



Radiographers' Role Extension in mammography in Kuwait

An investigation of radiographers' and radiologists' perceptions and attitudes towards extending the radiographers' role in mammography

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Dedication

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List of abbreviations

Accident and Emergency	A&E
Allied Health Sciences	AHS
American Society of Radiologic Technologists	ASRT
Breast cancer	BC
Computed tomography	CT
Data protection act	DPA
Diagnostic radiography	DR
Dual energy x-ray absorptiometry	DXA
Gastro-Intestinal	GI
Gulf Cooperation Council	GCC
Healthcare	HCARE
Intravenous Urography	IVU
Kingdom Saudi Arabia	KSA
Kuwait Cancer Control Centre	KCCC
Kuwait National Breast Screening Programme	KNBSP
Magnetic resonance imaging	MRI
Memorial Sloan Kettering Cancer Centre	MSKCC
Ministry of Health	MOH

Nation Health Service	NHS
National Health Service Breast Screening Program	NHSBSP
Nuclear Medicine	NM
Radiographer Abnormality Detection Schemes	RADS
Role advancement	RA
Role development	RD
Role extension	RE
Stereotactic needle core biopsy	SNCB
Ultrasound	US
United Arab Emirates	UAE
United Kingdom	UK
United states of America	USA

Abstract

Kuwait is faced with a shortage of radiologists, and particularly specialised mammography radiologists, resulting in increased workload which negatively affects the quality of the service, leading to longer waiting times for women in receiving full diagnostic investigations. This study was conducted to understand how radiographers and radiologists in Kuwait perceive radiographers' role extension (RE) in mammography, and whether this could be one strategy toward reducing radiologist workload and patient waiting times. Perceptions were examined under the lens of a theoretical framework; Abbotts' systems of profession theory and the concept of professional identity were adopted to underpin the results.

A single case study design was undertaken with multiple units: radiographers and radiologists, and multiple sites: government hospitals, screening clinics and specialist centres. Data included individual semi-structured interviews, documentary analysis and field notes. Participants were purposively selected to maximise variation and enhance the transferability of the results, covering all regions of the country.

The findings highlighted two main themes, firstly radiographers' RE in Kuwait, and activities of the extended role - this highlighted insufficient knowledge of the concept of RE, explored the current role of radiographers in mammography and areas of interest in extending their role. The second focused on an in-depth understanding of drivers and barriers to RE in mammography.

Evidence shows poor knowledge of the concept of extending radiographers' roles in Kuwait. Participants in both groups opposed radiographers performing extended tasks without radiologist supervision. Arguably, radiologists and radiographers' attitudes were influenced by the concept of professional identity and professional identity formation. Additionally, radiographers' insufficient knowledge negatively affected their readiness to be able to undertake RE in mammography. Moreover, radiologists seemed to refuse a blurring of boundaries in order to maintain and control the jurisdiction of their profession; as discussed in Abbott's theory, thus limiting any impact on workload or waiting times.

Chapter 1. Introduction

1.1. Introduction

This chapter discusses the rationale for the study and the gap in the literature which this research sought to fill. It also highlights the research questions and provides an overview of the study design. Finally, this chapter discusses the contribution to new knowledge, lays out the structure of this thesis and provides a summary of each chapter.

1.2. The rationale for the study

The number of breast cancer (BC) cases is increasing throughout the world (Missinne and Bracke 2015). However, the situation is particularly problematic in Kuwait, where cancers are becoming more aggressive; the disease is found in younger women, most notably with a late presentation (Ramadhan 2017). The current situation in clinical practice is that women in Kuwait may suffer long waiting times for diagnostic procedures and delays in receiving their breast screening reports. Such delays include breast biopsy appointments and breast ultrasound (US) exams, which may be due to the shortage of radiologists in Kuwait. Therefore, there is a pressing need to improve mammography services in Kuwait, in order to help with diagnosing and management of BC. Cowling (2008) highlighted that one way in which mammography services could be improved is by extending the role of radiographers, which has been done in other countries such as the United Kingdom (UK).

The UK, Australia and The United States of America (USA) have adopted role extension (RE) for radiographers. For instance, in the UK, radiographers are often permitted to perform clinical tasks that would traditionally be performed by radiologists, such as intravenous injections, fluoroscopic examinations and radiographic image reporting (Thom 2018). The role of radiographers in Kuwait is limited to taking images and adhering to the protocols of their department. Compared to the situation in the UK

where the radiographers' scope of practice has been extended and developed (Abuzaid et al. 2021; Cowling 2008; Ballani and Sukkar 2005).

Improving patient care is a priority for all healthcare providers to achieve patient satisfaction. To support the developing healthcare system and population growth in Kuwait, the Ministry of Health (MOH) relies on non-Kuwaiti health professionals because of the shortage of Kuwaiti nationals in the healthcare profession (Health System Profile 2006; Al-Tubaikh 2010). However, there is still a shortage of radiologists in radiology departments in Kuwait, despite recruitment from other countries. The shortage of radiologists negatively affects the quality of healthcare services and patient care as it leads to longer waiting lists for procedures and delays in undertaking reviews and issuing medical imaging reports (Field and Snaith 2013). In 1999 the National Health Service (NHS) in the UK proposed to educate radiographers to take on more responsibilities and to extend their role to enhance the service and overcome the shortage of radiologists (Howard 2013; Department of Health 2003). The main areas of common activities performed by radiographers in their extended role include:

1. Gastro-intestinal (GI) procedures, where radiographers perform barium enemas.
2. US, where radiographers use high-frequency sound waves to produce diagnostics images and write general reports.
3. Intravenous injection of contrast media in computed tomography (CT), nuclear medicine (NM) and intravenous urography (IVU).
4. Reporting of medical images in skeletal imaging, US, GI, NM and mammography.
5. Red dot schemes.

(Smith and Reeves 2010, p. 2-5)

This research aimed to fill the gap in the literature by investigating the attitudes of radiographers and radiologists in Kuwait towards the RE of radiographers in mammography. It has been argued that the shortage of radiologists means that only radiographers can offer immediate opinions in the radiology department (Mubuke and Pope 2015). In this thesis, the researcher explores the perceptions and attitudes of radiographers and radiologists towards radiographers' RE in mammography, for many reasons. The first is the high incidence of BC among women in Kuwait, and the need for

high-quality medical service to increase survival rates and improve the early detection of BC. However, the shortage of radiologists is negatively affecting mammography services and causes longer waiting lists for procedures and delays in mammographic reports. The second reason is the researcher's personal interest which extended from her MSc research on exploring the barriers to the uptake of BC screening among women in Kuwait. This led the researcher to explore mammography services in greater depth and the current scope of practice of radiographers in Kuwait. The third reason for conducting the current research is to understand the job satisfaction among radiographers in Kuwait, and whether extending their role will affect the level of satisfaction. Lastly, in Kuwait, and in the Ministry of Health (MOH) particularly, there is a huge dependency on the international workforce in the medical professions. Therefore, this research aimed to understand radiographers' and radiologists' perceptions towards radiographers' RE, as a step to reduce the reliance on the international workforce. The writing of this thesis coincided with the critical period during the coronavirus pandemic in 2020-2021 which made the shortage of radiologists in Kuwait an even greater issue. This has been exacerbated by the fact that Kuwait is a small country and 80% of its healthcare workforce is made up of foreign nationals (Al-Tubaikh 2010).

Heavy dependence on foreign nationals may be an issue as highlighted by the coronavirus outbreak. As the outbreak spread across Kuwait in March 2020, the government made urgent decisions to control the spread of the virus, one of which was suspending all flights to and from Kuwait, except for Kuwaiti nationals who wanted to return home (Hamadah et al. 2020). This action placed a large portion of the international workforce, some of whom were doctors and radiologists, in a critical situation where they faced issues on re-entry into Kuwait. This, in turn, created serious issues when the MOH suffered a shortage of medical staff to face the crisis (Hamadah et al. 2020). Such a problem highlights the importance of having a strong local workforce, especially in the medical and healthcare field. Indeed, this research identified the implications of a severe shortage of nationalised radiologists in Kuwait as a serious issue, and training radiographers to extend their role, as adopted in other countries such as the UK, the USA and Australia as one of the solutions to solve this problem.

1.3. Research question

How do radiographers and radiologists in Kuwait perceive radiographers' RE in mammography?

1.4. Overview of the research design

To answer the research question, the researcher adopted a qualitative case study research study design which enabled a deep engagement with the context and the use of multiple sources for collecting data from the participants. The researcher used documentary analysis, individual interviews and note taking. A series of one-to-one semi-structured interviews were conducted with 10 radiographers and 10 radiologists who were purposively sampled. The interviews were used to understand how radiographers and radiologists perceive radiographers' RE in mammography and gain an in-depth understanding of their opinions and the reasons behind their opinions towards extending the role of radiographers in Kuwait.

1.5. Contribution to new knowledge

According to the research aim and objectives, and in view of the study findings and discussion (chapter five, six and seven), the researcher argues that the study contributes new knowledge in theory and practice. The recommendations developed can be implemented by radiographers and radiologists, academic staff in the Allied Health College in Kuwait University and the MOH in Kuwait to hopefully address the shortage of radiologists within mammography. The details of these contributions are discussed in chapter eight.

1.6. Structure of the thesis:

Chapter one

The Introduction chapter provides a rationale of the study, research question and overview of the research design. This chapter also suggests the contribution to knowledge in accordance to the aim and objectives of the study. Furthermore, this

chapter highlights an outline of the structure of the thesis and brief description of each chapter.

Chapter two

Chapter two provides information about the context of radiography in Kuwait and includes general information about Kuwait, the healthcare system and the radiography profession. The second part of this chapter discusses the concept of radiographers' RE worldwide.

Chapter three

This chapter reviews the relevant literature related to the history of extending the role of radiographers, clinical areas for radiographers' RE in mammography and changing radiographers' role. It also investigates radiographers' performance in RE and highlights the impact of extending radiographers' role, and reviews the radiographers' and radiologists' opinions towards radiographers' RE. This chapter concludes with a further evidence section highlighting related articles published just before the end of writing this thesis.

