in the capital cities or the regional capitals so in the rural area you don’t have any”. (Rad 13)

“For radiographers in the entire region we are just 4, others are train on the job. But we have quite a number of other health professionals like nurses and physician assistants, hmmm!!! Say about over 50 in my District and about 200 in the entire region.” (Rad 11)

“For my facility I am the only radiographer with one assistant who was trained on the job, 1 surgeon, 10 prescribers, around 50-60 nurses, physician assistant with 2 pharmacists who run the facility 24/7” (Rad 7)

“radiologist is nil and radiographer is just one that’s why we call it one man station. That is one radiographer is being posted there and you can’t have two because management will tell you workload isn’t that much. It’s on and off, because there are times the whole day only four cases, some other days you have about ten and few times more. So why do you need two radiographers? That is the thinking of the system, you see? But, even if its four or ten, the place is not busy at least there should be two people yea? when one is on leave there will be somebody at post at all times because each day there are cases even if it is one case there should be somebody to attend to the person so before you realise you are working throughout your life time in the rural place without going for any leave.” (Rad 2)

One radiographer expressed his opinion about rural practice workforce indicating a lack of diversity within rural practice generally. He also further noted a lack of quality, frequent/constant healthcare service delivery within rural practice:

“Okay, okay let me say honestly, unlike the urban centers we don’t have, ermmm!!! there is no much diversity in the health work force in the rural areas as compared to the urban centers. Over here, it is difficult to have a radiologist. We don’t have radiologist in rural areas, and you will not find one. No!!! I don’t think you will. Hmmm!!! the only side; the medical side you will find the gynecologist but very few, you may find one or two gynecologists in the rural setting or even sometimes just one in an entire district. And then dental nurses you may find two or three not more than that. And the medical surgeons; sometimes you may not even find a surgeon in the rural area but those that are lucky may have one or two who manage one facility as well as other few ones. Okay, in terms of radiography workforce; I will say ermmm!! in rural settings the average is mostly two. Two radiographers maybe in a facility, if they will run shift ermmm!! one will go for day and the other one will go for night that will be the end. Most of the facilities in the rural areas cannot afford to run 24hr services and so it is a challenge. Where I am currently I am the only qualified radiographer with two radiation assistance who run shift because I must always be there and one should also always be there to support me to do the work because of the high workloads, so we are lacking in terms of radiography workforce in our rural communities.” (Rad 4)

5.3.2.2 Scope of practice/job description

The study revealed a lack of official scope of practice for radiographers in Ghana. Majority of the study participants in the absence of an official/specific scope of practice for radiographers in Ghana, gave varied opinions about what they perceived to be their scope of practice at registration and went on to give indication about their job description in rural practice:

“Officially, there is no documented scope of practice but what we rely on is what we see in the UK okay? The scope of practice which seem to bind us because they colonised us and they started this training but as to official document at that time during that practice, there wasn’t anything like that and even now though we’ve developed to some professional level. However, at the ministry of health you can’t

find anything like that or Ghana health service you can't find anything like that either, but we in the practice know our scope that this is what we are supposed to do, this is not what we are supposed to do based on our training but not as a nation or a country. There is no laid down scope backed by ermmm !! laws or other things that if you go outside of that scope maybe you err and so you can be penalised but within the professional context as professionals we know that this is our scope so we operate within that". (Rad 13)

"Honestly ermmm!! officially there is no specially designed scope but the major roles or the scope include what I mentioned earlier and from our training at our institution we know the major role of a radiographer is to provide images of high quality worthy of diagnosis, ensure patient management, and then radiation protection for public and workers as a whole. But there is no specially designed scope of practice for radiographers in Ghana" (Rad 1)

"Hmmm!! there is no specific scope of practice for radiographers in Ghana generally. Hahahaha !!! not to even talk of one purposely for rural radiography practice." (Rad 11)

"Okay so ermmm!! Basically I don't know and have never come across an official scope of practice for radiographers in Ghana. What we basically do is ermmm !! production of quality images as a radiographer, radiation protection measures for patients and the public, then patient management measures. These are, ermmm!! this is the scope of practice. This does not include interpretation of results because its beyond our scope we are supposed to give the radiograph to make sure it is of high quality, ensure patient radiation protection and the public radiation protection and also to ensure better patient management conditions" (Rad 2)

"At registration the scope of practice were basically on what we were trained on okay?. So we do what we were doing before the transfer to rural practice. There is no scope of practice that I know of. I really don't know if there is any. May be, maybe not, Hmmm!!! But to the best of my knowledge there is no official scope of practice for rural radiographers. We only do what we can and is expected of us. You know, where you trained or when having your clinical training, you know you get exposed to so many other procedures right? In the rural area even if you stay here for over 100 years you will never see it, your practice is really limited in scope". (Rad 3)

Most of the study participants gave a number of opinions regarding what entails in their role as rural radiographers:

“Okay, as a radiographer, my main role is to produce high quality diagnostic images which would aid in better management of patients. I also ensure patient safety and effective patient management which is key as a radiographer”. (Rad 5)

“In reality, I evaluate request forms and also able to use my expertise to carry out specific X-ray procedures to produce radiographs that are readable to the physicians. I keep records, check and take stock, mix chemicals that are used to produce the images. I also keep data of every activity. But as a head of department, I combine my work with other duties at the department such as ensuring that Air conditioners, light etc are working properly. Ideally it’s supposed to be the work of the estate officer but I combine that in addition to my work. (Rad 11)

“Yea, basic task or job description is providing basic X-ray to the community okay? So it was basically axial and appendicular skeleton cases that we were doing. Besides that, in the hospital you could be assigned to either a committee or something of that sort to help. So you keep doing more than you are supposed to do on paper; some of them is ermmm!! one particular is maybe being a member of a welfare committee, that sees to the welfare of the entire staff of the hospital that is one, and then once a while you may be called upon to assist in something else okay? to sit in management meetings. But, then within the practice itself it is just the basic conventional X-ray that we are supposed to do. So you go to work and make sure your everything is set, you prepare the place ready for the days’ cases and ermmm!! yeah basically that is it.” (Rad 8)

“Yes as a radiographer, Hmmm!!! Yes I’m a radiographer, a degree radiographer and my job description is to produce radiographs for diagnosis of diseases and also ensure proper work ethics within the facility. You know, on the ranking system we have the radiographer, senior, principal, deputy chief and then the chief. But currently I’m just a radiographer, I have not moved to the next level yet, but, I end up doing a lot, what is even expected of a principal radiographer or even a chief radiographer because I am involved in the overall management of the department.”

(Rad 1)

“Currently I am the head of department at my unit, I always make sure X-rays requested by Doctors and physicians are carried out accurately. I also ensure that the machine performs efficiently. I also observe radiation protection for both patients and their relatives, again periodically I write to NRA to come to check the machine. I also produce report on the state of the X-ray department to management during quarterly clinical meetings.” (Rad 10)

“Yea, ermmm!!! like I mentioned previously, radiological services in rural communities is purely the basic practice okay? We don’t do any advance or contrast examination and those things, the point is we don’t even have a radiologist here to interpret or to be doing such cases with you okay? But the rural folks too deserve to have some access to some of these things, already they are poor meaning if they need to have these examinations they need to travel to the urban areas where they can get access to facilities where they do some of these cases. So in the rural context the practice is just basic radiography.” (Rad 15)

“If you look at the training of a radiographer you know it’s wide so if you are limited to just a small area of the practice because of your situation in terms of your location in a rural place, you don’t feel comfortable and you are not able to exhibit the bigger aspect or the bigger picture of your profession you know, so that’s the problem but then ermm!! you have no choice so...” (Rad 16)

5.3.2.3 Occupational Health and safety issues

The study participants suggested a lack of specific occupational health and safety protocol in rural radiography practice. Study participants however gave varied opinions about their understanding and approach in ensuring safe healthcare delivery to both patients and themselves by promoting occupational health and safety measures during their practice:

“Occupational health and safety issues in my opinion have been neglected. It is poorly handled here. Those responsible to perform routine checks and mandatory test do not come as expected. So, we cannot tell whether or not there are radiation leakages or if the equipment or doses that are given are optimum”. (Rad 9)

“So the occupational health and safety in the rural settings ermmm!!! first of all I will talk about the radiation protection measures within the imaging facilities. We as

radiographers will always try as much as possible to reduce the amount of dose for radiation we take each day or even throughout the year and so we have protective clothes that we put on such as the overall lead aprons during radiation exposures to minimise the occupational doses that we take each day. We also ensure our patients are protected by justifying every exposure, besides we provide gonad shields and lead skirts when need be during exposure to radiation. In terms of safety with regards to fire outbreaks; we have fire extinguisher which is within the facility that we can use in an event of any outbreak for our safety. Hmmm!!! But for safety regarding equipment efficacy the least said the better; there are little to no maintenance culture which is very bad. I think this is as a result of lack of policy or SOP regarding health and safety in rural radiography.” (Rad 1)

“We ensure that radiation protection measures are put in place, ermmm!!! collimation is one key and then shielding is also another key point. Body part that are not of interest in the procedure are shielded from the radiation using the lead apron and then the area of interest is specifically collimated. The beam is collimated to the area of interest in order to prevent exposure to other parts of the body which are not necessarily of interest in the procedure. Ermmm!!! these are some of the measures we put in place to ensure safety” (Rad 8).

Irrespective of the participants’ suggestion of a lack of specific health and safety protocol available in rural radiography practice; there seem to be an adherence to most occupational health and safety standard protocols. As it was observed that radiation warning signs were displayed at the entrances of most of the imaging rooms at the various facilities within the rural settings. There was also lead glass for shielding operators behind the control panel from the equipment area. Lead aprons, skirts as well as some immobilisation devices were also available within almost all the facilities. Also, with respect to fire safety; there was a fire extinguisher just at the entrances and within most of the imaging rooms. (Reflections of researcher)

A participant suggested good hygiene practice is adhered to and they ensured that environmental hazards are prevented during service delivery:

“...And we also make sure the ground is also well cleaned and dried before work begins. Besides, any other liquid which is found on the floor is quickly cleaned before

we do procedures in order not to lead to these physical hazards. We also ensure that generally good hygiene practice is observed at all times.” (Rad 14)

Participants also made some revelations regarding the state of risk assessment and also indicated radiation protection measures within rural practice:

“Honestly, currently there are no specific guidelines for risk assessment management in the facility, however as radiographers sometimes you could assess your facility yourself and then you know what is wrong and then you try to do the right thing. You know, just got to keep work going on.” (Rad 3)

“Yes radiation protection is important, justification is one thing so when we are undertaking a procedure we make sure we consider the area of interest and not radiating other part of the body which are not of interest, so we put in most of the radiation protection measures in order to protect our patients and also to protect ourselves.” (Rad 17)

“Well as for radiation protection is like what you asked me earlier; this scope of practice thing okay? Ermmm!!! there is no policy, so far as I know there are no documents from the ministry, from the hospital that talks about or that binds you on some of these things. Because of the training, you are aware that you need to provide radiation protection to yourself and then to the community that you serve, the only legislation that we knew or know of is that of the Ghana Atomic Energy Act okay? which covers some few areas of the radiography practice. And we don’t even have any specific policy on radiation protection just for rural practice. Even if there is a specific framework; rural practice and the urban practice is treated the same, so our knowledge during the training or our knowledge in the practice is what we basically use. But you see, beside the Atomic Energy Act on radiation protection at least there should be some regulations, policies from the ministry on this issue but there is nothing like that, if they were, we wouldn’t be having quarks in some of these rural places because they have not been trained and then the ministry looks on which tells you that they seem not to be aware of the dangers posed by radiation.”
(Rad 13)

“...., I know the three cardinal principles of radiation protection that is time, distance and then shielding. Ermmm!!! for staff that come to the imaging unit, we advise they keep their distance from the source of radiation, mostly those who are not aware of

the radiation, we quickly inform them to move very far away from the source so as to be protected from the radiation and for others whose services may not be needed in the imaging room are advised to stay outside the imaging room or the X-ray room to prevent any form of radiation exposure to them.” (Rad 9)

One of the participants gave his perception regarding health and safety framework purposefully for population (the general public) considering dose creep issues:

“Ermmm!!! health and safety framework; in terms of legal documents, I’m not aware of any for the population. But in relation to radiation protection and dose creep issues; there are dose limits due to modern technological trends. There are international standards that regulate dose limits. That is minimum dose that the population may absorb or may be exposed to in a year or in a month. But there is no legal framework or document specifically for population protection within the Ghanaian rural practice that I am aware of.” (Rad 2)

The participant was probed to give further and better particulars regarding his assertion about the dose limits that he mentioned earlier: how do you determine that, how do you know a particular patient have exhausted that dose?

“Ermmm!! for that it is the details of the medical physicist within the Ghana Atomic Energy agency in Ghana. We are mostly given ermmm TLD badges that are used to measure the doses that we the workers receive. But for the population, it mostly very difficult even though there is a minimum dose limit but it is difficult to measure doses of the population or the people from outside, it’s very difficult. Hmmmmm!!! this is what I can say for now.” (Rad 2)

Furthermore, participants noted that they were not aware of any legal, professional and ethical framework that binds rural practice:

“I don’t think there is any framework that binds rural practice. No!!! there is none, I have never seen any rural policy or anything of that sort or issue of that sort guiding our practice, there is none.” (Rad 13)

“Not that I am aware of. There is no legal or professional framework for rural radiography practice. No there isn’t any.” (Rad 10)

“There is no specific ethical framework that binds rural practice okay? But you know we operate under the general ethical practice under the Ghana Health Service or the

Ministry of Health and then the general ethical practice binding each hospital and then your practice itself, that is what is there. But anything specific for rural practice; I have not come across anything of that sort. There is none.” (Rad 18)

5.3.2.4 Radiographic modalities/equipment

Most of the study participants gave varied opinions regarding state of equipment as well as modalities available within rural radiography practice:

“In most rural facilities we mostly have general radiography, because we lack radiologist. So most of the specialised cases are not common in my facility because we don’t have modern machine like CT Scanner, MRI etc. Even though we are trained in school on how to do special cases, because of where you find yourself you become restricted. You know; management of rural facilities are not willing to buy those sophisticated machines to enhance the work.” (Rad 11)

“Erm!!! usually there are basic X-ray equipment, what was used was the military equipment called PICA and later they brought what we call TURD D37 okay? It does only basic functions or basic things, yeah!!! just conventional X-rays.” (Rad 13)

“Equipment here are very poor, most of the equipment that we use were installed several decades ago. Currently what we work with one of it was installed somewhere 1992 and we are still using the machine that brings frequent breakdown but it was in 2015, 2016 that in connection with the government the universal delft brought us one DR machine. So that is the new innovative machine that we use, but we sometimes have to fall on the old deteriorating bigger machine due to internet and software issues faced with the new equipment. So in general, I will say the machines in rural practice are not innovative they are just the old stock” (Rad 2)

“The radiation safety equipment that are available in this facility, hmmm!!! Okay, we have TLB badges, we have lead aprons, we have the warning light, and then we have the radiation symbol on the X-ray room door entrance and so once you see the warning light; when the red is light on, the safe light you know the X-ray is on and so no one enters the room. When the red light is on outside of the radiation room and you also see the radiation symbol, it tells you that this is a radiation area and is a no go area. That is you are not needed or your services are not needed in that area. We

also have the lead apron which we use for shielding or protecting our patients and ourselves from radiation. We have the waist aprons, we have the neck aprons for the thyroid protection, we also have ermmm!!! a very thick concrete wall about 15inches thick which prevents radiation from escaping out of the imaging room. Besides, the control panel, that is the work station has a lead glass window which protect us from scattered radiations from the X-ray machine.” (Rad 9)

“We were initially using mobile X-ray machine and a dark room but with time we have had a digital X-ray machine that was purchased by the ministry of health. You know Radiographers are usually not involved in deciding which radiographic equipment is needed, they just purchase it and present it to the unit without your input. So most times the equipment that are purchased are actually limited and you don’t get to see its full use. Because depending on the cases you do, like trauma cases, you will for example need a ceiling mounted X-ray machine so you could be able to angulate the tube head to various degrees to help you effectively do your projections. So sometimes the needed quality of radiographs may be compromised due to the equipment which is not good for diagnosis. But, you just have to work with what is available.” (Rad 7)

Similarly, another participant also suggested that the condition of equipment one uses in radiography has a direct effect on the diagnostic value of radiographs that are produced. He argued that the decision on which type of equipment to purchase and the actual purchasing is usually done by the Ministry of Health:

“We use to have an MRS conventional X-ray machine which was recently replaced by the universal delft machine. We are limited in what we do here; we only do general radiography cases. The point is I don’t think radiographers are involved in the decision of equipment purchase. You know as end users, we are supposed to give our input and suggest the type of machine that ought to be purchased, considering the fact that we know the kind of cases we are faced with here and the equipment that could give the needed quality images. But, well !! what can I say? You will be there and an equipment will be fixed.....”. (Rad 1)

The participant further argued that in an ideal world, those involved in the decision making and/or purchasing these X-ray equipment ought to possess the required technical and professional skill to guarantee that the right equipment are purchased

as noted in the Procurement Act 663, 2003 which regulates public procurement in Ghana. The Act requires all public agencies to have a procurement entity that oversees all procurement activities and ought to be done as indicated by the requirements of Act 663. Part II section 15 (3) of the procurement act reads:

“Procurement decisions of an entity shall be taken in a corporate manner and any internal unit concerned shall contribute to the decision making process” Public Procurement ACT 663 2003 (Document).

Yet, it was contended that this was not always the situation in Ghana. The participant was not willing to say emphatically whether or not decisions and purchases were based on corruption. He was however unequivocal that politicians and leaders who make the decisions could have their personal interest. But, raised a concern that their decision on equipment purchase could affect work flow and quality, but contended that, there is little that can be done:

“... You know the politicians and the big men have influence in these things, hmmm!!! You know some could have their own personal interest. But, ermmm !!! these things are so complicated and sensitive you know? But, the issue is; ermmm!! like I mentioned earlier; the type of equipment could affect the quality of image but what can we do? Nothing. But, hey!!! since the introduction of the universal delft machine, maintenance is done every year and so every year they will have to come and service the machine. They have to do calibration of the machine and then reset the computers at the work stations control panels. They do that every year.” (Rad 1)

As indicated above, it was observed that the participant was hesitant in explicitly commenting about politicians and people in authority and their involvement in purchase of equipment; he seemed to be afraid of being possibly victimised. As noted from his response, he initially said politicians and big men may have their own personal interest in the equipment purchase. But later appeared to be holding back to much more information as he pointed out how complicated and delicate these issues are. (Reflections of researcher).

Furthermore, one participant gave his opinion regarding how maintenance of equipment are carried out within rural practice. He further went on to provide his opinion regarding reality of working in rural area:

“So okay ermmm!!!, equipment maintenance has been poor. It even takes a long time for equipment to get fixed when it breaks down. As for the lead aprons, honestly so far it’s been physical assessment done by me. We haven’t done any scientific experiment to assess the state of the lead aprons, to know whether it is in good state or in bad state. Hmmm!!! Regarding modalities available within rural radiography practice; as qualified radiographers the only wish is to put our hands on the various modalities such as the CT, MRI, the fluoroscopy and other imaging modalities. But, in reality here the issue is we just have a general X-ray machine which is even ermmm!!! which has a fixed 100cm FFD and is not able to do most of the procedures which required angulations and so each and every day you do general X-ray or ultrasound and that is somehow let me say a monotonous way of doing some of the things. And we are mostly, ermmm!!! I am mostly not happy in doing one thing all the time and so that is a downside for me” (Rad 3)

5.4 Challenges in rural radiography practice

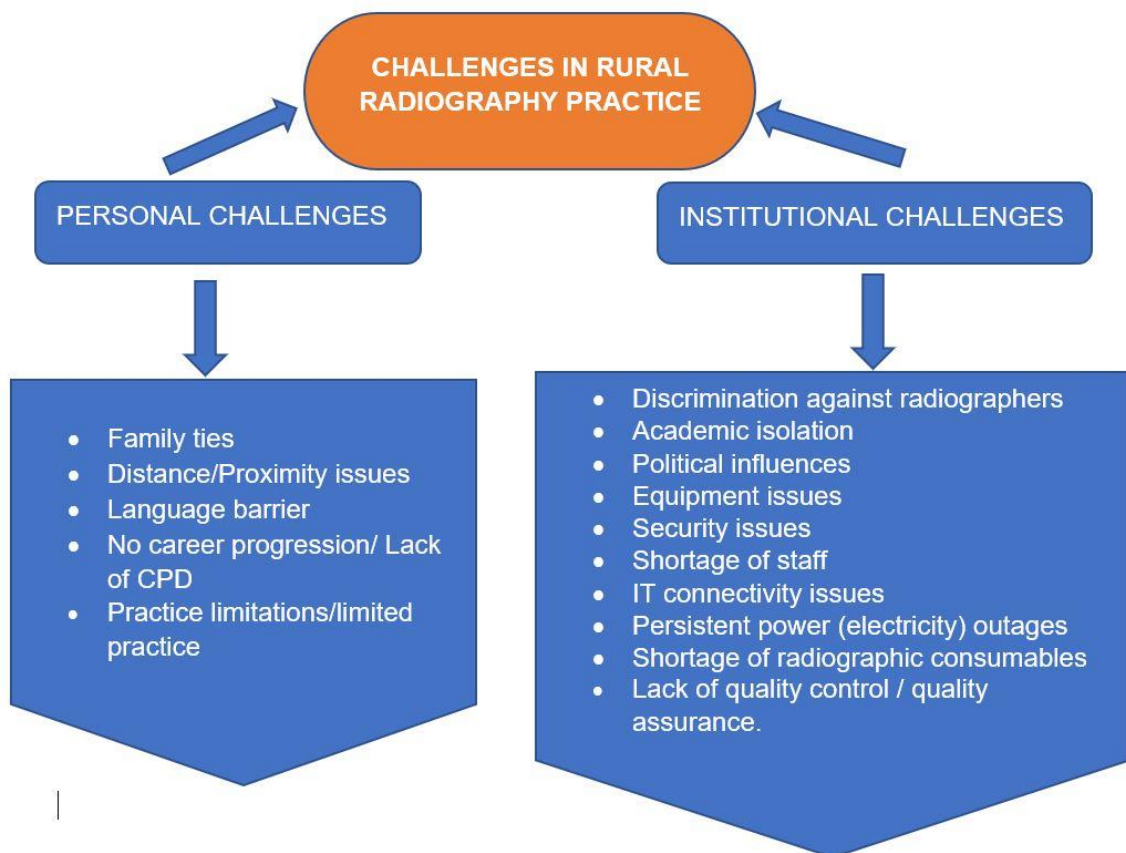


Figure 5.3. Theme structure for challenges in rural radiography practice

Figure 5.3 above shows the sub-themes derived from the theme "challenges in rural radiography practice". This theme was supported by either interviews, documentary review and/or observational data. The study revealed varied opinions from the participants when they were questioned about their experiences and practice challenges within the rural setting. Similarly, various items were observed and some documents reviewed also reflected some of the rural radiographers experiences and practice challenges. Their views about challenges in rural radiography practice were grouped into two major categories (personal and institutional challenges). The categories identified under the sub-theme 'personal challenges' were: Family ties, Distance/Proximity issues, Language barrier, No career progression/ Lack of CPD, Practice limitations/limited practice. While the other category identified under the sub-theme 'institutional challenges' were: Discrimination against radiographers, Academic isolation, Political influences, Equipment issues, Security issues, Shortage of staff, IT connectivity issues, Persistent power (electricity) outages, Shortage of radiographic consumables, and Lack of quality control, and quality assurance programmes.

5.4.1 Personal challenges

5.4.1.1 Family ties

Participants gave varied opinions regarding their individual challenges that they encounter in their rural radiography practice. Most participants indicated some difficulties due to family ties:

"This is a rural area, my family is not with me, I have to always travel to see my wife. Even though this is a rural area you will be surprised how expensive food is in this area, living condition is very high here as compare to certain part of the city that I know. These causes you to miss your family a great deal". (Rad 12)

"My family is very far away from me, it affects me emotionally especially when I have to be thinking about my family and how I have to get closer to them. When I travel to visit my family, I don't also come back early enough and this affects my clients as well. Especially when I travel on weekends and there is an emergency, I won't be

able to take care of that. So, I am forced to stay on at times for several months without getting to visit my family". (Rad 2)

5.4.1.2 Distance/Proximity issues

Accommodation issues were revealed by most of the participants. They gave varied opinions regarding issues of distance from where they lived and where their work and how that affects them:

"Erm!!! not fully, like I told you, I thought that going to rural place could be challenging, so you know you will be treated better than those in the urban setting in terms of accommodation and other minor things that will make you feel happy and stay put in that area. But you don't get what you were promised; once you are posted there that's it and if you don't take care you will remain there forever. You will need to struggle for your own accommodation and sometimes you might get a relatively comfortable accommodation miles away from your facility. This is really stressful."

(Rad 13)

"There are, as I said earlier the working environment, the community and how difficult it is to get access to your work place. It is a poor community so people do walk, it is only a few rich people that use motors and bicycles. For about 10 years now there were no taxis so it was difficult to conveniently get access to your work because we stay far away from our workplace....". (Rad 11)

One participant made an interesting revelation regarding having to transport himself from home to work in case of an emergency or on-call duty without any recourse to funds from management:

"Yes, I stay far away from the facility, because I wanted a cheaper place, my accommodation is not closer to the facility, I use motorcycle to come to work whenever there is an emergency. The hospital doesn't even pay for the transport.

But, I do that just on humanitarian grounds to save lives". (Rad 12)

"It was observed that most of the participants seemed to be in a hurry just few minutes to their closing time and usually would want to leave in a haste right after work. Further probing revealed that they needed to rush to catch a motor-bike which

was their only source of transporting themselves back to their various homes, as these bike owners usually close and leave before it gets dark”. (Reflections of researcher)

5.4.1.3 Language barrier

“It was observed that most patients that visited most of the facilities spoke different dialects and at some points the radiographers had to call for others to interpret the languages spoken to them in order for them to carry out some of their examinations successfully”. (Field Note)

Besides, most participants also gave their opinions regarding language barriers and how that affected their practice:

“We receive patients from other places with different language backgrounds and so the major challenge here is on the different dialects spoken. One thing I don’t feel happy about is when I’m not able to communicate properly to my patients and that is one thing I don’t actually like. You tell him/her one thing and he/she’s doing different thing or you are speaking to him by trying different languages but he does not understand, it’s something which is always hectic to me, you have to go and find someone to interpret and all that, and that wastes a lot of time u know,”. (Rad 1)

“Okay number one barrier or challenge is the language barrier, there are a lot of people coming from different places who speak different languages and ermmm!! for me I don’t understand a lot of languages. But, I’m privilege to have the Ashanti Twi, the English language, the (Name of dialect) and then maybe the (Name of dialect). But other languages such as the (Name of dialect), the (Name of dialect) and other (Name of country) languages are very big challenge cos not many people speak that dialect, so you have to get someone to interpret it for you and that increases the time that you will use to execute a procedure”. (Rad 2)

Document reviewed suggested many dialects spoken across most parts of Ghana. Accordingly, it makes communication somewhat cumbersome and challenging and becomes a barrier for professionals who are posted to areas where they do not understand and/or speak those dialects. Excerpts from the document (Rad-Aid Ghana report 2018) could be seen below:

“....,English is the official language of the Republic of Ghana and the main language of government and instruction, teaching and medical services. There are more than sixty indigenous languages, although it is hard to state an exact number due to different classifications of language and dialect. Twi and Fante are two dialects of Akan and the most commonly spoken local languages. Hausa, a Nigerian language, is often used by traders in the north of Ghana (Commisceo Global Consultancy Ltd., 2017; Every Culture, 2018)”. (Document)

5.4.1.4 No career progression/ Lack of CPD

Majority of study participants expressed their displeasure with how they were treated regarding their career progression as well as attempting to secure a CPD point:

“Well, I think I have mentioned some of the challenges earlier. But I think generally the system within rural setting is very frustrating. Management are not supportive, you don't get the opportunity to upgrade yourself, you are always left behind in terms of professional development. Just imagine since graduating I have not had any opportunity to upgrade myself. All my juniors are Masters and PhD holders. I had big hopes when I was brought here, but sincerely I lost hope. I will say my motivation is my service that I render to the people. I will say for God and country. As for the barriers they are many,....” (Rad 9).

“ Some of the major challenges that you face when you enter into rural radiography here in Ghana, is when you are posted to work here permanently, because in the rural area it is so difficult for you to receive continuous professional development. It becomes a very big burden when you even want to improve or to even upgrade your knowledge in radiography,.....” (Rad 2)

“Personally, I think difficulty in getting the needed opportunity for continuous professional development. It gets even more tougher when you want to upgrade. Since you are a lone radiographer you are mostly denied by management when you want study leave or even to attend a CPD programme. You are sometimes asked to get a replacement before they allow you to go, can you imagine?” (Rad 7)

“....., I had to stay for over five years when I first arrived without any opportunity for CPD....” (Rad 4)

5.4.1.5 Practice limitations/limited practice

In as much as most participants indicated that the practices or healthcare services within rural setting is generally limited; regarding radiographic services, one participant opined that they have their way of trying to improve on the services that they provide and/or attempt to give some sense of direction to how work ought to go in order for the patients to benefit fully:

“Yea, most of the time you have to go the referral physician, the doctor or the clinician just to tell them how these things should be done, how request should be made, the reasons why for instance; why we need brief clinical history okay. So there was one case where I gave an example to a doctor that for instance you asked somebody to come and do X-ray whether its tuberculosis or coughs or accident you are suspecting, fractured rib or anything, you know fractured rib you will not even ask the patient to take in deep breath and hold it you see that is different from the routine or normal chest X-ray cases that we do so it helps in the projections, the number of views that you have to do okay for them but at times they don’t seem to understand, some of them ermmm! when you educate them on that they do agree and then they do the right thing in their subsequence request.” (Rad 13)

“The practice limitation within rural healthcare is not only related to Radiography practice, but other professionals as well; one of the challenges is how prescribers write X-ray request and even how they fill request forms without numbers and all that. You see, some too make mistakes of requesting same X-ray which had being requested for same patient days back.” (Rad 11)

It was observed that most participants were limited with the type of cases that they handled as most were into conventional X-rays. Almost all radiographers observed from the various sites indicated some level of practice limitations in that due to equipment unavailability simple cases that ought to have been done within rural settings are almost always referred to regional hospitals and/or other facilities who may have the needed services (Field Notes).

5.4.2 Institutional challenges

5.4.2.1 Discrimination against radiographers

One participant was blunt with a jaw dropping revelation regarding discrimination within the healthcare industry; the participant posits that Radiographers are discriminated against. They are not allowed to attend workshops, conferences but other healthcare professionals such as the doctors are given the opportunity to attend:

“Well I thought that ermmm!!! you know most people don’t want to work in rural areas so I thought that once you are posted there to help because of the lack of so many things within the rural areas there will be some form of incentives as a rural practitioner okay! that will boost your morale and to motivate you maybe to even remain there for some time. But it’s not like that, at times it’s like you are forgotten okay, and then when there are workshops or training programs and other things that you need to attend; because you are alone you know this rural practice is only one radiographer and with your maybe few assistance who does minor jobs in the department, you can’t leave the hospital and go for any training, workshops or conferences that are usually organised by your professional body or society so it becomes a problem between you and your administrators. Because they don’t want to release you for any period so when that happens, gradually you will be going stale. So my expectation was that erhhh working in a rural area they should have known better that because of the situation once in a while we should be allowed to also update ourselves to come and help the practice in the rural area. But that is what we don’t usually experience, we don’t get it so it makes you frustrated, worried and then you plan to even leave the place for a better place where you can get access to some of these things. Afterall, even within rural area, they allow some other professional groups like the doctors to attend workshops, conferences and the likes” (Rad 13).

“....., so most of us here in the rural practice anytime that we apply for us to upgrade our knowledge, most of us are denied. Management always tell us that we have to be replaced before we can get the leave and come and study more about radiography to increase our knowledge, can you imagine?. I feel we are discriminated against as other health professionals are given the opportunity to go so others will come knowing that they will be given the opportunity to go as they will only stay for a while and be

given the opportunity to leave when they want unlike the radiography professionals (Rad 2)

“....., some of the professional bodies have managed to get themselves, their members or their professionals to be motivated as they work in the rural settings but as for radiography it is very difficult. Even accommodating us in bungalows or quarters has become so challenging, yet other professional groups are provided with the needed accommodation with ease. We see these things and we get very sad. Hmmm!!! apart from your individual salary that you’ve been given no other incentives are added up to it”. (Rad 17)

5.4.2.2 Academic isolation

The study revealed that most of rural radiographers were concerned about how isolated they felt they had been with respect to academics. It was observed that most rural radiographers were sad, worried and disappointed when the issue of academic activities were raised by the researcher during the field work. (Researcher’s reflection)

Furthermore, a participant opined that opportunities to educational programmes such as workshops, conferences or even further studies is lacking and even approval by management gets extremely difficult and almost impossible:

“....., I mean in terms of professional programs you are not released to go, mean while the rule is that when there is workshop or anything of that sort your managers must sponsor you. But, you don’t get that sponsorship; you send the invite letter and that is if you are even fortunate to get the letter that there is going to be a program here or there. |Even when you submit it for approval, you don’t get the approval you see, so when that happens you become frustrated and plan to leave the practice. The point is it is very difficult to get the opportunity to attend workshops, conferences and the rest. In fact, it is rare to get approval to attend conferences for 2 or 3 days,.....” (Rad 18).