Chapter four

This chapter discusses the theoretical framework of the study and how it would contribute to a deep and meaningful understanding of the issue.

Chapter five

This chapter provides a rich description of the research design and methodology. It discusses the research paradigm, philosophical standpoint and explains the sampling process, data collection process, data analysis, ethical considerations and research trustworthiness.

Chapter six

This chapter presents the first part of the findings including the first main theme that emerged from the data and examines the meaning of the findings in relation to the related literature. Integrating the results with the discussion enabled an in-depth meaningful understanding of the interpretation of the emerged data.

Chapter seven

This chapter presents the second part of the findings including the second main theme that emerged from the data. Similar to chapter five, this chapter also examines the meaning of the findings in relation to the relevant literature.

Chapter eight

This chapter explored the meaning of the emerged data philosophically through the lens of the adopted theoretical framework.

Chapter nine

This chapter concludes the thesis by presenting an overview of the study and highlighting the main findings. It also highlights contribution to knowledge and theory and implications for policy and practice. The researcher concludes this chapter by presenting the limitations of the study and suggestions for future research.

1.7. Summary of the chapter

In this first chapter, the researcher presented the rationale of the study, research question and overview of the study design. The chapter provided an outline of the thesis. The next chapter will present information about the study context, which is important to set the scene and guide the reader to understand the context within which this study was conducted.

Chapter 2. The context of diagnostic radiography

2.1. introduction

Diagnostic radiography (DR) is a healthcare profession that involves imaging the human anatomy using ionising radiation, magnetic resonance imaging (MRI) and US to produce high-quality images for the purpose of diagnosis and treatment of pathology. Radiographers (also known across the world as radiation practitioners, radiologic technologists, diagnostic radiographers and medical radiation technologists) are specialists, who work within the radiology team and are mainly involved in producing diagnostic images using the lowest radiation doses as reasonably possible (Ballani and Sukkar 2005). The radiographer has been described in the UK radiography curriculum as:

'Being responsible for providing safe and accurate imaging examinations in a wide range of clinical environments, using a variety of imaging modalities and techniques so that there can be appropriate management and treatment of patients' (College of Radiographers 2003, p. 14).

The diagnostic radiographers' role consists of two main functions: firstly, performing radiological examinations for diagnosis using various modalities such as general X-ray, CT, MRI, fluoroscopy, mammography. Secondly, to provide a high level of patient care throughout the radiological examination whilst creating a safe mechanism for radiological procedures by preventing unnecessary exposures and overexposures (Lee et al. 2016). However, the radiographers' scope of practice is developing and changing. Changes are mainly driven by the high demand for the service, technological advancement, and in many cases a shortage of radiologists. Despite the high demand for the service and the critical issue of radiologist shortage, across the Middle East and particularly in Kuwait, the radiographers' scope of practice is still limited along with a dearth of literature that examines the situation and the perceptions of radiographers and radiologists towards introducing new extended roles for radiographers.

2.2. Background to radiography in Kuwait

2.2.1. The public healthcare system in Kuwait

The MOH is responsible for the Kuwaiti healthcare system. The Kuwaiti government has established the MOH more than 80 years ago, aiming to provide high-quality medical care to its citizens through its network of main hospitals and primary healthcare clinics. The healthcare system in Kuwait is divided into three categories: primary, secondary and specialised. Primary healthcare in Kuwait provides services including medical care from general practitioners, dentistry, maternity care, nursing care, preventive care, pharmaceuticals and family medicine. Each geographical area in Kuwait has its primary healthcare clinics, which means that more than 90 clinics are providing primary healthcare (Health System Profile 2006). With regard to the secondary healthcare system, there are seven main government hospitals in Kuwait: Al-Amiri hospital, the first hospital in Kuwait which opened in 1949, Al-Jahraa hospital, Al-Sabah hospital, Mubarak hospital, Farwaneya hospital, Al-Adan hospital and Jaber Al-Ahmad hospital, which was opened in 2019. Lastly, there are specialised centres that focus on special conditions and ailments Health Systems Profile (2006). These centres include:

Specialised centres	Services
Chest hospital	pulmonary ailments
Hamed Al-Essa Transplant Centre	organ transplants
Hearing Impairments Centre	disorders connected with hearing
Ibn Sinaa hospital	neurosurgery
Kuwait Cancer Control Centre (KCCC)	cancer diagnosis and treatment
Kuwait Centre for Allergies	allergies
Obstetrics (delivery) hospital	maternity
Psychiatric hospital	mental disorders
Razi hospital	orthopaedic hospital
Sulaibikhat hospital	physiotherapy and rehabilitation

Figure 1 Specialised Medical Centres in Kuwait

The MOH is responsible for 80% of healthcare services in Kuwait, while the other 20% is under the control of the private sector (Al-Jarallah et al. 2010). However, private hospitals in Kuwait are subject to the terms, conditions and policies of the MOH.

Kuwait is divided into six administrative regions as demonstrated in Figure 2. Each region has its own main government hospital and a number of primary healthcare clinics.

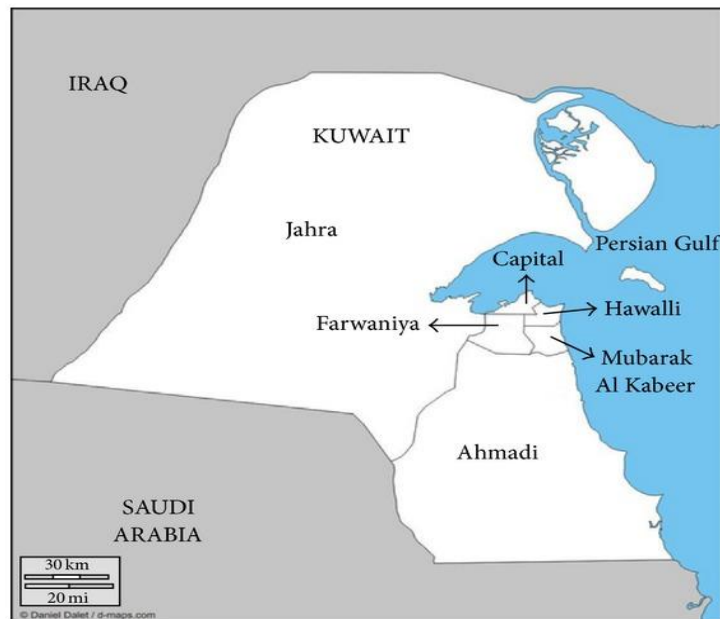


Figure 2 Kuwait geographical map (The public authority for civil information statistics 2012)

The MOH also implemented the Kuwait National Mammography Screening Programme (KNMSP) in 2014, which aims to improve early detection of BC for Kuwaiti women aged 40 and above. Non-Kuwaiti women who live and work in Kuwait and need breast cancer screening (BCS) bring a BCS request from their general practitioners and are referred to one of the previously mentioned hospitals based on the city they live in. There are five BCS centres distributed around Kuwait: Shaikhan Al-Farsi, South Khaitan Health Centre, Al-Zahra Health Centre, Al-Naeem Health Centre and Al-Equila Health Centre, in which each administrative region has a screening centre. The KNMSP in Kuwait allows women to attend voluntarily and free of charge at the five centres. The KNMSP aims to provide a BCS and care programme that matches the high standards of care in the UK and the USA (Al-Khawari 2016) and is coordinated by Memorial Sloan Kettering Cancer Centre (MSKCC). MSKCC, a cancer treatment and research institution in New York City, was founded in 1884 at the New York Cancer Hospital. It is the largest and oldest private cancer centre in the world and one of 47 National Cancer Institute-designated Comprehensive Cancer Centres in the United States of America (Memorial Sloan

Kettering Cancer Centre 2020). The primary aim for introducing and establishing BCS services in Kuwait was to reduce the mortality rate by enhancing the early detection of BC among asymptomatic women (Biesheuvel et al. 2011).

There are two ways for women to access government mammogram services in Kuwait. One way is to access the secondary and specialised centres. This was the only way to do so before 2014. All women with BC symptoms and women without symptoms who need screening for early detection of BC as a check-up, can access a hospital and see the doctor, surgeon or GP who will decide if she needs a mammogram. A mammogram screening request will then be raised. After the mammogram is performed, the patient will be asked to wait for the radiologists to perform a routine US examination. This usually takes at least two hours. BCS services have changed since 2014 when the MOH established the KNMSP. Unlike the old system, women now do not need a request to access the services as they can call or use a smart phone application to book a BCS appointment. In contrast to the UK, where women receive a screening invitation when they are 50 or above, the screening system in Kuwait is self-referred for all women aged 40 and above (Muhanna and Floyd 2019). Jusot et al. (2011) argued that the variation in preventive care utilisation can be influenced by some factors such as the availability of the resources in the health system, the financial incentives for healthcare providers to enhance the healthcare services and how healthcare is financed. These may explain the variation for mammography screening age between the UK (50 years old) and Kuwait (40 years old).

At the BCS services in Kuwait, the screening examination is performed by radiographers, and the images are sent to a radiologist in a different specialised centre to be diagnosed. If any abnormalities are detected, the patient will be called back and asked to attend secondary or specialised centres for US or further screening images and examinations based on the radiologist's request. However, this process usually causes a delay in the diagnostic procedure, which may negatively affect women attending BCS services. The clinical evidence within radiography departments and screening clinics highlighted that radiographers in Kuwait do not have authority to perform breast US and supplementary special mammographic projections such as magnification or spot views, as these are part of the radiologists' role (Ballani and Sukkar 2005). If any breast abnormality is noticed

by the radiographers, they do not have formal authorisation to make any decision in performing further special mammography projections, therefore the radiographers are obligated to send the mammography images to radiologists who will decide the need for US or supplementary views. Based on the researcher's clinical experience, such practice is negatively affecting patient care and the quality of the service. Firstly, this process may take up to three weeks as the radiologists report the images within a minimum of one week and then arrange an appointment for US or supplementary mammography images. This will cause a delay in patients' reports and diagnosis. Secondly, patient call back (requested to return for further examinations) is negatively affecting patients psychologically, as they often expect the reason for the call back to be a detection of cancer. Patients panic despite all radiographers explaining to their patients that there may be the possibility of a call back for further examination (Feig 1988). Such issues highlight the need to change the radiographers' role in mammography and extend radiographers' autonomy in Kuwait to enhance the quality of the service and patient care.

2.2.2. Radiography in Kuwait

The workforce in the MOH in Kuwait is highly dependent upon foreign labour. Al-Tubaikh (2010) suggested that the delay in diagnostic reports, examinations appointments and long waiting time are because of the radiologists' shortage. There appears to be a shortage of radiologists in general and Kuwaiti nationals working as radiologists in particular (Al-Tubaikh 2010). However, part of this research was to investigate the percentage of Kuwaiti nationals working in the imaging departments in Kuwait. The radiology workforce issues are mainly an overall shortage in radiologists, a high turnover rate among the profession due to some approaching the retirement age and some choosing to work in the private sector instead, all of which creates a critical shortage of radiologists in government hospitals (Al-Tubaikh 2010).

2.2.3. Radiography teaching in Kuwait

Radiologic Science is a four-year bachelor programme in Kuwait University, Faculty of Allied Health Sciences (AHS), aiming to educate highly skilled imaging professionals in NM and DR (Ballani and Sukkar 2005). The programme of radiography teaching in Kuwait allows the student to choose between two pathways, NM or DR, therefore, the students

who graduate from the AHS radiology department are either radiologic technologists or nuclear medicine technologists. The diagnostic radiology technologists' role is to produce high-quality diagnostic images for all the organs of the human's body, while the nuclear medicine technologists' role is to produce diagnostic images using the gamma camera, using the radioactive materials injected into the patient's body. The following schedule (figure 2) from Ballani and Sukkar (2005) shows a detailed radiography curriculum at Kuwait University.

Table 1 Radiologic sciences BSc degree graduation requirements

Course number	Credit hours
University requirements (19 credits)	
115 Finite maths	3
151 English language	5
152 English language	5
250 English language	3
Elective	3
Faculty requirements (27 credits)	
104 Introduction to the professions	3
110 Chemistry and 111 Chemistry lab	4
121 Physics and 125 Physics lab	4
122 Physics and 127 Physics lab	4
132 Introduction to computers	3
160 Biostatistics	3
220 Psychology of medical care (AH)	3
Elective	3
Professional courses (76 credits for diagnostic radiography and 80 credits for nuclear medicine technology)	
<i>Common courses (63 credits)</i>	
151 Anatomy I	4
152 Physiology	3
202 Patient care and management	2
203 Fundamentals of radiologic technology	3
210 Anatomy II	2
316 Clinical medicine and pathology	3
354 Imaging procedures I and lab (DR, NMT)	3
362 Imaging procedures II and lab (DR, NMT)	3
364 Digital imaging techniques	2
370 Clinical practicum I (DR, NMT)	4
371 Clinical practicum II (DR, NMT)	4
374 Physics of medical imaging I and lab	4
375 Physics of medical imaging II and lab (DR, NMT)	4
455 Imaging procedures III and lab (DR, NMT)	3
430 Special imaging procedures (DR, NMT)	3
466 Computer applications in imaging	3
472 Clinical practicum III (DR, NMT)	5
473 Clinical practicum IV (DR, NMT)	6
492 Research I	2
494 Research II	3
<i>Track I: diagnostic radiography (13 credits)</i>	
356 Radiologic imaging and processing I and lab	2
357 Radiologic imaging and processing II and lab	3
453 Radiologic pathology	3
481 Quality assurance (DR)	2
<i>Track II: nuclear medicine technology (17 credits)</i>	
114 Organic chemistry	4
117 Biochemistry	3
474 In vitro studies and lab	3
477 Radiopharmaceuticals	3
480 Quality assurance (NMT)	1

Figure 3 Radiography curriculum at Kuwait University in 2005

The above figure illustrated the units and subjects that radiographers' study in Kuwait. The curriculum description shows three credit hours for physiology and three credit hours for radiologic pathology. This may indicate a superficial education on what are seen as important areas. Clinical perception of the researcher suggests that such a superficial curriculum may contribute to the production of graduates with a low or weak level of radiography knowledge. Most of the newly graduated radiographers in Kuwait are unable to distinguish between normal and abnormal radiographic images such as fractures in musculoskeletal radiographic images and detect abnormalities in mammography images. From the perspective of the researcher and based on her clinical experience for two years as a radiographer in Kuwait and studying in the UK, the clinical education and training of student radiographers appears inadequate and not fulfilling the needs of the clinical departments. During the clinical training of radiographers in Kuwait, the first two semesters are observing, and then independently performing examinations of the extremities (upper/lower limbs). In the other two semesters, radiographers perform chest and abdominal plain radiography independently, however, there is no training on special radiographic examinations such as CT, mammography, and MRI. The issue could be solved by training and educating radiographers in every imaging modality (mammography, CT and MRI) by senior radiographers until radiographers are sufficiently confident to work independently. However, due to the regular clinical rotation among imaging modalities every three months approximately, most of the junior radiographers need retraining to refresh their knowledge when they return to a specific imaging modality. The current research will therefore look to explore how the Kuwaiti bachelor curriculum serves the radiographers in their current scope of practice and their ability in detecting abnormalities on diagnostic images. Furthermore, this research will review any updates to the curriculum of radiography in Kuwait.

2.2.4. Employment

All graduate students from the faculty of the AHS can apply through the MOH to work in government hospitals unless they are planning to work in the private sector. Graduate students can be employed immediately after their graduation, and they have the right to choose the government hospital or specialised centre they wish to work in. The

decision of the location of their employment will be made based on the capacity and needs of the centres and hospitals.

2.2.5. Role/job description and role structure in Kuwait

The radiographer's specific role/job description has not yet been established in Kuwait. Until 2020, the career structure of the profession of radiography has been composed of five levels based on the MOH classification: practitioner, primary practitioner, specialised, primary specialised and supervisor radiographer. In the UK, the role description, identification, purpose and scope of a diagnostic radiographer have been defined (Price et al. 2002). Manas et al. (2018) argued that the absence of a job description and structure negatively affects the practitioners in illuminating their roles and responsibilities. Indeed, the absence of a job description limits radiographers' autonomy in Kuwait especially when it is illegal for radiographers in Kuwait to decide the positioning procedure, imaging protocol or the need for supplementary diagnostic images in mammography. Radiographers in Kuwait must only follow the imaging request from physicians and radiologists. Such a limited scope of practice and lack of autonomy appears to negatively affect the job satisfaction of radiographers (Wuni et al. 2021). One of the research objectives is therefore to investigate the current level of job satisfaction associated with the radiographer's existing role and scope of practice.

2.2.6. The promotion system in Kuwait

After the first three years of employment, a radiographer in Kuwait will be promoted to a primary practitioner. The second promotion will follow five years of working, the third promotion will follow seven years and the fourth promotion will follow more than thirteen years. Interestingly, the promotion system is automatic in most of the Kuwaiti ministries, follows the regulations of the Civil Service Commission and is affected by the annual appraisal system from managers' supervisors. Promotion in the MOH usually affects both the salary and job title, but it does not make any difference within the radiographers' scope of practice, career development or radiographers' autonomy. Additionally, radiographers who are Master and PhD holders, junior or senior radiographers have the same scope of practice with no additional role or extra responsibilities. Such legislation does not serve the high demand of the healthcare service in Kuwait or the situation of radiologist shortage, especially in mammography.

Mollura (2016) and Bwanga (2020) highlighted that training radiographers to perform an extended role in African countries helped with the shortage of radiologists and reduced the workload on radiologists. Within the researcher's clinical experience, some senior radiographers are trusted by radiologists and are practising informally extended role skills, such as injecting contrast media, performing supplementary special views in mammography, and sending asymptomatic patients to BSC. However, they are not recognised or rewarded for performing at that level. The current research, therefore, investigated the situation in Kuwait associated with radiographers' years of experience and extending their role.

2.2.7. Guidelines and Policies on Radiography Role Extensions in Kuwait

Radiographers' RE has not been previously identified in Kuwait. Radiographers in Kuwait perform a very limited job scope, and they have no autonomy; their work is based on following the doctors imaging requests and the protocol of the department that has been developed by the department's manager (Ballani and Sukkar 2005). However, the situation of the radiographers role and scope of practice have not changed since 2004. Hence the current research investigated the barriers to extending radiographers' role in mammography and explores both radiographers' and radiologists' perceptions, attitudes and opinions towards radiographers' RE in mammography.

It has been argued that enhancing the situation of the current radiographers' role and practice will attract students to health professions (Ballani and Sukkar 2005). It is also worth mentioning that radiographers have been trying to develop a professional body for radiographers and there is currently still no association that represents the radiographers in Kuwait. Ballani and Sukkar (2005, p. 70) mentioned that "*a local (i.e., Kuwaiti) long-awaited Society of Radiographers and Nuclear Medicine Technologists is a dream that is yet to be realised*", yet, after 16 years the situation had not changed. This issue has been a concern for almost all radiographers working in Kuwait for significant reasons. Arguably, developing an association of radiographers in Kuwait with a permanent office in the MOH in Kuwait will strengthen radiographers' position and claim to full professional status. There is no published evidence about radiographers' concerns in Kuwait, however, they launched a hashtag on Twitter in Arabic to explain the reasoning behind their claims (#التوصيف_الوظيفي_لإختصاصيي_الأشعة_التشخيصية).

The radiographers highlighted that developing a radiographers' association will enable them to develop academically and professionally; therefore, they will be able to practise their role with greater autonomy and confidence. Radiographers also highlighted the need for continuous education on using new imaging modalities such as mammography, MRI and CT, they explained that such training courses are very rare and short which is not helping them to keep pace with fast technology development. Furthermore, the radiographers explained that legislations pertaining to radiation protection are not adhered to. Additionally, they highlighted the importance of having independent management for radiographers that is separated from the department of radiologists.