5.4.2.3 Political influences

One participant gave a very detailed analysis of her position regarding the frequency in breakdown of equipment within rural settings. She expressed her frustrations by

indicating that the rapid equipment failures was as a result of not procuring the right equipment which is due to political influences. She also added that the recurrent breakdown of equipment within most rural facilities were due to the heavy workload on these equipment which are either obsolete and/or not the specific equipment required to withstand the pressure as demanded by the kind of services rendered within these facilities. The participant further concluded on her analysis of the situation by suggesting that the situation that they find themselves within rural settings raises questions of decision making on the type of equipment to purchase for a given facility and whether or not the expected patient throughput was taken into consideration. Also, whether or not experts were consulted or it was politically motivated business transaction or decision that was taken in procuring equipment of the same capacity for all facilities, without considering their particular needs:

“We had only one machine which was breaking down frequently because of the pressure so we sometimes send patients to (Place name) to take X-ray whenever there is equipment breakdown. You see, the frequent breakdown is with many rural facilities because most of the equipment are very very old and the cause is due to political influences. I say this because you wonder what they consider before planning to purchasing an equipment. They just purchase equipment that they feel will give them their needed profits and you even wonder if they contact any expert .

Personally, without fear or favour I can boldly say that most of these equipment purchase deals are politically motivated. There are kick backs and what we call 10% in the system and this is what is killing us as people.” (Rad 13)

5.4.2.4 Equipment issues

The study revealed an unpleasant state of radiographic equipment within most rural facilities, though one participant indicated some levels of improvement in recent times. Participants had varied opinions regarding that:

“They are very poor, most of the equipment used were installed long ago. Currently what we work with one of it was installed somewhere 1992 and we are still using that machine. This brings frequent breakdowns, but it was in 2015/2016 that in connection with the government the universal delft brought us one DR machine. So that is the new innovative machine that has been added, but we sometimes have to fall on the deteriorating older bigger machine due to internet and software update issues. So,

overall, in terms of the rural practice, I will conclude that the machines are not innovative enough, they are just the old stock. (Rad 2)

It was observed that some equipment were not positioned suitably as expected during installation within some imaging rooms which visibly limited and altered its effective usage by the radiographers, which makes one wonder why and how that happened. This was reiterated by most of the participants during field work. (Reflections of Researcher)

Besides, a participant indicated that lack of expert involvement in purchase agreement and installations resulted in poor positioning of the radiographic equipment during installation which then affects its functionality/efficiency:

“Most of the equipment that are installed here have technical limitations because during installation the radiographers who are the end users are usually not involved in any of the process till the equipment get installed. A typical example is what we have here; the table bucky is too close to the chest stand making the chest distance very restricted by the bucky table”. (Rad 10)

Some of the participants contend that equipment breakdown delays unduly before they get fixed which may be as a result of a lack of servicing and maintenance agreement during procurement and installation as well as bureaucratic processes. It was further indicated that the situation is such that since there is no known purchasing agreement for these equipment, during faults engineers only come to examine the equipment after they had been pursued a number of times. After diagnosis of the fault, if it is required that a part needs to be replaced then it becomes the responsibility of the facility. This most often takes time to be executed and renders radiographic procedures to halt within such facilities. Hence equipment malfunction is very predominant within most rural hospitals:

“Radiographic equipment regular functionality is really a big challenge within rural hospitals. This is really an issue of the public sector as this issue of faulty equipment cuts across most government facilities. You see, most equipment breakdown often and it takes forever before they get fixed. There is no proper maintenance culture or servicing agreement when the equipment are purchased, so when it breaks down, engineers are usually invited to come over to examine the machine which usually

takes very long. So during breakdowns every radiographic procedure stops till the machine starts working.....” (Rad 18)

“Hmmm, I personally don’t know if there is any servicing agreement during procurement of the equipment or even just before installation is done. Because when the machine develops a fault, you will chase the engineers for so long before they even come to check what the issue is, they then go back and schedule a time to fix as they may need part replacement or something like that. For me, I think if there is some level of commitment in a form of agreement, the engineers will come promptly when they are called, or even, routine maintenance will be done and that will prevent the issue of frequent breakdowns. But as for equipment issue within rural area, hmmm!! It’s just so bad.” (Rad 1)

“Over here our machines breakdown frequently and they usually delay before they get fixed. Engineers are usually invited to examine what the problem is and then they report their findings to management who then takes charge of buying parts and other things needed to fix the equipment. All these processes I think causes the delay and during these periods work stops”. (Rad 3)

A document reviewed from the Rad-Aid report on Radiology services in Ghana reiterated the complexity of issues regarding radiographic equipment amongst others. Excerpts of the document is seen below:

“Equipment inventory and distribution:

It is difficult to obtain specific numbers of what radiology equipment exists in the country and if it is functional. According to Schandorf and Tetteh (1998), the first X-ray equipment in Ghana was installed in colonial times. Since then fluoroscopy and dental procedures have been undertaken, with use of mammography and ultrasound established in 1993. The use of ultrasound appears to be widespread as in most lower-income countries due to its portability, ease of use and cost-effectiveness....”.

(Document)

5.4.2.5 Security issues

The study revealed security concerns in some parts of rural community as expressed by some of the participants, particularly due to lack of police post/stations and/or chieftaincy conflicts:

“In the rural community there is no security, the police post and other security agencies are far away from us. So, whenever there is any crime you have to travel far away to get them which is quite a challenge....” (Rad 12)

“....,but the only thing is the fear and insecurity within us because the area being previous war-torn area. We have heard a lot of conflicts in the (name of place) area , tribal or ethnic conflicts in the area as well as chieftaincy disputes. This is quite a concern for us and it makes working here uncomfortable at the initial periods when we came. But, we are able to manage and live with the fear”. (Rad 1)

5.4.2.6 Shortage of staff

It was observed that staffing levels across all the sites were inadequate. The problem of shortage of staff seem to be across the entire country as revealed through observation, interviews as well as documentary review. (Field notes)

Most participants gave their opinions regarding staffing within rural settings in Ghana:

“Radiologist is nil and radiographer is just one that’s why we call it one man station; that is one radiographer being posted there. You can’t have two because when you request for additional staff you will be told that workload isn’t much....”. (Rad 13).

“.... in the rural areas there is shortage of healthcare professionals across most disciplines. Radiographers are very few and we don’t even have radiologist , already in Ghana you know generally radiologist are few so most of them are located in the capital cities or the regional capitals so the rural area you don’t have that so the doctors usually at times seek your help when they don’t understand these images or radiograph that you produce...” (Rad 5)

“...., at times the doctors are not available, sometimes there could be only one doctor available and nurses are also relatively few than expected.....” (Rad 14)

The issue of shortage of radiographers has been a great concern expressed by all stakeholders in Ghana including GSR, MOH as well as GHS. An official document (minutes of a stakeholder meeting) organised by the director general of the Ghana Health Service regarding measures taken to address the issue of shortage of radiographers in the country. The title of the document is “Meeting On Modalities To Address Shortage Of Radiographers For Public Health Facilities”. Excerpts of the said letter is seen below:

“MEETING ON MODALITIES TO ADDRESS SHORTAGE OF RADIOGRAPHERS FOR PUBLIC HEALTH FACILITIES”.

Date: Wednesday, 11th April, 2018

Time: 3.15 pm – 4:54pm

Venue: Director General’s Conference Room, GHS Head Office

Context and Purpose of the Meeting

i. The meeting was held primarily to discuss modalities to get qualified Radiographers for the operation of X-ray machines installed under the ORIO-TB Case Detection Project and to also discuss the way forward in meeting the rising demand for Radiographers in the public health facilities in the country....”.

(Document)

5.4.2.7 IT connectivity issues

Participants gave varied views about IT connectivity related issues within the rural setting:

“Like I said, internet services have always been our problem in these areas. We have always depended on our mobile phone internet connectivity service. Management attempted to install some wireless service but it is not always functional as there are issues with data. I had always wanted to transfer X-rays to other facilities in the urban centre for our images to be reported but internet has been a major barrier. So, images that needs reporting are manually sent by being carried along by either patients or their relatives.” (Rad 9)

“Internet issues within rural practice is just bad. It is totally nil, nothing to write home about....” (Rad 4)

“There is no internet connectivity in my unit. There is some available within the hospital however, it always run out and/or there is an issue with the functionality due to cable issues and so many other things. That is what the IT people tell us....”. (Rad 8)

“There is nothing really like better IT within rural setting. Nothing like that, even ermmm!!! mobile phone networks are also very poor, so communication via such mediums are very bad, even landlines are not so efficient”. (Rad 7)

“Well in terms of IT our region is doing well little by little but we can’t compare it to the bigger cities, just as I said the DR machine that we received from Universal Delft require a whole lot of IT because its DR and so internet connections will be required for software updates and even transfer of data to clinician. But, due to bad internet connectivity, we are always not successful. It’s a new thing so little by little we will improve”. (Rad 2)

“Most of the communities within rural areas are gradually hooking up to the internet but connectivity is not that good. So we cannot take X-rays and do something like telemedicine or something like transferring to clinicians up and down like PACS you know? But, we are picking up in terms of connectivity as a region at the regional capital level. But the radiographers who are at the district levels are still struggling with internet connectivity issues, so at a new era of moving images between equipment, we in the rural area are still moving from one district to another by manually carrying radiographs” (Rad 10)

“We have bad network, so connectivity to transfer some of the images to the doctors is a problem, so we are not able to do it. We wanted to use the PACS system but because of the internet services its really challenging and that has made it impossible for us to use that. So, we are still printing X-ray films for patients to send to their physicians”. (Rad 12)

“Concerning internet connectivity, if I want to read more about radiography online, due to bad internet network am not able to do it. Again, how to use the PAC system to get report for our client is also a problem. Also, because of poor network am not able to partake in CPD training online....” (Rad 17).

A participant having provided his thoughts regarding state of IT connectivity within the rural setting, went ahead to suggested a solution to the connectivity issues:

“Internet connectivity is very bad in most of our villages which is unfortunate as we tend to lack behind in so many aspects irrespective of today’s technological advancements. In fact the telecommunication network providers should boost up their internet services here. If it is the cables that they are going to extend to enhance the coverage, they should try and do something about it so people like us can use the internet to access our CPD through online and also access the PACS system. If we can also get a reliable system or software that can easily be accessible for our images and report from few radiologists in the city that will help a lot”. (Rad 18)

5.4.2.8 Persistent power (electricity) outages

The study revealed persistent power outages as one of many challenges identified with rural radiography practice:

“...., electricity is a problem, sometimes there are power fluctuation which isn’t good for the equipment. When the power fails the equipment cannot function so work stops....” (Rad 13)

“access to electricity here is a problem unlike the city. We experience acute power fluctuation and outages from time to time....” (Rad 11)

According to the Rad-Aid report on radiological services in Ghana; electricity was an issue across the country but more challenging within rural parts of Ghana. Excerpts of the report is seen below:

“In 2013, Electricity was accessible to 72% of the total population, but only 50% of rural areas had been electrified, compared with 92% of urban areas (CIA, 2018). Not including hydropower, the goal is to have 10% of energy produced by renewable sources by 2020. Bio-energy has recently attracted investment which may stimulate rural development and create jobs. Scheduled outages occur regularly in different regions as publicised on the Electricity Company of Ghana Ltd website (ECG Ltd, 2016). These outages are planned for maintenance and upgrading equipment in addition to any unexpected outages due to, for example, the weather, equipment breakdown, construction error, vandalism or contact with animals or fallen trees. In

2015 there were 159-days of blackouts across the country (University of Cambridge/Phys.Org, 2017)". (Document).

5.4.2.9 Shortage of radiographic consumables

It was observed that there were shortages of one item or the other in all the sites visited for data collection. There were shortage of consumables such as gloves, films, developers, fixers and the likes. It was even observed that X-ray envelopes and radiographs were being cut into smaller sizes all in the name of managing them to avoid possible shortage. (Field notes)

Most participants argued that the availability of consumables at all times is not guaranteed within most rural facilities. It was indicated that most often, very basic consumables such as sanitisers, gloves, cotton wool, X-ray films, envelopes and the likes are usually in short supply. Participants asserted that such circumstance hinders the easy flow of work:

"There is shortage of supplies like the X-ray films, and even sometimes chemicals to develop the films. Sometimes too even X-ray envelopes is a problem, and the usual consumables such as disinfectants, gloves, cotton and the likes are always not available. This really affects work flow and also affects the (Rad 2).

"....,Again logistics to work with is also a problem; there are shortages of films, disinfectants and so on." (Rad 8)

"We lack lots of things even with consumables, they are always constantly short in supply. It is a huge challenge, I must be very frank with you." (Rad 12)

5.4.2.10 Lack of quality control, and quality assurance programmes.

A participant contend that there was lack of quality control and/or quality assurance programmes within most rural settings, however they manage to undertake the necessary quality checks that are feasible and able to be conducted by themselves:

“For the new machine we don’t have any official quality control or quality assurance programme to deal with that. No, not even the old machine. But, it is the lead aprons that are easy to check to see weather its able to block radiation from penetrating it. Apart from that we don’t have the basic quality assurance equipment or tool to check radiation penetration, radiation leakages at the door and all that. But, the little once we can do, we put them in place, especially basic checks and safety at the doors and signage’s etc” (Rad 11)

Irrespective of the indication by some participants about the lack of quality control and assurance programme within rural radiography practice; a document by Rad-Aid country report: Ghana regarding regulation and policy on quality control within Radiology facilities has been indicated to be managed by GAEC. Excerpts from the said document is seen below:

“Regulation and policy:

Various agencies exist in Ghana to oversee radiology services. There is a Radiation protection Board as part of the Ghana Atomic Energy Commission (GAEC) and a Physics

Department, University of Ghana to assess the safety of and ensure the quality control of

medical X-ray facilities.” (Document)

Nonetheless, has indicated by the participants, it was also observed that there were no signs of quality control protocol or quality assurance programmes as it where; sighted in the documents observed within the sites selected for field work nor was there any snippets displayed within any of the rural radiography centres visited for data collection. Besides, after further inquest regarding that it was reiterated that there was no quality assurance or quality control programmes within most rural radiography facilities which suggests a comprehensive lack of quality assurance within rural radiography as indicated by the study participants (Reflections of Researcher).

5.5 Impact of challenges in rural radiography practice

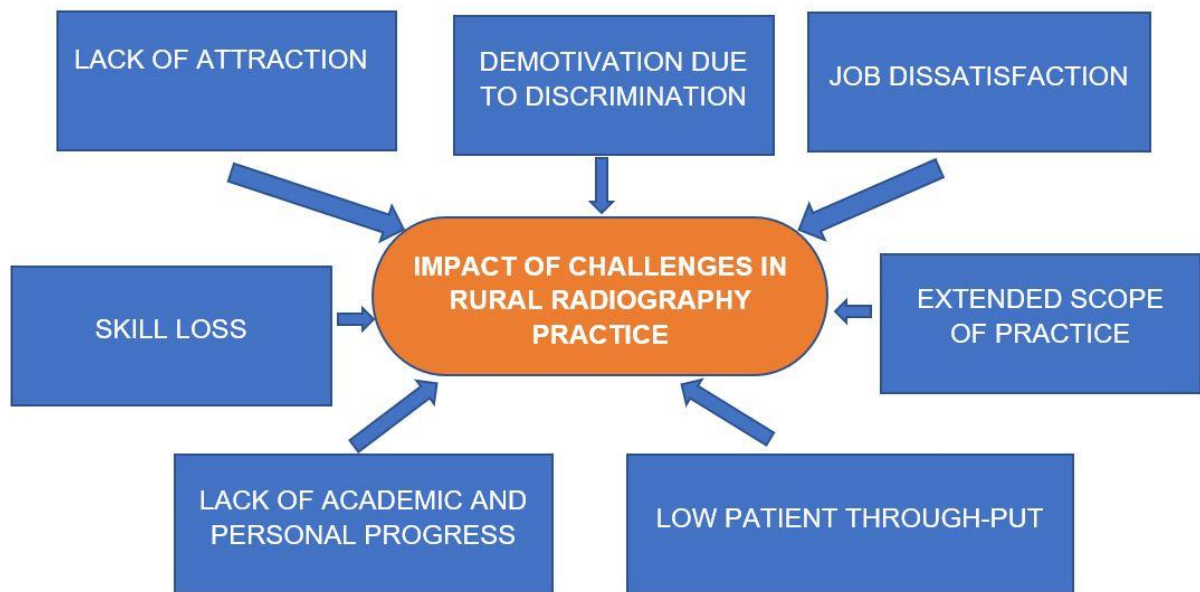


Figure 5.4. **Theme structure for impact of challenges in rural radiography practice**

Figure 5.4 above shows the sub-themes derived from the theme " impact of challenges in rural radiography practice ". This theme was supported by either interviews, documentary review and/or observational data. The study revealed varied opinions from the participants when they were questioned about the impact of challenges and barriers within the rural setting. Similarly, various items were observed and some documents reviewed also reflected some of the rural radiographers thoughts regarding the impact of their practice challenges. Their views about the impact of challenges in rural radiography practice were grouped into seven major sub-themes: Demotivation due to discrimination, Lack of attraction, Job dissatisfaction, Low patient through-put, Extended scope of practice, Skills loss, and Lack of academic and personal progress.

5.5.1 Demotivation due to discrimination

Participants argued that radiographers are being discriminated against and they gave varied scenarios and reasons for their stance:

"Yes, we feel discouraged and being treated unfairly which is one of our greatest challenges, other rural professional groups are rewarded in so many ways with free accommodation and the rest. But for us, we were promised that when we engage in

rural practice we will be given incentives. Nothing incentives promised ended up not to be true and so it quench our joy even at the start or commencement of our practice here.....” (Rad 2).

“.....,meanwhile other professional groups managed to get free accommodation and other incentives which we do not know how that was achieved. Radiographers are ignored completely and its really unfair and disheartening” (Rad 1)

“.....,and so we tend to jealous our friends that are in the other professions, even those in the bigger cities, because they will all have other offers aside their main work, that is what we call locum radiography, when they close from work they can get a place to work extra in order to get additional income but for us the rural rads when we close from work that is all,....” (Rad 15)

“Yes, that is one major challenge, I remember when I arrived several years ago. I was promised so many things. Accommodation, transport allowance and remunerations etc. But it all ended up not being entirely true so it really got me disappointed and so I’d wanted to leave at the time. Leaving some of us regretting to accept the rural posting”. (Rad 9)

“The reason is that, I completed school with colleagues who are done with their Masters others currently pursuing their PhDs and so on. But, I am still having a diploma certificate. Meanwhile if I want to go to school and I tell management there are issues. Anytime I make an attempt of going to school, the hospital will ask of a replacement from me, my question is where will I get a replacement from? Is it my responsibility to get a replacement or recruit a member of staff? But, others are given the opportunity within the same facility. So, if I find myself in the city and would be considered for a study leave to upgrade myself just like my other colleagues in urban practice., won’t I leave? (Rad 12)

5.5.2 Lack of attraction

Issue of lack of attraction was asserted by participants who provided various opinions regarding that with some providing their thoughts regarding steps to attract radiographers:

“Yes, just as I said I am experiencing a current trend that the younger ones or the new radiographers who are coming up will not want to take up the role because aspects of rural radiography roles are not being taught in schools and when we are trained as a radiographer we tend to choose where we want to go currently. Formally, it could have been the system that will send you there but now you choose where you want to go and then because of the conditions in rural radiography a lot of the young ones wouldn’t want to take up that role or they feel that they may have challenges with working as a rural radiographer, so when the issues are rather opened up and taught in schools or discussed freely and openly, it is really going to help the situation. Because young radiographers will be able to make a formidable choice whether to work as a rural radiographer or to stay in the bigger cities”. (Rad 2)

“...., those in urban areas are aware of these challenges so they don’t want to go, that’s why up to now there are still places lying empty within rural areas. The issue is Radiographers may be available but because they have the mindset that treatment in some rural settings at times is not nice, they will refuse to accept to go there and work”. (Rad 13)

“The challenges is what I have mentioned, but if you are a radiographer and have big hopes for rural radiography and you come here your hope will be dashed. Because you will not be using good machines and then some of the things that will create a barrier for you in having joy in your practice is the issue of machine breakdown and how long it takes for it to be repaired. People hear about having been off work for couple of weeks due to machine breakdown very discouraging and therefore do not want to work in such conditions” (Rad 1)

“....., so if rural incentives are created for rural radiography it is even going to create a whole lot of movement to this areas, you know”” it will attract more of our colleagues and our people here in the (name of place) will not suffer due to lack of workforce”. (Rad 16)

“.....,the system in place is also not motivating enough to attract others who may have fresh and better ideas to come in to help us in the rural radiography practice. Almost all the young graduates are centered in the big capitals. (Rad 18).

5.5.3 Job dissatisfaction

Job dissatisfaction amongst rural radiographers were revealed as some participants gave varied opinions regarding their job as rural radiographers:

“Yea, the challenges identified have serious impact on us, the impact is that it doesn’t make you feel like the professional you want to be and it also discourages colleagues from coming to the rural areas. The point is most of us are not enthused and have lost interest in the work. There are lots of problems or challenges which needs to be addressed, in fact we need research into so many aspects of our practice here in rural areas and then try to help change the situation, but as it stands now is like when you are sent there you are forgotten”. (Rad 13)

“Yes, there is job dissatisfaction amongst some rural radiographers, as our practice is limited due to equipment limitations.....” (Rad 9)

“....., So, any breakdown means work has to halt till the engineer arrives. This makes practice of radiography here not exciting and discouraging.....” (Rad 14)

“I am dissatisfied with my job and I always think of leaving rural practice, It comes to mind often especially when hospital management frustrations get too much. I get frustrated when there is frequent breakdown of machine which are not readily repaired, I also get demoralised as most of my school year mates are now either pursuing their masters or PhD”. (Rad 12)

“We mostly refer very simple cases to the urban facilities due to equipment breakdown or lack of the specific modality, professionally you feel dissatisfied because you become totally useless in helping your patients when the machine breaks down or when you cannot conduct a simple procedure because of unavailability of equipment. (Rad 6).

It was observed that most radiographers were not much interested about discussion relating to their continuous stay in rural practice. During field work, it was obvious few of them clearly displayed disinterest and job dissatisfaction and even some clearly reiterated wanting to leave rural practice. (Reflections of Researcher).

5.5.4 Low patient through-put

Study participants mentioned various issues that usually lead to low patient through-put within most rural facilities during service delivery:

"....,well, equipment faults create an unpleasant environment for us as we have to turn down radiological requests which affects our patients who need our services the most. Most patients get stranded and their conditions get worsened as some may not have the financial means to travel long distances from the rural area to the urban centres to get an X-ray service. Besides, lack of consumables as well as differences in spoken dialect also significantly contributes to increased procedure time". (Rad 4)

"Yes, we experience low patient through-put for instance due to language barrier as well as other constraints...." (Rad 7)

"The thing is as I mentioned earlier, anything that disrupts smooth work flow increases the minimum time I have to use for a single procedure here at a time, that is the big impact on the practice". (Rad 15)

"As a radiographer we first receive a request form and after we justified the forms before we go ahead and do a case. Here in a case where a patient comes from village with a request form but the request cannot be justified you have to go ahead and find out from the patient what is wrong with him or her, in this case you are acting as a physician because you have to take the patients clinical history before you can go ahead to do the case. This causes inefficient flow of patients through the department, so you can't really ensure timely and appropriate level of care as expected. But, we manage to make sure we do the best we can to make things happen". (Rad 11)

"Okay ermmm!!! a reason for low patient through-put could be due to language barrier. The fact is the time for each procedure; that is minimum time for each procedure to be taken will be increased due to the language barrier, let's say if I'm going to perform a chest x -ray which will take a minimum of maybe 1-2minites and then due to language barrier I'm not able to execute that procedure within that 2minites and I ended up using about let's say 5-10minites to do such a procedure it means that work load is going to be packed because there will be a lot of people in

the waiting area waiting for their turn and that affects the speed of work in my facility". (Rad 1)

5.5.5 Extended scope of practice

It was observed that most of the participant's had extended their scope of practice, in that some were seen providing comments for referring clinician's within the rural setting. Others were also into Ultrasonography while some were observed taking up administrative roles by attending department meetings. (Field Notes)

Additionally, some participants admitted their roles have been extended beyond their normal scope:

"So, additional activity we do is that on my job description there is nothing like reporting, and so what I have added to my job description is to assist clinicians report or find the cause of their patients problems so I have added that role aside my official one as well and I have also extended my role by getting involved in ultrasonography, so in my job description there is nothing like scanning patients but I have also added that role to my work". (Rad 3)

"There was on the job training in ultrasound, but the certification was not given, it was on the job training and later there was training basically on it in the region to our radiographers however they failed to provide certificate after that either. But, overall I go beyond the scope of my practice". (Rad 5)

5.5.6 Skill loss

Most of the rural radiographers indicated why in their opinion they feel they are either losing or have lost their skills:

"....,I have almost forgotten most radiographic techniques that were taught in school as I have not performed these examinations in a very long while. (Rad 9).

"Yes we are getting rusty day by day, look! as I mentioned; the joy wouldn't be there because we are not being the opportunity to advance in our roles, we are denied incentives and then our scope of practice has also become limited. Because radiography is evolving, there are a whole lot of things that are coming into radiography which is not available to us here in the part of the country. We hear of

discussions about artificial intelligence in radiography, we can't get to experience any of these things because internet is a challenge here. We are limited and continue to practice with the old things that I met since 2009, our radiography upgrade becomes so limited here. You really get rusted as you have not practiced all the techniques that you were taught in school for a very long time. You will lose most of your advanced Radiography practice skills sincerely.” (Rad 3).

“The experience is thought provoking I should say as a lady practicing here. There is some kind of mixed feelings when you really want to talk about the practice of rural radiography here in this part of the country and how out of form we are gradually becoming as professionals. Hmmm!! the thought of the fact that I am not able to do lots of things that I was taught in school is quite regrettable. Hmmm, reason is that some special examinations such as IVU, barium studies, Myelogram and the likes that I could have been able to perform with the help of a radiologist are all referred to the regional hospitals. So, you see, one gets rusted and forget the trade. In fact, lack of radiologist around this town makes it impossible to offer those services so we just render general X-ray services and then the special ones are referred to either the (name of place) hospital or other private facilities in the urban centre”. (Rad 11)

5.5.7 Lack of academic and personal progress

Participants argued and vehemently mentioned their displeasure with how they are treated when it comes to academic and personal progress within the rural settings:

“I am really disappointed in how issues of academic and personal progression is handled in this parts of the country. It seems when you accept to work in a rural area, then you have signed your own warrant to be doomed in terms of academic or professional progression. This is serious, if these things continue, there will be a time when no one will be interested to practice in rural areas”. (Rad 16)

“Most people outside rural practice are aware of the lack of opportunities to progress personally as a professional or upgrade yourself when you are in rural practice. You know, these issues are open secrets; they are discussed at our conferences and

most young rads are always skeptical about working in such areas when they are approached. This is quiet disappointing and needs prompt necessary attention.”

(Rad 18)

A participant indicated that he had to leave rural practice once he felt the need for personal and professional progression/development. He further indicated he has no regret leaving as he had achieved a lot in terms of academic progression and professional status:

“Yea at some point I decided that no! enough is enough, I needed to move for better opportunities. I have to upgrade myself; go for further studies and so I started planning to leave the rural area, so I have to go to Accra, complain to my bosses, those who can influence my transfer from the rural area to the urban area okay?, because I have done my part having serve the rural areas for about 4years plus and that was enough so somebody else too should be send there so that I can also have the opportunity that lies ahead for a radiographer. And fortunately when I did that, I got the transfer and came to urban area. I had a scholarship to do this further studies at a university in (name of place). (Rad 13)

“....., it was good I left there because so many things go on in the urban areas that we in rural areas do not even get to hear about them. We don't know about it okay?, that is one big challenge, so many things you don't hear, because there was no efficient mobile or telephone connectivity system within most rural areas even for you to communicate with your colleagues somewhere for you to know what is happening, so it was as if we were shut out totally, we were in darkness”. (Rad 13).

5.6 Education and Training

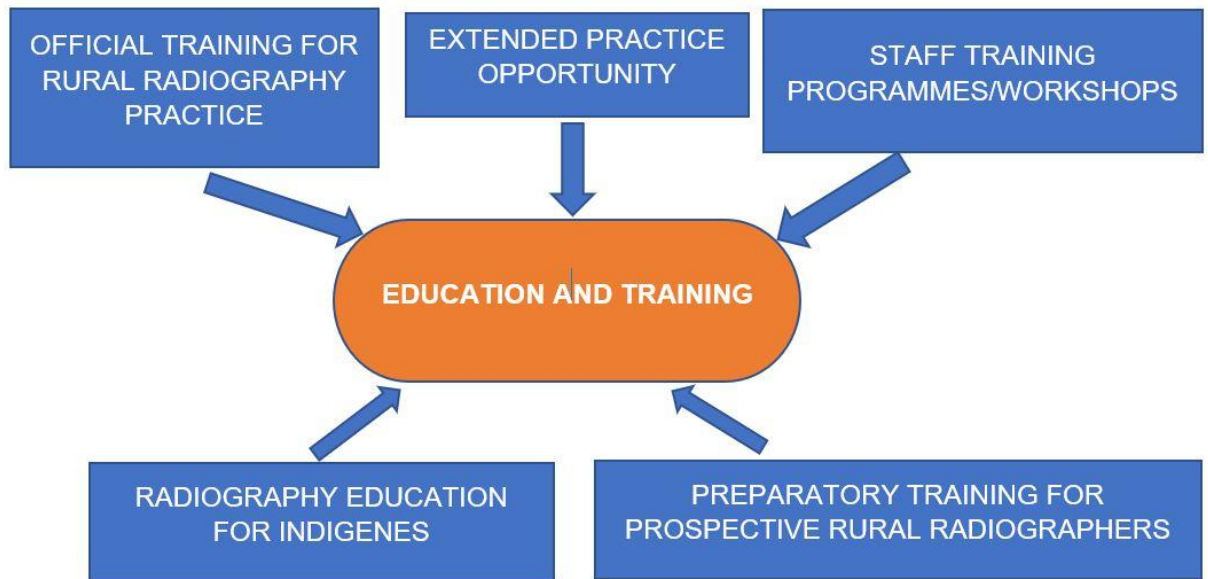


Figure 5.5. **Theme structure for education and training**

Figure 5.5 above shows the sub-themes derived from the theme “education and training”. This theme was supported by either interviews, documentary review and/or observational data. The study revealed varied opinions from the participants regarding education and training for Radiographers within the rural setting. Similarly, various items were observed and some documents reviewed also reflected some of educational and training needs for the rural radiographers. Five major sub-themes were selected regarding education and training: Radiography education for indigenes, Staff training programmes/workshops, Extended practice opportunity, Preparatory training for prospective rural radiographers, and Official training for rural radiography practice.

5.6.1 Radiography education for indigenes

Some participants expressed their thoughts and opinions regarding the need to train indigenes from rural communities and/or to provide them with sponsorship for radiography education, so they will be required to return to their community and offer radiographic services as a way of helping curb the issue of shortage of radiographers and also to prevent quackery in the system:

“There is a shortage of radiographers especially in most rural areas, yet the government wants to procure more equipment in order to increase our radiological services. So, i think there should be a need to educate some of the locals from the community so they can come back to work as rural radiographers. These students picked from the communities can be bonded by the government to work for the district after completing their education in radiography”. (Rad 1)

One participant indicated that his recommendation to the management has been accepted and plans are far advanced to train about three of the indigenes :

“In my facility because I am the only radiographer, I suggested to management to send somebody from the community to school, who will be sponsored by the district. Management considered it has a laudable idea so they even plan to extend to the district assembly and then to government itself. So, we have gotten about three (3) students who are currently going to be sponsored by the district for this academic year”. (Rad 12)

5.6.2 Staff training programmes/workshops

The study demonstrated that staff training programmes/workshops are an essential element for rural radiography practice as it provides the need support required to thrive as a rural radiographer when posted to such facilities:

“There should be an attractive incentive for rural radiographers to start with aside the opportunity for offering training support. There should be education and training for radiographers who have accepted to be working in rural area. The staff training, workshops, or ermmm!!! in-service training are very important for us. Because that will give us the opportunity to share our thoughts and also ask questions about things that may be bothering our minds as rural rads”. (Rad 11)

“You don’t get the chance to upgrade yourself not to talk of workshops. If the workshop is not closer to me, I don’t get the chance to attend. So, in terms of continues professional development I don’t get the chance of developing myself. Again, because of poor internet network I don’t get to read much on my profession online. So, opportunities for staff training doesn’t look good here”. (Rad 12)

“Yes, personally I feel we need some in service training and also get to attend workshops and conferences so we can share with other colleagues what goes on here so that they are also aware of what goes on in rural area.....” (Rad 1)

“..., for the reporting I think radiographers can be sponsored by the government for courses outside the country and come back and help in rural areas, you know; in terms of the reporting. With respect to giving intravenous injection for special radiographic cases, I believe if radiographers are well trained and certified they can do it in the rural areas...” (Rad 17)

“That has been a major challenge, ermmm!! CPD has been a major challenge for us in rural radiography practice, because sometimes there may be CPD programs but very far in the urban areas. We do not have access to CPD programs within the rural areas where we can you know move at ease and then attend such CPDs and then come back and do our work. You know, when sometimes there are CPDs at the urban centers it’s difficult to leave the job and attend because, it would mean there will be no one to take care of the facility when you are away and management will not even approve your attendance, so is a big challenge for us here”. (Rad 2)

“Ermmm!! as I indicated, it is very difficult moving out from the rural areas to attend such programs or trainings in the urban areas which is far away. So it is very difficult to move from here, I have not had one yet, I’m yet to attend any workshop of training program since moving here”. (Rad 10)

“Regarding rural rads given the requisite post-graduate training to extend their roles in reporting and other things; my views are that it could have been very brilliant point that the system could adapt so that we will be able to replenish the short falls of the radiologist in the country because currently one radiologist is to about three hundred fifty thousand [350,000] Ghanaians or so. So, bring it and factor it to the (name of place) where I am currently working, there is no radiologist at all, if we are given extended training on report writing and also in carrying out special examination it is really going to improve rural radiography, it will also bring joy to those who want to take up this new role, it is also going to improve in our services and job satisfaction for both the radiographer and the referring clinician that you’ve been able to assist to make healthcare delivery better” (Rad 3)

A document indicating training of radiographers did not capture specificity of training to rural radiographers but gave a general overview of what seemed to be workshops/in-service training to some group of radiographers in some few facilities across the country. Excerpts of the document can be found below:

“Radiographers were trained on using the Medex Z-Ray administration system (GHS, 2017) but Picture Archiving Communication Systems (PACS) only exists in a few centres. In 2016, a PACS system was installed at KBTH following a donation from IBM, and in recent weeks a Radiology Information System (RIS), both supported by RAD-AID International (RAD-AID International, 2018). GHS has introduced Telemedicine schemes, but currently do not include radiology reporting as far as I could establish”. (Document)

5.6.3 Extended practice opportunity

Participants gave varied views regarding extended practice opportunities, education and training for rural radiographers and also suggested how extended practice could best be regulated and controlled within rural areas in Ghana:

“Opportunity to expand our role as rural radiographers is necessary, because we end up going beyond our scope of practice anyway. You know, doctors approach us to give our opinions about radiographs and other things. I think when a framework for radiography practice in a rural setting is established, I think they will be able to control the radiographers in that setting in the sense that those reporting will be given a license that indicate that they can only report in a rural community or in a rural setting so that when they are given the certification as a reporting radiographer they do not quickly move out from the rural area. It can be controlled, the rule can be that the certificate will only allow you say in this part of the region alone, so coming outside of it to work as a reporting radiographer will be invalid. I think when its controlled that way it will help us all”. (Rad 2)

“I wasn’t given a full or adequate training in rural radiography, in fact I knew nothing about rural radiography, we were all trained as one and then after that they decide where to send you to. We came here and we automatically got our roles extended one way or the other, I think opportunity to train us for additional or role extension won’t be a bad idea”. (Rad 7)

“I have not had any advance or extended practice opportunities since moving here.

But I have additional roles and responsibilities, apart from performing the conventional X-ray duties, I also scan as in ultrasound and also do give comments on radiographs that I produce from time to time when the doctors seek my opinion on any of them. (Rad 1)

“I feel every rural radiographer must be given the opportunity to be trained for extended practice. Because look, it is something that we can’t run away from. Once you are working in a rural facility, doctors will always come to seek your opinion about the radiographs that are produced, because radiologists are not available to report. I believe we need to be trained on reporting and we can easily be controlled and regulated. AHPC regulates radiographers, we can always develop a policy and that can help with the control and regulation. Even when a radiographer reports on a case, the best way to control is to seek a second opinion from a specialist that is the radiologist before giving out the report, I think it is a control measure which can help in managing the patient better”. (Rad 12)

The participant further suggested how he feels these reporting radiographers could be regulated:

“The regulation can be done by the Allied Health Professions Council. The council can develop a model which will direct how these reporting radiographers can be licensed to practice”. (Rad 12)

5.6.4 Preparatory training for prospective rural radiographers

Majority of study participants recommended the need for preparatory education and training for prospective rural radiographers in order to prepare adequately to meet the demands of their role:

“Yes, I think every radiographer before posted to a rural facility needs some sort of training to help condition him or her so they will be able to stay on and work. Because you are mostly working alone, you are your own boss and teacher at the same time and then there is no one checking on your activities. Therefore when given a prior education on what to expect in a rural centre you won’t get overwhelmed when the challenges start coming up. So, I think there should be a system in place to prepare radiographers for their role in rural areas”. (Rad 11).

“....,there should be education and training for radiographers who are posted to the rural area to prepare them ahead of time because coming here without being aware of how it is like to live and work here can be very demotivating,....” (Rad 10)

“In my opinion radiographers coming to the rural area need special education or training to prepare them for their role. I think such Radiographers will need comprehensive mentoring, tutoring and education about rural practice before they are posted”. (Rad 9)

“From my experience, I think Radiographers who are posted to rural areas without any prior knowledge end up leaving the job soon when they arrive as they find the new life very difficult to adjust. Younger radiographers do not want to come to rural area due to lots of negative information that are sent out there. So when they get the right mentoring and training they should be able to adjust when they arrive”. (Rad 8).

“Certainly, it is very important to rule out some education policies so that people who wish to patronize the rural radiography would be exposed to some training or education on rural lifestyle and ermmm!! and then the realities in the rural areas and all that before they get there. For some people, if they are not aware of something and they get there and find out about things happening, they feel bad and would want to withdraw their services. So there must be some form of education, to educate incoming radiographers on the realities of the rural area, the challenges and all that so that they will be much more prepared to embrace the rural practice”. (Rad 18)

“We don't have any special rural radiography training, the training is just general, once you qualify and you are not fortunate you are sent to a rural place, so there isn't any special post-qualification training or anything like that....” (Rad 14)

“...,it is very, very important that those in rural areas or rural radiography practice gain these competencies, because it helps the rural community and also helps the doctors who are there and those who have challenges understanding some of these radiographs or images. At least and we have to prove to ourselves that cases that you don't understand, you cannot explain, you cannot provide any clue as to what is happening to the patient to that doctor, don't lie or say things that are not right, you

just advice, if possible the hospital should take this to where there is a radiologist for interpretations. But once you are given the basic image interpretation and deeper pattern recognition training; I think it will help to some point". (Rad 13)

The participant further went on to justify his stance for supporting the need for preparatory training for rural radiographers prior to moving to rural practice:

"Well things are changing okay?, we are now moving from this darkroom system to digital system and so on, so if you don't provide this training for rural radiographers and you come and install a new digital equipment, then that equipment may not last without these forms of training and the training is also important because with this kind of equipment which is coming in, it can do so many other things okay?, you just look at even in the urban areas CT and MRI if the radiographers operating are not given once in a while some E-service training, the capacity of the equipment will not be fully utilized. MRI can do a lot but people sometimes under use it, same as CT, the same thing applies to rural training, that is the more reason why they need training. There should be a system in place where once in a while these guys are brought together and train in the advancements which are taking place within the profession, the way we use to do things are changing so they should also know".

(Rad 13).

"I believe for radiography in the rural setting to be very perfect as compared to the cities there are lots of things that are supposed to be put in place, first the radiographer who accepts to go to rural area should be given extra training on how to handle patients with different cultural background, how to work alone and how to relate with other health professionals to come out as a team,....." (Rad 12)

5.6.5 Official training for rural radiography practice

Almost all the participants resolved that there should be provision for official training for rural radiography practice and went on to suggest what training will be needed and how they may be supported and adequately prepared for their roles in the future:

"Training for rural radiographers must be official, in the future the training should be done quarterly, so that those who will be responsible for it will have to come up (name of place) here and take us through the training specifically every quarterly. When they take us through that we will be able to take up such information and quickly put it into

practice, and so when they come and they are teaching us in terms of clinical settings it is really going to help us". (Rad 1)

"Okay, so what I would also say is that; I would need to be given hands-on training on pattern recognition and then radiographic pathology and then some other radiologic trainings when it comes to interpretations of my images to assist our clinicians up here. And also to be able to achieve this, it will mean that you need to be attached to a radiologist who then turns to train you for such work or to be attached to radiographers who have gone through postgraduate courses on reporting of radiographs, so these ones can take up the role and mentor some of us who are in the (Name of place) to augment the shortage of radiologist in our region here". (Rad 2)

"I did not have any formal education or training specific to rural radiography to prepare or support me in my rural radiography role, but I think going forward a formal training should be instituted for rural rads to help meet the complexity of the job".

(Rad 13)

"...,that would be brilliant and a laudable idea. You know there is shortage of radiologists in Ghana generally, so if we are given extended or postgraduate training in report writing and also in performing special examinations it will improve our practice in the rural areas. Some of us are already commenting on radiographs so when given the adequate training we can do far better and work satisfactorily. Hmmmm!!! I think the training should be done periodically, in order for the trainers to come around in person to train us within our clinical environment. I think radiographers can be supported by providing them internet connectivity to be able to study more online". (Rad 9).

"Okay, I think the radiographers would need hands-on training particularly with special examinations. They should also be provided training on pattern recognition or image appreciation and radiographic pathology. With the reporting I think a radiologist must be attached to the department to mentor and monitor the progress of the radiographers who have gone through postgraduate courses on reporting of radiographs". (Rad 18)

Document by GSR indicated a controversial subject matter regarding an official training of unqualified and unskilled persons by qualified Radiographers to man X-ray equipment within rural areas of Ghana. The document provides warning to qualified

Radiographers who are perpetrators to the said unscrupulous act regarding the issue of training of these unqualified persons. A section of the document could be seen below:

“Dear Colleagues,

It has come to the notice of the National Executives and for that matter the National Executive Council of GSR that the " ACCELERATING TUBERCULOSIS CASE DETECTION IN GHANA PROJECT" are falling on qualified licensed Radiographers to train unlicensed and unskilled persons to handle and operate X-ray machines installed by the TB PROJECT TEAM nationwide which will serve as beneficiaries to attached hospitals.

The training of such contravenes with section 21(g) (j) of THE HEALTH PROFESSIONS REGULATORY BODIES ACT (HPRB ACT 857: 2013). By this, under no circumstance should any licensed Radiographer train any unskilled persons (quacks) to operate any X-ray machine.

In accordance to the above act, the leadership of the society is therefore sending a very STRONG CAUTION to all Radiographers to desist from training unqualified persons, anyone found guilty will face the full rigorous of the law.” (Documentary Review)

5.6 Policy and Planning

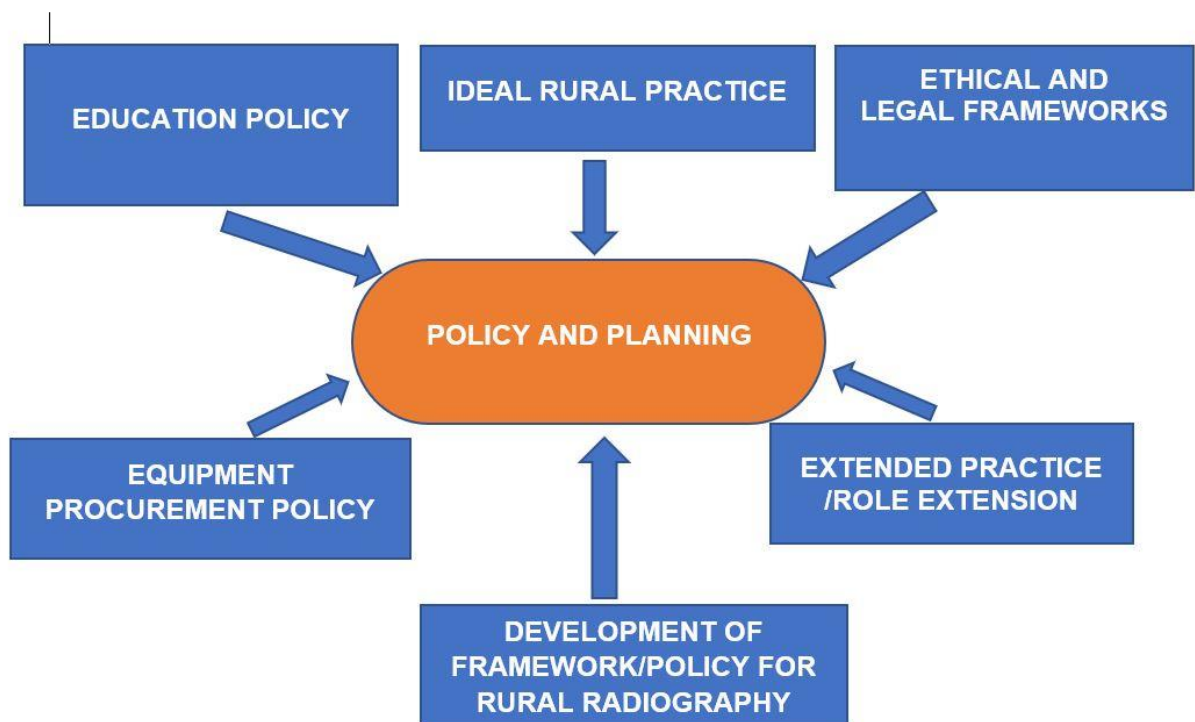


Figure 5.6. **Theme structure for policy and planning**

Figure 5.6 above shows the sub-themes derived from the theme “policy and planning”. This theme was supported by either interviews, documentary review and/or observational data. The study revealed varied opinions from the participants regarding policy and planning for rural radiography practice. Similarly, various items were observed and some documents reviewed also reflected some of the policy and planning needs for rural radiography practice. Six major sub-themes were selected regarding policy and planning: Development of framework/policy for Rural radiography practice: Extended practice /Role extension, Ethical and legal framework, Ideal Rural Practice, Education policy, and Equipment procurement policy.

5.6.1 Development of framework/policy for Rural radiography practice

Overall, the study demonstrated and championed the need for development of a nationally recognised framework and/or policy for rural radiography practice in Ghana. Participants gave varied views and opinions regarding how they felt it should be tackled:

“To me there should be a policy and some sort of structure to govern the practice of radiography within rural settings, we need to be provided them with good equipment and its accessories. We need stable power supply and continues professional training for rural practitioners, I think this should do for now”. (Rad 6)

“There should be policy that will specifically ensure that CPD programs are decentralised, should be brought down to the rural levels so that people in the rural areas should also have easy access to CPD programs in order to keep themselves there, get the necessary new skills and new procedures in their profession. I also suggest that ermmm!!! government in collaboration with the mother association that is the Ghana Society of Radiographers should ensure that free accommodation is provided to radiographers who accept to be posted to the rural areas. And also, there should be hardship allowances or rural allowances should be provided to these radiographers in order to attract them to the rural areas. One more thing I will say is study leave with pay should be provided for rural radiographers to advance in other specialised areas in order to improve their practices in the rural areas. (Rad 11)

A radiographer gave an interesting and a brilliant in-depth experience of what rural radiography is like in Ghana and suggested what development of a policy specific for rural radiography practice would mean for healthcare in rural Ghana:

“Okay, all stakeholders in the management of healthcare services in Ghana have to make rural practice generally appealing and attractive to professionals in the urban areas. Salary increment, incentives, allowances, accommodation must be made available for radiographers who accept rural postings. Internet connectivity issues, state of the art equipment must be brought to rural practice. Management must support radiographers from upgrading, Study leave with pay must be granted to rural radiographers who work for at least 2 years. Promotion must be done faster as compared to the time taken for those in the cities. The authorities may even make rural radiography one of the first stages in every radiographer’s life like national service, so they have a feel of rural radiography practice before progressing. I think all the challenges identified could be considered in solving the issues”. (Rad 9).

The participant further provided his thoughts regarding what needs to be done in order to ensure and guarantee improved rural radiography services:

“Better imaging equipment, Provide adequate training on reporting as rural radiographers are already literally pushed to give comments or assist in imaging interpretation, and finally incentives for choosing to work here in rural area”. (Rad 9)

“I will recommend that rural radiographers’ opinions and experiences are sought in order to establish in depth information and knowledge about what actually happens in rural radiography practice. I think there is a need to consider the challenges and issues identified and it’s solutions in order to factor it into the framework. I think looking at all that I have said, I have raised some issues that in the same way should serve as a recommendation, we look at the challenges and then make the recommendation but as at now there is no clear cut move to do this, if the government or the ministry or the profession have that plan I don’t know yet, but its urgent that we have this, we should make some recommendations to the government or to the ministry to have special policy of rural practice”. (Rad 16)

One participant indicated the need for framework specific for rural radiographers and suggested how impactful it would be for service delivery:

“Yea, a framework for rural practice specifically is going to be perfect. Look, working here has serious impact on your life. The impact is that it doesn’t make you feel like the professional you would want to be and it also discourages colleagues from wanting to come to the rural areas. So if there is a policy that will take care of all our challenges then I think rural practice will be attractive and the issue of shortages will be a thing of the past”. (Rad 5)

“Yea, I think policy for rural radiography practice is essential. We shouldn’t just allow the barriers in the rural setting affect the need to improve our practice, because from my experience there are some cases that if the equipment in place are the right ones, patients will not be referred to the cities. I’m not talking about big facilities like maybe MRI or CT, no !!, at least some basic fluoroscopic things should be in place. Hmmm!! but at times too the reason why we don’t find these types of equipment in this hospital is because we don’t have specialist within the hospitals. And some of these examinations must be referred or requested by a specialist not just a general practitioner and because most of this rural hospitals have general practitioners there is that limitation. But they should also improve so that gradually cases that leave rural places to the urban places should be reduced, so we should not look at it from

the imaging point of view alone because it's a chain reaction kind of thing, if there is a specialist then there should be this and that, if there is that then there should be this and that in place, so the way forward is a policy that will direct our practice as rural radiographers. I think that is the only way we can move forward in rural practice". (Rad 4)

"Policy for rural radiography practice is a must for us in this country. The policy that will provide the need for special training for rural radiographers to be able to report and perform other duties in the absence of radiologist who will not and are not even willing to come and work here in this part of the world. The training must be defined and specific and must be limited with what we need to do, so that we become true to ourselves, so that you will not go and portray yourself as the radiologist, go and write things that you are not supposed to write or say things that you don't have to say about a patient clinical condition has been demonstrated on the radiograph which you know that you don't understand. So there should be some kind of policy, then you know your limit". (Rad 13)

"Okay, I will endorse a policy formulation for rural radiography practice. I will suggest that the policy offer us good imaging equipment, training on reporting as rural radiographers to assist in imaging interpretation and then we should be given incentives for us working here in rural area". (Rad 2)

"Yes, there is a greater need to develop a nationally recognised framework for rural radiography in Ghana because rural radiography is really lacking behind and the challenges are many which is making attraction of fellow rads very difficult. I will recommend that they seek the opinions and tap in the experiences of the radiographers here working in the rural communities to give in depth knowledge about what is really happening here, I think they should factor it into the framework". (Rad 14)

One participant gave an interesting commentary regarding why he feels policy to formulate and regulate the practice of rural radiography in Ghana is paramount. The participant indicated that the policy will help them overcome some challenges they have with local traditional healers who request for unjustified x-ray examinations:

"I think policy for rural radiography practice should be well defined and formulated. That move will deal with some of the challenges we face here. Though it is nice that

traditional medical practitioners most of whom are not well formally educated, have come to realise that coming to do x-ray before they start their traditional methods of treating conditions like fractures and the rest; they are not by law or any regulation allowed to and/or required to request, but they do here in most rural settings. But, the way they write their request is something else and it gets really difficult turning such people down. You know some of these things need to be fixed. If you are going to work in the rural place then you need to be educated on some of these things or trained on some of these things like cultural related issues and how to handle them, because you live with them and so if you refuse or reject their requests because it cannot be justified, you can meet their wrath". (Rad 13)

Another participant indicated the need for a framework for rural radiography practice and provided specific policy for reporting of radiographs and how it should be handled:

"A framework for a radiography practice in the rural area is needed. I think when that is established, radiographers can be controlled as they will require license to report only within a rural setting. They will be given certificate to practice reporting which would only be valid for a specific setting. This could be called rural radiography certificate for reporting. I think when it is controlled this way it will help". (Rad 3)

The participant further reiterated on the need for policy formulation which will take care of their personal/professional development, their welfare as well as wellbeing while working in rural areas:

"I will recommend that any policy on radiographic practice that the government wants to formulate, should involve radiographers so that they can also seek for their thought on it. The government should also train more radiographers, there should also be transfer system in place where radiographers in Ghana can be transferred after working at a place for a couple of years or be given the chance to upgrade their knowledge and advance themselves in an area of practice or a particular modality. Also, I think the government should upgrade the current health facilities that we have. The government should also liaise with mortgage companies to provide more accommodation for workers within rural areas. The government should bring and improve on the existing social amenities in rural areas to help develop the place and make it more attractive for people". (Rad 1)

5.6.2 Extended practice /Role extension

Participants gave varied opinions regarding how extended practice such as reporting or image interpretation within rural settings should be tackled and also suggested how to regularise it. The study further made revelations regarding role extension of rural radiographers and also offered plans/factors to address challenges revealed:

“Okay, ermmm!! let me say we are not supposed to tell patients the results of their X-rays and even sometimes we are not even supposed to interpret radiographs because sometimes you may report on something and then the physician may also interpret different thing. So when you tell the patient this, maybe he/she goes to tell the doctor that the radiographer said this and if he/she is told a different thing then it becomes a conflict between the two professionals. But at certain instances when the doctor or the physician does not get the imaging pattern clearly then, we usually go beyond our scope of practice to actually interpret exactly what is on the radiograph for the benefit of the patient. Ermmm!!! sometimes when there is a demand or the need arises beyond your job description then you have to do so to help the patient.”

(Rad 12)

“Most of the time there are medical officers who seek our opinion on radiographs that are produced. There are times that they come back to seek my view or my opinion on some of the images when the need arises. There have been instances where I have made some comments on certain images. But, most of the report that I give are verbal reports with the clinician present. However, if I am in that terms with the clinician or he has sorted my view before and I see something on the radiograph, I sometimes use the Red Dot System; I just put a dot on the image so that the doctor will know that there is something wrong, and that is what I have been employing ever since I came here”. (Rad 2)

“Though in Ghana radiographers are not supposed to legally write reports and all that, when you find yourself in places like the rural settings, you are forced to do such things. Most times you are forced to produce a comment on the radiograph. Sometimes, when you send the radiograph to the physician even though there is may be nothing wrong with it, they are not able to read or interpret properly and some make excuses about the quality of image. Yet, they end up coming to you for your comments, so it would have being best if rural radiographers are trained on how to write a report because there are no radiologist in most rural setting. Request are

made and they want you to produce report because most of them cannot read the radiographs". (Rad 16)

"Apart from the general X-ray duties, we are also engaged in Ultrasonography. In rural radiography practice, unlike practicing in the urban centres where there are many doctors, radiologists and the likes who perform the ultrasound scans, here most people coming for ultrasound are done by the radiographer. This is an additional role that most of us come to learn and its good for our professional development" (Rad 18)

Irrespective of participants admitting they gave comments or produce reports on radiographs that they produced, most gave details of why and how they go about producing their comments on their radiographs and how they help manage the situation:

"I help in image interpretation because I believe it will go a long way to help manage the patient better. But, I personally give verbal comments rather than producing written reports on radiographs because I feel it is not my responsibility to write reports in the first place. Generally, we don't write because you know we were not permitted even now we are not permitted, but at least we were taken through some image pathology and pattern recognition, the red dot system and all that. So you raise a flag okay? It is just to show where the disease or whatever it is you have identified on the image. But, you will not mention it, ermmm!!! some few of them you can okay? maybe plural effusion, or pneumonia or something of that sort or Koch's or tuberculosis as people will know it you can tell them." (Rad 13)

"Okay, there are reasons why we don't write report and only give verbal opinions. Ermmm!! honestly looking at the time involve in handling the patient and also because we are not expected to write reports we only give verbal reports when the doctors approach us. It sometimes take time to write the report and so things that they are not able to understand they just come for clarifications and then they are okay and then they go back so no need to write it down on paper". (Rad 8)

"So the doctors usually at times seek our help when they don't appreciate images or radiograph that we produce so if we are also limited in image interpretations; at least the basic ones you know, you will not be of help. More so with the rural practice people can just walk in to the department asking you to do an X-ray for them

because they are having a pain here or there without seeing a doctor or without going through the normal clinical process for a competent clinician to request or demand X-ray for a particular person you know? So because they know you are in the rural community at times if you reject them or you try to educate them on what they are supposed to do, you know some of them don't take it likely because they feel you are been wicked or difficult because they don't seem to understand anything so that is one of the challenges that we usually face and then in the rural areas too erm!!! at times when the doctors are not available as there could only be one doctor available, nurses request for X-rays and some of the requests you look at them and they are not appropriate, no clinical history, at times you can even get something like X-ray the affected part or whole body X-ray okay? You may then have to may be take history of the patient or you let the patient go back by writing a small note to the referring clinician or prescriber so that you can do the right thing for them. It is a very challenging role; at times it creates some kind of conflict between you as a rural radiographer and then the clinician who make the referral” (Rad 15)

The study further sought to probe and request to identify how certain identified conflicts were raised and how they resolve such issues:

“Yea, most of the time you have to go to the referral, the doctor or the clinician just to tell them how these things should be done, how request should be made, the reasons why for instance why we need brief clinical history okay? So there was one case where I gave an example to a doctor that for instance you asked somebody to come and do X-ray whether it is for accident or to rule out tuberculosis or Koch's you are suspecting, or fractured rib or anything. You know fractured rib you will not even ask the patient to take in deep breath and hold it, so you see that is different from the routine or normal chest X-ray cases that we do. So clinical history helps in the projections, the number of views that you have to do for them, but at times they don't seem to understand, some of them when you try to educate them on that, they do agree and then they do the right thing in their subsequence request, others will fight you.” (Rad 15)

A participant gave an interesting account of a situation with a doctor and a patient and how his timely intervention helped and positively impacted that patient management:

“Yea, I have several experiences with engaging doctors about patients diagnosis; there was one particular doctor who always will come to my room. She will leave the consulting room with an X-ray that is done and sent to her and come and nicely ask: ‘my friend so what do you think is wrong with this patient’? So you can discuss. So on this occasion there was a case that the patient had slipped on a staircase so she couldn’t walk well; she was a female patient. The doctor asked for X-ray of the ankle it was done, she wrote the usual AP-LAT as you know. It was done and the patient went away. You could see an oblique fracture but it’s like a shadow; some dark line was there. The doctor said it wasn’t a fracture so she should just go and apply liniment on it or ointment on it, so looking at the way the woman was walking you know ermmm!!! But at times these doctors too they can be someway. I saw that it was a fracture and the patient fortunately came back to me and said the doctor said she should go and apply ointment and that she will be fine but walking is difficult for her. So I went to the doctor and told her, ermm!! she was a female doctor, that there is a fracture on that case, she said no it is an artifact and I said no there is no artifact on it, I insisted and asked myself; an artifact from where? is it chemical artifact or what? Nothing of that sort, so I told her that this dark oblique thing you see is a fracture and then I remembered I should have added a mortise view for her okay? So I called the patient and added that view and the fracture was opened and revealed properly on that view. The doctor later came to agree with me and apologised and told me that those were some of their challenges. This X-rays or images at times we find it difficult to interpret them. I said that is why we are here I came to tell you that this wasn’t an artifact but a fracture and I even blame myself that we’ve seen slip cases where we suspect injury to the ankle joint though it is not requested we can add that view; the mortise view demonstrates the fracture glaringly. So these are some of the things in rural places with no radiologist or nobody to help physicians with image interpretation”. (Rad 13)

5.6.3 Ethical and legal framework

Study participants indicated that they were not aware of any ethical, professional or legal framework that binds rural radiography practice. However, a participant indicated that irrespective of the lack of specific policy on working with radiation protection in rural practice, because of the training they had in school, they tend to be aware of their

responsibility to ensure the provision of radiation protection to themselves and the general public. The participant further stated that the only known legislation is that of the Ghana Atomic Energy Act:

“No, I’m not aware of any legal framework that binds rural practice, there is no professional framework about rural practice and there is also no ethical framework whatsoever. There is no framework about working with radiation too, all we apply is the basic ethical responsibilities we were taught in school, that is as radiographers we need to be the gate keepers of radiation protection” (Rad 1)

“No I’m not aware of any of all these frameworks. I don’t think any really exist, at least not in rural settings even if some exist” (Rad 5)

“Not that I know of, what I know is generally as a radiographer you have to use your TLD, and ensure you provide good services and also respect your patient and work hard to maintain good health for all. But there are no lay down procedures that I know of in terms of legal frameworks and all that. No, not at all, nothing like that...” (Rad 3)

“Ethically as a radiographer you are train in school on how to relate to patient and make them comfortable but on the job field there are no specific rules or document to that effect. Basically, there are no frameworks specifically for rural practice”. (Rad 11).

“There is none, I have never seen any rural policy or anything of that sort or issue of that sort guiding our practice, there is none.” (Rad 10)

“....., well as for radiation protection is like what you asked me; the scope of practice thing okay? There is no policy or so far as I know any document from the ministry, from the hospital that talks about or that binds you on some of these things, and because of the training you had as a radiographer, you become aware that you need to provide radiation protection to yourself and then to the community that you serve. The only ermm!!! legislation that we knew or know of is that of the Ghana Atomic Energy Act okay, which covers some few areas of the radiography practice and we don’t have anything that is different for the rural practice and then the urban practice, it’s the same. So our knowledge during the training or our knowledge in the practice that is what we are using but you see beside the Atomic Energy Act on radiation protection, at least there should be some regulations, policies from the ministry on

this issue. But there is nothing like that, if there were, we wouldn't be having quarks in some of these rural places. Because they have not been trained and then the ministry looks on which tells you that they seem not to be aware of the dangers of ionizing radiation". (Rad 18)

"There is no specific ethical framework that binds rural practice okay, but you know we operate under the general ethical practice under the Ghana Health Service or the Ministry of Health and then the general ethical practice binding each hospital and then your practice itself, that is what is there. But, specific for rural practice I have not come across anything of that sort". (Rad 13)

"There are no ethical or legal framework that governs rural radiography practice. We lack a lot of things so I can say for a fact that a lot of attention has not been paid to health and safety in the rural setting. Almost everything is left for the radiographer to handle. There are no proper systems in place to check that. We do our best though, to protect ourselves and all facility users". (Rad 12)

5.6.4 Ideal Rural Practice

Overall, all participants provided varied views with how they perceive an ideal rural radiography practice in Ghana. Also, opinions of participants were sought from their experiences of rural radiographic practice, about how different they thought rural practice would have been before entering:

"I believe for radiography in the rural setting to be flawless as compare to the cities there are a lot of things that are supposed to be put in place, first the radiographer who accepts to go to rural area should be giving extra training on how to handle patients with different culture background and how to relate with other health professionals to come out as a team , in the urban areas we have a radiologist who check on your activities but in the rural settings you are on your own and no body checks on your activities to see weather what you are doing is right or wrong . Again there should be special incentive for rural radiographers because you are the only person working there , you are always call upon whenever there is an emergency which makes the work very stressful. I think rural radiography should have a CT

scan, MRI, because conveying a patient from the rural area to the city to access the service if care is not taking may end in the patient losing his or her life” (Rad 11)

“Well, to me ideal rural radiography practice should be a situation where you should not want for something okay? because this rural caseloads are not great okay?, so you should have what you need to have to provide the services. Unfortunately also at times that is not the case; sadly there are shortage of films , purchasing of chemicals because at that time we are not into that digital facilities, so at times you have these challenge, so ideally a rural practice must have all that it takes for the practice to go on smoothly and also rural practice deserves better at least one radiologist who could serve in the community close by in hospitals and also X-ray facilities but all of them not having any radiologist so that we can send cases to such places for the radiologist to report, we know they are not many but they also deserves better because thus try and error, this is pneumonia, this is that and it can lead to wrong diagnoses and wrong treatment, are you okay with that?” (Rad 13)

“Ideally yes we need to get services similar to that found within the urban centres, but you can’t get what is in urban area in rural, because for instance special examinations, you don’t expect that to be in a rural facility where you don’t have a radiologist to also be part of the procedure. We need to have standard or at least the basic practices and procedures, we need to have everything sorted as done in the regional or teaching hospitals, so that we don’t have challenges when we want to provide the services.” (Rad 10)

“Well I thought that since most people don’t want to work in rural areas, once I am posted here to help because of the lack of so many things in the rural areas, there will be some form of incentives as a rural practitioner okay that will boost your morale and to motivate you maybe to even remain there for some time. But it’s not like that at all. Many times you feel like you are forgotten okay? When there are workshops or training programs and other things that you need to attend, because you are alone you know this rural practice is only one radiographer and may be your maybe an assistant who does minor jobs in the department, you can’t leave the hospital and go for any training, workshops or conferences that are usually organised by your society. So it becomes a problem between you and your administrators because

they don't want to release you for any period for you to do that and when that happens gradually, gradually you will be going stale. My expectation was that working in a rural area they should have known better that because of the situation once in a while we should be allowed okay to also update ourselves to come and help the practice in the rural area. But that is what we don't usually experience, we don't get it so it makes you frustrated, worried and then you plan to even leave the place for a better place where you can get access to some of these things” (Rad 13)

5.6.5 Education policy

A participant suggested the need for an educational policy that ensures the encouragement of most young pupils to pursue science course at senior high level in order to prepare them for radiography studies:

“I think the government should do more to encourage people to do science and to go into radiography practice, and also give special incentives to people who are willing to go into the rural areas; again the government should make modern machines available to rural settings to encourage more radiographers to rural areas”. (Rad 11)

Furthermore, most participants suggested the need for policy to train radiographers before coming to rural practice and also contended for an educational policy for further study for radiographers who are already in rural practice as well as offer the needed education and/or training to locals/indigenes to become radiographers:

“I wasn't given any training in rural radiography; in fact, I didn't know anything about rural radiography practice before being posted here. But I believe when one is trained efficiently, it will be adequate for his/her professional practice even in a rural centre. So to me I will suggest for an educational policy specifically targeted at training for rural radiographers” (Rad 17)

“....,for instance they are talking about or here I am talking about not getting access to CPD or basic in service training and those things, at least we can inform these hospitals, the administrators that this is what we've seen or observed so from time to time these crop of guys or radiographers will be called for training either within the area or in the urban area so that they can improve on the services that they provide in the rural communities, I think this should be understandable to them. That is an

immediate need for educational policy for rural radiography practice. I think this the only way we can improve on the rural practice". (Rad 13)

"Yes education policy is a must have item for rural radiography practice, the government should try as much as possible and the ministry and all that are involve to make rural medicine even very appealing to professionals that are coming and I know for other professionals they have really worked it up for them. But we are calling on the leaders in radiography to try as much as possible to get the same trend for our young ones who will be graduating from schools to have joy in rural radiography, to fully embrace it, because they have also fought for incentives to be given to their professionals, and then those who are at the ministry and as well as at our directorate should also see the need to give or extend upgrading of knowledge to radiographers, because we are limited in this region. We are few in numbers and so when they are able to give us approvals for study leave to our members here we will be able to upgrade our knowledge and quickly come to improve the settings here. Because no one is coming , and so when they make it a point to give permission for those of us here to train and even given study leave all the way to even the PhD level, people will know that when they move to rural radiography they will even get a stepping stone to upgrade their knowledge and even advance to the PHD level. So they should even make rural radiography one of the first stage in every radiographers life to have a taste of rural radiography before even improving so the authorities should open up to upgrade knowledge in radiography". (Rad 2)

"I did not have any formal education or training specific to rural radiography practice to prepare or support me in my role as a rural radiographer. But, in my opinion I think radiographers coming to rural area need special education training to prepare them for their roles. I will say, we never had that, there wasn't anything like that. But, yes !!