Radiographers also argued that those in Kuwait should be employed at the same, higher grade, as the physiotherapists. The MOH justified this difference by stating that physiotherapists are performing a therapeutic role while radiographers are performing diagnostic jobs. It is worth mentioning that although therapeutic radiographers (NM radiographers) in Kuwait practise a therapeutic role, they are not employed at the same higher grade as physiotherapists. From a radiographers' perspective in Kuwait, this is unfair. Radiographers also suggested that the MOH should reconsider the situation of higher education holders (MSc and PhD), as they perform the same scope of practice with no additional responsibilities or privileges. Another point raised by the radiographers was to allow them to share the decision of choosing the imaging equipment with radiologists. Radiographers justified this claim as the main function of the radiography department, and they have the right to choose the equipment that they are working with; this is a major part of the radiographers' scope of practice. The current research sought to better understand the existing role of radiographers in mammography and their readiness to undertake such extended roles.

2.3. Study context

2.3.1. Role extension, role development and role advancement

RE and role development (RD) are terms that have been widely used for explaining clinical practitioners' role, however, these terms have not been clearly defined in the remit of a DR career structure. Eddy (2008) differentiated between RE and RD for therapy radiographers, she explained RE as being involved in a specific skill outside the

scope of practice and where accountability is expanded, however, practitioner autonomy will still be restricted under specific protocols. In contrast, Eddy (2008) explained RD as a more developed area of practice that includes aspects of RE. Thus, RD requires a higher level of practising autonomy in which the radiographer controls a complete episode of care, being involved in a wider range of healthcare professional activities such as service enhancement, research and teaching (Eddy 2008).

Hardy and Snaith (2006) have explored the term of extension and advancement under the umbrella of radiography practice. It has been argued that RE can be defined as additional skills and responsibilities beyond the responsibilities that have been defined in the professional registration. In contrast, 'advanced role' can be explained as a higher level of practice within the profession and continuously developing the scope of practice to include decision making, leadership and teaching (Hardy and Snaith 2006). According to the Department of Health (2003) and NHS career framework, '*role extension*' of radiographers includes the performance of complex tasks such as barium enemas, image reporting, performing US and stereotactic biopsies. In contrast, the concept of '*role development*' and '*advanced practice*' is for radiographers to undertake other complex tasks that involve decision making, leadership and research.

For this study, the researcher chose the term '*role extension*' as the best term to capture what the author aimed to achieve in exploring radiographers' and radiologists' perceptions, attitudes and opinions towards an extended role for radiographers in mammography in Kuwait. This included the taking of breast biopsies and performing ultrasound and image interpretation. The reason for choosing the term RE instead of RD and role advancement was that the concept of radiographers' RE and handling more responsibilities usually performed by radiologists has not been explored in Kuwait. Since this research aims to understand the current role of radiographers in mammography and highlight radiographers' and radiologists' attitudes towards radiographers RE in mammography, it is logical to initiate the subject by exploring and understanding the concept of RE. Understanding that will help to build basic knowledge and explore the appreciation of RE in the context of Kuwaiti radiographers, rather than initiate a subject with a concept that involves a role with broader autonomy and added decision-making by radiographers as in RD.

2.3.2. RE in radiography: a global perspective

Radiographers worldwide are working within a specific scope of practice that defines their responsibilities and boundaries in the diagnostic imaging field. The literature highlights the importance of the RE of radiographers, which identifies the factors influencing the quality of the healthcare services including the radiologist shortage, quality of patient care and job satisfaction (Wuni et al. 2021). A few countries (led by the UK) have enforced the scope of practice of radiographers, although most countries have no regulatory body overseeing the radiographers' RE. The following section depicts situations in countries across the international radiography community that have made some progress in extending their radiographers' role.

2.3.2.1. United States

As a result of increasing patient demand, technology development and radiologist shortage in the USA, the American Society of Radiologic Technologists (ASRT) discussed the idea of developing advanced roles for registered radiographers in 2001 (May et al. 2008). It was revealed that the workload of radiologists had increased by 25% between 1992 and 2002, which was a challenging situation for healthcare providers in the USA. May et al. (2008) revealed that the success of extending radiographers' role in the UK was the driver for ASRT to extend their radiographers role. This was hoped to increase productivity and efficiency at a time when the patients' demands are increasing rapidly. Interestingly, it was mentioned that the concept of the extended role of radiographers is not new in the USA, and it had been practised since the mid-1990s under the job title of "radiology practitioner assistant". However, the ASRT moved towards an official educational program, and by 2007, ten radiologist assistant educational programs had been developed (May et al. 2008).

However, such an extended role for radiographers is still limited as the ASRT revealed that radiographers who received the training cannot substitute for radiologists, act independently nor provide an official interpretation of diagnostic images finding (May et al. 2008). The study highlighted that the radiology practitioner assistant is only allowed to evaluate a patients' condition during and after the procedure, perform selected invasive procedures under supervision by a radiologist and make observations about diagnostic images and forward these observations to radiologists (May et al.

2008). Indeed, such a limited scope of practice required the radiologists' presence in the workstation and supervision, which may not have made a significant difference in solving the shortage of radiologists and the high demand for the service.

2.3.2.2. Australia and New Zealand

The Australian Society of Medical Imaging and Radiation Therapy (2015) revealed that the Australian Institute of Radiography accredited special courses for radiographers to extend their role in mammography. They mentioned that radiographers who completed the courses successfully will be authorised to perform stereotactic biopsies, breast US, and mammography image reporting. However, while The Royal Australian and New Zealand College of Radiologists (2018) argued that the main driver for extending radiographers' role was the shortage of radiologists, there was in fact sufficient radiologists in Australia. The organisation also highlighted that extending the role of radiographers will negatively affect the quality of the service and the patient care, it was mentioned that reporting images and further extended roles require lengthy training as radiologists spend approximately 7 years training to perform these jobs. Radiographers, on the other hand, have their curriculum and training limited to image acquisition and production of images. Such a perspective is similar to the situation in Kuwait where the radiographers have no autonomy in exercising professional judgment and make independent decisions regarding the diagnostic imaging procedure. The Royal Australian and New Zealand College of Radiologists' (2018) opinion seems to be personal and subject to bias, indicating the radiologists' perspective only, without acknowledging the literature that proved radiographers' success in extending their role. They claimed that all the studies that evaluated the performance of radiographers on image reporting were limited and cannot reflect the actual situation. Nonetheless, there is strong evidence to indicate that radiographers can report on imaging results with high accuracy, comparable to radiologists. There are also studies that have evaluated the performance of radiographers in RE with comparison to that of radiologists (Brealey et al. 2005). Indeed, Field and Snaith (2013, p.14) suggested that medical resistance through "entrenched hierarchies" and the lack of underpinning knowledge may act as a strong barrier for extending the radiographers' role.

2.3.2.3. UK

The UK is seen as the leader in extending radiographers' role and is emulated by the previously discussed countries. In the UK, radiographers are trained to extend their role and perform tasks that are usually the responsibility of radiologists, such as image reporting, performing US and stereotactic biopsies. The radiologist, radiographer and oncologist shortages were the main drivers for the government to improve patient care by developing more staff and introducing more grades of staff (skill mix programme) as was intended in both NHS and cancer plans. The four-tier model, which has now become the NHS Career Framework, was first introduced in 1999 by the government based on a College of Radiographers initiative (The Society and College of Radiographers 2021a; Woodford 2006). It was piloted within the national breast screening programme, which aimed to reduce the mortality rate and improve cancer services. The skill mix programme initially focused on breast screening programmes, was quickly extended to include radiotherapy and, two years later, diagnostic imaging (including sonography). The project aimed to redesign the clinical team by skills and experience rather than by profession, introduce a tiered structure incorporating mechanisms of lifelong-learning and skills-escalation, develop occupational standards for the clinical aspects of each service, review and implement educational and learning processes to enable practitioners to develop new and valued roles within the multidisciplinary team (Department of Health 2003).

The Four Tier Model (NHS Career Framework) has four aims:

- *To define multidisciplinary teams not by profession, but by the skills and competencies that best deliver the patient or client's needs.*
- *To promote new roles, extended roles and advanced practice that will encourage lifelong learning.*
- *To widen the routes of access to clinical careers and improve recruitment and retention of the health professions.*
- *To maintain practice standards and develop the inherent potential of all clinical practitioners in the public interest.*

(Department of Health 2003, p.11)

Defined roles in the four tiers (NHS Career Framework)

1. Assistant Practitioner

An assistant practitioner performs protocol-limited clinical tasks under the direction and supervision of a registered practitioner.

2. Practitioner

A practitioner autonomously performs a wide-ranging and complex clinical role and is accountable for his or her own actions and for the actions of those they direct.

3. Advanced Practitioner (State registered)

An advanced practitioner, autonomous in clinical practice, defines the scope of practice of others and continuously develops clinical practice within a defined field.

4. Consultant Practitioner (State registered)

A consultant practitioner provides clinical leadership within a specialism, bringing strategic direction, innovation and influence through practice, research and education.

(Department of Health 2003, p.11)

Introducing a similar system into Kuwait might help overcome the issue of radiologist shortage and alleviate the significant shortage of local radiologists in particular. Implementation of this system would enable radiographers to practice autonomously thereby reducing the need for radiologists attending at the workstations during the imaging procedure. Radiographers in Kuwait need radiologists' approval before performing any step, which consequently increases the workload of radiologists. The current research sought to understand the existing situation, and both radiographers' and radiologists' perceptions towards initiating new extended roles for radiographers in mammography specifically.

There is a dearth of literature in the Middle East and particularly in Kuwait about the concept of radiographers' RE, therefore the perspective and the situation of radiographers extended role has not been previously published or documented.

2.4. Summary of the chapter

This chapter presented background information of the study context including the background of radiography in Kuwait and also explored the global perspective of radiographers' RE. The UK is seen as the leader in radiographers' RE, and while other countries have attempted to emulate this, they have been met with their respective challenges. This has not yet been attempted or documented in the Middle East generally, hence this research would be one of the first forays into this field within this region of the world. The next chapter will explore relevant literature to this study and discuss the adopted theoretical framework.