I think they need that. Because ermm !! though you've had your training but the community that you are going to serve, there are things that you can face and how to even handle them is the thing. One example is that they can come to you that I'm having a pain here, I'm having chest pains, can you take X-ray of my chest for me okay, so these are some of the things, so when you are been sent there or during the training these things should be mentioned and how to handle them will be taught. These are some special or rare cases that comes to you: 'X-ray affected part'; how

do you handle such case?, you write back to the doctor or the person who referred.

At times some of these cases you will be surprised where they are coming from, ermmm !! mostly traditional medical practitioners". (Rad 18).

The study revealed that irrespective of the need for educational policies particularly for rural radiographers as suggested by majority of the participants, there is a policy by MOH that seems to ought to have addressed these issues, but for whatever reason it seems not have been resolved, hence the rural radiographers persistence on having an educational policy specific for rural radiography practice in order to deal with the issues as revealed (Reflection of researcher).

Accordingly, a document reviewed as indicated above; spells out exact policy regarding human resource health policy on education, training and development. Excerpts of the said policy document title: "Human Resource Policies and Strategies For The Health Sector 2007 – 2011 Ministry of Health" is seen below:

"HRH Education, Training and Development

Policy Thrust: The MOH shall maintain a reasonable balance in terms of numbers, diversity and competences of HRH and provide adequate resources to support training.

Strategies

- *Effectively coordinate the activities of health training institutions in the country.*
- *Select and admit appropriate numbers of students into various health training institutions in accordance with requirement.*
- *Establish new training institutions and programs for the specialist cadres.*
- *Increase numbers of health post-graduate training institutions.*
- *Expand training institutions and provide necessary equipment, logistics and the requisite training programs to meet accreditation standards.*
- *Expand practical training sites and train more preceptors for effective practical training on the schools.*
- *Promote the establishment of other forms of training such as sandwich, distant learning and e-learning." (Document).*

5.6.6 Equipment procurement policy

One participant argues that the lack of expert involvement in procuring equipment at times ends up in the inadequate setting up of installed equipment within the examination room, thus hindering how it can be used effectively:

“Most of the equipment that are purchased and installed here have some levels of technical limitations due to lack of involvement with the radiographers who will use the machines, so some of the, machines were not installed accurately. So, to me I think there should be a policy on purchasing of equipment”. (Rad 7)

It was observed that in a particular site, the equipment was not installed properly as there was a significant level of restrictions, in that the distance between the control panel and the erect and horizontal bulky (the position of the X-ray tube) were rather too close than expected (Field Note)

Some participants suggested that preferably, there should be policies in place to direct the purchase and installation of machines within rural setting, and that when machines are procured, they should factor maintenance agreement even before installation. So that regular checks would be done on the machines and in case of fault or damage, there won't be delays in fixing them:

“I think it is important to consider or review the policy for buying radiographic equipment, particularly for rural facilities. What is lacking in most rural facilities are service agreement after equipment have been installed. So there is no servicing of the machine unless it is faulty or spoilt completely before an engineer is invited to come and repair it, and it takes very long time to repair it, so I think if there is a policy in place to deal with such issues, these delays will seize”. (Rad 15)

“In rural facilities we mostly have general radiography, because we lack radiologist so most of the specialise cases are not common in my facility. Because we don't have advance machines like CT Scan, MRI etc, even though we were trained in school on how to do special cases, because of where you find yourself you become restricted, as management of rural facilities are not willing to buy those sophisticated machines to enhance the work. But I think if there is a national policy that directs the purchase of equipment, I'm sure things may have been different. Hmmm!! even if there is a policy, one may wonder why things still remain the way they are. So I don't think there is a policy on that but there should be a policy”. (Rad 11)

“Well, me I think equipment maintenance policies for rural radiography practice and radiation protection policies must be framed,....”. (Rad 9)

“...., in rural settings just as I said equipment issues are very poor in the sense that we are all alone with our machines up there, and so if there is any fault with our machine we wouldn't know, because for the mandatory or the regulatory body that does the testing and then the setting up controls of this particular machines normally do not come in time. So we realise we are all alone with our machines even if it's faulty we wouldn't know, I could relate an experience that we have been using the machine for a long time, so when the regulatory body came to access our equipment in terms of its safeness, they realised that the machines where using much higher radiation than what we input into it, so in terms of that we realised that radiation protection activities there in terms of safety of our patients and ourselves is very poor. So you see, we definitely need a policy to deal with all these issues (Rad 2)

One participant indicated that maintenance checks are not carried out on the imaging equipment as regularly as needed. Furthermore, the participant stated that generally health and safety has been compromised at the place of work as well. However, there are some radiation safety equipment available such as lead aprons but they were not checked for their efficiency to be determined:

“Checks of the machines are not done routinely as expected. It is done once in a while though they are supposed to do the checks I think every 6 months or so, I don't keep track of it because they never come. As for risk assessment it has never been carried out before. Generally occupational health and safety measures are not really the best here. But, we have radiation safety equipment, that is apron that's all and they have also not been checked for a very long time”. (Rad 1)

The participant further went on to give a scenario when a check revealed a compromised radiation safety equipment and concluded on the need for a policy specific for equipment usage in rural settings:

“Hmmm!!! with the efficacy of the lead aprons; our attention was drawn to it when the authorities that checks came and told us that the lead aprons were not effective any longer so we needed to request for a new one other than that we could have been

using it continuously, so I think a policy to check and regulate these things is very useful". (Rad 1)

A document by Rad-Aid country report on Ghana regarding regulation and policy on procurement of equipment suggested a need for quality assurance. Excerpts from the said document is seen below:

"Regulation and policy:

In terms of procuring new equipment, the Ghana Standards Board states that medical equipment imported must have a quality certificate from a recognised

ISO900 lab (Export.gov, 2018). The MoH will issue a national or international competitive

bidding advertisement in the press for complex and expensive capital items".
(Document)

5.7 Conclusion

This chapter presented the findings of the study which explored the experiences and practices of rural radiographers in Ghana. The chapter describes themes identified from the data. The chapter constituted findings expressed differently by including participants' quotes, excerpts from documents reviewed as well as observational/field notes and reflections of the researcher to support these reports which had generated six major themes during the data analysis from the coding categories. The six themes that have been analysed and reported are: Motivations to Rural Practice, Rural Practice Experiences, Challenges in rural radiography practice, Impact of challenges in rural radiography practice, Education and training, and Policy and planning.

Notwithstanding, the chapter identified three broad areas that were explored: Motivation to rural practice, Education and Policy. By and large, it was established that issues of rural radiography practice in Ghana is mostly about status and value. In that; most of the participants argued for a need for a broader consultation on motivation/attraction, education and policy development that involves all stakeholders within the healthcare sector, so that no particular group would feel excluded from the processes and outcomes. As most participants felt other groups were favoured with

more opportunities and incentives such as study leave, accommodation, transport allowances etc and are also offered better conditions of service and are more valued and respected than them.

Also, the need for policy to guide and determine rural radiographers' scope of practice in order to deal with challenges/barriers identified, what education is needed in order for their roles to be extended/expanded, what specific areas should the policy cover, what elements constitute a good policy and how it should be planned and implemented/executed were explored.

Most participants argued in approval of a basic need for a policy that will guide an official scope of practice and the introduction of regularising the practice of role extension in rural setting and proposed for the government to take charge of the processes promptly. Furthermore, participants reiterated what they believed were the elements of a good policy. Most participants consented that the policy should include practice regulation; were activities of these rural radiographers could be monitored and controlled. However, there were varied opinions on who the regulator should be and how/what should be regulated/controlled. Most participants argued that the AHPC should regulate the practice of role extension such as rural radiography reporting since they are already the regulating body for Radiographers in Ghana. Others felt Radiologist could help in controlling the reporting roles as reports could be reviewed by them before being sent out. Some also expressed their view that GSR could also help to regulate and control extended practice by providing supervisors to regularly visit and monitor these rural centers.

Most participants further indicated areas that they felt should be regulated and suggested duration for education/training as well as the need for certification once trained. Most argued that rural radiographers who undergo specific education such as reporting should be certified to practice within only rural areas (primarily to ensure that practitioners were stationed at locations where their services will be most needed) with specific conditions of service attached to the position. The chapter concluded with participants contending that lessons ought to be learnt from the long period of a lack of an official scope of practice for radiographers in Ghana, particularly the issues reiterated by participants regarding complete neglect of rural radiography practice and what an ideal rural radiography practice should be. Therefore, these issues should guide policy makers in ensuring the need to regulate rural radiography practice. The

next chapter discusses the study findings in the context of relevant literature, provide strengths and limitations of the study, implications for Policy and Practice and present recommendation for future research.

CHAPTER 6

DISCUSSION & CONCLUSION

6.0 Introduction

The discussion of the findings of the study is based on the data generated from interviews, observations of rural radiographers in Ghana, documentary review and the reflective diary of the researcher. The data analysis established six major themes from the coding categories: these thematic findings were merged into three broader concepts – Motivation, Attraction and Retention to Rural Radiography Practice; Challenges & Impact of Rural Radiography Practice; and Interventions & Policy formulation for Rural Radiography Practice based on their similarities and conceptual associations.

The aforementioned three conceptual grouping constitutes what the study established regarding the experiences of Ghanaian rural radiographers and their practices. Focusing on radiography workforce in rural areas, scope of practice of Ghanaian rural radiographers, issues of occupational health and safety in rural facilities, reason for retention of rural radiographers, experiences of challenges encountered by these radiographers enabled the study findings to be related to the themes arising from the chapter 2 literature review. This comparison identifies what is new about this study and establishes the need for national policy framework for rural radiography practice in Ghana. The chapter will further discuss the limitations of the study, implications for practice, and recommendations for future research and define the contribution to knowledge and conclusion of the study.

6.1 Motivation, Attraction and Retention to Rural Radiography Practice in Ghana

The Human Resource For Health Country Profile (2011) reported an imbalance in urban/rural distribution of health workforce in Ghana. Studies have also reported unwillingness of healthcare professionals to accept rural postings (Borracci et al. 2015; Okeji et al. 2014; Kawooya 2012; Ghana Health Workforce Observatory 2011; Mubuke et al. 2009) due to poor living and working conditions. Despite this, there have been an apparent lack of effective strategy and policies to motivate, attract and retain healthcare professionals within rural sub-Saharan Africa WHO (2010). The

radiography workforce situation in sub-Saharan Africa generally (Kawooya 2012; Scarisbrick 2003) and Ghana in particular (GSR 2018; Ofori 2011) has been reported as very poor compared to developed countries in terms of relative number of radiological staff with an acute shortage of radiography workforce within rural areas.

The current study revealed that the huge challenge of insufficient radiography workforce across rural communities in Ghana remains. The findings agree with earlier studies (Ashong et al. 2016; Ofori 2011) amongst multiple healthcare disciplines in Ghana particularly radiography. The current study further revealed that apart from shortage of radiographers across rural areas, most imaging facilities have just one lone radiographer dealing with all imaging requests and most had no resident radiologist within the entire district and/or region. The current study indicates this apparent unwillingness of radiographers to accept rural postings is likely to relate to rural working and living conditions (*see findings chapter*) which agrees with literature (Borracci et al. 2015; Okeji et al. 2014; Victorian Medical Radiation Workforce Supply and Demand Projections report 2010). Accordingly, the workforce shortage situation in rural Ghana could potentially be affecting the few radiographers that have accepted rural postings, as their workload will increase and potentially cause them stress (Ashong et al. 2016). This could negatively affect better patient outcome as they are less likely to be attended to adequately and thus, a need for an immediate intervention.

Difficulty in establishing exact numbers of radiological workforce and equipment distribution in Ghana has been reported previously (GSR 2018; Hitchins 2018). Literature suggest that as of 2020 the radiography workforce across Ghana is not even up to 500 in total (Wuni 2021). Yet, it had been projected by Ghana MOH in 2007, (in their human resource policies and strategies for the health sector between 2007 – 2011) that health workforce projection by 2011 by virtue of estimated numbers of radiographers that would be trained annually across the country should have about 7,000 radiographers across the country. The current study data shows a 14-fold shortfall of that target. This suggests an ineffective implementation of the said policies and strategies (*see findings chapter*). This agrees with broader literature (Borracci et al. 2015; Okeji et al. 2014; Kawooya 2012; WHO 2010) that indicates most strategies and policies meant for the healthcare sector particularly in most developing countries fail due to their ineffective implementation and sustenance. The current study did not determine the number of staff and equipment and its distribution across the whole

country, but established that some stations/facilities had X-ray equipment without no radiographers to man them. The aforementioned situation establishes the 1st objective of the current study (to map out contextual factors, i.e. radiography workforce, equipment, etc). Despite it being only a case study, it gives an in depth example of a range of rural setting within the Ghanaian context. This agrees with Hitchins (2018) who provided Rad-Aid report on radiology services in Ghana, which stated that it was difficult to obtain specific numbers of what radiology equipment exists in the country and if it is functional, particularly with data on equipment distribution within rural radiographic facilities. Therefore, the Ghanaian situation needs prompt attention by all stakeholders because if it is not addressed, it could potentially adversely affect radiological service provision across the country particularly within rural areas.

Interview data from the current study demonstrated that rural radiographers in Ghana are of the opinion that other professional groups are favoured with more opportunities and incentives to move to or stay in rural practice, such as study leave, accommodation, transport allowances and the offer of better conditions of service. This created a perception that the others are more valued and respected than them. Thus, motivation and attraction to rural radiography practice in Ghana was generally identified by these radiographers as based in professional status and value. Related to this feeling of being under-valued was a perceived need for broader consultation for the development and implementation of policies and strategies that offer or contribute to better conditions of service for these rural radiographers. This finding agrees with Mubuuke et al. (2009) who reported that most radiographers in Uganda were willing to consider a career in rural radiography only if there is provision for better conditions of service. The current study however further indicated that participants wanted to influence policy to support the aforementioned. This is an issues that GSR ought to spearhead by engaging all stakeholders particularly rural radiography groups to address the situation.

The current study revealed a number of key factors that attracted the radiographers to rural practice and also established the reasons why they remain in their roles irrespective of the numerous challenges they claimed to face. Thus, the current study revealed both 'voluntary reasons' and 'involuntary reasons' (see *chapter 5, figure 5.1*). About 83% of the study participants reported that they were posted to rural area to

work and that they had not voluntarily opted to work there. In the past when most radiographers were trained and sponsored by the government postings were compulsory, hence these government-trained radiographers were bound to adhere to the governmental directives (Antwi 2018, GSR 2018, Arthur 2016; Gawugah 2016). This was enacted to counter the imbalance of radiographers at government arranged installed equipment within rural areas. This was revealed in a document *“Invitation to a meeting to address shortage of radiographers”* (see findings chapter: 5.2.1.1) reviewed for analysis where stakeholders were invited to a meeting to find solutions to a situation where X-ray equipment had been installed with no radiographers in place to operate them within various rural centres. This is an example of literature which indicates governmental/political commitment and policy interventions which are the major factors that can be used to deal with the aforementioned challenge (attraction and retention) of inequitable rural-urban distribution of health workforce could be by (WHO 2010). Similarly, though a different context, same principle applies in Wales where radiography students that take an NHS Wales bursary have to agree to work in Wales for 2 years on qualification (to prevent excessive movement to rest of UK or abroad) (Department of Health & Social Care 2021; www.wales.nhs.uk, n.d.).

The current study also demonstrated that voluntary reasons for motivation for practice in rural areas which were absent from the radiography literature were due to marital reasons, others also felt it was an opportunity for a new professional challenge and affinity with the feel of rural environment, while others accepted due to personal reasons as well as professional status/autonomy of practice (see chapter 5, section 5.1). Interview data suggested that the aforementioned was due to willingness to serve the rural community due to love and their belief about service to humanity (see chapter 5, section 5.2.2.2, Rad 13), often underpinned by religious beliefs. The latter is an issue found largely within most African context particularly Ghana as revealed by studies (Snow et al. 2011; Kruk et al. 2010) which indicated that healthcare professionals acceptance of rural postings are significantly inspired by their religious beliefs. The aforementioned finding is in agreement with wider literature which suggested that some healthcare professionals accepted rural postings as a result of their love for the poor and the delight and fulfillment knowing they have impacted lives (Ntangu 2014; Okeji et al. 2014) as well as value for human lives, particularly effectively managing patients to recover (Lori et al. 2012). In contrast to this, the

current study have also shown that a reason why radiographers *would* accept rural postings was financial motivation. This finding introduces a clear governmental mechanism that could improve recruitment and retention of rural radiographers. It is also supported by studies which disclosed that adequate remuneration and peculiar rural allowance should be added to the pay package of health professionals including radiographers in order to motivate them to accept and remain in rural practice (Okeji et al 2014; Ebuehi and Campbell 2011; Lehmann et al. 2008).

Partly related to ideas of community service, but rooted in a deeper connection to an area and/or culture, the current study revealed that some radiographers accepted rural postings as they were indigenes and were very much aware of the rudiment of living conditions in rural areas. The available literature is conflicted on this issue: It has been suggested that an individual's personal origin can have a major influence on their preference for rural practice. Thus, an individual who grew up and was educated in a rural area will be more likely and more willing to accept rural posting than a person with urban background (Ntangu 2014; Wilson et al. 2009). However, this finding is in contrast with Agyei-Baffour et al. (2011) who suggested that personal origin (rural origin) was not associated with willingness of medical students to work in rural areas. This personal and professional factors are not always easy to untangle, but the current study further discovered that some of the participants were motivated to rural practice due to professional reasons. Thus, those participants felt they were experienced and educated enough to provide quality diagnostic services within the rural area (considering the fact that most were degree holders) and indicated that they could contribute positively to the more pressing issue of how to deal with untrained workers in rural practice. They hoped that over time their influence on inadequate services would counter the negative perception particularly those with urban backgrounds about working in rural areas (Choudhary et al. 2018; Gupta et al. 2017). This willing workforce could be explicitly used to promote and motivate others to join rural radiography and in turn also get the opportunity to go for postgraduate studies. Thus, addressing a negative perception which affects professionals' decision to accept any rural posting/job offers (Choudhary et al. 2018; Gupta et al. 2017; Dutt et al. 2014).

The current study additionally found several other determinants to accept rural practice. For some, it was due to economic experience and relatively low cost of living,

while others was to have autonomous practice. That is, greater opportunity to manage a department and/or have the authority to make decisions and the freedom/leverage to act in accordance with professional knowledge base, experience and exposure. However, a female participant indicated strongly that she wanted to move and that she was still in rural practice due to her husband who is a missionary. Although the opportunity for autonomous practice was a somewhat motivating factor, she vehemently indicated that she will leave when her husband is transferred. This supports Agyei-Baffour et al. (2011) who indicated that female professionals were less likely to accept rural practice, but for marital reasons in comparison with their male counterparts. It also agrees with findings of studies done by Okeji et al (2014) and Cheunkongkaew et al. (2016) who demonstrated that gender was strongly associated with healthcare professionals' attitude towards rural practice. This is because anecdotally, males are understood to be stronger in dealing with unforeseen rural practice situations than females. Notwithstanding, the current study did not exclusively identify/report/establish an association between gender and rural practice acceptance. However, male participants dominated the current study as majority of rural radiographers in Ghana were males. This is a situation that reflects the radiography workforce situation within the Ghanaian context as majority of radiographers nationwide are males (Ashong et al. 2016).

This study revealed why Ghanaian rural radiographers remain in their roles despite the varied barriers indicated. But, some participants wanted to leave rural radiography practice and gave reasons. They felt that they were falling behind in terms of career progression and that many of their peers had progressed to pursue higher education qualifications up to PhD levels whilst they were limited to practice within their diploma certificate. This academic isolation and lack of career progression opportunities for rural medical imaging professionals has been previously reported (Kawooya 2012). Issues of difficulty to attend CPD programmes, seminars, workshops and further studies, as well as little or no opportunity for personal or career progression were noted as the major demotivator within rural radiography practice in the current study. Hence, most professionals refuse postings and those already in, do not want to remain (Kawooya 2012). Similarly, the current study demonstrated that most participants wanted to leave rural practice due to lack of management support (and living and working conditions) despite the fact that they do currently remain in their roles. This

was because the study participants felt if there is adequate management support and better infrastructural development such as IT connectivity, CPD opportunities could be readily available as there would be a prospect for remote learning.

Current study observations and interviews, and previous research in medics (Belaid et al. 2017) revealed that working conditions, particularly poor infrastructure and IT connectivity, inadequate equipment, stock-out of drugs and supplies negatively influenced doctors' and radiographers' decision to remain and practice in rural areas. Hence, the recommendation for intersectoral policies (frameworks/actions that provide collaboration by healthcare workers with other governmental and non-governmental agencies to improve health and wellbeing), which are required to address the multifaceted risk factors for health and ensure full access to health and health equity; a major factor needed to enhance living/working conditions within rural areas (Belaid et al. 2017). Studies have indicated that security issue was a main concern, particularly in the rural and remote areas where women are at high risk of insecurity (Belaid et al. 2017; Ebuei and Cambell 2011). The current study revealed that most participants were concerned about security issues within most of the rural areas in Ghana. This fear was understandably more apparent in females and those with families. Reasons given related to recent history of tribal war and other political related unrest which has always become a fear factor. This study uncovered that a major fear factor for some of these radiographers, particularly new professionals, was lack of a security post/police station within most rural areas. This made them feel insecure knowing they do not have the opportunity to readily report an issue and/or have prompt response even when they do.

Interview data suggests that decent accommodation and free amenities such as internet services were key in attracting Ghanaian radiographers to accept rural postings. However, Ghanaian rural radiographers felt they were discriminated against by their management, as they were denied accommodation when free accommodation and other incentives were offered to other professional groups such as medical officers. Therefore, it was a demotivation for them and given as a reason why they would want to leave rural practice. However, these professional groups were more favoured perhaps they have a stronger professional union/association that fight for such stuffs for them. Nyandoro et al. (2016) found that inadequate salaries and incentives, insufficient and obsolete infrastructure/accommodation, unsatisfactory

career progression, poor living conditions and lack of basic recreational amenities were reasons why healthcare workers refused to accept rural practice. Comparably, studies have suggested that accommodation quality/price and other incentives were found to influence the retention of health workers in rural areas (Okeji et al. 2014; Ditlopo et al. 2011; Hanson and Jack 2010; Kruk et al. 2010a).

Some of the participants in this study who had indicated that they had to move to urban centre as they felt that their continuous stay in rural practice would not have allowed their career progression. Thus, these participants (*see Chapter 5, 5.2.3*) indicated no regrets about leaving rural practice as they had been yielded the full benefit of leaving (i.e. pursuing higher degrees and taking on advanced clinical roles). This suggests Ghana lacks a key interventional strategy that could address poor perceived working conditions in rural areas. This reaffirms Lehmann et al. (2019) who indicated that purposive recruitment and training incentives, and compulsion, were the main reported interventions to solve rural practice challenges. Studies have suggested that interventional strategies such as role extension development programs in rural healthcare have contributed to quality service delivery and enhancement of the radiography profession in some developed countries (Okeji et al. 2014; Kawooya et al. 2011; Stein et al. 2008). This according to Okeji et al. (2014) have been reported as one of the key interventional strategy in motivating, attracting and retaining rural radiographers in most countries.

Some of the findings for motivation, attraction and retention for rural radiographers of this study are confirmatory as they have previously been reported in the literature from other professional groups or in other countries. The current study has additionally revealed findings that add to existing literature. Thus, this study found that there was a completely lack of official scope of practice for rural radiographers in Ghana. There is also lack of ethical/legal framework, lack of OHS policies as well as lack of quality management protocols within rural facilities in Ghana. Furthermore, the current study revealed that workforce strength as well as numbers of equipment are unknown within the Ghanaian context as compared to other jurisdictions that seem to have records of equipment and workforce distribution. Similarly, there were no equipment procurement policy and apart from conventional X-ray and ultrasound, there were also no other modalities within the Ghanaian context as compared to other places such as rural Australia or UK that have different radiographic modalities aside conventional X-rays.

Notwithstanding, it is worthy to note that these countries overcame the aforementioned issues over time, hence Ghana could potentially learn from strategies and policies employed by these countries in order to also overcome her own challenge. The current study also revealed that there was no salary structure specifically for rural radiographers which could have captured rural allowances and other incentives found in other countries. By and large, the current study demonstrated that there is no specific RRP policy in Ghana compared to other countries, which is a major consideration if standards are to be kept with RRP. Consequently, an urgent need to establish one as soon as practicably achievable.

6.2 Experiences, Challenges and Impact of Rural Radiography Practice in Ghana

Participants expressed varied opinions about their experiences and practices within the rural setting. Similarly, various practices and settings were observed and documents reviewed also reflected some of these settings but often rural radiographers' experiences and practices were undocumented. The study revealed living condition experiences such as standard/cost of living, socio-cultural issues, issues of entertainment and availability of social amenities. Also, working condition experiences demonstrated issues of workforce, radiographic modalities/equipment status, scope of practice/job description as well as occupational health and safety issues.

Regarding the living condition, this study demonstrated that there is generally cordial relationships among the people living within a rural setting, but they are collectively faced with various challenges which impacts their social and living conditions. This study revealed that Ghanaian rural radiographers are of the opinion that living conditions are not favourable, especially where their background is a lack of experience and exposure with rurality. This agrees with Ditlopo et al. (2014) who indicated that due to unfavourable living conditions, medical students refused to stay in the rural areas after their compulsory service. However, studies have indicated that better living conditions such as decent accommodation, free amenities, socio-cultural activities (including festivals and entertainment), low cost of living associated with rural settlement were what influenced the retention of health workers in rural areas (Nyandoro et al. 2016; Kruk et al. 2010a; Hanson and Jack 2010).

This study found that there was a perceived lack of social amenities and entertainment within most rural areas in Ghana. It could be recounted that a radiographer indicated that there was no other activities or social places to engage in aside from their radiography job. The lack of outlets was frustrating despite the living cost within rural areas being relatively low. Consequently, most professionals ended up joining friends in drinking bars with attendant risks of alcoholism and other poor health behaviours (see chapter 5 section 5.3.1.4 – Rad 13). Yet, most of the participants suggested they were coping in rural practice partly as they spend less compared to life in the cities and could therefore build a sounder economic base. This supports findings from Ditlopo et al. (2014) and Okeji et al. (2014) who suggested that healthcare workers accept rural postings due to generally better economic conditions. These challenges encountered by Ghanaian rural radiographers could affect their practice. Therefore, there is a need for timely intervention by the Ghanaian government to prevent quality of service provision from being compromised as a result of the negative impact of the living conditions on the practice of these rural radiographers.

Regarding Ghanaian rural radiographers' experiences with working conditions, this study demonstrated some peculiar working conditions across most rural settings in Ghana as observed by the researcher and also suggested by participants (see *chapter 5 section 5.3.2*). These involved rural radiographers mostly working alone with no support staff/assistant, similar working pattern across most rural facilities, availability of similar radiographic modalities/equipment, as well as similar challenges. The current study revealed that staffing levels across all the rural sites in Ghana were inadequate, as there were mostly a lone radiographer working in all the study sites (as compared to urban centres where there are at least more than one radiographer at a given shift). The problem of shortage of staff in Ghana seem to be across the entire country as revealed through observation, interviews as well as documentary review. Additionally, challenges noted across most rural facilities in Ghana include image reporting scope of practice breaches, shortage of staff, practice limitations/academic isolation/no career progression opportunities, discrimination against radiographers by management, issues with OHS, equipment, security & IT connectivity issues, shortage of radiographic consumables, issues with family ties, distance/proximity issues, language barrier, political influences, persistent power (electricity) outages, and lack of quality control, & quality assurance programmes. These challenges as revealed are

predominantly common in most rural areas in sub-Saharan Africa, particularly developing countries such as Tanzania, Niger and many others (Kawooya 2012). Possible reasons for the aforementioned is that; unlike developed countries such as UK, and Australia who have so far developed policies and frameworks that governs RRP; developing and/or under developed countries usually lack policy or framework that purposefully deal with RRP as indicated in literature (Kawooya 2012; Tashobya et al. 2010). Also, there is an issue of poverty; consequently government would not readily be capable of supplying all the needed amenities and other items identified, therefore, much attention is not usually given to RRP in these countries.

Nonetheless, the aforementioned challenges/conditions within rural facilities have also been reported by a number of studies conducted across the world including some developed countries such as Australia (Williams et al. 2020; Myklebust et al. 2019; GSR 2018; Antwi 2017; Mung'omba and Botha 2017; Gawugah 2016; Squibb et al. 2016; Kawooya 2012; Tashobya et al. 2010; Smith et al. 2009). However, it is important to note that socio-cultural issues, policies, protocols and working patterns (conditions of service and/or code of conduct) differs from country to country across the world. Hence, given that there is no empirical data about RRP in Ghana, it was significant that this current study identifies these challenges of RRP within the Ghanaian context. The current study therefore revealed that Ghana unlike other countries lacks specific policy exclusive for RRP. This study anticipated to establish the impact of working environment on the practices of these Ghanaian rural radiographers. Correspondingly, the current study among other issues/challenges identified as indicated, generally revealed lack of professional recognition amongst rural radiographers in Ghana. Some participants claimed that rural radiographers were discriminated against by management; in that they were not allowed to attend workshops, conferences, or even further studies. But, other healthcare professionals such as the doctors in rural practice were given the opportunity to attend such programmes. However, the situation is different in the urban sector as radiographers like the other healthcare professionals are allowed to attend CPD programmes. This is because the number of healthcare professionals in urban are far more than those in rural practice. Hence, there will always be 'skeleton staff' available in an urban setting, when some of these radiographers are permitted to go for such CPD activities.

There were also issues of equipment procurement & maintenance (a display of lack of policy), improper regulation & radiation concerns, lack of conditions of service, lack of specialisation & role extension pathways as well as education & training concerns. The above issues agree with claims made by some authors regarding similar experiences with RRP regarding among several other issues; an unpleasant state of radiographic equipment within most rural facilities (Mung'omba and Botha 2017; Kawooya 2012; Tsegaye 2010). This was as a result of not procuring the right equipment which may be due to political influences as revealed by this study. It is therefore important to note that adequate measures/strategies ought to be taken by all stakeholders in Ghana to eliminate any potential political influence during procurement of equipment. This will prevent the purchase of substandard and unsuitable equipment to rural facilities in Ghana as revealed by the current study (see *chapter 5; 5.4.2.4*).

Furthermore, this study found a lack of official scope of practice for radiographers in Ghana. The implications of this in the rural setting were different than in the more organised and regulated urban centres in the absence of supervising or supporting colleagues rural radiographers provided a range of opinions regarding what their role entails as rural radiographers. Thus, this study revealed that most Ghanaian rural radiographers have their roles extended, in that they were involved in roles beyond their traditional scope of practice/job description at registration, however this is done on an ad-hoc basis. Some of these additional/extended roles include radiographers' taking up administrative/secretary roles, reporting and performing ultrasound as well as improvisation with the available equipment to perform other specialised examinations such as HSG and barium studies. The Obvious reason according to the study participants for the aforementioned additional 'uncertified' or 'unapproved' responsibilities taken by these radiographers were due to shortage of healthcare workforce within most rural areas in Ghana. This view was supported by study observations.

However, these actions (extended roles) without certification and approval by the authorities constitute scope of practice breaches. This agrees with Hardy and Snaith (2006) who suggested that rural radiographers in UK were engaged in extended roles beyond their scope of practice. The study reported that in rural areas radiographers

are often concurrently triaging patients which includes evaluating patient's clinical status based on the identified radiographic abnormality (Hardy and Snaith 2006). Additionally, Squibb (2013) suggested that rural radiographers are involved in reporting of radiographs and are often faced with ethico-legal dilemmas regarding communication of radiographic findings. Also, Kawooya (2012) reported that rural radiographers roles within rural facilities have been extended as medical officers rely on radiographers' comments on radiographs that they produce without recourse to medico-legal transgressions. This agrees this with the findings of the current study (see *chapter 5, 5.6.2 – Rad 2*).

The current study additionally revealed lack of specific occupational health and safety protocol within most rural facilities in Ghana. In response, these rural radiographers were observed to adopt an approach in ensuring safe healthcare delivery to both patients and themselves by self-promoting occupational health and safety measures such as risk assessment during their practice. These included measures to prevent environmental, electrical, radiation, fire and slip/trip/fall hazards as well as adherence of good hygiene practices during service delivery. This supports Health and Safety Executive (2009) who suggested that the general purpose of any health and safety program is to establish the best safe working environment and to lessen hazards, injuries and accidents at work. The difference here was that radiographers were not working under an established regulatory framework. Study data revealed that Ghana lacks QC and QA programmes within most rural hospitals. QA activities are deemed essential in guaranteeing quality of healthcare service delivery, in order to safeguard patient safety and also to ensure the sustainability of hospital facilities (Silimperi et al. 2002; Seawright and Young 1996). Therefore, it is essential that adequate measures are taken by Ghanaian policy-makers in ensuring that there is functional OHS policy in order to promote safety in RRP.

This study further demonstrated both individual and institutional challenges to RRP in Ghana. Issues such as family ties and proximity issues were reiterated by most of the study participants. Most Ghanaian rural radiographers were concerned about the fact that they live far away from their families who live in urban areas. Most also indicated that accommodation was a challenge which directly affects their practice as radiographers because they live far away from the hospital in somewhat dangerous

places. As revealed, most of the radiographers stay in accommodations relatively far away from the hospital, consequently, they spend much on transport when there is on-call duty without any recourse to funds from management. Others also claimed they get so exhausted by the time they get to work, because they often need to walk miles from their accommodation to their respective workplaces. A lack of specific funds dedicated to compensate for such activities (on-call duties etc), or lack of adequate regional transport services were cited reasons, as well as lack of specific policy for RRP to account from such deficiencies in Ghana. This finding agrees with Nyandoro et al. (2016) who suggested similar working conditions for rural radiographers in Zimbabwe, which has similar socio-political issues amongst others, revealed that healthcare workers refuse rural postings due to accommodation location and transport challenges.

There are different dialects spoken across rural parts of Ghana, which makes communication somewhat cumbersome and challenging. This factor becomes a real barrier for professionals who are posted to areas where they do not understand and/or speak those dialects. No supporting translation services are available to healthcare professionals in these regions (Hitchins 2018) Correspondingly, this study demonstrated that language barrier was a major problem for most Ghanaian rural radiographers as most were not indigenes and had to rely on ad-hoc others to interpret the languages/dialects spoken to them in order for them to carry out some of their examinations successfully. This led to feelings of professional frustration that they could not practice to their best ability and was also identified as a threat to patient safety (*see chapter 5, 5.4.1.3 – Rad 1*).

As previously outlined in terms of a retention factor, the current study has shown that most of the radiographers indicated their displeasure with how issues of practice limitations, lack of career progression, CPD and academic isolation are handled in rural Ghana. Consequently, that made the radiographers less enthusiastic about their profession and daily working practices. Rural radiographers in Ghana were limited with the type of cases that they handled as most facilities offered conventional X-rays only. As a result even simple clinical cases were almost always referred to regional hospitals and/or other facilities who may have the needed equipment/services. This created a sense of loss of existing professional skills, as well as limited opportunities to develop new skills. This practice challenge amongst healthcare workforce in rural

areas has been previously reported by Gyambrah (2017) and Choudhary (2018). In fact, some study participants were forced to develop skills such as communication and even go beyond their scope of practice, but these skills were not recognised professionally (see *chapter 5, 5.6.3 – Rad 2*).

The current study revealed persistent power outages as a key challenge to RRP in Ghana. There may not be the electrical system to keep equipment effectively working as modern hospitals run on three-phase. Getting three-phase electric power, which guarantees an uninterrupted supply of current, to rural areas is a tremendous task as unreliable current is an everyday problem in developing countries (Antwi 2018). These adversely impact service provision as electrical outages causes frequent breakdown of equipment (see *chapter 5, section 5.4*). The current study has shown that there was lack of quality control and/or quality assurance programmes within most rural settings in Ghana though it is seen as essential to sustain a thorough quality management framework through QA and QC programmes in the radiology department (Ramlaul 2010). However, study data established that participants manage to undertake quality checks that are feasible and able to be conducted by themselves (see *findings chapter*). These checks include but not limited to daily warm up of the X-ray machine, checks of image plates as well as lead aprons. This reflects the situation that the framework of quality service in healthcare remains a focus for development across the globe, as many institutions/organisations are keen and interested in measures to improve the quality of healthcare service delivery.

However, healthcare service quality delivery has long been indicated as a multi-dimensional framework which determines whether or not service delivery to patients are deemed most suitable/appropriate to provide a better patient outcome (Fuentes 1999). Consequently, it is important for institutions to execute organised quality programmes as a management method to guarantee that health service providers provide quality healthcare services equitably to all patients (OECD 2020). Contrary to the aforementioned recommendations, sadly this study revealed shortage of consumables such as gloves, films, developers, fixers and other X-ray items needed for a comprehensive quality programme as well as the effective running of the department. Researcher observations included X-ray envelopes and radiographs being cut into smaller sizes in the name of managing them to avoid likely shortage.

Most participants argued that the availability of consumables at all times is not guaranteed within most rural facilities in Ghana and that this was a threat to safe and quality care provision. Very basic consumables such as sanitisers, gloves, cotton wool, X-ray films, envelopes are usually in short supply. The current study established that such circumstance hinders the routine flow of work with negative impacts on service delivery, patient and staff safety. The covid-19 pandemic has only served to further highlight the problem of insecure supply of consumables and the need to deal with such in order to promote patient safety and better patient outcome.

Medical imaging in Ghana has been confronted with several challenges which eventually impacts the quality of service delivery in a number of ways (Gawugah 2016). The current study revealed that major issues that threatens effective healthcare practices, some of which have been reported previously include but are not limited to: shortage of workforce, constant power (electricity) fluctuations, lack of radiographic consumables, inappropriate exposure to ionising radiation, absence of QA/QC programmes (Antwi 2018; Gawugah 2016). Studies have also revealed some similar challenges encountered in RRP in other countries (Mung'omba and Botha 2017; Kawooya 2012; Tashobya et al. 2010). Correspondingly, the current study established practice challenges within the Ghanaian rural radiography context. These include demotivation due to perceived professional discrimination, job dissatisfaction from low patient through-put and consequent skills loss, an unsafe and unregulated extended scope of practice, and lack of academic and personal progress. A combination of these factors was seen to demotivate rural radiographers in Ghana which makes RRP in Ghana less attractive.

Additionally, the current study revealed low patient through-put due to equipment unavailability and malfunction in most rural facilities in Ghana. lack of local equipment/modalities meant rural radiographers in Ghana suffer the loss of their carefully developed skills. Most of the rural radiographers perform conventional plain film radiography only and are therefore limited in their official practice compared to urban colleagues. Specifically, they do not get the opportunity to perform advanced radiographic procedures with the CT, MRI and fluoroscopy modalities that they once learnt at diploma/undergraduate level. Hence, the impact of challenges with RRP in

Ghana is to cause reduced/limited/non-existent opportunities for academic and personal professional progress.

Lack of equipment, absence of radiologists amongst other limitation within rural areas in Ghana influences these rural radiographers to engage in extended roles beyond their scope of practice. This clearly suggest that some rural radiographers in Ghana may be operating within unclear professional boundaries and consequently potentially place both themselves and patients at risk. Such practice may be due to the good intent of radiographers to help patients and/or the need to contribute in the effective management of their patients. Yet, there are medico-legal transgressions associated with these activities which needs urgent attention and redress. This conforms with broad literature that suggest that though radiographers are not supposed to communicate radiographic findings, some patients may still inquire/demand that from them (Dimond 2002). Findings of the current study indeed revealed that some radiographers were uncertain about whether or not to report/comment on radiographs due to unclear clinical pathways for their scope of practice. Such radiographers may be unsure of what information they should disclose to such patients when they identify abnormalities that require medical attention. Such ethico-legal dilemmas regarding when and whom to communicate clinical information has been identified by Lewis (2002) and Squibb (2013). Therefore, it is justifiable and imperative to establish recommendations for RRP policy formulation and implementation in Ghana in order to deal with these professional boundaries issues and establish a clear scope of practice.

6.3 Intervention and Policy Formulation for Rural Radiography Practice in Ghana

Studies have suggested that role extension development programs in rural healthcare have contributed to quality service delivery and enhancement of the radiography profession in most countries (Okeji et al. 2014; Kawooya et al. 2011; Stein et al. 2008). This have been reported as one of the key interventional strategy in dealing with RRP in most countries such Nigeria and Uganda (Okeji et al. 2014; Kawooya et al. 2011). Similarly, literature suggests that most countries have benefited from various interventional policies for rural practice (Mung'omba and Botha 2017; Kawooya 2012; Ditlopo et al. 2011; Tashobya et al. 2010). According to Ditlopo et al (2011) most government have focused on rural policy formulation and implementation in order for

policies and frameworks gain the anticipated impact. Thus, appropriate rural policies contribute to the interventional approaches for RRP challenges (Wilson et al. 2009). Studies have indicated that in order to overcome the RRP challenges; government, policy makers and all stakeholders are encouraged to help develop a policy on education and training which ought to be an accredited training programs (Antwi 2018; GSR 2018; Gawugah 2016; Okeji et al. 2014; Wilson et al. 2009). As that would ensure that rural radiographers are provided with the necessary training in order to meet the demands of their work within the rural facilities (GSR 2018). However, the aforementioned policies and interventional strategies though relevant, were broad/generic and vague; as they lacked specific and well defined framework purposefully designed for specific rural radiographic activities (Okeji et al. 2014; Kawooya et al. 2011). Thus, the purpose of these interventional strategies could not be fully achieved due to its lack of rural specificity. Additionally, the implementation of these programs were mostly interfered by socio-cultural and political activities (change in government) (Antwi 2018; Ditlopo et al. 2011). However, generally it has been established that such policies have contributed to quality service delivery and development of the radiography profession in most countries (Okeji et al. 2014; Kawooya et al. 2011; Stein et al. 2008).

Accordingly, this study established the need for recommendation for a nationally recognised framework for RRP in Ghana as there was clearly no policy/framework specific for RRP within the Ghanaian context. The need for such policy according to rural radiographers in Ghana would potentially manage the establishment of a major change in how rural radiographic services are delivered in Ghana. Consequently, RRP in Ghana will require a policy that seeks to guide the formation of an initiative such as rural radiography scope of practice which focuses on RRP role extension and other opportunities. However, most participants contended that unlike UK and other advanced countries, rural radiographers' extended roles are not officially regulated in Ghana. Therefore, its establishment within the Ghanaian context necessitates the formulation and implementation of a policy to manage and regulate how RRP role expansion should be practiced. Thus, this study proposed that the policy ideally should guide practice and should also provide the framework through which practice is conducted. It is therefore important to note that there is a need to juxtapose and/or

consider/take into accounts the problems and enablers of national policy framework for RRP in other countries, to help guide and shape the policy formulation for Ghana.

Additionally, majority of respondents posits that government formulated/enacted policies would regulate practice and would further stamp more authority on the scope of practice for these rural radiographers than their professional association (GSR) would. The primary motivation for establishment of RRP policies to allow radiography extended roles globally is due to shortage of radiologists as well as introduction of government policy that anticipates to improve healthcare and advance technology (Okeji et al. 2014; Kawooya et al. 2011; Stein et al. 2008). Besides, most countries introduced role extension activities in order to safeguard the welfare and wellbeing of patients (Ditlopo et al. 2011; Wilson et al. 2009).

This current study further established interventional measures that anticipates to deal with challenges identified about RRP in Ghana. These include the need for radiography education for indigenes, staff training programmes/workshops, extended practice opportunity, preparatory training for prospective rural radiographers, and official training for rural radiography practice. Overall, the current study demonstrated and championed the need for development of a nationally recognised framework and/or policy for RRP in Ghana which aimed to establish an ideal RRP. Thus, this study established the need for the following policies: extended practice/role extension, ethical and legal framework, education policy, as well as equipment procurement policy. Study participants indicated a lack of the aforementioned policies within the Ghanaian context. Also, they were not aware of any ethical, professional or legal framework that binds rural radiography practice. However, the study participants indicated that irrespective of the lack of specific policy on working with radiation protection in rural practice, because of the training they had in school, they tend to be aware of their responsibilities to ensure the provision of radiation protection to themselves and the general public.

This supports literature that suggest that key interventional strategy in dealing with RRP challenges in most countries are practice, education and training policies (Mung'omba and Botha 2017; Kawooya 2012; Ditlopo et al. 2011; Tashobya et al. 2010). Correspondingly, as indicated above, the current study revealed the need to train indigenes from rural communities and/or to provide them with sponsorship for radiography education, so they will be required to return to their various communities to offer radiographic services as a way of helping curb the issue of shortage of radiographers and also to prevent quackery in the system. Also, the need for establishment of protocols that ensures that communication is better support for the provision of diagnostic services and cultural inclusivity as well as competence for rural radiographers in Ghana. Rural radiographers need to be double-trained in diagnostic radiography and sonography in order to effectively perform duties within rural settings. This supports claim by Ditlopo et al. (2011) who suggested that most government have focused on rural policy formulation and implementation in order for such policies and frameworks gain the anticipated impact.

Additionally, some participants contended that lack of expert involvement in equipment procurement often results in the inadequate setting up of installed equipment within the examination room, thus hindering how it can be used effectively. Hence, some participants suggested that preferably, there should be policies in place to direct the purchase and installation of equipment within rural setting. Also, when equipment are procured, they should factor maintenance agreement even before installation. So that regular checks would be done on the machines and in case of fault or damage, there won't be delays in fixing them. This was suggested because most participants argued that maintenance checks were not carried out on the imaging equipment as regularly as needed within most Ghanaian rural facilities. The current study further demonstrated that staff training programmes/workshops were essential element for RRP as it provides the needed support required to thrive as a rural radiographer when posted to such facilities.

Participants further argued for a need of a policy for an official training for RRP and went on to suggest the type of training that will be needed and how rural radiographers may be supported and adequately prepared for their roles in the future. Thus, the current study established that all stakeholders in the management of healthcare

services in Ghana ought to make RRP generally appealing and attractive to professionals, especially those in the urban areas. Salary increment, incentives, allowances, accommodation must be made available for radiographers who accept rural postings. Internet connectivity issues, state of the art equipment ought to be brought to rural practice. Management must also support radiographers upgrade. Study leave with pay ought to be granted to rural radiographers who work for at least 2 years. There must also be expedited/accelerated promotion compared to the time taken for those in the cities. There ought to be a policy that allows rural radiography becomes one of the first stages in every radiographer's life; just like national service. This will allow every radiographer in Ghana have a feel of RRP before progressing. The aforementioned interventions and strategies as established by this current study agrees with literature (Mung'omba and Botha 2017; Gawugah 2016; Kawooya 2012; Ditlopo et al. 2011; Tashobya et al. 2010) that suggest policies that need to be formulated in order to ensure and guarantee improved rural radiography services. The aforementioned are policies and strategies which Ghana lacks as revealed by this current study. But, are adopted by other countries which supports RRP. Hence, the urgent need to adopt such interventional strategies to improve radiographic services within rural Ghana.

Finally, this current study established that Ghanaian rural radiographers are in dire need for an educational policy that ensures the encouragement of most young pupils to pursue science courses at senior high level in order to prepare them for radiography studies in the future. This will potentially increase the number of students who could be in a position to be trained as future radiographers. These prospective radiographers could further be motivated, attracted and retained in rural practice. However, the current study revealed that irrespective of the need for educational policies particularly for rural radiographers as suggested by majority of the participants, there is a policy by MOH Ghana that ought to have addressed some these issues, but for whatever reason it seems not to have been resolved. Obvious reason was due to shortfall of the said policy which could be due to poor implementation strategies and/or monitoring as well as political interferences due to change of government(s) (*see findings chapter*). Hence, the rural radiographers persistence on having an educational policy specific for RRP in order to deal with the issues as revealed. This agrees with literature that suggests that employers owe it a duty of care to ensure that every employee is duly

qualified, possess the needed training, skills, resources and support (WHO 2010). Studies have also indicated that recruitment and retention strategy ought to focus on the retraining of healthcare workers particularly in rural areas (Okeji et al. 2014; Ghansah 2011; Wilson et al. 2009). According to Ministry of Health and Social Welfare, Government of Lesotho (2010), policy on education and training has a remarkable impact on the performance of healthcare workers as well as their willingness to accept rural practice (MOHSW, Lesotho retention strategy 2010). Therefore, in order to increase the attraction and retention of healthcare workforce in rural areas, WHO (2010) advised that enhanced education and training as well as recruitment of students from rural background are useful interventional strategy. The aforementioned strategies could easily be adopted by Ghana to serve as an interventional measure in dealing with the issues of RRP as revealed by the current study.

6.4 Strengths and limitations of the study

In the absence of any existing study that explores the impact of working environment on practices of rural radiographers, this study used data on rural radiographers to offer some understanding of RRP in Ghana. Though the study provided useful and fundamental insights, about lack of specialisation, role extension pathways and education/training and radiation concerns amongst others, and advances our knowledge about how rural radiographers practice in the healthcare system in Ghana, there were some limitations with this study. Firstly, this study cannot overclaim the results to encompass the experiences and practices of other healthcare professionals in rural practice in Ghana specifically because only radiographers were studied.

It is noteworthy that data was collected during the Covid-19 global pandemic which presented a shift in working patterns for most people in various industries. However, the researcher has reason to believe that Covid-19 did not substantively change the data collected because the researcher engaged in an informal conversation with some of the participants regarding their opinions about impact of the pandemic particularly regarding motivation, attraction and retention of radiographer to work in rural areas. It was revealed that majority felt indifferent on the impact of Covid-19 although some did indicate that due to lack of Covid-19 safety equipment (PPE) within rural areas, they would prefer to work in urban due to the availability of PPE which would guarantee

their safety during practice, despite the workload noted in urban practice. The researcher amended the project timelines as he anticipated possible delays with data collection due to the lockdown during the pandemic however, data was actually collected successfully as expected. But, its timing was delayed by two months due to the Covid-19 restrictions amidst lockdown.

The case study approach permitted the use of multiple sources of data which offered different views that showed wider awareness of local and national issues. However, the nature of a case study is to provide in depth understanding of the cases. Therefore the generalisability of the findings to other settings is uncertain. The study involved only three out of the sixteen regions of Ghana. Exploring other rural sites might provide further insight on the practice of radiography in rural areas. However purposive selection of a range of rural settings could be said to be characteristic of conditions in Ghana. The use of semi-structured interviews offered participants the chance to flexibly and safely explore issues which would not have been feasible with other data collection tools. Focus groups could have created discussion and interaction regarding how rural radiographers make a case for their position under different rural practice environment and geographical conditions. However some of the participants may not be willing to speak freely in a group setting.

Official relevant and available documents were sought to support data generated from interviews. This proved the least useful source of data as there were very limited specific documents about rural radiography practice in Ghana (the only official source of data that specifically mentioned rural radiography practice were official letters from GHS and GSR that sought to address the issues of shortage of radiographers within such areas in Ghana). It was difficult to ascertain if any other official documents might exist but not be available to an independent researcher. Spradley's (1984) method of people, places and events format were used for the observations which were mostly done by 'shadowing' participants. With shadowing, there are limitations of possible changing behaviour due to observation (e.g. unsafe activities may not be performed under observation).

A major limitation of the study is that it did not include patients (beyond incidental observations). It would have strengthened the research to explore the perceptions of patients about the practice of radiography in rural areas. Particularly to establish their views on the quality of the service and care provided. This was not feasible due to

time, resource and ethical constraints. A final limitation of this study was that the researcher felt a pay-off between study breadth and depth was inevitable, due to the fact that very little was previously known about RRP within the Ghanaian context. Hence a broader exploration approach was used to minimise the risk of closing down possible fertile areas/opportunities. Consequently, a wide range of issues was identified. The case study approach limited this exploration to a more manageable number of settings. Furthermore, some of these areas have been recommended for further work (*see recommendation for future research section*). Regardless of the limitations of this study, issues that require further research and directional change policy and professional practice have been established.

6.5 Implications for Policy and Practice

The findings of this study raise several policy and training issues with respect to how RRP can be managed in Ghana. The main focus of this thesis was to explore the experiences of rural radiographers in Ghana in order to establish the impact of working environment on their practices. This apart from the main ethos of the study, was also based on the expectation that the social environment in which people are raised or socialised invariably can affect their behaviour/practice. For example, if participants are motivated to accept rural postings due their background and/or value and altruism (as this study found), then perhaps how they feel about RRP and their experiences and views will be different from those who frown on accepting RRP. Though studies have revealed a number of challenges with RRP globally, no study to date had inquired about the experiences of how Ghanaian rural radiographers practice within rural facilities.

There are good reasons to suggest that the findings reported in this study have policy implications for our understanding of RRP in Ghana. Among the policy issues this study brings to fore are the following; firstly, it has profound implications for general issues dealing with radiographer scope of practice in Ghana. As the stories and information provided by the participants have shown many Ghanaian rural radiographers perceived lack of official scope of practice, which need serious attention. There are no policies and legislation currently in place both nationally and at the institutional levels which could possibly offer direction. This therefore affects

their practice and willingness to remain in their roles. Policy and practice structures currently in place if any seem to have no positive impact on the professional handling of RRP. Arguably, there is the need for urgent policy and practice framework overhauling which would appropriately direct professionals who practice in rural healthcare to operate efficiently to the benefit of the patients and the community.

Secondly, while the existing policies and regulations in some other countries about rural radiography practice are noteworthy and some rural radiographers may be knowledgeable about these policies; this was not the case with respect to the Ghanaian rural radiographers. Indeed, none of the radiographers interviewed were fully aware of the content of the scope of practice and/or conditions of service regulation of the country and how it bound on them in their practice. They were additionally, not aware of the country's health policies guiding ethical/professional/legal framework as well as occupational health & safety and how health professionals should respond to the rural radiography practice challenges identified. However, these radiographers are not to be wholly blamed for the lack of awareness of the aforementioned issues, as the employer ought to have provided them with the needed knowledge/information about RRP before they are posted. Yet, they provided recommendations for possible policies that will inform RRP in Ghana. Therefore, it is imperative for the tertiary institution involved in training radiographers and other stakeholders who have a role to play in the RRP to offer courses that will guarantee safe and effective rural radiography role extension practices. Particularly, on radiographic pattern recognition/pathology, and ethics in order to promote radiographer reporting in the absence of radiologist within rural facilities in Ghana.

The Ghanaian regulation does not specifically mandate health professionals including radiographers in any way to report on radiographs. However, it has been established that in the absence of radiologist within most rural hospitals, most medical officers and other referrers rely on the rural radiographers radiographic opinion without recourse to medico-legal transgressions. Yet, with the current situation, there are no laid down protocols or structures in place to check some of these scope of practice breaches. Hence, the need for some critical policy considerations and concerns.

Participants' reports suggest training deficits, academic isolation, lack of career progression socio-cultural issues, issues of entertainment and unavailability of social

amenities. Also, shortage of workforce, radiographic modalities/equipment status, scope of practice/job description as well as occupational health and safety issues with regards to RRP in Ghana were established. However, key interventional strategy in dealing with rural radiography practice in most countries have been established (Okeji et al. 2014). The situation in Ghana indicates lack of monitoring of strategic programmes/policies to evaluate whether or not RRP is in conformity with the healthcare policies of the country. As a result there have been discretionary approaches to managing challenges in RRP in Ghana. Many of the radiographers were aware of or could easily identify the challenges, however, where to go and how to deal with which ever challenge was the problem. Most felt the medical director/superintendent (management) were in charge and that they should report to them about their practice challenges. However, some failed to do that due to demeaning responses they received from some of the management team members. It was clear that several socio-cultural/political influences were at play behind whether the radiographers decided to act on issues. This was strengthened by uncertainties and fear of being victimised by these managers. Others, also had no other place to go and that was the reason they remained in their roles.

Despite many references in the literature about the advantages of policy formulation approach effectively managing RRP, teamwork/cordiality between management and radiographers appeared weak and lacking in many Ghanaian rural hospitals. It is necessary for managers of the various health facilities to instil in their workers the need for such collaboration to advance healthcare delivery as a whole in the country, and in particular cases involving RRP. Furthermore, RRP requires regular follow-ups in most cases and collaboration among stakeholders handling rural workforce and activities. Contrarily, the comments made by the participants from their experiences showed that this had not been the case in the imaging departments and hospitals where they work. This was attributed to the absence of structures (i.e. policies, guidelines/protocols and recognised framework for RRP) in place for proper management of issues RRP.

Official multidisciplinary training which would educate rural radiographers of their specific roles in rural practice appears to be lacking in the Ghanaian context. This lack of serious educational campaign at the organisational level on the issue of RRP seems to have some implications for effective and quality service provision within most rural

areas in Ghana. Another factor noted in this study which seemed to discourage radiographers from accepting rural practice was the lack of opportunities for personal and professional development. They had the perception that they would be frustrated once posted to rural areas as they will not have the opportunity to progress in their career.

Clearly the findings from the study suggest the need for strong policy guidelines that rural radiographers should be required to follow to guide them in their practice. Arguably, there exist some sense of cooperation among the various stakeholders in charge of radiography practice in Ghana. This could be noticed in the various official letters between GSR, GHS and other stakeholders that sort to address some issues of rural radiography practice specifically; shortage of radiographers, conditions of service, accommodation and other issues. However, in reality the situation is that for a number of reasons, the needed cooperation between these stakeholders have not always been cordial and possible due to some political, bureaucratic or administrative issues, attitudinal, cultural and lack of clear cut policy. This therefore calls for a nationally recognised comprehensive framework that will involve all stakeholders involved in RRP in Ghana.

Furthermore, it is equally important, for an urgent need to train radiographers in Ghana about RRP using all available teaching methods. This is because the findings have implications for education. The introduction of RRP education/training policy will necessitate a review of the curriculum for radiography education at the undergraduate level, as that anticipates to prepare radiographers adequately for RRP. This implies that curriculum of radiographers' training should include RRP specific issues, cultural and linguistic competencies which were found to have a profound influence in practicing radiography in rural areas. The study findings also suggest that there are role extension opportunities for rural radiographers in Ghana and that there is a need for a change in policy that allows these rural radiographers to extend their roles without concerns for scope of practice breaches and medico-legal transgressions. There is, therefore, a need for the government and all stakeholders, to explore the opportunities of a change in policy that will ensure effective use of the skills of these rural radiographers to better enhance service delivery to patients within rural areas. Thus, the policy should endeavour to improve the quality of services and the patient experience. However, this will involve facing traditional professional boundaries,

hence the approach ought to be done with diplomacy and negotiation. It is essential to note that any policy formulation ought to involve all stakeholders and should have clear purpose. This purpose ought to be thoroughly discussed based on the findings of this study in order to develop a policy for RRP which will deal with issues identify about RRP and also allow rural radiography role extension.

Finally, this study has clinical implications; the findings suggest a need to address the issue of scope of practice breaches such as reporting by rural radiographers whose competency could not be established. This has the potential of adverse medical outcomes such as wrong reporting/diagnosis which could result in preventable injuries and/or deaths. The introduction of radiographer extended roles and additional responsibilities, have medico-legal implications for the practice of rural radiographers. These rural radiographers will be responsible for their actions and inactions, consequently should be satisfactorily prepared for the new clinical responsibilities. It is anticipated that these policies and framework will offer motivation and improved job satisfaction for these rural radiographers. This therefore promotes efficiency and quality of services rendered by these radiographers. There are also clinical implications to patients as quality of radiographic services ought to be safeguarded irrespective of whoever is performing the duties. It is therefore anticipated that rural radiographers identify how their working environment impacts their practices as patients ought to experience improvement in the quality of service they receive.

6.6 Recommendation for future research

The study should be repeated periodically to explore whether or not there have been a change with the current findings and also to determine if recommendations from the findings have been put to practice. Thus, it is critical that a clearer set of suggestions regarding the gaps that remain to be filled and/or new gaps that emerge from this thesis be openly articulated to inform future scholars. As a result, it is worth noting that future research will be of interest to this field if they can thoroughly examine challenges to professional practice, as this was one of the primary concerns for rural radiographers in Ghana. Thus, this study ought to be repeated periodically to determine the state of affairs after subsequent years. Besides, this study may not have been able to exhaust and/or explore the subject of challenges to professional

practice in greater detail. As good research addresses questions (sometimes only partially) but generates more questions or hypotheses, hence the need for future researchers to focus on the issues outlined below:

- A national and accredited curriculum to support role extension.
- Professional standards for Ghanaian rural radiography practice, which bound the scope of practice.
- Strategy for motivation, attraction and retention of rural radiographers in Ghana.
- Evaluation of rural radiography practice challenges and measures to deal with
Impact of barriers and challenges to rural radiography practice in Ghana.

The topic of professional practice issues, such as shortage of workforce, scope of practice breaches, internet connectivity issues, and equipment functionality and procurement issues, were highlighted across all sites, and it was identified as an acute challenge in Ghanaian rural practice. This disrupts the flow of work and has an impact on the quality of healthcare services. Some of the challenges/barriers also provide an impetus for the implementation of role extension/rural radiography specialty modules/programs in rural Ghana. Hence, a critical look at the subject is required on a regular basis/periodically to assess progress. A mixed method approach could be used in phases to collect data, where a cross-sectional survey could be done in phase 1 to gather data from radiographers across the country and subsequent qualitative approach could further be used to evaluate progress in addressing the issues listed above and also to potentially gather in-depth data from participants to establish their opinions regarding the subject area (i.e. what is needed to be done to improve rural radiography practice in Ghana).

Another gap that future research should fill is regarding the paucity of workers across all sites, which has a detrimental impact on healthcare delivery in rural regions. Ghanaian rural radiographers believed that introducing role extension in RRP could boost professional autonomy, which might lead to increased job satisfaction and improve radiographer attraction and retention in rural locations. Therefore, as a first step, a quantitative cross-sectional study could be conducted across the entire Ghanaian radiography workforce to test and/or establish radiographers' opinion regarding role extension, motivation and attraction to rural practice.

The current research's recommendations (see section 6.6: Recommendation for future research) may broadly be grouped under education and training. These two areas

would need to be evaluated in terms of feasibility, acceptability and effectiveness, through longitudinal quantitative and in-depth qualitative methods, if RRP training and education recommendations are implemented. Furthermore, future researchers might concentrate on the ingredients of a scope of practice for rural radiographers in Ghana and track the progress adherence to a policy guideline for guiding and/or governing RRP in Ghana.

Also, future study should cover all sixteen regions of the country. Quantitative approach could be employed by future researchers to explore/involve all radiographers (both rural/urban) in order to establish whether or not those not in rural practice will accept rural postings and why?. The findings from this study can be used as a guide in reviewing the undergraduate curriculum as well as drawing up a curriculum for a postgraduate education/training for RRP roles such as reporting and other extended roles/responsibilities.

Future researchers could also conduct studies focusing on equipment, procurement and availability of various radiographic modalities for rural facilities by the MoH/GHS as this was an area of major concern to most radiographers. However, this study did not explore that area in more depth as it was not the main focus for the thesis. But, findings from this study could inform a change in equipment procurement policies within rural facilities.

Finally, it will be interesting for future studies to focus on workforce and radiographic equipment distribution within rural areas. As this promises to assess the issues of shortage of radiography workforce and skewed distribution of both radiographers and equipment across most rural areas. These recommendations are deemed crucial as they could potentially help address some of the challenges established by this study. This will help to streamline regulation and policies for RRP in Ghana. As that would make it more effective for the current and future needs of the profession, as the practice of radiography evolves continuously.

6.7 Contribution to knowledge

This study sought to explore radiographers experiences and perceptions of RRP in Ghana and establish the impact of working environment on their practices. The study has therefore made a unique contribution to the body of knowledge on RRP; this

include the establishment for a need of a clear pathway for rural radiography specialisation/role extension within the Ghanaian context as well as a need for policy/framework to govern RRP in Ghana, particularly in similarly low resource countries more generally. The findings can be used as a fundamental guide that can be adapted/modified to meet local needs towards the successful introduction of policy and framework for RRP in Sub-Saharan Africa particularly Ghana. Most developing or low resource countries are faced with similar challenges within the healthcare industry. This is because most countries in sub-Saharan Africa are likely to have similar working patterns, historical and cultural structures. Thus, this study findings are likely to be readily translated and acceptable. The possibility for improving quality of service delivery and better patient outcomes by the introduction of RRP policy framework that will govern RRP in Ghana cannot be overemphasised. This is necessary due to the number of challenges with RRP in Ghana as recounted by this study. To the best of the researcher's knowledge there is no other piece of research that has explored experiences and perceptions of RRP in Ghana and established the impact of working environment on their practices.

6.8 Conclusion

Rural radiography is a relatively well explored topic in international research, however in most of Sub-Saharan Africa particularly Ghana, it has been under-researched. This study therefore set out to explore RRP in Ghana and establish the impact of working environment on their practices. This study employed a single case study with nested units of analysis design to explore the views and experiences of rural radiographers in Ghana. Data was generated from semi-structured interviews, documentary review of relevant and available official documents and observations. Data was analysed thematically with data integration at the analytic stage employing Braun and Clark (2006) steps of thematic analysis which resulted in three broad themes. These formed the main findings of the study. The key elements of the findings have been discussed in the discussion chapter with reference to the relevant literature.

The study found various reasons for motivation/attraction/retention for rural radiography practice in Ghana. Thus, reasons why radiographers accepted rural postings and why they remain in their roles. It also established challenges of rural

radiography practice in Ghana and its impact on service delivery. The study finally found interventions and need for policy formulation. The data revealed that Ghana lacks policy specifically designed to attract and retain rural radiographers.

Challenges to RRP were a key finding from this study across all sites. These challenges hinder the efficient flow of work and affect the quality of healthcare service provision. However, it offered opportunities for rural radiographers to extend their roles such as reporting of radiographs in the absence of radiologists. The study revealed that Ghanaian rural radiographers were concerned about value and professional recognition, which was one of the factors in accepting RRP. The study established that rural radiographers felt that they could bring more professional autonomy which might also result in increased job satisfaction and improved retention. They suggested that once their roles are officially extended and given the needed training and authorisation, there would be better patient outcomes as quality of care would be improved with radiographers reporting radiographs. This would potentially increase patient throughput, reduce waiting times and increase timely diagnosis within the rural settings. Findings of this study revealed the need for education/training for RRP. This study established that the current undergraduate curriculum needs to be reviewed to reflect current RRP particularly, to prepare radiographers for possible RRP roles.

Furthermore, the study findings suggested the need to develop policy that will guide RRP. This study established the need for broad consultation of all key stakeholders to boost the prospects of policy success as part of the process of policy formulation. The study found that in order for RRP to be effective in Ghana, policy and framework should include scope of practice, conditions of service, incentives/allowances as well as geographic locations where these radiographers could practice. The study revealed that some rural radiographers were already involved in unofficial role extension activities such as reporting of radiographs, contrast administration and performing specialised examinations such as hysterosalpingography within rural facilities. These unofficial roles may have been developed and accepted due to the lack of the needed healthcare professionals within most rural facilities in Ghana. Though some activities of radiography role extension such as reporting/commenting has been reported in literature within other jurisdictions, the aforementioned findings of this study within the Ghanaian context was quite revealing. Therefore, such situation suggest an urgent

need for formalisation/validation of such roles in order to avoid potential medico-legal transgressions especially in the absence of radiologists.