Chapter 3. Literature Review

3.1. introduction

This chapter discusses the relevant literature to this study and is divided into two sections. The first section defines the problem statement, aim and objectives of the study, search strategy and search parameters. Based on the outcomes of the search strategy there are six main themes associated with the research question. The first theme is associated with the historical context and drivers of RE, the second explores the areas of radiographers' RE in mammography, while the third theme is changing the radiographers' role. The fourth theme is evaluating radiographers' performance in RE, and the fifth highlights the impact of extending the radiographers' role. The last theme discusses the radiographers' and radiologists' perceptions and attitudes towards radiographers RE in mammography.

In the second section of this chapter, the researcher identifies the theoretical framework, which is Abbott's (1988) theory of professions. It involves concepts of professionalism, professionalisation, power and jurisdiction, and knowledge (Abbott 1988). In order to assist the adopted theory, the researcher embraced the concept of professional identity for a greater understanding of the issue within the context. Furthermore, a discussion is raised to show how the previously mentioned theories could enhance the understanding of the issue under investigation.

3.2. Problem statement

The functions that a radiographer working in the Kuwaiti healthcare system can perform are currently limited to taking images and adhering to the protocols of their department as outlined earlier in Chapter Two. Complying with these restrictive practices severely limits the scope of radiographers to demonstrate their initiative and quashes any innovation. This is problematic at a time when the healthcare sector worldwide, and within Kuwait, is experiencing continual technological developments as well as changing demands, and a shortage of radiologists.

It has been argued that there is a strong relationship between professional status and job satisfaction. Probst and Griffiths (2009) highlighted three main factors that affected the radiotherapist's (therapeutic radiographer) job satisfaction: job design, leadership and stress. In Kuwait, both diagnostic radiographers and radiation therapists are facing the same issues of a limited role and the lack of autonomy. This PhD thesis concentrates on job design, the current scope of practice of radiographers and attitudes of radiographers and radiologists towards radiographers' RE. Moreover, it also highlights the corresponding factors that affect job satisfaction, such as the degree of autonomy for diagnostic radiographers in Kuwait and the opportunity for career development in mammography in particular.

Furthermore, the spread of BC among women in Kuwait, the low attendance rate of BCS for early detection and the shortage of radiologists in general and Kuwaiti-national radiologists in particular, are significant issues that may be countered by extending the radiographer's role and improving patient care. Extending the role of radiographers may resolve the shortage of radiologists, therefore reducing patients' waiting times for their reports and other processes of diagnosis. It will also allow them to cover the radiologists and give them more time to deal with patients and therefore may enhance the quality of the service and enhance the job satisfaction of both groups. Extending the role of radiographers may also increase the attendance rate of women attending breast screening for early detection, as a long waiting time was one of the barriers to the uptake of BCS in Kuwait (Muhanna and Floyd 2018).

3.2.1. Aim

The research aims to investigate the attitudes and opinions of radiographers and radiologists in Kuwait towards the RE of radiographers in mammography.

3.2.2. Objectives

The objectives of this research are to:

- describe radiographers' current scope of practice in mammography in Kuwait.
- evaluate radiologists' and radiographers' knowledge of radiographer's RE.
- highlight clinical areas of interest in mammography for RE.

- understand the attitudes of radiographers and radiologists towards RE in mammography.
- analyse any barriers and drivers for RE in mammography.
- Investigate the relevance of the diagnostic radiography curriculum in Kuwait in 2005 and 2020.
- evaluate the radiographers' job satisfaction.
- develop recommendations for possible future RE of radiographers based upon the results of this study.

The use of semi-structured interviews and field notes were designed to achieve the research objectives, except investigating the relevance of the diagnostic radiography curriculum in Kuwait in 2005 and 2020, which was investigated by a documentary analysis approach.

3.3. Search strategy

The online literature search was conducted using the Cardiff University library search facilities. CINAHL, OVID, MEDLINE, and GOOGLE SCHOLAR databases were used. Hand searching was used by the researcher, where a manual literature search was conducted within the academic journals related to the radiology discipline. The journals searched were Radiography, Imaging & Oncology, Journal of Medical Radiation Science, British Journal of Radiology, Radiotherapy & Oncology and Synergy and Radiotherapy in Practice specifically. Both historical and recent literature has been reviewed and appraised. The researcher also used the reference lists of the articles found to search further for additional relevant articles. A number of search terms were used to effectively identify the related literature, and these are presented in the following Table 1.

Term	Further search terms
Radiographers	Medical radiation technologist
	Medical radiation practitioner
	Medical radiation scientist
	Medical imaging technologist
	Radiologic technologist
	Radiation technician
	Radiologist assistant
	Mammographer
Role extension	Advanced practice
	Extend practice
	Extended role
	Extend scope
	Expand scope
	Role development
	Change role
	Develop role
Perceive	Attitude
	Thoughts
	Opinion
Job satisfaction	
Clinical areas	Mammography, mammogram, breast imaging, ultrasound, stereotactic biopsies, interpretation, reporting, supplementary reviews

Table 1 literature review search terms

While the researcher is aware of the difference between the phrase ‘role extension’ and ‘advanced practice’, some authors did not differentiate between the concepts. Therefore, the researcher used all the related terms to capture all the relevant literature.

3.4. Search parameters

The inclusion criteria considered any articles from radiography and healthcare professions resulting from searches using the identified terms. Only English language literature was included in the literature review because of the limited language skills of the researcher and the prohibitive cost of translation of other languages. However, the researcher's first language (Arabic) was also excluded as there was no relevant published literature in the Arabic language. Both recent and historical literature from 1970 was appraised, as the researcher aimed to review the history of radiographers' role extension.

3.4.1. Search outcome

The relevant literature has been classified into six main categories:

1. Historical context and drivers of radiographers' RE.
2. Areas of radiographers' RE in mammography.
3. Changing the radiographers' role.
4. Evaluating radiographers' performance in RE
5. The impact of radiographers' RE
6. Perceptions of radiographers and radiologists on changing radiographers' role

As a result of the paucity of studies that discuss radiographers' RE in mammography in particular, the researcher reviewed the articles that discussed and highlighted the situation in all featured clinical modalities that resulted from the literature search. This enabled the researcher to create a rich and detailed discussion and analysis of the search results, creating a strong narrative built from the interpretation and synthesis of the literature found.

The researcher is aware of the importance of including up to date literature for the literature search. While the current research covers a subject that has been explored and established in the UK for more than 30 years, radiographers' RE is a new concept in Kuwait that has not been introduced or explored. Therefore, the researcher felt that it was important to understand the development of RE within the radiography field, which means it is important to review the historical perspective of extending the radiographers role and the ongoing debates within the field. Furthermore, it was vital to include

relevant literature from other countries worldwide without making the date of publication an issue, to enable the researcher to understand RE for radiographers in the modern Kuwait context. In order to maintain a balance, the researcher reviewed both older literature and recent literature and the literature review was updated in 2021. At the end of this chapter, the researcher has highlighted some new literature that emerged very close to the end of the study.

3.5. Historical context and drivers of role extension

Traditionally, the radiographer's professional role is to produce high-quality diagnostic images using different techniques and technologies (NHS 2019). Radiologists have the main role in image interpretation and provide a diagnostic report on which treatment is based (Otoni et al. 2018). Indeed, there is plenty of research that has clarified the ability of radiographers to extend their scope of practice. Swinburne (1971) suggested that radiographers can detect abnormalities in diagnostic images and also argued that enhancing the role of radiographers would lead to developments in the profession's structure at the graduate stage. Swinburne clarified that the drivers for suggesting an extension of the radiographer's role were a shortage of radiologists and the fact that radiographers are functioning at a level below their full potential. Furthermore, while radiologists report on all diagnostic images, it was identified that the radiographers who have attended a short training programme have the capability to interpret images (McLachlan 1975).

Cheyne et al. (1987) conducted a project at Northwick Park Hospital, in which the radiographers were allowed to use the Radiographer Abnormality Detection Schemes (RADS), known as 'red dot', which assesses doctors in an emergency department on detecting abnormalities in diagnostic images. The RADS system allowed radiographers to express their opinions about abnormalities in a radiographic image by placing small red dots on the outside of an envelope (Price 2001). RADS has been used broadly to assess radiographers' skills in identifying abnormalities (Hughes et al. 1996).

Renwick et al. (1991) conducted a prospective study to evaluate the radiographer's ability to identify abnormalities in radiographic images in a casualty's x-ray department by categorising radiographic images into four groups: normal, abnormal, insignificantly

abnormal and further advice required. The study found that because of the high rate of false positives, which means that results of the diagnostic images suggest abnormalities when in reality it is not, the radiographers could not extend their role. The false positive rate of radiographers' abnormality detection was 7% and 14% false negative rate. However, the authors have been criticised on this by Nawrocki and Nawrocka (1991), who suggested that radiographers need to undergo a short period of training to be able to detect any abnormalities within the radiographic images.

By the early 1990s, delay in reporting was becoming an issue because of the increasing demands of healthcare and the shortage of radiologists in the UK. A study by Rose and Gallivan (1991) identified that there was a significant shortage of radiologists, which led to a large number of unreported radiographic images. Questionnaires were sent to all consultant radiologists in the UK and 254 (45%) out of 565 responded, which may reflect an acceptable response rate for the generalisability of the results and mitigating bias (Smeeth and Fletcher 2002). The research revealed important findings regarding radiographic image reporting. Forty radiologists (16%) declared that all the films were reported, and 85 (33%) radiologists stated that 10% or more of the films were never reported. Of the sample, 147 radiologists stated that the radiographic images should be reported by a radiologist. The radiologists revealed that the justification for not reporting all radiographic images was that the failure to report them would not have affected patient management. This issue was questioned by Saxton (1992).

Saxton (1992) raised some concerns and highlighted some key issues about the radiologists' reporting scheme:

- Do the radiologists read all the radiographic images?
- Do the radiologists read all the reports?
- Reporting was too late to influence clinical management.
- Radiologists were becoming overloaded.

(Saxton 1992, p. 1-3)

These concerns raised by Saxton (1992) can be explored in Kuwait to help improve the level of patient care and evaluate the quality of the service provided. Indeed, exploring

the issues associated with the radiologist shortage can be seen as the first building block to understanding the context in Kuwait.

Despite the slow progression of the subject of radiographers' RE, such concerns raised by Saxton (1992) helped to highlight the areas of weakness in the service provided, which enabled the researcher to pave the road for better practice and improved service.

Twenty years after Swinburne's (1971) proposal and Saxton's (1992) idea of extending the role of radiographers, Loughran (1994) and Wilson (1995) conducted a project for radiographers' RE. Wilson's (1995) project was conducted to train radiographers on image reporting. The drivers for initiating the radiographers' RE project were mainly the shortage in the existing system of plain film reporting and the fact that the reports were not issued quickly enough. The project was funded by the Department of Health and included the College of Radiographers and the Royal College of Radiologists in the controlling group. Engaging the Royal College of Radiologists was a significant step, taking into account their resistance to any other group taking on the work of reporting radiographic images. Involving radiologists in the project helped to reduce the expected resistance against blurring the professional boundaries and included radiologists in the process of training and educating radiographers for a more extended role. At the same time as this, Loughran (1994) was conducting in-house radiographer training for fracture image reporting, but unlike Wilson (1995) project, Loughran (1994) trained three radiographers to report abdomen and chest radiographic images. Loughran (1994) revealed that with structured training, radiographers could report images at a high-level equivalent to consultant radiologists.

Following Loughran (1994) and Wilson (1995) efforts, Hughes et al. (1996) conducted a study to evaluate the introduction of a pattern recognition technique for chest radiographs by radiographers. The pattern recognition technique can be explained as "allowing the individual to identify whether a given situation is normal or abnormal without a prolonged and complex training" (Hughes et al. 1996, p. 264). The study revealed that the technique enhanced the radiographers' ability to identify significant and insignificant radiographs. Hughes et al. (1996) highlighted that pattern recognition is a valuable factor to enhance the process of extending radiographers' role; they also suggested that adopting the recognition technique improves job satisfaction as a result

of acquired confidence. However, even 25 years later, until the day of writing this thesis, the progression of radiographers reporting chest radiographs independently across all regions in the UK is slow (England, Wales, Scotland and Ireland), which indicates a slow progression of radiographers' RE (Milner et al. 2016).

3.6. Areas for radiographers' RE in mammography

The main role of radiographers in mammography in Kuwait is the positioning of patients to produce high-quality diagnostic and screening mammographic images. However, this role could be extended by training and educating radiographers to undertake breast US, perform breast biopsies, and report mammography images and breast US. The Society and College of Radiographers (2021 a) has a list of post-registration education approved by the College of Radiographers, including the Certificate of Clinical Competence in Mammography. Similar training and education programmes are not established in Kuwait or the Middle East.

Smith and Reeves (2010) suggested that patients' rapid access to diagnostic services, the shortage of radiologists and long waiting times were some of the reasons for countries, such as the UK, to extend the radiographers role as an attempt to enhance the quality of the service provided. In Kuwait, the radiology department provides a mammography service unit for symptomatic and asymptomatic patients; as Kuwait is an Arabic and Islamic country, there are specific religious beliefs and cultural attitudes from patients, such as women requesting female radiologists for breast examinations (The Holy Qur'an, surah Alnoor). This issue is causing longer waiting time for patients to receive the examination and diagnosis, starting from reporting of the mammography images, performing the routine US after the mammogram (as radiographers in Kuwait do not perform US), and other diagnostic procedures such as performing biopsies. However, religious and cultural beliefs are not the only driver for women requesting female radiologists in Kuwait and worldwide, another reason could also be the embarrassment of exposing intimate areas of the body during the medical examination of the breast.

3.6.1. Performing breast ultrasound

An US examination is able to provide a diagnostic result without the need to expose the patient to radiation dose, which caused a dramatic increase in the need for this imaging modality (McKenzie et al. 2000). Such a high demand caused pressure on radiologists due to their shortage in the UK, therefore, radiographers extended their role in the field of performing general US with the radiologists' support (McKenzie et al. 2000). Generally, sonography (the practice of US) is not exclusive to a specific medical or healthcare profession. It has been argued that performing US is an established area of extended and advanced practice for radiographers (Henderson et al. 2016). Mitchell et al. (2019) revealed that in the UK, sonographers are registered as radiographers or come from other healthcare professions such as nurses and physiotherapists. In contrast, performing US in Kuwait is generally the radiologists' role, however, some other medical specialists such as gynaecologists, urologists and surgeons perform US, and this has also been a point of contention between radiologists and other medical professions. Based on anecdotal evidence, radiologists in Kuwait claim that performing US should not be done by any other specialism or profession since it is under the radiologists' scope of practice and there is a strong objection to the blurring of boundaries in this context. Indeed, the situation of sharing the role of performing breast US between radiologists and radiographers may be more complicated than it is between radiologists and their colleagues from other professions within the medical domain because of the professional hierarchy variation. More details about this concept are explored in-depth in the following theoretical framework section.

Although performing breast US by radiographers is common practice in the UK, Australia, the USA, and Canada, there is a dearth of literature around this area (Berg and Mendelson 2014; Canadian Association of Radiologists 2016; NHS Breast Screening Programme 2019; The Royal Australian and New Zealand College of Radiologists 2002). Interestingly, it is common practice for radiographers in the USA to perform US for every part of the body, except for the breasts, however, the diagnostic breast US has been added to radiographers' scope of practice because of the wide spread of breast diseases. Since 2011, screening breast US has been added to the radiographers' scope of practice, while the interpretation is done by radiologists (Berg and Mendelson 2014).

In contrast, performing breast US in Kuwait is a radiologists' role, and it is not within the radiographers' scope of practice. However, in Kuwait, radiographers are trained by radiologists to perform 3D automated breast US. According to the researcher's clinical experience, radiologists have allowed radiographers to perform 3D US and not 2D US (a handheld US) as 2D US is operator dependent. Operator dependent means that this examination is linked to a real-time evaluation whilst performing the examination, which may cause variation in the quality of the screening capability of the practitioner and subsequent clinical results. This links well with Wise (2008), who found that the aptitude in performing US may vary from one trainee to another.

In an effort to minimize the factor of operator dependency, there are two main types of breast US worldwide, handheld US and 3D automated breast US (Arslan et al. 2019). Handheld US is more common, well-tolerated, and allows the user to accurately evaluate the breast and the axilla. On the other hand, automated 3D US is operator independent, providing the user with the 3D high-resolution images with a large field of view to cover a larger area of the breast (Arslan et al. 2019). However, both types of US have their limitations. Arslan et al. (2019) explained that the limitation of the handheld breast US is being operator dependent, which requires a high level of proficiency to avoid missing any abnormality. Furthermore, handheld breast US allows only a small field of view and gives only 2D views. Conversely, automated 3D ultrasound has limited access to view the axillary area, giving shadowing artefacts and a 10% lower cancer detection rate. In addition, automated 3D breast US has higher false-positive rates and recalls (Arslan et al. 2019).

Berg and Mendelson (2014) argued that the concept of US as an operator-dependent procedure is a concern for medical and healthcare staff, whether the procedure is undertaken by medical physicians or radiographers. However, Berg and Mendelson (2014) suggested that intensive training and a standard technique is essential to achieve high-quality performance for radiographers. They also recommended rescanning especially for any unclearly expressed abnormality, specifically during the period of training for radiographers. The same can be said for Kuwait. Based on the researcher's clinical experience, most radiologists tend to repeat the breast US examinations that have been performed by other radiologists, claiming that the US examination is operator

dependent, and they cannot report the images with confidence if the examination was not done by them.

3.6.2. Reporting mammography and breast US

Training radiographers to report mammography images and breast US is another area for extending radiographers' role in mammography. Radiographer reporting is not a new concept in the healthcare and medical domain; they have critiqued the images, given their professional opinion verbally, even in countries that have not established the concept of extending radiographers' role. Different countries worldwide trained radiographers to report mammography images and breast US, to overcome the radiologist shortage issue, as in Australia, Canada and the UK (Woznitza 2016). Donovan and Manning (2006) revealed that the practice of radiographers reporting on mammography and accident and emergency (A&E) skeletal images, is well established in the UK, and showed successful progress and accuracy that matching that of radiologists. The authors highlighted that *"the legal definition of acceptable professional performance is that level of performance which would be expected to be achieved by the majority of practitioners having similar experiences and responsibilities as the individual being scrutinised. For reporting radiographers this means being measured against radiologists"* (Donovan and Manning 2006, p8). Torres-Mejia et al. (2015) reported that screening mammography interpretation can be undertaken by radiographers in countries with a radiologist shortage. However, the authors suggested that radiographers could serve as the first reader under radiologists' supervision after receiving formal training. Such practices may not help solve the radiologist shortage, as radiologists will always be needed to advise and supervise radiographers, regardless of how well they were trained. Indeed, the current research highlights the areas of radiographers' RE in mammography from radiographers' and radiologists' perspective. Since the concept of extending radiographers' role has not been explored and discussed previously in Kuwait, the current research enabled participants to express their feelings towards radiographers RE in various areas in mammography such as reporting breast mammography, breast US, performing US and biopsies and having the authority to decide the need for supplementary mammography views.

3.6.3. Performing breast biopsies

Despite the development of imaging technology in the field of radiography, pathological examinations are still necessary to examine abnormal lesions detected by imaging procedures such as mammography and MRI. The method of testing suspicious lesions is to conduct a biopsy. During a breast biopsy procedure, a small sample of breast tissue is removed for laboratory testing; though this procedure can be completed through various means, the most common are US-guided biopsy, stereotactic guided biopsy and MRI guided biopsy (Nakano et al. 2018). Performing breast biopsies are originally part of the radiologists' scope of practice, however, due to the high demand for this service, radiographers have been trained to perform breast biopsies in some countries such as the UK.