In conclusion, this study contends that Ghana needs a policy to address the challenges identified and motivate/attract/retain radiographers in rural areas. Ghanaian rural radiographers need functional professional systems that offer opportunity for career development, particularly by gaining exceptional interprofessional skills and comprehensive knowledge of imaging pathology/pattern recognition to undertake extended roles such as radiographic reporting in the absence of radiologist provision.

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APPENDIXES

Appendix A - Ethics approval from School of Healthcare

School of Healthcare Sciences
Head of School and Dean Professor David Whittaker

Ysgol Gwyddorau Gofal Iechyd
Pennaeth yr Ysgol a Deon Yr Athrawes David Whittaker



19 November 2019

Cardiff University
Eastgate House
13th Floor
35 – 43 Newport Road
Cardiff CF24 0AB

Tel Ffon: +44 (0)29 20 688559
Email E-bost: HCAREethics@cardiff.ac.uk

Prifysgol Caerdydd
13^{ed} Lawr
Ty Eastgate
35 – 43 Heol Casnewydd
Caerdydd CF24 0AB

Gabriel Ashong
Cardiff University
School of Healthcare Sciences

Dear Gabriel

RURAL RADIOGRAPHY PRACTICE: EXPLORATION OF EXPERIENCES OF RADIOGRAPHERS IN GHANA

The School's Research Ethics Committee Chair has considered your research proposal. The decision of the Committee Chair is that your work should:

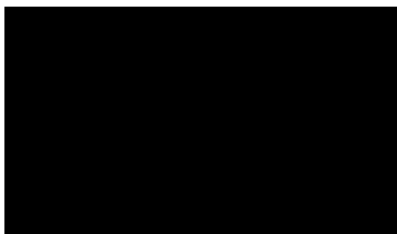
Pass –and that you proceed with your Research in collaboration with your supervisor

The Committee has asked that the comments made in the e mail be actioned.

Please note that if there are any subsequent major amendments to the project made following this approval you will be required to submit a revised proposal form. You are advised to contact me if this situation arises. In addition, in line with the University requirements, the project will be monitored on an annual basis by the Committee and an annual monitoring form will be despatched to you in approximately 11 months' time. If the project is completed before this time you should contact me to obtain a form for completion.

Please do not hesitate to contact me if you have any questions.

Yours sincerely



Appendix C - Facility approval from GSR

GHANA SOCIETY OF RADIOGRAPHERS

• Member:

International Society of Radiographers
and Radiologic Technologists (ISRRT)
Ghana Federation of Allied Health Professions (GFAHP)



P. O. BOX KB 393 Korle Bu
Accra, Ghana.
Tel +233 24 476 8551
+233 24 275 6417
+233 24 481 9146

• Bankers:

GCB Bank, Korle Bu Branch
Account No: 1131010043444

website: www.ghanasor.org
email: info.ghsor@gmail.com

Our Ref: GSR/RE/12/10-19

Your Ref:

Date: 17th October, 2019.

To Whom It May Concern

APPROVAL TO ACCESS RADIOGRAPHERS IN GHANA FROM THEIR FACILITIES FOR A RESEARCH STUDY

The Professional Development, Education and Research Committee of the Ghana Society of Radiographers (GSR) on Wednesday October 16, 2019 granted approval to access Radiographers from their respective hospitals within the rural areas in Ghana in a research work leading to the award of Doctor of Philosophy Degree in Healthcare Studies at the Cardiff University by Gabriel Gilbert N.A. Ashong.

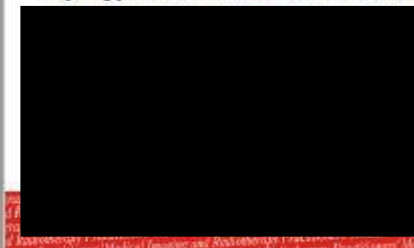
This approval comes to serve as implied consent to access these Radiographers from their various hospitals which was expected to infer when the approval was granted on Wednesday September 12, 2019 with reference number GSR/RE/09/09-19 to allow the researcher to involve Radiographers in Ghana in a research work.

In Ghana, it is not the practice for facilities to issue letters of access when the researcher will only be interacting with only professionals and for that matter Radiographers. The Society gives all approvals for radiography researches in Ghana. Thus, seeking opinion from Radiographers in Ghana from their various places of work only requires GSR approval and does not require approval for access by the facilities in Ghana. However, letters of access would be required if the researcher would go beyond just interacting with the Radiographer and would involve the use of hospital equipment for the study.

Nonetheless, GSR as part of encouraging research activities for the growth and development of good radiography practice in Ghana; renders support to its members in good standing particularly when it comes to the area of research by engaging and liaising with the relevant authorities from various facilities.

As requested, GSR will contact registered members of the Society about the research on behalf of the Researcher and will request members who are interested in the study to contact the Researcher.

By copy of this letter the researcher is advised to use this data just for the purpose of the research work.



'Promoting health through Medical Imaging and Radiation Therapy'

Appendix D - Permission letter to GSR



School of
Healthcare Sciences
Ysgol y Gwyddorau
Gofal Iechyd

Cardiff University

Eastgate House
35-43 Newport Road
CF24 0AB
Tel: 029 2251 0708
Email: HCAREDeaney@cf.ac.uk
www.cardiff.ac.uk

8TH MAY, 2019.

Prifysgol Caerdydd

Ty Eastgate
CF24 0AB
Tel: 029 2251 0708

THE PRESIDENT
GHANA SOCIETY OF RADIOGRAPHERS
P. O. Box KB 602
KORLE BU, ACCRA

Dear Sir,

APPLICATION FOR PERMISSION TO CONDUCT A STUDY IN GHANA

I am a member of the Ghana Society of radiographers and currently a PhD student at Cardiff University. As part of my study I will conduct a study in Ghana that will involve Radiographers and it is an institutional requirement that I get permission from the Society of Radiographer in Ghana allowing me to conduct the study in Ghana subject to ethical clearance from the society.

My study topic is: **Rural Radiographic Practice: Exploration of experiences of Radiographers in Ghana.** This will involve in-depth interviews with Radiographers within Rural areas of Ghana.

I would therefore be very grateful if you could grant me permission and provide me a letter to that effect in order to conduct the study in Ghana using members of the society. Counting on your usual co-operation. Thanking you in anticipation.

Yours Sincerely

Gabriel Gilbert N.A. Ashong



Email: AshongGG1@cardiff.ac.uk
Diggyclef21@yahoo.com



Registered Charity no. 1134805
Dunfermline, Fife KY11 3JN

Appendix E - Request access to facilities



School of
Healthcare Sciences
Ysgol y Gwyddorau
Gofal Iechyd

Cardiff University
Eastgate House
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CF24 0AB
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Email: HCAREDeanery@cf.ac.uk
www.cardiff.ac.uk

Your Ref: GSR/RE/09/09-19

THE PRESIDENT
GHANA SOCIETY OF RADIOGRAPHERS
P. O. Box KB 602
KORLE BU, ACCRA

Prifysgol Caerdydd
Ty Eastgate
CF24 0AB
Tel: 029 2251 0708
Epost: HCAREDeanery@cardiff.ac.uk
www.caerdydd.ac.uk

Dear Sir,

**APPLICATION TO ACCESS RADIOGRAPHERS IN GHANA FROM THEIR FACILITIES FOR
A RESEARCH STUDY**

With reference to your letter of approval granted on Wednesday 11 September 2019 for my PhD study to access Ghanaian rural radiographers. The approval letter was submitted, together with related documents to Cardiff University Ethics Committee for ethical approval. The response from the committee (dated Wednesday 09 October 2019) required that I present letters of access from the facilities that I intend to interact with its radiographers.

In as much as I am aware of a different set up in Ghana compared to what is applicable here in the UK, I deem it necessary to humbly request that you provide a letter to serve as written proof of my claim to the committee with respect to letter of access from facilities. I am aware once approval is granted by GSR that I am free to access those radiographers from their respective facilities after they express interest to participate in my studies. However, it is my responsibility to provide evidence to that effect.

I would therefore be very grateful if you could issue and provide me a letter of access to these facilities in order to present to the school's ethics committee. Pending ethical approval, I will furnish you with further details including study invite. Counting on your usual co-operation. Thanking you in anticipation.

Yours Sincerely

Gabriel Gilbert N.A. Ashong



Email: AshongGG1@cardiff.ac.uk
Dinawclef21@yahoo.com



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Appendix F - Participant information sheet



School of Healthcare Sciences

College of Biomedical and Life Sciences

Participant information sheet for health or social care professionals

Topic: Rural Radiography Practice: Exploration of experiences of radiographers in Ghana.

I am a senior diagnostic radiographer with over a decade of experience. I would like to invite you to take part in a PhD research study looking rural radiography practice in Ghana and how it impacts on the quality of healthcare patients receive within rural areas. I will like to explain why the study is being done and what it will involve for you before you make a decision on taking part or not.

Please take the time to read the following information carefully. You might want to talk to other people about the study and you may have questions that you want to ask. If you have any questions or want to know more, please contact me on the number at the end of the information sheet.

What is this study about?

This study will explore experiences and practices of rural radiographers in Ghana and its possible impact on patient care. The researcher will seek to explore the ways by which Ghanaian rural radiographers understand the extent of their roles or scope of practice by conducting in- depth interviews with a cross section of radiographers within various rural settings across the country. These radiographers will be selected based on a criterion.

Why have you been invited to take part?

You have been invited to participate in the study because you are a radiographer and the study involves radiographers. Your participation would enable the researcher to identify possible areas with practical implications. It is intended to disseminate the findings to the policy makers to ensure what could be a sustainable efficient rural radiography practice in Ghana.

Do you have to take part?

This is a request for help to participate in this study and taking part is voluntary. You have the right to withdraw from the study without giving reasons and you should not be influenced by anybody to participate. It is entirely your decision to make. If you are interested, I will explain to you what the study involves and take you through the information sheet. After taking you through the information sheet if you still agree to be a part of the study, I will invite you to give your consent by completing a form confirming your agreement to be involved in the study. However, even after consenting and you feel you are no longer interested and you decide to withdraw from the study at any point you can do so without having to give any reason for the decision.

What will happen to you if you take part?

I will be in touch with you to schedule a day for an interview which will last approximately sixty minutes. The interview will be audio-taped and it can take place at a venue of your choice. At the interview I will ask you questions relating to the rural radiography practice, the situation in Ghana and its impact on patient care. These you will be able to discuss. Your practice may also be observed and field notes taken. The observation will be for a full shift (8 hours) for two days (16 hours). Thus, you will be observed over a two day period of an eight hour shift daily as you go about your normal duties.

Are there any risks?

This study has no significant risk to participants or researcher. However, if as a consequence of participating you feel the need for support then the following website may be of use; www.ghanahealthservice.org - The health administration & support services division and research & development division (Research Coordination and Capacity Development Section). Alternatively, you may want to see your hospital chaplaincy unit for support. Additionally, the awareness of the benefit of the study outcome could reassure participants and could also manage any anxiety. Moreover, observation and interview would be arranged at the participant's convenience.

What are the possible disadvantages of taking part in the study?

There are no significant disadvantages for you if you take part in the study. Unprofessional conduct that you reveal through the interview could be reported to the appropriate agency. However, all the material collected for the study will be confidential and when the study is written your name will not be mentioned. Quotes will be included in the report but you cannot be identified from them.

What are the possible benefits of taking part?

Taking part in this study will help bring to light the situation of rural radiography practice in Ghana and its impact on patient care. This may inform or contribute to a change in policy that could bring about to what could be a sustainable efficient rural radiography practice in Ghana. This could result in greater job satisfaction, increased recruitment and retention within the rural settings.

What will happen to the results of the research study?

It is imperative that you are made aware that your identity will not be revealed in any publication, conference presentation or PhD study. At the end of the study the results will be published in radiography and medical journals and the study will be presented at radiography and medical conferences. The completed PhD will be submitted to the University and examined both internally and outside of the University. I would like to retain the results of the study with a view to being able to carry out a secondary study, present the findings at conferences and use the materials for teaching with your consent. I will also provide a report of the findings from the study for everyone who participates. All the information collected in the study will also be privately stored and subsequently destroyed, using the guidance for storing research information set out by Cardiff University.

Who is organising and funding the research?

The funding has been arranged so that the study can operate for three years. This funding was awarded by Ghana National Petroleum Corporation (GNPC) Foundation. The study will be supervised by two senior and experienced staff, one of whom is Professor Jane Hopkinson and the other Dr Nicholas Courtier.

Who has reviewed this study?

The ethics committee of the School of Healthcare studies of Cardiff University reviewed the study and has agreed that the study is ethical.

Further information and contact details

You may want some more general or specific information about this study and you may want to talk to other healthcare professionals about participating as they may be in a good position to give you advice about getting involved in the study.

If you decide to take part in the study and you are unhappy at any point about your participation, and/or if you have any queries or concerns about how your personal data will be used during the research project, please contact me.

Thank you for considering taking part in this study. If you need to contact me, you can do so at the e-mail address and number below:

Gabriel Gilbert Nii Asharku Ashong

PhD Student



Email : AshongGG1@cardiff.ac.uk

If you have a concern about any aspect of this study, you should ask to speak to the researchers who will do their best to answer your questions (contact Cardiff University email and phone number).

If you remain unhappy and wish to complain formally, you can do this by contacting the School of Healthcare Sciences Director of Research Governance (Dr Kate Button. Email : buttonk@cardiff.ac.uk Tel : +44 – (0)2920687734. Room 13.17, 13th Floor, Eastgate House, 35-43 Newport Road, Cardiff, CF24 0AB).

In the event that something does go wrong and you are harmed during the research and this is due to someone's negligence then you may have grounds for a legal action for compensation against Cardiff University but you may have to pay your legal costs.

Appendix G - Consent form



**School of Healthcare Sciences
College of Biomedical and Life Sciences**

Title of project: Rural Radiography Practice: Exploration of experiences of radiographers in Ghana.

Researcher: Gabriel Gilbert Nii Asharku Ashong

Consent form for healthcare or social care professionals

Please do initial in the space provide at the end of each statement if you agree.

1. I confirm that I have read the information sheet for healthcare professionals (version 1.0 29.10.19) for the above study. I have had the opportunity to consider the information, asked questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without it affecting me.

3. I understand that my interview will be recorded on a digital recording device and my practice may be observed. I give permission for this.

4. I understand that data collected will be anonymised and may be looked at by responsible representatives from Cardiff University for the purposes of monitoring and auditing the conduct of the research. I give permission for this.

5. I understand that data collected will not be transferred to any commercial organisation but may be used anonymously for publication in healthcare journals (using anonymous quotes from the interviews), presentation at conferences, for teaching purposes and for future studies. This data will be securely stored for a period of 5 years. I give permission for this.

6. I agree to take part in the above study.

Name of Participant

.....

Signature:

Date:

Name of person taking consent (Researcher)

Gabriel Gilbert Nii Asharku Ashong

Signature

Date: 29/10/2019

Appendix H - Interview guide



1. Can you start by telling me how many years you have been in rural practice?

Prompts and probes: Can you describe your current role as a radiographer? How different is rural practice from what you thought it will be? What was your scope of practice at registration? What is your current scope of practice?

2. What is your professional perception as a radiographer about occupational health and safety issues within rural setting?

Prompts and probes: Can you describe how maintenance checks are carried out on imaging equipment? Can you describe how risk assessment is carried out in your unit with respect to health and safety? Do you have radiation safety equipment such as lead aprons? How often are checks done on the radiation equipment?

3. Explain what formal education/training you have had to prepare or support you in the rural radiography role? In retrospect, do you feel this was adequate?

Prompts and probes: Have you attended any course(s) to develop any new skills since becoming a rural radiographer? In your opinion does radiographers coming to rural area need any special education/training to prepare them for this role? In your opinion how adequate is rural radiography education/training for your professional development? Can you describe how clinical supervision is provided within rural setting? In your opinion are you adequately supported by professional bodies? If so, which ones? What are your views on rural radiographers being given the requisite post-graduate training to report on radiographs? Can you tell me more about this, what training is needed, how might they be supported and prepared for this role in the future? What are your views on how extended practice, such as radiograph interpretation, can best be regulated and controlled within rural areas in Ghana?

4. Can you tell me what attracted you to rural radiography practice?

Prompts and probes: Were there professional reasons? Were there personal reasons like the rural community, lifestyle or social reasons? Can you describe what involves in living and working in your community? What do you like about it? What don't you like about it? Does this affect your role as a radiographer? Can you give me some examples? Can describe your general experiences about practicing radiography in the rural area?

5. What makes you remain in your role as a rural radiographer?

Prompts and probes: Do you intend to leave the practice of radiography within the rural setting? If so, when and for what reason? If not, what makes you stay? Do you intend to retire as a rural radiographer? If so, at what age do you intend to retire? What did you expect? Have your expectations been realised?

6. *What are your views on radiological services available within rural facilities?*

Prompts and probes: In your opinion are you appropriately remunerated? Do you have any issues with getting your leave? What are your challenges in rural practice? Can you describe the impact of these challenges on your practice? What possible solution could you suggest would help solve these barriers/challenges?

7. *Can you describe to me what you understand by an idea rural radiography practice?*

Prompts and probes: With respect to your radiography role within the rural context is there the need for specific training targeted for rural radiography practice in Ghana and why? What form of support will you be willing to offer for this special training to be successfully implemented and sustained? What should be the standard of proficiency before being allowed to extend roles as a rural radiographer? What should be the scope of the extended roles? Where should the rural radiographers who extend their roles be placed on the salary structure? What are the factors that could possibly promote or inhibit its introduction?

8. *What three things would you suggest to improve rural radiography service provision here in Ghana?*

Prompts and probes: Are there factors/recommendations needed to be considered to develop a nationally recognised framework for rural radiographic practice in Ghana? Anything else you would like to add about how future services within rural settings could be developed to meet the needs of the people?

Thank you for your time

Appendix I - Sample Observation extract

People	Events	Places
Radiographer	<p>The researcher arrived at the X-ray facility about half an hour before the start of work. This was because the researcher needed to arrive well on time in order to prepare adequately before the arrival of the study participant.</p> <p>The radiographer got to work about twenty minutes before the start of work. He appeared happy to see me and we exchanged pleasantries. He went into the office and offered me a place to put my stuff. He then went into the imaging room and switched on the power and started to perform various checks and tests on the equipment before the start of the days' work. The facility has a reception area, imaging room, a dark room, an office, a changing room, toilet facility both for patients and staff as well as waiting room. There was a separate room for an ultrasound machine. There was no in house radiologist for either scan or reporting. There was a lone radiographer who was observed carrying out both X-rays as well as ultrasound cases. All cases that</p>	<p>Reception</p> <p>Imaging room</p>

	<p>needed a radiologist reports were kept and later sent to another station for comments and patients are told they will get their reports after couple of days. It was observed that emergency/urgent cases were attended to ahead of patients who were in the waiting area. However, the radiographer was observed informing and explaining the situation to the patients in advance. The services rendered by this radiographer in this facility was second to none. It was by far significantly better than all the other rural facilities visited during this study</p>	
	<p>The radiographer appeared very ready to perform the examinations, he was very welcoming and interacted well with his patients. The patient waiting area had some chairs and a TV set. The radiographer introduced himself to each patient and communicated to them by explaining to them what the examination was about and what he expected from them. It was observed that the radiographer combined sign language together with spoken language in his interaction with them. It appeared there was a bit of struggle with communication as the radiographer was not very fluent in</p>	<p>Patients' waiting area</p>

	<p>the local dialect spoken by some of these patients. However, there were some patients who helped with interpretation of what seemed difficult for either the patient or the radiographer to understand, this made patient had relatively shorter stay in the X-ray department. This was not always the case in some facilities which were almost always crowded with patients due to low-through put. I could not conclude whether or not the attention the radiographer paid to each patient was because he had relatively fewer patients or that was his normal practice routine (protocol/standard practice) irrespective of the number of patients.</p>	
	<p>There was lead apron hanged on a rail, immobilisation aids were placed on a table in the imaging room. Control panel had a lead screen, there was also a radiation warning light placed at the top of the door in the wall which switches on whenever an exposure was made. There was also a fire extinguisher placed at a corner in the imaging room towards the entrance of the dark room area. It was observed that the radiographer was the one who calls the patients for</p>	<p>Imaging room</p>

	<p>each examination. He also gives instructions to the patients and supervised them to change when need be. He had an assistant who was in the dark room most of the time. It was also observed that the radiographer made notes in a book after every examination. These notes were information about the examination: patient name, age, type of examination and either National Health Insurance (NHIS) number and/or payment receipt numbers). Patients without NHIS had to pay for the services whilst those with NHIS had it done for free. It was observed that a number of patients after their examination inquire from the radiographer what could possibly be the outcome of the examination. The radiographer spoke to them nicely and reassures them and politely asked them to speak to their physician. It was observed that some of the patient were not amused by what the radiographer told them. However, it was observed that the radiographer made notes in a paper after some of the examinations and placed them in the X-ray envelope. These notes according to the radiographer were his opinion (comment/reports) of the radiograph</p>	
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	<p>sent to the referrers to help with diagnosis which would aid better patient management. It was also observed that nurses and some medical officers came into the X-ray unit to discuss some of the radiographs. The radiographer's opinion was sought and he provides that verbally and also wrote some on a piece of paper. Some of the healthcare professionals who approached the radiographer regarding the radiographs that he had produced showed gratitude to him.</p> <p>The radiographer did not seem to have an official break time. According to him, he has no break time and that he only gets the opportunity to have his lunch only when he clears all his cases on time.</p>	
<p>Patients, relatives, and other staff</p>	<p>The door outside the X-ray room had radiation warning sign as well as light. There was also a fire extinguisher just by the door hanged on the wall outside the imaging room.</p> <p>There were two long chairs well placed away from the pathway with patients and relatives seated on. These were patients who will either be ushered to the waiting area for various X-ray examinations or to other units close to the X-ray facility.</p> <p>There were hospital staff seated</p>	<p>Corridor outside X-ray room</p>

	<p>behind a desk close to the X-ray unit just away from the entrance of the corridor that leads to the imaging room and other units. These were receptionist who appeared very eager to help and were full of smiles.</p>	
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Appendix J - Sample In-depth Interview of a participant

Interview 2

R: Good morning

I: Good morning sir

R: How are you today?

I: Ahhh by God's grace I'm fine and you?

R: I'm also good, following the conversation we had about my thesis, accepting to participate in my study and giving your consent. As agreed, I'm here today to conduct the interview.

I: okay

R: I will like to seek your concern again, are you looking for us to continue?

I: Oh yea that's why I'm here, I was just waiting for you, I fully agree that we can have the interview

R: Okay, so let me remind you again that I will be recording everything and the conversation that we are having today. Can we go on?

I: I don't have any problem with that

R: Okay thank you, let's start; can you start by telling me when you qualified as a radiographer?

I: Yea, I qualified in 1991

R: 1991

I: 1990 sorry yea 1990

R: 1990, so over two decades ago

I: Exactly

R: So where did you train?

I: Well, I first train in the training school in Ghana Health Service, and then continued to do my first degree at University of Johannesburg; it is formally called Technical Withwatestin.

R: Where have you worked since qualifying?

I: Well I've worked in several places within the capital that is Accra, and then some few rural places, and when I started I worked in the rural area at Mampong-Akuapem hospital, that was where I started and then later on I came to Accra and then later I worked with other hospitals within the city.

R: Okay, could you tell me in which particular year you worked in Mampong-Akuapem?

I: That was the early 90's

R: Oh okay, alright, do you mind telling me your age range, let's say between 30-40,50 plus etc?

I: It will be 50 plus

R: Okay alright, so do you know about rural radiography before going there?

I: Yes, I knew because there were few facilities in some rural communities with X-ray facilities so I knew that you can be posted there anytime when you complete. At that time it was Ministry of Health not Ghana Health Service.

R: How many years were you in rural practice?

I: I was in the rural practice for about 4years.

R: 4years?

I: Yes

R: Okay alright, so can you tell me what attracted you to rural radiography practice at the time?

I: Well, not that there was any particular reason that attracted me there, but that was where I was first posted to practice and you had no choice. You had no choice to refuse your postings, that's why I went there and I also wanted to taste the rural practice, so I wasn't worried when I was ask to go there to practice.

R: Okay, so it means that it was purely professional reasons

I: Yes

R: Where there any personal reasons like rural community lifestyle or social reasons apart from your professional reasons you indicated?

I: Yes, I felt that if you wanted to start life, at times it is also better to start in the rural areas, where economically you will not spend much, accommodation is cheaper and socialising with people is also easier. You get to know each other very well so your safety is even secured, and food is not a problem in some of these areas. So if you are in such places you see that you can at least save towards the future, so that was why I didn't refuse the posting.

R: Okay, can you describe what involve living in your community?

I: What involves living in the rural community?

R: What involves living and working in the rural community, but you can first talk about living in the rural community?

I: Well, living in rural community though has its good side and bad side you know, so the good side is where you are known to the people and you are respected by the rural folk because you are healthcare personnel and then socialising with people is easy and interesting and at the same time the rural area if you are interested in farming they are ever ready to give you land to farm, okay?, so these are some of the good sides, and the other aspect or bad aspect of being in the rural area is maybe carrier

progression and access to some information that you need and also within the rural practice too you are limited to a small area of the professional practice okay?, that is worrying so when you stay there for a long time it's like you don't have any opportunity to upgrade yourself in any form you know. You forget about some of the other things you where train on.

R: Okay, you obviously mentioned what you like about living and working in the community and what you don't like about it, I would like you to tell me how that affected you as a radiographer, living and working in your community, how does that affect your role specifically as a radiographer?

I: Yea, if you look at the training of a radiographer you know its wide so if you are limited to just a small area of the practice because of your situation in terms of your location in rural place its quite worrying. Also, you don't feel comfortable as you are not able to exhibit the bigger aspect or the bigger picture of your profession you know such as advance imaging. So that's the problem but then you have no choice so you just have to adapt.

R: Okay alright, can you tell me about your general experiences of practicing radiography in the rural area?

I: Yea, there are lots of experiences in the rural community. In the rural area we don't have radiologist, already in Ghana you know generally radiologist are few so most of them are located in the capital cities or the regional capitals. So the rural area you don't have that so the doctors usually at times seek your help when they don't understand these images or radiographs that you produce. So if you are also limited in image interpretation, at least the basic ones you know you will not be of help, more so with the rural practice people can just walk in to the department asking you to do an X-ray for them because they are having a pain here or there without seeing a doctor or without going through the normal clinical process for a competent clinician to request or demand X-ray for a particular person. But because they know you are in the rural community at times if you reject them or you try to educate them on what they are supposed to do, some of them don't take it likely because they feel you are been wicked or difficult. Because they don't understand anything you tell them, it gets really difficult which is one of the challenges that we usually face. Also, in the rural areas at times if the doctors are not available, as there could be only one doctor available, the nurses take over for X-ray request. But some of them, the request are not appropriate; no clinical history, and even at times you can even get something like X-ray the affected part. So you would have to may be take history of the patient then or you let the person go back by writing a small note or referral to the one who asked the patient to come and do the case okay? So that you can do the right thing for them. These are some of the challenges, at times it creates some kind of conflict between you as a rural radiographer and then the clinician who makes the referral.

R: And so when these conflicts are raised as you indicated can you tell me how you resolve such issues?

I: Yea, most of the time you have to go to the referrer, the doctor or the clinician just to tell them how these things should be done, how request should be made. The

reason why, for instance we need brief clinical history okay? so there was one case where I gave an example to a doctor that for instance you asked somebody to come and do X-ray and failed to indicate whether it was to look out for tuberculosis or coughs or with accident when you are suspecting fractured rib or anything else; you know with fractured rib you will not even ask the patient to take in deep breath and hold it, so you see that is different from the routine or normal chest X-ray cases that we do so it helps in the projections, the number of views that you have to do okay for them but at times they don't seem to understand. Some of them when you educate them on that they do agree and then they do the right thing in their subsequent request, but others also disagree.

R: So I will like to take your mind back again focusing on the experiences, the practicing radiography in rural setting how different is rural practice from what you thought it would have been before entering in ?

I: Well I thought that, ermmm!!! you know most people don't want to work in rural areas, so I thought that once you are posted there to help, because of the issues of lack of so many things in the rural areas, I felt there will be some form of incentives as a rural practitioner okay that will boost our morale and to motivate us, maybe to even remain there for some time but it's not like that. At times its like you are forgotten okay? And when there are workshops or training programs and other things that you need to attend, because you are alone; you know this rural practice is only one radiographer and with your maybe few assistance who does minor jobs in the department, you can't leave the hospital and go for any training, workshops or conferences that are usually organised by the Ghana society of radiographers. So it becomes a problem between you and your administrators because they don't want to release you for any period for you to attend such activities and when that happens gradually, you will be going stale. So my expectation was that ermmm!!! working in a rural area they should have known better that because of the situation at least once in a while management should allow us to also update ourselves to come and help the practice in the rural area. But that is what we don't usually experience, we don't get it okay? so it makes you frustrated, worried and then you plan to even leave the place for a better place where you can get access to some of these things.

R: Okay, you've spoken my mind, I was about asking you what you expected and looking at whatever you've mentioned do you think your expectation were realised?

I: Ermmm!! not fully, like I told you I thought that going to rural practice because of certain known challenges, you know you will be treated better than those in the urban setting in terms of accommodation and other minor things that will make you feel happy in that area. But you don't get all those stuffs, once you are posted there that's it and if you don't take care you will remain there forever.

R: Can you tell me about or describe your professional contest to your role by stating your views on radiological services available within rural facilities?

I: Yea, ermmm!! like I mentioned previously, radiological services in rural communities is purely conventional; the basic practice okay? we don't do any advance or contrast examination. And those things we don't even have radiologist there to interpret or to

be doing such cases with us okay? But rural folks too deserve to have some access to some of these things, already they are poor, meaning if they need to have these examinations they have to come to the urban areas where you can get access to facilities where they do some of these cases. So purely in the rural context the practice is just basic radiography.

R: Alright, can you tell me about the populations that the facility serve ?

I: Yea, the community I worked lets say about two thousand, between two thousand and three thousand. Yea, because it's not the town itself that you are serving but other smaller communities in the area and culturally it seem have immigrants that are coming from other regions that have settled there to do farming, but purely majority are from the same ethnic groups.

R: Can you tell me the social and the economic conditions of the people that are seen by the facility?

I: In fact with the social because they are small community is like they are one big family, they know each other so they help each other in everything. From funerals, whatever festivals and those things, marriage ceremonies and whatever you see them all coming together to help. But you know they have their own challenges because the facilities many issues such as water problem. Even in the department at times you will not get water flowing and that doesn't help, especially when using dark room processing. Because when there is no water, the chemicals become contaminated, you know they contaminate each other because there is no water to rinse the developer before putting it into the fixer. When this happens you can't do much. Then electricity too at times isn't available throughout and this communities don't have generators to support to sort of have a somewhat stable power supply within the hospitals, so when there is power outage no work. These issues amongst others makes the economic condition not so good.

R: Oh okay, so in general rating the economic conditions of the people would you say averagely they are medium income or poor ?

I: They are poor, poor farmers mostly because in these communities apart from the hospital and then maybe basic schools that are available you don't find any actual public job or institution there okay? So say about 90% are doing peasant farming and how much do they get? We are all farmers, we produce plantain or whatever and your neighbour also produces the same thing so even getting market is a challenge. So usually people travelling along the road to the cities patronize such produce. That is if you are fortunate, they buy your items and then you can get some money. Other than that, all of us have farms so going to buy someone's food item is rare so that is the issue, most are poor.

R: Can you tell me the state of work force within rural practice, generally ?

I: Yea the workforce I think is the same across board, not many healthcare professionals are available. You have relatively many nurses than the other professional groups, at times just one doctor and the auxiliary staffs and that is it. So the workforce isn't that large within the rural setting.

R: Can you tell me the average number of radiographers, radiologists at a given facility using yours as an example?

I: Radiologist is nil and with radiographers is usually just one that's why we call it one man station; that is one radiographer being posted there. Management argues that you can't have two because workload isn't much, and that there are times the whole day only four cases are done in certain areas. Some of the days you have about ten or so cases, so why do you need two radiographers? That is the thinking of the system but even if its four or ten, the place is not busy at least there should be two people so when one is on leave there will be somebody at post at all times. Because each day there are cases even if it is just one, there should be somebody present to attend to the patient. So before you realise you are working throughout your life time in the rural place without going on any leave.

R: Can you tell me the state of equipment in the rural setting?

I: Usually there are this basic X-ray equipment, what I was using there was the military equipment called PICA and later they brought what we call TURD D37 okay?, which does only basic functions or basic things, just conventional X-rays. There are no specialised equipment such as fluoroscopy, CT or MRI.

R: Can you tell me about IT connectivity related issues within the rural setting?

I: All I can say is totally nil.

R: There is no internet available?

I: No, no there was nothing like that, even ermmm!! mobile phone networks were very poor, so communications were very bad and landlines were not so efficient either.

R: Okay, you've mention about lots of challenges and I mean giving me a whole new experience, I mean telling me its quiet interesting and looks like I'm experiencing it myself, can you tell me what makes you remain in your role at the time?

I: Yea, its service to mankind because that is me, the fact that is a rural place doesn't mean they don't deserve better service, you know service to mankind, okay, so I will just put it simply like that because I have parents who are in the rural areas who need to be attended to in the same way when they are sick okay? so offering my service to rural communities is a joy despite its attendant challenges.

R: Okay so I want to know at what point did you consider to move to urban center?

I: Yea, when I decided that no enough is enough, I have to upgrade myself, I needed to go for further studies. And so I started planning to leave the rural area. I then had to go to Accra, complain to my bosses those who can influence my transfer from the rural area to the urban area okay?, Because I have done my part having serve the rural areas for about 4years and that was enough, so somebody else too should be sent there so that I can also have the opportunity that lies ahead for a radiographer. Fortunately when I did that, I got the transfer and went to urban area. I had scholarship to do this further studies at a university in South Africa.

R: So would you say that it was good you left rural practice?