Dixon and Dearnely (2008) used questionnaires to understand the experience of mammography radiographers who completed a formal program of education and training in stereotactic needle core biopsy of the breast. A total of 14 radiographers who completed the training program were asked to complete a questionnaire. The study was conducted six months after the end of the course and showed that trained radiographers can help to make a positive difference in the NHS plan and NHS cancer plan. The study also illustrated that extending the radiographers' role in performing stereotactic biopsies enhanced the quality of the service provided and improved patient care. Furthermore, the radiographers in this study experienced positive changes for them individually and professionally, and they revealed that performing extended roles increased their confidence and the respect and recognition from both patients and colleagues. Although the study provided important aspects of radiographers' experience in performing stereotactic biopsies for the breast, some of the questions of the questionnaires seem to be leading questions, for example, the questionnaire included the following question:

Do you believe that taking the stereotactic needle core biopsy (SNCB) module has been of benefit to?

You personally?

You professionally?

Your colleagues?

Your patients?

(Dixon and Dearnely 2008, p. 87)

The question could have been better phrased as “Do you believe that taking the SNCB module made a difference?” The word “benefit” in the original phrasing of the question gives the feeling that the participants are restricted to answer things positively. Furthermore, stating the areas such as “personally, professionally, colleagues, and patients” is leading too. Choi and Pak (2005) argued that minimising the bias in the questions of surveys help to collect more accurate data in healthcare research.

3.6.4. Supplementary mammographic views

There are four basic mammography views or projections that are undertaken as part of radiographic breast examinations: bilateral (both sides), craniocaudal, and mediolateral oblique. However, some breast abnormalities are located in areas such as the extreme medial or lateral aspects of the breast tissue, which make it hard to cover with the basic mammography views (Kelly 2015). In this case, there are a various number of special mammography views, which are called supplementary mammography views and include the magnification view, spot view and cleavage view, that could be used to present the breast tissue appropriately and achieve a high-quality diagnostic image. The type of supplementary mammography views needed is dependent upon the appearance of the breast abnormality. Kelly (2015) highlighted that all practitioners (radiographers) should be able to decide the type of required supplementary views and when to utilise them under the supervision of a healthcare professional trained in mammographic image interpretation. The person who decides the need for performing supplementary mammographic views is different from one region of the world to another. For instance, in the UK, a trained assistant practitioner can perform supplementary mammographic views after the authority and agreement of the supervising radiographers (The Society and College of Radiographers 2021 b). However, the situation is different in Kuwait. Radiographers do not have the authority to decide on the need to perform supplementary views. The radiologists first read the basic mammographic images, if the

examinations revealed any suspicious abnormality indicating malignancy, the patient will be asked to attend the radiography department for further assessments, which could include supplementary mammographic images. However, Feig (1988) highlighted that the ideal time to perform the supplementary views, if needed, is at the time of the initial examination in order to obtain the entire breast imaging workup in a single visit. It has been argued that having patients return for further assessments such as breast US or more supplementary views causes anxiety for patients and is inefficient for the mammography department, as there is a need to schedule appointments for these further investigations (Feig 1988). To reduce the anxiety and the psychological harm of patient recalls and enhance the quality of the service provided, participants in this current study have been asked about their opinions of extending their role to include the decision making on the need for further supplementary mammographic views.

3.7. Changing radiographers' role

The roles of health professionals are being adjusted as a result of increased demand and the shortage of the workforce in general, however, in Kuwait, the scope of practice of radiographers has not been changed or extended. Furthermore, the concept of extending the radiographers' role has not been formally proposed as a solution to solve the radiologist shortage and consequences associated with long waiting times and delays in patient reports. Al-Tubaikh (2010) highlighted that the policy that the MOH is following in Kuwait is to recruit radiologists from abroad, however, despite the recruiting process, the shortage of radiologists is still an issue in Kuwait. Indeed, the radiographers' RE is a central interest for the researcher, who has explored changing radiographers' role, evaluating radiographers' performance in RE, highlighting the impact of radiographers' RE, and identifying perceptions of radiographers and radiologists on changing radiographers' role. The literature revealed a large number of studies of radiographers accepting and undertaking responsibilities that are usually performed by radiologists.

For instance, Price et al. (2002) conducted a UK study to analyse the adoption of radiographers' RE activities from 1998 to 2000, to identify the national changes of radiographers' role, identify any specific regional patterns of development and

determine factors impacting the rate of development. A total of 172 out of 253 imaging managers completed structured questionnaires, giving a 68% response rate. A total of 161 (93.6%) of the managers revealed that radiographers are performing intravenous injections, while 119 (69%) managers said radiographers conducted barium enemas in their departments. The results also highlighted the reporting practice by radiographers, 124 managers showed that radiographers reported on US, while only 18 managers stating that radiographers reported on mammogram images. However, it was not clear how the authors validated the questionnaires. Another limitation mentioned by the authors is that the questionnaires did not cover the full extended tasks that radiographers undertook. Nonetheless, the study was strengthened by the high response rate.

Following the previous study by Price et al. (2002), Price and Masurier (2007) conducted a study to evaluate the longitudinal changes in extended roles in radiography using a structured questionnaire. The researchers aimed to monitor the changes since 2000. The questionnaires were sent to 258 radiology managers at NHS acute hospitals across the UK covering England, Wales, Scotland, and Ireland. A total number of 177 managers completed the questionnaire, giving a high response rate (68.6%) which lent some reliability to the data. The results revealed that the majority of managers (95%) indicated that radiographers were performing intravenous injections (IV), and the number of radiographers performing IV increased from 1544 to 2183 compared to their previous study. Regarding barium enemas, 146 (82%) of the managers revealed that this practice is performed by radiographers, and the number of radiographers performing barium enema has been increased from 322 to 473 compared to the author's previous study. Additionally, 19 managers (11%) mentioned that barium meals are performed by radiographers. Furthermore, the results showed that 146 of the managers revealed that radiographers are reporting US, and 81 of the managers revealed that radiographers are reporting appendicular skeleton. In addition, 7 of the managers stated that radiographers are reporting chest radiographs, while 38 of them stated that radiographers are reporting mammography. This showed progress when comparing to the previous study. The study added a significant point about radiographers reporting independently - 92% of the managers stated that radiographers are reporting US

independently and 37% of the managers stated that radiographers are reporting mammography independently. Furthermore, the managers revealed that 89% of the radiographers are reporting plain films and appendicular and axial independently. The study was strengthened by the high response rate which underpinned the representativeness of the study. Further study is needed to explore the reasons why independent reporting by radiographers is higher in some imaging modalities and lower in others. Radiographers reporting independently may positively influence the issue of radiologist shortage in the UK.

Smith et al. (2008) adopted an interesting view, in which they believed that the RE 'must be a global movement' and the main reasons are the shortage of the workforce and the increasing need for healthcare services. They described the evolution and status of advanced practice in medical imaging and radiation therapy in Australia. The authors identified that the progress of RE is very slow in Australia compared to the situation in the UK. However, the reason may be, as mentioned previously in the introduction chapter, that there is an abundant number of radiologists in Australia, and there is a belief that only radiologists who have studied medicine to an advanced level can perform specific tasks such as reporting images and performing biopsies. Further study is needed in Australia to understand and explore radiographers' and radiologists' perceptions and thoughts of radiographers' current scope of practice and their attitudes towards extending their role.

Hardy et al. (2008) conducted a cross-sectional study to describe the status of radiographer reporting of trauma images in the four countries of the UK and reflect on its relevance to the development of similar advanced practice roles internationally. A total of 306 out of 456 hospitals across the UK where there was an emergency department or a minor injuries unit completed a cross-sectional survey. The questionnaire was emailed to each radiographer in control of emergency imaging at each hospital. The survey was piloted on a small group of advanced practitioners to ensure the appropriateness of the questions. The results showed that the number of radiographers reporting in the hospitals that have an emergency department is larger than in hospitals with minor injuries unit, and England had the highest number of radiographers reporting followed by Wales, Northern Ireland, Channel Islands and

Scotland. A total of 174 out of 306 hospitals highlighted that image reporting is one of the radiographers' duties. The number of radiographers reporting in most of the respondents was from 1-6 radiographers. The study provided significant insight into the progression of the extended role of radiographers. However, further studies are needed in the UK to highlight the reasons for geographical variation associated with radiographers extended role. For the current research, the researcher included all the government hospitals and BSC clinics from all geographical regions in Kuwait to highlight any similarities or variation between hospitals and BSC around Kuwait.

Following Hardy et al. (2008), Snaith et al. (2015) conducted a longitudinal analysis of development in radiographer reporting practice, using the data from the authors' earlier study (Hardy et al 2008). The authors used the same survey with some amendments to capture the broader nature of radiographer reporting practice. The authors piloted the updated version of the survey using 4 reporting radiographers, this enhanced the quality of the survey, therefore, increasing the credibility of the results.

The results suggested that although the number of Scottish sites with radiographers reporting is less than any other UK country, this number has doubled in comparison with the author's previous study. However, the study showed no significant changes in the numbers of radiographers reporting at different sites in the UK. The authors enabled the participants to use free text comments, which were used as direct quotes in the study. Sandelowski (1994) explained that using direct quotes helped to explicate the participants' ideas and convey the participants' attitudes. The text comments indicated that the main obstacles for radiographers to report images is the shortage of radiography staff and radiologists' resistance. It is evident that the scope of practice of radiographers reporting was not regularly practised across organisations, instead, it had evolved to meet service needs. This indeed did not reflect the initiative of the skill mix programme which aimed to extend radiographers' role to overcome radiologists' shortage and enhance the quality of the service provided. Observational studies across geographical sites may provide important insights into the actual situation of radiographers' practices and monitoring obstacles for them to extend their role.