I: Yea, it was good I left there because so many things go on in the urban areas that we do not even get to hear about. We don't know about it okay?, that is one big challenge, so many things you don't hear, because there was no telephone system there for you to even call your colleagues somewhere else for you to get to know what is happening. So it was as if we were shut out totally, we were in darkness.

R: Okay, you've told me about your personal experience and all that. But I want you to tell me since you are very experienced radiographer of over 20years, I want you to tell me what you consider to be the pull or push factors, reasons why people do not remain in rural practice or reasons why they want to leave rural practice?

I: I think is the same reasons that I told you, you know at times you go to a place though they have hospitals with X-ray facility but the community or the area has water problems; that is they barely have boreholes or normal pipe borne water. Electricity is also another problem and then no entertainment and if you don't take care you end up in drinking bars okay! You end up joining friends and you will be a drunkard or alcoholic because that was the only thing that could make you happy. You can't remain indoors after work always, you need to go out so that was a big challenge and that was why some radiographers don't want to go to the rural areas. Because once you are posted there is like you are forgotten, they need to attend a program, an important program I mean in terms of professional programs you are not released to go. Meanwhile the rule is that when there is workshop or anything of a sort, your managers must sponsor you. But the reality is that you don't get that sponsorship, you send the letter and if you are even fortunate to get the letter regarding a program and you submit it for approval, you don't even get the approval. You see?, so when that happens you become frustrated and plan to leave. Even those in urban areas are aware of these challenges so they don't want to accept rural posting, that is why up to now there are still places lying empty without radiographers because treatment there at times is not nice.

R: Can you tell me what your official scope of practice was at registration at the time?

I: My scope of practice ?

R: Your official scope of practice as a radiographer in Ghana at registration?

I: At registration the scope of practice where basically on what we were trained on okay?, So we were doing basic X-ray examinations. Before being posted to a rural facility, where we trained or had our clinical training, you know we were exposed to so many other procedures which in the rural area we don't get to see even if you stay there for over 100years you will never see it. It is difficult stating specifically what our official scope of practice is as radiographers.

R: But I want to know is there any official scope of practice for radiographers in Ghana?

I: Officially, there is no documented scope of practice in Ghana, but what we rely on is what we see in the UK okay?, their scope of practice which seem to bind us because they colonised us and they started this training. But as to official document at that time during that practice there wasn't anything like that and even now though we've developed to some level, even at the ministry of health you can't find anything like that or Ghana health service you can't find anything like that. But we in the practice know

our scope, that this is what we are suppose to do, this is not what we are supposed to do based on our training. More like job description kind of thing. But as a nation or a country, there isn't a laid down scope backed by law. There is simply no official scope of practice that if you go outside of that scope you may be checked and/or in case you err you can be penalized. But within the professional context as professionals, we know that this is our scope so we operate within that. As I said based on what we were taught during our training.

R: Okay alright, so can you tell me at the time your job description as you indicated I want you to be explicit about what you did as a rural radiographer, the job description; when you where given the offer you were expected to do certain tasks could you share that with me?

I: Yea, basic task or job description is providing basic X-ray to the community okay?, so it was basically axial and appendicular skeleton cases that we were doing. Beside that we in the hospital you could be assigned either to ermmm maybe a committee or something of that sort to help but then within the practice itself it's just the basic conventional X-ray that we are suppose to do. So you go to work and make sure your everything is set, that is you prepare the place ready for the day's cases.

R: Oh okay, So as you mentioned about joining committee means that there are other tasks that you are involved in, can you tell me what your actual roles and tasks are in terms of what you are expected to do based on your job description. You clearly indicated that you end up doing more than you are supposed to do on paper, can you tell me some of those things?

I: Some of them, one particular is being a member of a welfare committee, that sees to the welfare of the entire staff of the hospital that is one, and then once in a while you may be called upon to assist in something else okay? to sit in cases such as disciplinary committee and the likes. You also end up providing comments for radiographs that you produce.

R: In our conversation you made mention of the fact that as a rural radiographer sometimes the clinicians over there are inexperience in terms of radiology so they rely much on you, can you tell me one or two things that you do in terms of that ?

I: Yea, I have several experiences, there was one particular doctor who always comes to me in the room, he will leave the consulting room with an X-ray that is done and come and tell me "my friend so what do you think is wrong with this patient"? so we get to discuss the image. And then there was another case that the patient slipped on a staircase so he couldn't walk well, a female patient. The doctor asked for X-ray of the ankle it was done, he wrote the usual AP-LAT as you know. It was done and the patient went but you could see an oblique fracture but it's like a shadow; some dark line there. The doctor said it wasn't a fracture so she should just go and apply liniment on it or ointment on it, so looking at the way the woman was walking you know there could be more to it than what was initially diagnosed. At times some of these doctors are difficult. I saw that it was a fracture and the patient fortunately came back to me and said the doctor said she should go and do this and that but walking is difficult, so I went to the doctor, she was a female doctor. I told her that there is a fracture on that

image, she said no and that it was not a fracture but just an artifact. But I insisted there is no artifact on it, artifact from where? is it chemical artifact or what?, nothing of that sort, this line oblique thing you see is a fracture and then I remembered I should add this mortis view okay? for her so I called the patient and added that and the fracture was opened and properly revealed on that view. Then the doctor came to agree with me that she is sorry and told me that “you see this are some of our challenges ooo, this X-rays or images at times we find it difficult interpret them” and I said that is why we are here, I came to tell you that this wasn’t an artifact but a fracture and I even blame myself that we’ve seen slip cases where we suspect injury to the ankle joint though if it is not requested we can add that view, the mortis view and lo and behold that demonstrated the fracture glaringly. These are some of the things in rural places, no radiologist or nobody to help them with image interpretation.

R: Alright, one last thing about what you do about the additional role you played in, I’m just thinking I want to find out when they want to get a comment from you, do you write the comments or you just give them verbal comments ?

I: No, we don’t write because you know we were not permitted even now we are not permitted but at least we were taken through some image pathology and pattern recognition, the red dot system and all that. So you raise a flag okay? It is just to show any issue on the image that could be fracture or a pathology. But at times when the disease or whatever it is, is obvious you will point it out. But some few of them you can, may be plural effusion, or pneumonia or something of that sort, coughs or tuberculosis as people will know it you can mention it to the referrer.

R: Alright, are you aware of any legal framework that binds rural practice?

I: There is none, I have never seen any rural policy or anything of that sort or issue of that sort guiding our practice, there is none.

R: Is there any professional framework for rural practice?

I: There is none.

R: I want to know if there is any framework about working with radiation protection in rural practice?

I: Well as for radiation protection it’s like what you asked me earlier, about scope of practice okay? Ermm!! there is no policy, or so far as I know there isn’t any document(s) from the ministry, from the hospital that talks about or that binds us on some of these things. And because of the training we had, we are aware that you need to provide radiation protection to yourself and then to the community that you serve. The only legislation that we knew or know of is that of the Ghana Atomic Energy Act okay? which covers some few areas of the radiography practice. The said act for the rural practice and the urban practice is the same, there is no difference. Our knowledge during the training or our knowledge in the practice is what we usually use in dealing with radiation protection issues. But you see, aside the Atomic Energy Act on radiation protection, at least there should be some regulations or policies from the ministry on this issue but there is nothing like that. If there were, we wouldn’t be having quarks in some of these rural places, because they have not been trained to effectively use

and/or handle radiation sources and equipment. But then the ministry looks on, which tells you that they seem not to be aware of the dangers of radiation or ionizing radiation.

R: Are you aware of any ethical framework that binds rural practice?

I: There is no specific ethical framework that binds rural practice okay? But you know, we operate under the general ethical practice under the Ghana Health Service or the Ministry of Health and then the general ethical practice binding each hospital and then your practice itself as a professional, that is what is available. But something specific for rural practice I have not come across anything of that sort.

R: And now can you tell me what you understand by an ideal rural radiography practice?

I: Well, ermm!!, to me ideal rural radiography practice should be a situation where radiography practice within rural area is seen just as what goes on in urban centres. You should not lack most things, rural caseloads are not so much okay, so you should have what you need to have to provide the needed services. But, unfortunately at times that is not the case. There should not be shortage of films, purchasing of chemicals ought to be done regularly and adequately. Because at that time we were not into digital facilities, there are challenges with manual processing due to lack of chemicals etc. So ideally a rural practice must have all that it takes for the practice to go on smoothly and also rural practice deserves better; at least one radiologist who could serve in the community close by in hospitals and also X-ray facilities. But if not all, most facilities do not have any radiologist, so cases are sent to far places for radiologist to report. We know they are not many in the country, but the rural folks also deserve better. They need a qualified person to report on images, because at times there are complains about try and error with diagnosis from some of these rural medical officers. That is images are interpreted as example pneumonia, or this or that and that can lead to wrong diagnosis and wrong treatment. So ideally everything must be in place to ensure effective service delivery and better patient management. Are you okay? Is it clear?

R: Yes, I'm okay, it's clear. Basically you mean to say that, ideally what you expect in urban practice is supposed to be in rural practice?

I: Yea, ideally yes. But, you can't get what is in urban area in rural because for instance special examinations, you don't expect that to be done in a rural facility where you don't have a radiologist. Because you will need a radiologist to be part of the procedure with specialized investigations. That should be the standard or the basic practice, to have everything so that we don't have challenges when we want to provide such services.

R: Okay, now I will like to know, did you have any formal education or training specific to rural radiography practice to prepare or support you in the rural radiography role?

I: We never had that, there wasn't anything like that.

R: Okay in your opinion does a radiographer coming to rural area need any special education training to prepare them for their role?

I: Yea, I think they need, because ermm though you've had your training but the community that you are going to serve there are things that you can face and how to even handle them, one example is what I gave to you earlier. People in the community can walk to you and complain that he/she is having a pain here or there, or "I'm having chest pains, can you take X-ray of my chest for me"? So these are some of the things, so when you are been sent there or during the training these things should be mentioned, these are some special or rare cases that comes to you, X-ray affected part, how do you handle such cases, you write back to the doctor or the person who referred, at times some of these cases you will be surprised they were coming from traditional medical practitioners, healers and the likes.

R: Oh okay

I: Oh yes!!, you can even ask the patients, some of them were even using ministry of health forms, how they got it no one knows. Then when you ask the patient which hospital they are coming from as that form is not from your hospital, and you attempt to know where they bring it from, they usually will say; "I went to see this man who said this and that, then when you try to probe further they will tell you it is not an hospital but a traditional practitioner, so you can see from the handwriting on the form as well as how it was requested and how it's been written. These are some of the challenges, though it is nice that these traditional medical practitioners most of whom are not well educated are realizing the importance of X-ray in managing such patients is positive. However, the danger of it is that basically these are cases that mostly come with fractures, they know that if they see the pictures may be they can align the bone well and apply their local things on it for healing to take place. But the way they write they are not by regulation require to request, so some of these things need to be addressed. If you are going to be working in the rural place you need to be educated on some of these things or train on some of these things, how to handle them and because you live with them at times when you refuse you can meet their wrath. This is very much of a problem for rural radiographers.

R: Okay, did you have any CPD opportunity, when you moved into rural practice?, with your 4years stay, did you have any CPD opportunity?

I: I never had any CPD opportunity, never!!, and even at that time it wasn't common, but I never had any.

R: But did you have an advance or extended practice opportunities as at that time?

I: what?

R: Extended practice, advance or extended practice

I: No? There was nothing of a sort.

R: There was no opportunity like that ?

I: No opportunity, you know at that time there wasn't many opportunities for rural radiographers, once you are posted there all you are expected to do is to take X-rays and that is it. But currently, most radiographers are going into ultrasound practice and other things. Some rural places now have ultrasound equipment, but in our time we

didn't have ultrasound for you to develop interest and even go to that extended role okay?, nothing like that.

R: Did you attend any course to enable you to develop any new skills since you were there as a rural radiographer?

I: Ermmm!! there few occasions that Ghana Atomic Energy once in a while organised radiation protection training workshop. I attended I think just two, and even with that I had the opportunity to attend because I had come to do something in the city, so I decided to remain and be part of the workshop or the program because when I go back I can't get the opportunity to attend.

R: And so since moving to the urban center have you attended any course for you to develop yourself?

I: Oh yes, a lot.

R: Can you give me an insight of where you were and where you are now?

I: Yea there are so many courses within the professional society because now you know the society is very strong so there have been several workshops, training days that we are taken through. An area like MRI, CT, and other things, so many other areas. I have gain a lot when I moved to the urban area and there are occasions that we have some international workshops organized within our country and so you are able to attend.

R: Okay, so professionally, you mentioned that you went to school, you had your degree opportunity in South Africa when you came to urban practice?

I: Yea, I did, I only got the opportunity when I returned to the city.

R: Since completion of that degree have you had an opportunity to extended your qualification ?

I: Yes, after my first degree I practiced for just two years. I finished in 2001 and I came back 2001 and 2003 I had another scholarship to do my masters degree at Cardiff University in Wales, so I was fortunate to have that opportunity.

R: Oh okay, and after that you came back to clinical practice?

I: When I came back, I came back in 2006, practiced for some few months and I joined the academia.

R: Okay

I: Yea, I joined the academia and since then I have remained in the academia.

I: After that, when I join the academia I had the opportunity to do my PhD as well.

R: Oh okay alright, so now you've moved from clinical practice to academia?

I: Yea, so from rural radiographer to urban radiographer to academic radiographer.

R: Oh okay, I guess I'm beginning to understand you well when mentioned earlier that your decision to move out of rural was a right one. And that if you had not decided to move out of rural radiography there is a tendency that you will still be there and when

you move there are so many opportunities, I now understand why you said that. Anyway, in your opinion how adequate is rural radiography education training for your professional development?

I: We don't even have it, we don't have any special rural radiography training, the training is just general, once you qualify and you are not fortunate you are sent to the rural place, so there isn't any special post qualification training, because you are going to a rural place or during your normal school training you were given special training on rural practice, there isn't anything like that. But, I think rural radiography education training will be good for a rural radiographers' professional development.

R: Okay, what are your view on rural radiographer been given the pre- requisite post graduate training to extend their role example, to report on radiographs, give intravenous injections and the likes?

I: Its very, very important that those in rural areas or rural radiography practice gain these competencies, because it helps the rural community and it helps the doctors who are there, particularly those who have challenges understanding some of these radiographs or images. These trainings permits us as radiographers to at least be professional in our service delivery. We don't have to prove to anyone or lie to ourselves about cases that we do not understand. Once you cannot explain or you cannot provide any clue as to what is happening to the patient to any doctor who approaches you for comments, you don't commit; as there are implications to your actions. These pre-requisite trainings offers the insight in handling such matters. We don't lie or say things that are not right, you just advice that, if possible the hospital should take this to where there is a radiologist for interpretations but once you have given this basic image interpretation and deeper pattern recognition things I think it will help to some point.

R: Okay, I will like you to tell me more about it, what training is needed, how might they be supported and prepared for this in the future?

I: You want to know?

R: Yes

I: The question again?

R: You made mention of the fact that rural radiographers being given pre-requisite post graduate training to extend their roles is very important, now I want you to tell me more about it, particularly what training do you think they need, how might they be supported and how might they be prepared for this role?

I: Well things are changing okay, we are now moving from this darkroom system to digital system and so on, so if you don't provide this training for rural radiographers and they are there and management comes to install a new digital equipment, then the equipment will not last without these forms of training. The training is also important because with this kind of equipment which is coming in, it can do so many other things okay?, you just look at even in the urban areas CT and MRI because the radiographers operating are not given once in a while some E-service training the capacity of the equipment, things that it can do, you see that we just use it for just some of the practice

okay?, MRI can do a lot but are we using it for that or we are under using it?, CT also can do a lot are we using it for that?, the same thing applies to rural training, that is the more reason why they need training, there should be systems in place where once in a while these guys are brought together and trained in the advances which are taking place within the profession, the way we use to do things are changing so they should also know. Once they are provided with all the needed training based on the equipment available within the rural setting that they may be posted, it means they have been prepared adequately for the task ahead. There may be regular in-service training for them as well to support them. Once their practice is extended they could be monitored in for example the reports that they produce from time to time.

R: Okay, what are your views on how extended practice such as the radiograph interpretation as you mentioned can best be regulated and control within rural areas in Ghana.

I: That is what I am saying that the training must take care of that so that we become true to ourselves, so that you will not go and portray yourself as the radiologist, go and write things that you are not supposed to write or say things that you don't have to say about a patient clinical condition has been demonstrated on the radiograph which you know that you don't understand so there should be some kind of policy, and know your limit. The reporting practice for instance must be limited in my opinion. Say a radiographer could only be trained on reporting just chest X-rays or only appendicular images.

R: Okay, thank you, now can you tell me about your professional perception as a radiographer, about occupational health and safety within rural setting?

I: Yea, with the rural settings occupational health and safety issues are also challenging to some extent. There should be all the safety things like protective items such as the lead aprons and other things that ought to be in place. One thing about the rural setup is that some of these items are so old, it has outlived its usefulness, but getting the authorities to replace them is also a problem. So these are some of the things we have to look at and enforce that at least the rural radiographer also matters so the safety of that practitioner should also matter.

R: Can you briefly tell me about general health and safety for staffs is there anything like general health and safety for staffs?

I: Ermmm!!!, general health and safety issues is not really on point. From my little exposure regarding my training in other countries, comparatively, the way health and safety issues are handled in the hospitals is unfortunately not what we see even in the urban areas here in Ghana much more the rural places. In my opinion things are not taken very serious and workers are usually responsible to ensure that they make do with what is available in ensuring their own safety and that of other facility users. Within a small setup in my department for instance, I have to ensure my health and safety is in place. Yes there are some health and safety things in place but not adequate. Generally in the hospital once in a while fire safety for instance, I have never had fire safety training as a rural or urban radiographer as it is elsewhere, where once in a while you are brought together to have a mandatory training on fire safety as well as

other safety area concern. Even fire safety is something that is like we don't even think of it , until recently that you see fire extinguishers been put in some hospitals, at the departments, it was nil. Have you seen anybody doing cleaning on the floors with those safety precautions in place to alert the general public the place is wet? No!!!

R: Hmmm !!!

I: I have not seen that in a long while, when we are talking about health and safety issues all these are considered minor things. But these things thought of as trivial are rather very important. These things are not just been done because ermmm!! you know we are not legal minded kind of population taking the hospital or health personnel to court because he/she fails to do this or to do that to ensure the safety of the patient or even you as a staff, so it's like we leave it to God kind of mentality ["yen fa ma nyame"], that attitude.

R: Is there any health and safety protocols for patients in rural setting?

I: Not specific, I think the health and safety protocols that is there, are the same thing that we are told during training. Well, I really can't tell of any health and safety protocols for patients in rural setting.

R: Are you aware of any health and safety framework purposely for population considering dose creep issues in the rural settings?

I: No, I don't know if there is, I have not come across it.

R: Can you tell me about how maintenance checks are carried out on the imaging equipments?

I: That one is nil. Poor maintenance culture if you ask me.

R: There are no maintenance check, so what happens when the equipment breakdown?

I: You know we have X-ray maintenance in Accra which was located at Korle-Bu, now when there is a fault then you report through your administrators who will then report to them, then they will come and check for you, it was rare to see them come on their own to check on the equipment. If there is no breakdown they don't come okay? so the equipment or the machine keep deteriorating and at a point it will not work again and that's it. Most of the time that's how it is, I never saw any engineering team coming there to do anything, the periodic maintenance, there wasn't anything like that .

R: Can you tell me whether or not there is risk assessment carried out with respect to health and safety?

I: The only time that risk and safety was done is when this Atomic Energy people came around. They usually come around to check the exposure factors whether the machine is giving the right exposure factors and if it isn't they try to help in the calibration of these things. So I remember there was a case whereby my equipment for instance if you set 40kvp I thought I had set 40 but when these guys came with their meters it was indicating 80kvp, so the setting aspect has been compromised and you wouldn't know until they come. This was quite worrisome and disturbing to say the least.

R: Okay, so it means that the focus was mainly on radiation hazards, what about the other hazards may be risk assessment on say fire hazards and the likes.

I: That is what I told you, there wasn't anything like that fire whatever hazards apart from the radiation risk that you as a trained professional put in place, there wasn't any training or meetings once in a while within the hospital maybe somebody from fire service to come and take you through how to deal with fire in case there is fire, how to or somebody from anywhere safety issues coming there to train you or to talk to you about safety, no if it was happening elsewhere I don't know but at the place where I was I never experienced anything like that.

R: Can you tell me radiation safety equipment that are available in your facility as at that time?

I: Apart from the radiation safety devices like lead aprons there wasn't anything.

R: How often are checks done on the radiation equipment such as the lead aprons you mention?

I: It wasn't checked, I never saw that, apart from you yourself who know how the lead apron is supposed to be and complain that you know your lead apron need to be changed, there isn't or wasn't any official team, health and safety team coming there to check these things, it doesn't happen.

R: Is quiet interesting the revelation you are giving me, we are almost done we are just left with about one or two issues to tackle. Are there general specific challenges and barriers within rural setting that you can let me know?

I: The things that I have just told you are all barriers or shortcomings and challenges that we face, so ermmm !!! that means rural practice at times isn't comfortable.

R: Can you tell me your individual challenges in rural radiography practice?

I: Individual challenges like what? because I have mentioned some of the challenges I don't think is different, you know you want something and it gets difficult to get, example like equipment breakdown and want it to be fixed or serviced promptly. It is always difficult getting the engineers to come and do the servicing or at times nothing is done at all. So the equipment remains there for a long while, meaning you also become literally waste as you will just be there without doing anything. Also, the community itself as I said has electricity and water problems. And here is recreational facility that you can go there and entertain yourself, and if you don't take care you will become an alcoholic or join a bad company or group. You know what they say, the devil finds work for the idle.

R: Can you describe the impact of these challenges on your practice, all the challenges you mentioned?

I: Yea, it has serious impact, the impact is that it doesn't make you feel like professional you want to be and it also discourages colleagues from going to the rural areas. There lots of problems or challenges that negatively affects the rural radiographers from giving out their best. But when we accept to practice in a rural area, we can bring these issues to light, research into it and suggest ways of dealing with these issues and then

try to help change the situation in the rural areas. But as it stands now is like when you are sent there you are forgotten. Therefore, many will refuse rural posting and there will continue to be shortage of rural radiographers if these issues are not resolved promptly.

R: Okay, can you suggest possible solutions that will help alleviate these barriers or challenges?

I: Yea, I think now that we have very strong professional society in place, the government's attention must be drawn to this, that's the only way. You can't get up as an individual to go and complain to the ministry, it should come from the professional body, those practicing in the rural areas must bring out their challenges because if you don't bring them for us to know or for the society to know to address them nothing will change, so the only way for our colleagues is to reach out to those in urban areas or the professional society to reach out to the rural folks to know what is happening there and then help address the situation. Those which is within our limit we should be able to solve them, for instance they are talking about or here I am talking about not getting access to CPD or basic in-service training and those things, at least we can inform these hospitals, the administrators that this is what we've seen or observed so from time to time these crop of guys or radiographers will be called for training either within the area or in the urban area so that they can improve on the services that they provide in the rural communities, I think this should be understandable to them. This is one major way we can improve on the rural practice.

R: I'm been motivated by what you've just said, the assertion you just made and that we should reach out and that the rural radiographers should also open up by giving their thoughts and then revealing their experiences, I'm been motivated because that forms the basis of my thesis and that is exactly what I'm doing, I'm very grateful for such motivation. Finally, I want you to tell me what three things you would suggest to improve rural radiography service here in Ghana?

I: Providing them with good equipments and its accessories, two; stable power supply. Three; continues professional training for rural practitioners.

R: Okay, are there factors or recommendations to be considered to develop a nationally recognised framework for rural radiography practice in Ghana?

I: I think looking at all that I have said, I have raised some issues that in the same way should serve as a recommendation, we look at the challenges and then make the recommendations but as at now there is no clear cut move to do this. If the government or the ministry or the profession has that plan I don't know yet, but its urgent that we have this, we should make some recommendations to the government or to the ministry to have special policy of rural practice.

R: Okay very well, anything else you will like to add about any future services within rural settings could be developed to know the needs of the people?

I: Yea, I think we shouldn't let just the rural setting erhhmm affect the decision to improve their practice because from my experience there are some cases that if the right equipment are in place, patients will not be referred to the cities, I'm not talking

about big facilities like maybe MRI or CT no!!, at least some basic fluoroscopic things should be in place. But at times too the reasons why we don't find these types of equipment in this hospital is because we don't have specialist within the hospitals, because some of these examinations must be referred or requested by a specialist not just a general practitioner and because most of this rural hospitals have general practitioners but they should also improved so that gradually cases that leave the rural places to the urban places should be reduced so we looking at it from the imaging point of view alone because it's a chain reaction kind of thing, if there is a specialist then there should be this, if there is that then there should be that, so that is the only way we can move forward in rural practice.

R: Okay thank you very much for your time, I'm indeed grateful, you've actually I mean unveil experiences and practices of rural radiographers in Ghana and I am really much glad I spoke to you. I'm also very grateful that you granted this interview, thank you so much for your time.

I: Thank you too, so in case you need any clarification anytime, any day just call upon me for any further discussion.

R: Okay, I'm very grateful, thank you very much.

I: Thank you

Appendix K - Sample thematic analysis of a transcript

Data Item	Codes	Sub-themes	Themes
I was posted to Saltpond government hospital here in the central region and have been working here since. That is where I'm currently stationed.	Postings	Employment	Rural radiography practice
No please, not at all. Right after school I was posted here and I had to come.	Compulsory	National service/permanent postings	Rural radiography practice
I do not know anything about rural radiography. What I know was the general radiography taught in school; which involved working in theatre, wards, accident centre etc.	Unfamiliarity	Knowledge about rural radiography	Rural radiography practice

<p>I have been here since 2003, so say about 17 years.</p> <p>Well ! there was no attraction sincerely. I was just posted here; at the time you had no choice. I did not specifically choose to practice here in the rural setting but I was posted here after I completed and qualified as a radiographer.</p> <p>No, it was just professional reasons that brought me here, was not personal at all.</p> <p>But what can you do, just stay, work and get use to the system. So, I am use to it now.</p>	<p>Years</p> <p>Attraction</p> <p>Professional</p> <p>Coping</p>	<p>Working experience</p> <p>Compulsory posting</p> <p>Professional status</p> <p>Adaption to environment</p>	<p>Rural radiography practice</p> <p>Motivation for rural practice</p> <p>Attraction to rural practice</p> <p>Motivation for rural practice</p>
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<p>Afterall I have been here literally all my life.</p>	<p>Experience</p>	<p>Professional limitation</p>	
<p>Hmmm!! Living here, and working here. Okay, professionally I would say radiography practice is very limited.</p>	<p>Lifestyle</p>	<p>Cost of living</p>	<p>Rural radiography experience</p>
<p>But in terms of lifestyles, I would suggest that preferably things are very moderate as compared to the big cities. It is expensive living and working in urban centres than here in rural centres. But overall lifestyle here is quite interesting.</p>	<p>Limitations</p>	<p>Shortage of professionals</p>	<p>Experiences in rural practice</p>
<p>Limited in every sense. With respect to human resource and</p>			

<p>whatever limitation you can think about. People do not want to come and work here.</p>	Practice	Professional limitations	Challenges to effective rural radiography practice
<p>We are limited in the sense that; we do not do a wide range of radiographic investigation. We are limited in our practice. We just perform plain x rays and basically that's all.</p>	Equipment	Obsolete equipment	Challenges to effective rural radiography practice
<p>Our equipment is not state of the art. We are far from that.</p> <p>It was just recently that some rural centres started receiving a lift up of their department in terms of moving from wet processing to day light processing of films.</p>	Improvement	Service improvements	<p>Challenges to effective rural radiography practice</p> <p>Rural radiography practice</p>

<p>Here you have more time to yourself because workload is not usually huge compared to the big cities. So, you may describe here as a stress-free environment; so, working in this environment isn't that stressful for some of us. We work as radiographers and also get extra time to ourselves to do other businesses.</p> <p>Well, what I like about living here in the rural community is basically what I just mentioned; you know the living cost is moderate, you don't spend that much and we have a very stress-</p>	<p>Workload</p> <p>Extra time</p> <p>Economical</p>	<p>Less workload</p> <p>Other business ventures</p> <p>Low living cost</p>	<p>Experiences in rural practice</p> <p>Experiences in rural practice</p>
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<p>free environment, no traffic as compared to living in the big city and life in general is relatively calm in this part of the country. However, what I don't like about rural practice is that just as I have said earlier is that fact that our practice is limited in scope and have equipment constraints. If my equipment breaks today, it will take several days if not weeks before and engineer comes to fix it. I guess you know why? Hmmm, because the engineer has to come from Accra. So, any breakdown means work has to halt till the engineer arrives. This</p>	<p>Calmness</p> <p>Practice</p> <p>Breakdown</p> <p>Displeasing</p>	<p>Stress-free environment</p> <p>Limited scope of practice</p> <p>Equipment maintenance culture</p> <p>Job dissatisfaction</p>	<p>Experiences in rural practice</p> <p>Experiences in rural practice</p> <p>Rural radiography practice</p> <p>Rural radiography practice</p>
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<p>makes practice of radiography here not exciting. The system in place is also not motivating enough to attract others who may have fresh and better ideas to come in to help us in the rural radiography practice. Almost all the young graduates are centered in the big cities.</p> <p>Well, it creates an unpleasant environment for us as we have to turn down radiological requests which affects our patients who need our services the most. Most patients get stranded and their conditions gets worsened as some may not have the</p>	<p>Graduates</p> <p>Unpleasant</p> <p>Conditions</p>	<p>Shortage of professionals</p> <p>Quality of service</p> <p>Impact to patient outcome</p>	<p>Rural radiography practice</p> <p>Challenges to effective rural radiography practice</p> <p>Challenges to effective rural radiography practice</p>
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<p>financial means to travel long distances from the rural area to the urban centres to get an X-ray service. We mostly refer very simple cases to the urban facilities.</p> <p>professionally you feel dissatisfied because you become totally useless in helping your patients when the machine breaks down.</p> <p>The experience is thought provoking I should say. There is some kind of mixed feelings when you really want to talk about the practice of rural radiography here in this part of the country. It is interesting as I said, but the thought of the fact</p>	<p>Referral</p> <p>Dissatisfaction</p> <p>Experience</p> <p>Regrettable</p>	<p>Quality of service</p> <p>Job satisfaction</p> <p>Mixed feelings</p> <p>Limited practice</p>	<p>Challenges to effective rural radiography practice</p> <p>Challenges to effective rural radiography practice</p> <p>Challenges to effective rural radiography practice</p> <p>Challenges to effective rural radiography practice</p> <p>Challenges to effective rural radiography practice</p>
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<p>hospital or other private facilities in the urban centre. Apart from that cost of living is okay and life is simple here.</p>	Lone-radiographer	Autonomy of practice	
<p>Well, when I was posted here, I thought rural practice was going to give me exposure to a lot of cases and build my experience and confidence in working alone which I may not easily gather if I was in the big city.</p>	Opportunity	Expectant to unlimited practice	Challenges to effective rural radiography practice
<p>I thought I would get the opportunity to work with all the equipment I had worked with during clinicals in Korle bu teaching hospital in Accra. Upon reaching here, I realised it was just a</p>	Different	Different work setting	Motivation to rural radiography practice

<p>conventional x ray machine with darkroom processing. Things were really different from what I expected.</p>	<p>Opportunity</p>	<p>Autonomy to practice</p>	<p>Motivation to rural radiography practice</p>
<p>But, I felt okay because I was able to perform cases alone which my senior colleagues in Accra would have done as most complex cases I just had to observe. But rural practice gave me opportunity to do them personally.</p>	<p>Hopeful</p>	<p>Unlimited practice</p>	<p>Motivation to rural radiography practice</p>
<p>As I said I expected to see things as I had seen in Accra</p>	<p>Posting</p>	<p>Compulsory postings</p>	<p>Motivation to rural radiography practice</p>
<p>No, it wasn't realised at all. But like I said I had no other option as I was posted here</p>	<p>Diagnosis</p>	<p>Job description</p>	<p>Motivation to rural radiography practice</p>

<p>so I needed to stay. And I did for all these years. You know I have gotten used to things around here.</p> <p>Okay, as a radiographer I am expected to assist in diagnosis of patients to aid better management of their condition. Due to lack of radiologist to report on radiographs that I produce, most clinicians within rural practice are also not very experienced. Most of them are either nurses or physician assistants so they almost had always sought my view about the</p>	<p>Reporting</p> <p>Radiographic comments</p> <p>Radiographic opinion</p>	<p>Inexperienced clinicians</p> <p>Second opinion</p> <p>Request for report</p>	<p>Motivation to rural radiography practice</p> <p>Rural Radiography Practice</p> <p>Rural Radiography Practice</p>
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<p>radiographs. Most of the x-ray referrers come to me to seek my thoughts about the images. Say with chest x-ray, there are usually follow ups for me to either describe or comment on any pathology that may be present on the radiograph. They ask whether it is normal, abnormal or there is something in there. So, I play my role as a radiographer and also have to play the role as a reporting radiographer. All that is to assist the clinician in achieve better patient outcome. So that is basically some of the roles I have to play here in the rural area.</p>	Reporting	Role extension	Rural Radiography Practice
	Clinician	Better patient outcome	
	Report	Verbal report	Rural Radiography Practice
	Red dot system	Written report/red dot	Rural Radiography Practice

<p>Most of the report that I give are verbal report when the clinician comes around. But, sometimes they require that I either point out an issue with a marker on the radiograph like the Red Dot System or write a brief report for them.</p>	<p>Population</p>	<p>Population served</p>	<p>Rural Radiography Practice</p>
<p>This is a district hospital within the central region. This facility serves the population in Saltpond and its environs, so let's say basically we will be somewhere around the figure of twenty five (25,000) people in the community. Our clients are from different works of life, but</p>	<p>Fisher-folks</p>	<p>Economic status</p>	<p>Rural radiography practice</p>
<p></p>	<p>Poverty</p>	<p>Economic status</p>	<p>Rural radiography practice</p>

<p>we mostly have fisher-folks coming from the surrounding communities.</p> <p>Hmmmm I will say that majority are relatively poor.</p> <p>People coming from the neighboring communities are poor but few are average. But comparing the circumstances I will say they are poor. It is a fishing community, the town also has a major market centre in the Mfantsiman Municipality. Most of them are traders who sellm fish and other foodstuffs. There are some shops too around. The Ghana Commercial Bank has a branch in the</p>	<p>Workforce</p> <p>Shortage</p>	<p>Professional workforce</p> <p>Shortage of professionals</p>	<p>Rural radiography practice</p> <p>Rural radiography practice</p>
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<p>and for radiographers in the regional hospital may have between three (3) and five (5). But the teaching hospital will have more because they have various equipment and a radiologist present.</p> <p>Very poor, most of the equipment that we use were installed over three decades ago. But somewhere five years ago DR machines were introduced across many district facilities by the government. But generally, equipment found in rural practice are not advanced</p>	<p>DR machines</p> <p>Advanced</p> <p>Problem</p> <p>Improvement/Internet</p>	<p>Facility improvement</p> <p>State of equipment</p> <p>IT connectivity issues</p> <p>DR system installation</p>	<p>Rural radiography practice</p> <p>Rural radiography practice</p> <p>Rural radiography practice</p>
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<p>enough, they are just old cargo.</p> <p>IT connectivity issues have always been a problem here. More recently, with the installation of the DR system, most facilities are attempting to install and improve upon the internet services but it could be better.</p>	<p>Internet</p>	<p>Internet services</p>	<p>Rural radiography practice</p> <p>Rural radiography practice</p>
<p>Like I said, internet services have always been our problem in these areas. We have always depended on our mobile phone internet connectivity service.</p>	<p>Transfer</p>	<p>PACS system</p>	<p>Rural radiography practice</p>
<p>Management attempted to install some wireless service but it is not always functional</p>	<p>Images</p>	<p>Manual transfer of radiographs</p>	

<p>as there are issues with data. I had always wanted to transfer x-rays to other facilities in the urban centre for our images to be reported but internet has been a major barrier. So, images that needs reporting are manually sent by being carried along by either patients or their relatives.</p> <p>I have always considered the services that I render to the people of this community. I feel like leaving often times but I get motivated to stay because I feel my contribution to the health and wellbeing of the people is assuring enough. It is</p>	<p>Services</p> <p>Motivated</p> <p>Leaving</p>	<p>Professional status/altruism</p> <p>Professionalism of radiographer</p> <p>Family and business influence</p>	<p>Rural radiography practice</p> <p>Rural radiography practice</p> <p>Rural radiography practice</p>
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<p>difficult but again I have lived here for all these years and have started business and family here too. So, leaving gets difficult. But overall, helping the people is my only motivation else I could have already moved from this place long time before now.</p>	<p>Frustrations</p> <p>Breakdown</p> <p>Demoralised</p>	<p>Hospital management issues</p> <p>Equipment Frustrations</p> <p>Academic isolation</p>	<p>Rural radiography practice</p> <p>Motivation for rural radiography practice</p>
<p>It comes to mind often especially when hospital management frustrations get too much.</p> <p>I get frustrated when there is frequent breakdown of machine which are not readily repaired, I also get demoralised as most of my school year mates are</p>	<p>Replacement</p> <p>Change</p>	<p>Push/pull factors</p> <p>Change of environment</p>	<p>Motivation to rural radiography practice</p>

<p>now either pursuing their masters or PhD.</p>	Upgrade	Professional development	Rural radiography practice
<p>Yes, I will. Hmmmm, I will move once I have a replacement.</p>	Salary/increment	Incentives and allowances	Rural radiography practice
<p>Hmmm, the pull and push factors; perhaps I need a change of environment. I need to upgrade myself also. I need systems that are working, better equipment</p>	License	License to practice	Impact of rural radiography challenges
<p>functionality, motivated human resource etc. I think salary increment and other incentives are all to be considered. These are the pull and push factors in my opinion</p>	Practice	Scope of practice	Rural radiography practice

<p>Yes, there is a body that we register with and have to renew our license to practice annually.</p>	<p>Radiographic</p>	<p>Job description</p>	<p>Impact of rural radiography challenges</p>
<p>I don't think we have any official scope of practice for radiographers apart from what we are required to do. That is our job description as radiographers.</p>	<p>Reporting</p>	<p>Role extension</p>	<p>Education and training</p> <p>Motivation for rural radiography practice</p>
<p>Perform radiographic examinations on patients to produce diagnosable radiographs to aid effective treatment and management of the patients</p>	<p>Reporting</p>	<p>Role extension</p>	<p>Rural radiography practice</p>
<p>Basically, like I said, I go beyond my job description</p>			

<p>as I have to report or give comments on some of the radiographs that I produce. So yeah, I always do more than what is expected of me.</p> <p>So like I said, reporting, is not part of my job description, so what I have added to my job description is to assist in commenting on radiographs. I also perform ultrasound which is an extended role and also perform secretarial and administrative tasks as I am a lone radiographer in my unit.</p> <p>It was mainly on the job training, but there was</p>	<p>Ultrasound</p> <p>Lone-radiographer</p> <p>Training</p> <p>Certificate</p> <p>Scan</p>	<p>Extended Role</p> <p>Multi-task duties</p> <p>Role extension training</p> <p>Training Certification</p> <p>Legality of ultrasound practice</p>	<p>Rural radiography practice</p> <p>Rural radiography practice</p> <p>Rural radiography practice</p>
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<p>training essentially on ultrasound in the region to other radiographers too however we were all not provided with certificates.</p>	Practice	Legal framework	Rural radiography practice
<p>Oh yes, my reports are accepted by the facility. Even some smaller clinics nearby bring their clients for scans.</p>	Radiography	Professional framework	Rural radiography practice
<p>No, I'm not aware of any legal framework that binds rural practice.</p>	Radiation	Radiation protection framework	Rural radiography practice
<p>Not that I am aware of. At least I have been in rural practice for nearly two decades. If there is any professional framework for rural radiography</p>			Rural Radiography Practice

<p>practice I would have known. I don't think there is any.</p>	<p>Ethical</p>	<p>Ethical framework</p>	<p>Rural Radiography Practice</p>
<p>R: No, there isn't any framework about working with radiation in rural practice. All I do is to stick to the ALARA principle which we were taught way back in school and also do some equipment checks once in a while.</p>	<p>Ideal</p>	<p>Ideal rural radiography</p>	<p>Rural Radiography Practice</p>
<p>Ethical framework? No, I'm not aware of any. Work ethics taught in school are basically what I apply daily.</p>	<p>Training</p>	<p>Specific formal training</p>	<p>Rural Radiography Practice</p>
<p>My understanding of an ideal rural radiography is a practice that</p>			

<p>should have all the necessary radiologic equipment, internet connectivity, radiologist and be able to perform every needed radiologic investigation.</p>	<p>Comprehensive</p>	<p>Preparatory training and education</p>	<p>Rural Radiography Practice</p>
<p>No, I did not have any formal education or training specific to rural radiography to prepare me before coming here.</p>	<p>Prior Knowledge</p>	<p>Difficulty in coping</p>	<p></p>
<p>Yes, they will need comprehensive mentoring, tutoring and education about rural practice before they are posted.</p>	<p>Negativity</p>	<p>Rural practice neglect</p>	<p>Rural Radiography Practice</p>
<p>Yes, they will need comprehensive mentoring, tutoring and education about rural practice before they are posted.</p>	<p>Adjust</p>	<p>Mentoring and training</p>	<p>Rural Radiography Practice</p>
<p></p>	<p>Irregular</p>	<p>Lack of CPD</p>	<p>Rural Radiography Practice</p>

<p>Radiographers who are posted to rural areas without any prior knowledge ends up leaving the job soon when they arrive as they find the new life very difficult to adjust. Younger radiographers do not want to come to rural area due to lots of negative information that are sent out there. So when they get the right mentoring and training they should be able to adjust when they arrive.</p> <p>Yes, but not regularly. I had to stay for over five years when I first arrived without any opportunity for CPD. However, years after they started organizing</p>	<p>Organising</p> <p>Opportunities</p> <p>Training</p>	<p>Workshops and CPD</p> <p>Extended practice opportunity</p> <p>Radiation protection training</p>	<p>Education and training</p> <p>Education and training</p>
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<p>some for the region so I manage to attend what I can.</p>	Skill	Skill development	Rural Radiography Practice
<p>No advance or extended practice opportunities, apart from the ultrasound have that I had.</p>	Adequate	Professional development	Rural Radiography Practice
<p>No, I haven't had any professional training on radiation protection apart from the workshops that are organized by GSR.</p>	Knowledge/training	Rural practice information	Rural Radiography Practice
<p>No, aside the ultrasound training organized in the region. I haven't attended any course to develop new skills since becoming a rural radiographer.</p>	Efficient	Efficient training	Education and training Education and training

<p>In my opinion rural radiography education or training for my professional development would have been somewhat adequate. But, I wasn't given any training in rural radiography; in fact, I didn't know anything about rural radiography practice before being posted here.</p> <p>But I believe when one is trained efficiently, it will be adequate for his/her professional practice even in a rural centre.</p> <p>Yes it should; I think when I am given adequate rural radiography training that would</p>	<p>Development</p> <p>Radiologists</p> <p>Extended/ Postgraduate</p> <p>Commenting</p>	<p>Rural radiography training</p> <p>Radiologist shortage</p> <p>Extended/post graduate training</p> <p>Reporting radiographer roles</p>	<p>Rural Radiography Practice</p> <p>Education and training</p> <p>Education and training</p>
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<p>have been enough for my professional development as a rural radiographer.</p> <p>That would be brilliant and a laudable idea. You know there is shortage of radiologists in Ghana generally, so if we are given extended or post graduate training in report writing and also in performing special examinations it will improve our practice in the rural area. Some of us are already commenting on radiographs so when given the adequate training we can do far better and work satisfactorily.</p>	<p>Periodically</p> <p>Support</p> <p>Hands-on</p> <p>Training</p>	<p>Modes of training</p> <p>Support for training radiographers</p> <p>Hands-on training</p> <p>Reporting modules</p>	<p>Education and training</p> <p>Education and training</p> <p>Education and training</p> <p>Education and training</p>
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<p>I think the training should be done periodically, in order for the trainers to come around in person to train us within our clinical environment. I think radiographers can be supported by providing them internet connectivity to be able to study more online.</p>	<p>Reporting</p>	<p>Radiologist mentoring and monitoring</p>	<p>Rural radiography Practice</p>
<p>Okay, I think the radiographers would need hands-on training particularly with special examinations.</p>	<p>Regulate</p>	<p>Regulatory framework</p>	<p>Education and training</p>
<p>They should also be provided training on pattern recognition or image appreciation and</p>	<p>Control</p>	<p>License to practice</p>	<p>Rural radiography practice</p>

<p>radiographic pathology.</p> <p>With the reporting I think a radiologist must be attached to the department to mentor and monitor the progress of the radiographers who have gone through post graduate courses on reporting of radiographs.</p>	<p>Reporting</p>	<p>Validity of certificate of practice</p>	<p>Education and training</p>
<p>In order to regulate the activities of these</p>	<p>Neglect</p>	<p>OHS issues</p>	<p>Education and training</p>
<p>radiographers; I think a framework for a radiography practice in the rural area is needed. I think</p>	<p>Routine</p>	<p>Checks and test</p>	<p>Education and training</p>
<p>when that is established, radiographers can be controlled as they will require license to report</p>	<p>Leakages</p>	<p>Radiation Hazards</p>	<p>Education and training</p>

<p>only within a rural setting.</p> <p>They will be given certificate to practice reporting which would only be valid for a specific setting.</p> <p>This could be called rural radiography certificate for reporting. I think when it is controlled this way it will help.</p> <p>Occupational health and safety issues in my opinion has been neglected. It is poorly handled here. Those responsible to perform routine checks and mandatory test do not come as expected. So, we cannot tell whether or not there are</p>	<p>Checks</p> <p>Protocols</p> <p>Hazards</p> <p>Protocol</p>	<p>Personal checks</p> <p>Personal HS protocols</p> <p>Hazards prevention</p> <p>Specific patients' HS protocol</p>	<p>Education and training</p> <p>Policy and planning</p> <p>Rural radiography practice</p>
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<p>radiation leakages or if the equipment or doses that are given are optimum.</p> <p>I try to perform my own checks, in fact since coming here until machine breaks down that you bring in an engineer around, no one comes to check routinely as it's supposed to be. I personally have my own protocols in place for health and safety aside the use of lead aprons and shielding.</p> <p>Apart from that I ensure that there are no hazards which could cause me harm.</p> <p>There is no specific health and safety protocol in</p>	<p>Dose creep</p> <p>Maintenance</p> <p>Checks</p> <p>Risk</p>	<p>Population HS framework</p> <p>Periodic Checks</p> <p>Seldomly checked</p> <p>Risk assessment</p>	<p>Rural Radiography Practice</p> <p>Occupational health and safety</p> <p>Occupational health and safety</p> <p>Occupational health and safety</p>
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<p>the unit for patients apart from applying what was taught from school. That is the ALARA principle and also acquiring the LMP from every female patient of child-bearing age.</p>	<p>Hazard</p> <p>Equipment</p>	<p>Prevention of hazards</p> <p>Radiation safety equipment</p>	<p>Occupational health and safety</p>
<p>No, I am not aware of any health and safety framework purposefully for population considering those creep issues.</p>	<p>Light</p>	<p>Radiation warning light</p>	<p>Occupational health and safety</p>
<p>Well, maintenance checks are to be carried out every six months or so but I don't keep track of it because, like I said they hardly come around to do the checks.</p>	<p>Checks</p> <p>Lead aprons</p>	<p>Safety checks</p> <p>Maintenance culture</p>	<p>Occupational health and safety</p>

<p>No, there is no risk assessment carried out in my unit with respect to health and safety.</p>			Occupational health and safety
<p>I personally only ensure there is no obvious hazard that could harm me or any facility user.</p>	System	Challenging Systems	
<p>radiation safety equipment that are available in my facility is Lead aprons.</p>	Management	Management support	
<p>Not only lead aprons, there is also a radiation warning light.</p>	Upgrade	Professional development	Occupational health and safety
<p>We have never done any checks on the lead aprons for a very long time.</p>	Opportunity	Professional development opportunity	Occupational health and safety
<p>Well, I have informed</p>	Hope	Job dissatisfaction	

<p>management about the need to replace the lead aprons but to no avail. I think the lead apron have been changed just once since I came here.</p> <p>Well, I think I have mentioned some of the challenges earlier. But I think the generally the system within rural setting is very frustrating. Management is not supportive, you don't get the opportunity to upgrade yourself, you are always left behind in terms of professional development. Just imagine since graduating I have not had any opportunity to upgrade myself. All my juniors are</p>	<p>Motivation</p> <p>Barriers</p> <p>Problems</p> <p>Difficulty</p> <p>Denied</p>	<p>Value altruism</p> <p>Equipment issues</p> <p>Internet problems & Incentives issues</p> <p>Opportunity for personal development</p> <p>Management support</p>	<p>Occupational health and safety</p> <p>Occupational health and safety</p> <p>Occupational health and safety</p> <p>Occupational health and safety</p> <p>Occupational health and safety</p> <p>Occupational health and safety</p>
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<p>Masters and PhD holders. I had big hopes when I was brought here, but sincerely I lost hope. I will say my motivation is my service that I render to the people. I will say for God and country. As for the barriers they are many, there are equipment issues, internet problems, and no additional monetary incentive.</p> <p>Personally, I think difficulty in getting the needed opportunity for continuous professional development. It gets even more tougher when you want to upgrade.</p> <p>Since you are a lone radiographer you are mostly</p>	<p>Incentive</p> <p>Promise</p> <p>Disappointed</p> <p>Limitation</p>	<p>Issues of incentive</p> <p>Personal needs: accommodation, transport allowances etc</p> <p>Push/pull factors</p> <p>Job dissatisfaction</p>	<p>Occupational health and safety</p> <p>Occupational health and safety</p> <p>Rural radiography practice</p> <p>Rural radiography practice</p>
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<p>denied by management when you want a study leave. You are sometimes asked to get a replacement before they allow you to go.</p>	Techniques	Loss of skills	Education and training
<p>Yes, lack of incentive is one of the many major challenges,</p>	Attractive	Stakeholder involvement in management	Education and training
<p>I remember when I arrived several years ago. I was promised so many things. Accommodation, transport allowance and remunerations etc.</p>	Incentives	Attractive packages	Impact of challenges
<p>But it all ended up not being entirely true so it really got me disappointed and so I'd wanted to leave at the time. Leaving some of us regretting to</p>	Practice		Motivation for rural radiography practice Challenges in rural radiography practice Challenges in rural radiography practice

<p>accept the rural posting.</p> <p>There is job dissatisfaction as our practice is limited due to equipment limitations.</p> <p>I have almost forgotten most radiographic techniques that were taught in school as I have not performed these examinations in a very long while.</p> <p>Okay, all stakeholders in the management of healthcare services in Ghana have to make rural practice generally appealing and attractive to professionals in the urban areas. Salary increment,</p>	<p>Support</p> <p>Promotion</p> <p>Authorities</p> <p>Solutions</p>	<p>Advancement in practice</p> <p>Management support</p> <p>Promotion policy</p> <p>Employment/ Postings policy</p> <p>Addressing rural challenges</p>	<p>Challenges in rural radiography practice</p> <p>Education and training</p> <p>Challenges in rural radiography practice</p> <p>Challenges in rural radiography practice</p>
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<p>incentives, allowances, accommodation must be made available for radiographers who accept rural postings. Internet connectivity issues, state of the art equipment must be brought to rural practice. Management must support radiographers from upgrading, Study leave with pay must be granted to rural radiographer who works for at least 2 years. Promotion must be done faster as compared to the time taken for those in the cities. The authorities may even make rural radiography one of the first stages in every</p>	<p>Services</p> <p>Training</p> <p>Incentives</p> <p>Framework</p>	<p>Service improvement</p> <p>Service improvement</p> <p>Choice to practice</p> <p>National rural radiography framework</p>	<p>Impact of challenges</p> <p>Impact of challenges</p> <p>Impact of challenges</p>
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<p>radiographer's life like national service, so they have a feel of rural radiography practice before progressing.</p> <p>I think all the challenges identified could be considered in solving the issues.</p>	<p>Recommendations</p>		<p>Policy and planning</p> <p>Policy and planning</p>
<p>Three things that I will you suggest to improve rural radiography services here in Ghana are: Better imaging equipment,</p> <p>Provide adequate training on reporting as rural radiographers are already literally pushed to give comments or assist in imaging interpretation and finally incentives for choosing to</p>	<p>Framework/solutions</p> <p>Equipment</p> <p>Radiation</p>	<p>Rural radiographers' opinions</p> <p>Challenges informs solutions</p> <p>Equipment maintenance</p>	<p>Rural radiography practice</p> <p>Education and training</p>

<p>issues identified and it's solutions in order to factor it into the framework.</p> <p>Equipment maintenance policies for rural practice and radiation protection policies must be framed.</p> <p>Yes, the future rural radiography services should be ideal with expectations of patients been met. There should be an improved or upgraded services such as wet processing to day light processing, the use of digital and telemedicine been brought to rural settings with stable internet connections,</p>			<p>Policy and planning</p> <p>Policy and planning</p> <p>Policy and planning</p>
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<p>proper IT systems should be in place and specialize imaging equipment should be brought to rural centres.</p>			<p>Policy and planning</p> <p>Policy and planning</p> <p>Policy planning</p> <p>Rural radiography practice</p>
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			Rural radiography practice
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Appendix L - List and title of documents reviewed.

Document Type	Title	Date
Government Document (Ministry of Health)	Human Resource Policies and strategies For The Health Sector 2007 – 2011	September 2007
Government Document (Ministry of Health)	GHWO: Human Resources for Health Country Profile	2011
Act of parliament	Health professions regulatory bodies Act 857	2013
Official letter	TB Control Programme	23 rd November 2016
A Published web document	Commisceo Global Consultancy Ltd., 2017; Every Culture, 2018)"	2018
A Published research paper	Postings and transfers in the Ghanaian health system: a study of health workforce governance	2017

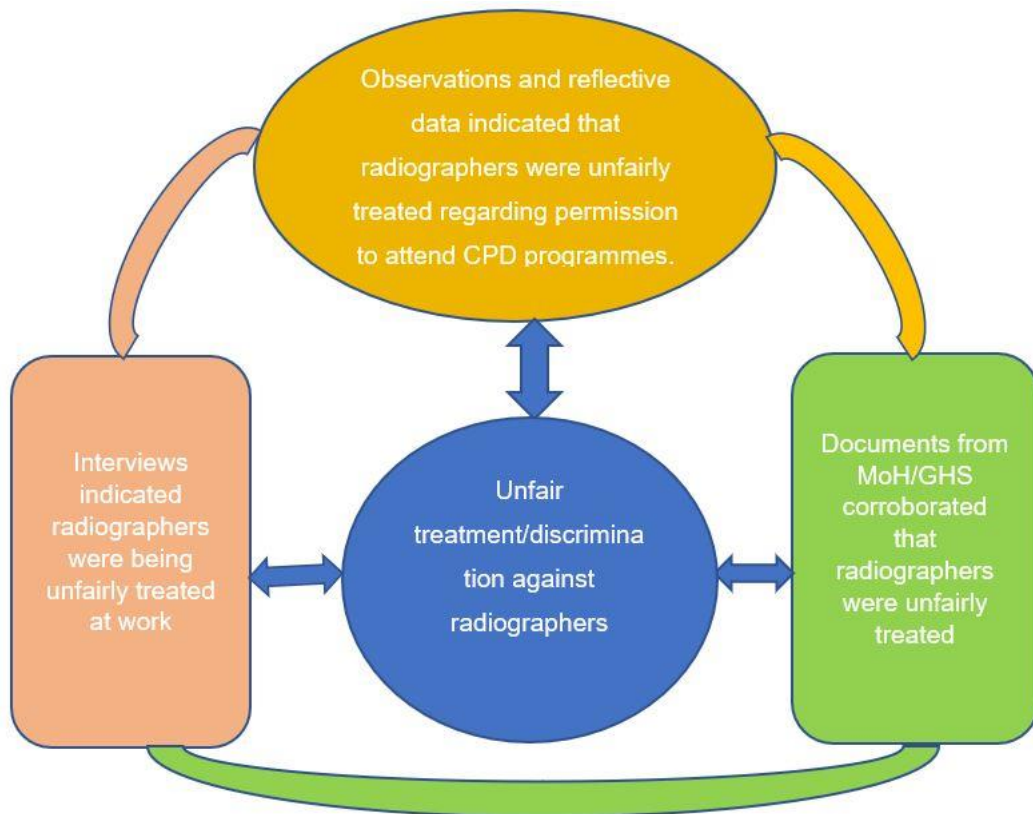
Official Letter	Lack of qualified radiographers to operate X-ray equipment under the 'Accelerated Tuberculosis case detection in Ghana project'	30th June, 2017
Official Letter	Alternative arrangement to address lack of qualified radiographers to operate X-ray equipment under accelerated Tuberculosis case detection in Ghana project	19th July, 2017
Official letter	Announcement: Warning Notice	21 st August 2017
Official letter	Resolution to the audience granted to the Ghana Society of Radiographers	29 th August 2017
Official Letter	RE: Alternative arrangement to address lack of qualified radiographers to operate X-ray equipment under accelerated Tuberculosis case	12th September, 2017

	detection in Ghana project	
Official Letter	Request of training of staff in X-ray	28 February, 2018
Official Letter	Invitation to a meeting to address shortage of radiographers	5th March, 2018
Official Letter	Attracting and retaining medical officers in Western Region	10th April, 2018
Official letter	Meeting on modalities to address shortage of radiographers for public health facilities	11 th April 2018
Official letter	Orio TB detection project	31 st July 2018
Published Document by Julia Hitchins	RAD-AID Country Report: Ghana	October 2018
	Demand Notice	

Official Letter	Joint position of GSMP and GSR on the implementation of the ORIO TB Case detection project	23 April 2019
Official Letter		3 rd May 2019

Appendix M - A Flow diagram of how triangulation of the data was done

An illustration of how triangulation of the data from various sources strengthened the case.



Triangulation involved cross referencing and evaluating data from the various sources for corroboration and/or disagreement/conflict. In this example, interviews indicated that radiographers unlike other healthcare professionals were not granted permission by management to attend CPD programmes. Thus, radiographers contended with discriminatory practices at work. This assertion was cross referenced and documents from the MoH/GHS corroborated the same. Also, after an informal interaction with some of the radiographers during the observational phase; the researcher's reflective data revealed that permission was granted to other professional group such as the medical officers by management to attend CPD programmes.

Appendix N – Methodological consideration for the study

Grounded Theory Approach

Grounded theory was the first to be considered; Grounded theory is a structured but flexible research method frequently used when little is known about a phenomenon with the principal goal of using empirical data in generating concepts and theories (Birks and Mills 2015; Bryant and Charmaz 2007). However, the focus of the current study was not to develop theories/hypotheses or invalidate existing theories even though grounded theory could be used to study human experiences where little or nothing is known about the situation or phenomena. Kennedy and Lingard (2006) indicated that data collection and analysis are frequently done concurrently and the analysis determines the next set of data collection. Similar to case study and ethnography, grounded theory adopts the use of multiple sources of data collections (interviews, observations and documentary review). The importance of starting a grounded theory with very limited previous knowledge and gathering data until there is saturation has been suggested by Strauss and Corbin (1998). They argued that the use of grounded theory is made very difficult if the researcher has prior knowledge of the area under study. The researcher in this case, already had substantial knowledge of the phenomena under study and had read a considerable amount of literature on the phenomenon. Therefore, the use of grounded theory for the current study was not suitable. Also, grounded theory was not deemed the method of choice as this study did seek to generate a theory from data. Besides, the researcher was also not in a position where he could return to geographical locations to collate additional data to develop emergent theory i.e. do theoretical sampling.

Phenomenology Approach

Studies have revealed that phenomenology emerged from philosophy around the late 19th century (Ploeg 1999; Morse and Field 1996; Anderson 1991). The purpose of the phenomenological approach according to Crotty (1996) is to specifically describe the “lived experiences” of people. Also, Crotty (1996) indicated that the purpose of studying experiences is to understand them by getting a grasp of their nature, their meaning and their essential structure. Thus, a phenomenological method will help uncover meaning and provide an interpretation of the meaning of human experiences in its situated context (Kafle 2011). However, it has been contended that like constructivism, phenomenology has a limitation of not laying much emphasis on the

social dimensions though present (Liu and Matthews 2005). This current study in the construction of knowledge, seeks to highlight the importance of the social dimensions, therefore phenomenology was not deemed the choice of method.

Ethnography Approach

Using ethnography exclusively for this study was however deemed not so appropriate considering the time frame of the study, as well as the nature of the area of inquiry. Researchers apply ethnography method to search for predictable patterns in the daily human experience (Angrosino 2007). This require researchers to immerse themselves into the daily activities or culture of the persons under investigation (Angrosino 2007). Thus, ethnography method would have required that the researcher visited research sites to observe how radiography practice was handled within the rural setting for an extended period of time (Holloway 2005). Besides, it has been indicated that ethnography adopts the use of multiple sources of data that are triangulated over a long period of time (Holloway 2005). The research process is inductive. It has been stipulated that ethnographic researches are typically conducted in the natural setting of the participants which is personalised as the researcher tends to become part of the group (both an observer and a participant). Holloway (2005) contends that ethnography researcher typically adopts an exploratory approach and remains flexible to data that emerges. The researcher sought to understand the practices and experiences of rural radiographers from the perspective of the participants and based on the above indications did not feel ethnography was the most realistic approach to use in this study. Social constructivism qualitative case study was arrived at as the appropriate qualitative approach for this current study because apart from its appropriateness, it has policy and practice implications which is needed to inform better patient management.

Studies Approach

The development and importance of case study methodology was influenced by a number of philosophers/methodologists (Thomas 2010). According to Baxter and Jack (2010), the definition of the case study approach was primarily highlighted as a scientific research by Stake (1988) who suggested case studies as intrinsic, instrumental, and collective. The case study methodology has generally been argued as a research approach that pays attention to getting knowledge/understanding of the existing dynamics found within a setting Eisenhardt (1989). Thus, Yin (1984) asserts

that case study researchers focus on either single or various cases, and some levels of analysis. Therefore, the case study approach, according to Taylor (2013) could be applicable in the exploration of multiple sources of data, within a real life (natural setting). The latter was supported by Yin (2017) who suggested that case study research thrives on 'multiple sources of evidence' such as interviews, observations and documentary review analysis. The case and/or cases under study could be explored or described by analysing the data gathered from these sources (Yin 2017). Additionally, it was stipulated that a case study approach could be used to exclusively explore service development or more commonly establish a present-day phenomenon in its natural context and also offers the freedom to gather data from multiple sources in order to answer the 'how' and 'why' questions (Crowe et al. 2011).

Case study approach is commonly used in several disciplines which includes but not limited to; healthcare, psychology, sociology, political sciences as well as some others. According to Obeng (2015), case studies first appeared around 1900 within the discipline of anthropology with the emergence of systematic investigations of other cultures captured in field studies. The focus at the time according to Obeng (2015) was "with participant observation being the predominant method of data collection" (Johansson 2003, p. 6). Frederic Le Play in 1829 first introduced the case study methodology into the social science (Le Play 2012; Healy 1947;). Going forward, Glaser and Strauss (1967), in their grounded theory research methodology, further advanced the use of case studies for the creation of new theory in social sciences.

Thomas (2011) suggested case study research as a progressively popular approach commonly used by many qualitative researchers. The importance of case study as a qualitative method has been suggested by Harrity (2013) that it is in its ability to examine, in-depth, a "case" within its "real life" context (Yin 2005, p. 380). Obeng (2015) alludes that there is an increased popularity of case study approaches across various disciplines as a result of contributions made by many prominent authors (Creswell 2013; Denzin and Lincoln 2011; Yin 2009; Merriam 2009; Stake, 1995; Ragin and Becker 1992).

Yin (2017) reiterated that case study involves an in-depth investigation of a present-day phenomenon within its natural setting, particularly in instances where there is no explicit evidence in the context between the boundaries and the phenomenon. Yet, the case study method has been suggested to provide an opportunity for an in-dept

and exhaustive study of a phenomenon within a setting and provides a pragmatic approach of enquiry (Yin 2003). However, Stake (1995) indicated that case study enables the researcher to gain an understanding on the boundaries of the case and the complex patterns within its bounded system. Baxter and Jack (2010) asserted that case studies are categorised in several diverse ways by many authors.

Three conditions that a researcher needs to consider in his/her quest to conduct a case study research according to Yin (2017) are; the form of research question asked, the command over and/or the control of real events by the researcher, and the ability to ascertain whether or not the phenomenon under investigation is contemporary or historical. It has been suggested that the research question(s) ought to be generally categorised as “who,” “what,” “why,” “where,” and “how” questions (Yin 2017; Thomas 2010). Baxter and Jack (2010) suggested that usually, research questions that emphasise on the “what” are of two types (the ones that are exploratory in nature and the ones that are in the “to what extent” line of questioning). By and large, it has been advised that case studies require the researcher not to influence and/or not to have total control over the actual or behavioural events in the study (Yin 2017). Consequently, it was imperative that the researcher of this current study did not have personal control over the actual or behavioural events as indicated above. Besides, the phenomenon under study is contemporary and not historical, therefore the researcher was convinced that the current study meets the three conditions set by Yin (2017) for case studies.

Appendix L - Extracts of articles appraised using CASP.

How the CASP appraisal tool was used: Three broad issues were considered when appraising each selected articles:

- Are the results of the study valid?
- What are the results?
- Will the results help locally?

Systematic evaluation of the selected articles were done to establish responses to the following:

1. Does this study address a clearly focused question?
2. Did the study use valid methods to address this question?
3. Are the valid results of this study important?
4. Are these valid, important results applicable to my patient or population?

If the answer to any of these questions is “no”, the researcher discontinued reading the rest of it.

CASP Checklist: Articles were appraised using CASP which involves asking some questions to help the researcher make sense of each selected article. This consist of asking answerable questions, i.e. putting the questions into a format that allowed the researcher to search the medical literature (article) for answers - which was accomplished by using the PICO tool, which breaks down the question into Population, Intervention, Comparison, and Outcome.

Patient/Population – Who or What?

Intervention – How?

Comparison – What is the main alternative? (If appropriate)

Outcome – What are you trying to accomplish, measure, improve, effect?

Table of extracts of articles appraised using CASP

Articles	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Author(s)	Was there a clear statement of the aims of the research?	Was the research design appropriate to address the aims of the research?	Was the recruitment strategy appropriate to the aims of the research?	Was the data collected in a way that addressed the research issue?	Has the relationship between researcher and participants been adequately considered?	Have ethical issues been taken into consideration?	Was the data analysis sufficiently rigorous?	Is there a clear statement of findings?	How valuable is the research?
Antwi 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Ashong et al (2016)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Wuni et al. (2021)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Wuni (2019)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Gawugah (2016)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Okeji et al. (2014)	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Valuable
Mung'omba and Botha (2017)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Kawooya (2012)	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Valuable
Edzie et al. (2020)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Agyei-Baffour et al. (2011)	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Valuable
Choudhary et al. (2018)	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable

Gupta et al. (2017)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Smith et al. (2009)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Smith and Jones (2007)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Abdulai et al. (2017)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Cheunkongkaew et al. (2016)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Prytherch et al. (2013)	Unclear	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Valuable
Shankar and Thapa (2012)	Not clearly stated	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Sulemana and Dinye (2014)	Yes	Yes	Unclear	Yes	Unclear	Yes	Yes	Yes	Valuable
Yaya et al. (2017)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Asamani et al. (2021)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Myklebust et al. (2019)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Valuable
Squibb et al. (2016)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Williams et al. (2020)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable
Tashobya et al. 2010	Not clearly stated	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Valuable
Ditlopo et al. (2014)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Valuable