Smith and Reeves (2010) utilised descriptive research using a literature review to evaluate the RE of radiographers in the NHS from the year 1995 to 2009. A total number

of five key surveys were used for the purpose of the study. The study captured the situation of the radiographers' RE during those 14 years. The study revealed that the radiographers' role has been extended over the years, concentrating on the main activities of radiographers' RE, which are barium enemas, IV injections, and image reporting. The results also showed that radiographers injecting IVs have increased from 88% in 1999 to 95% in 2007. The study also showed that the incidence of radiographers reporting is lower in Northern Ireland and Scotland compared to Wales and England. The study highlighted that the reasons for the accelerating of extending the radiographers role are government initiatives, long waiting lists and radiologists' shortage. However, despite the radiologists' shortage, radiologists' resistance was the main barrier for radiographers' RE. Indeed, the same situation currently exists in Kuwait. The radiologists are acting as a barrier for any initiative associated with extending radiographers' scope of practice. Despite a dearth of published literature around RE in Kuwait, the researchers' clinical experience highlighted that radiologists in Kuwait were against training radiographers to perform general and breast US.

Milner et al. (2016) conducted a quantitative online questionnaire to update the understanding of individual radiographer contribution to plain film reporting workloads and assess whether there was scope for further increasing radiographer reporting capacity within this area. Invitations to the research were posted to every NHS trust in the UK and snowball sampling, which is a non-probability referral sampling, was employed for data collection. A total of 264 responded including consultant radiographers, managers, lecturers and purely reporting radiographer. The study showed slow progression in extending radiographers' role in reporting chest and abdomen radiographic images due to various obstacles such as radiologists' resistance, time constraints and inter-professional challenges. The study also revealed that chest and abdominal image reporting varied by geographical region, and no radiographers report abdomen and chest images in Northern Ireland, the South West of England or Wales. However, the results of the study cannot be generalised as the questionnaire was self-administered online, which may increase the selection bias. Furthermore, Sadler et al. (2010) importantly indicate that using a snowball sampling technique may result in some bias in the results and there is no statistically reliable method to decide the

saturation of the sample. Additionally, excluding managers and lecturers may have strengthened the results of the study since their current scope of practice was not explained in the current study.

Indeed, changing radiographers' role could be a global movement to help the shortage of radiologists and eliminate the under utility of the radiographic workforce. Due to the spread of BC in Kuwait, a shortage of radiologists and the need to enhance the quality of the service provided, it is important to explore the situation of radiographers' role in mammography in Kuwait and how they compare to other countries worldwide.

3.8. Investigate radiographers' performance in RE

It is important to evaluate radiographers' performance in context with other countries that have extended radiographers' role, such as the lead taken by the UK. Highlighting the outcomes of radiographers' RE worldwide provides a clear image of expectations for the healthcare system providers in places such as Kuwait to initiate a discussion about introducing radiographers' RE in mammography as one of the solutions for the issue of radiologist shortage. In fact, the issue of radiologist shortage is not only affecting the radiography and radiology department but also negatively affecting the long process of diagnosis and treatment of patients in Kuwait, causing delays for surgeons, physicians and all other professions along the patient's medical and healthcare pathway (Al-Tubaikh 2010). The following studies explore and evaluate radiographers' performance in radiographers' RE.

Berman et al. (1985) conducted a study that evaluated radiographers' ability to extend their roles compared to casualty officers. The study revealed that half of the clinically important abnormalities that were correctly reported by radiographers were wrongly reported by casualty officers. These results suggested that the nature of radiographers' roles and their direct involvement in taking diagnostic images and evaluating, helped to enhance radiographers' ability to detect abnormalities compared to casualty officers.

Similarly, Coleman and Piper (2009) conducted a study in the UK to compare the accuracy of radiographic interpretation between casualty officers, nurse practitioners and radiographers. A total number of 38 participants (18 radiographers, 13 nurses and

7 casualty officers) all of whom were working in the same hospital were asked to complete an image test bank of 20 appendicular radiographs. The results showed that the radiographers produced the highest scores in image interpretation. Coleman and Piper (2009) also suggested that the radiographers had the knowledge and the ability to successfully provide the casualty officers with radiographic reports to assist in radiographic diagnosis. However, the study cannot be generalised to all the professions because of the small sample size, especially as radiographers made up more than double the number of casualty officers. Also, skills may vary between casualty officers, nurses and radiographers as it was not clear if all the participants of this study had any prior experience in image interpretation. Indeed, more experience could improve the accuracy and sensitivity of the diagnostic image interpretation.

Another study aiming to compare radiologists' and radiographers' image reporting performance was conducted by Buskov et al. (2013). Two radiographers and four trainee radiologists were asked to retrospectively evaluate and categorise 1000 radiographic images into true positive/negative and false positive/negative. The images had been already reported by radiologists. The study concluded that the radiographers showed high accuracy in image reporting compared to the trainee radiologists and no significant difference was found regarding the clinical impact of wrongful reporting between radiographers and trainee radiologists. The sensitivity for diagnosis was 99% for reporting radiographers and 94% for trainee radiologists, while specificity was 97% for reporting radiographers and 99% for trainee radiologists. The random selection of the radiographic images reduced selection bias and strengthened the results of the study. The results of the study highlighted that radiographers are qualified to perform image reporting tasks and improve patient management negatively impacted by the shortage of radiologists.

Previously, Murphy et al. (2002) had conducted a study to compare the radiographers and radiologist reports on radiographer conducted barium enemas. A total number of two specially trained radiographers completed 788 barium enema examinations from 1997 to 1999. The radiographers completed provisional reports for these examinations, and their reports were compared with the formal reports completed by 7 consultant radiologists of the same examinations. The results suggested that there was a perfect

correlation between the group of radiographers and radiologists, and trained radiographers can report barium enemas to a high standard. However, the study was limited due to the small sample size, especially from the radiographer group, as the two radiographers are not representative of the wider population of radiographers. Additionally, the authors did not mention any details about the special training that the two radiographers received.

Similarly, Booth and Mannion (2005) conducted a pilot study to compare the perception abilities of radiographers and radiologists reporting double contrast barium enemas. A total number of three radiographers and three radiologists independently reported fifty double contrast barium enema examinations that had been chosen purposively and retrospectively. The authors mentioned that the three consultant radiologists had a wide range of experience, and the radiographers had more than five years' experience of performing double contrast barium enema and received similar training under the radiologists' supervision. Similar to Murphy et al. (2002), the results of this study revealed that there was no significant difference in sensitivity or specificity between the radiographers and radiologists. This study was limited to the small sample size, which affects the external validity of the results.

Indeed, the extended role of radiographers in mammography, in particular, is the one area that radiographers are showing progress in their role and in performing tasks. This progress is greater than in other areas that have shown less progression and geographical variation in the skill mix (Donovan and Manning 2006). Radiographers in the UK are involved in single and double reading practices and diagnostic decision making of mammography images (Culpan 2016).

Double reading of mammography images by two radiologists increases BC detection rate by 15% (Wivell et al. 2003). This has been challenging however due to the shortage of radiologists in the UK. Therefore, it has been suggested that radiographers should be trained to interpret mammography images, to achieve the double reading where one consultant radiologist and one trained radiographer would read each set of mammograms. Wivell et al. (2003) conducted a retrospective study aiming to evaluate the ability of radiographers to read mammogram screenings in the National Health Service Breast Screening Program (NHSBSP). Three radiographers were asked to re-read

1000 mammogram images that had been already diagnosed by radiologists. Three radiologists were asked to evaluate the radiographers' diagnosis whilst all the radiographers were blind to each other's opinion and the radiologists' previous opinions. The data revealed that training the radiographers in image interpretation had resulted in detecting cancers to the same standard as radiologists. Moreover, radiographers were more skilled in detecting calcifications and small cancers, while radiologists were more skilled at detecting large cancers (Wivell et al. 2003). The fact that the radiographers were blinded to each other's opinion and the radiologists' opinion strengthened the credibility of the study since there were no external factors that may affect the radiographers' reports. However, the study used a very small sample size of three radiographers, in which the results of the study cannot be generalised. In Kuwait, the diagnostic image report should be completed by two radiologists, the first reader may be a junior or senior radiologist, and the second reader should be a senior specialist radiologist, to enhance the quality of the diagnostics report and eliminate reporting errors. Although such a protocol enhances the quality of the reports (Wivell et al. 2003), it may cause a delay in the patients' reports and increase the load on radiologists.

Moran and Warren-Forward (2011a) conducted a retrospective study of the performance of radiographers in interpreting screening mammograms. The authors aimed to provide data on the success of radiographers in reviewing mammograms with similar accuracy to radiographers trained specifically to interpret screening mammograms in Australia. Nine radiographers including two official screen-reader radiographers participated in the study. The screen-readers had over 15 years of experience in mammography, while the other 7 radiographers had 10-20 years of experience working as specialised mammographers. The participants completed 250 screening mammography reports during the period of January 2008 to May 2009. The results highlighted that two of the radiographers attained higher sensitivity than the official screen readers. Furthermore, the sensitivity of the screen readers was 79% and 93%, and between 57% and 97% for radiographers; the specificity for the screen readers was 82% and 84%, and between 63% and 80% for radiographers. This study highlighted significant results in proving that radiographers are suitable for reporting screening

mammography images in Australia. However, there is a need for specialised training and education to improve the radiographers' performance in image interpretation.

Debono et al. (2015) undertook a study to evaluate the accuracy of radiographers' screen-reading mammograms. Twenty radiographers working in BCS and diagnostic centres were invited to participate in the study. A total of 10 radiographers consented to participate, the radiographers who did not receive a formalised training were asked to read 500 mammogram examinations. The accuracy was determined using a comparison between radiographers' performance and the gold standard of known pathology results. The radiographers' years of experience ranged from 7-47 years. The radiographers completed the reading using a Breast Imaging-Reporting and Data System (BI-RADS). Magny et al. (2020) explained the BI-RADS as a breast imaging-reporting and data system, which is a classification arrangement suggested by the American College of Radiology to provide uniformity in reporting for non-radiologists. The results of the study revealed that the radiographers' sensitivity in their reporting was 76%-92%, while the specificity was 74.8%-96.2%. This indicated an acceptable accuracy level which showed that with formalised training, the performance of the radiographers may meet the gold standards of the known pathology results. However, the study was limited by its small sample size, which may affect the generalisability of the study. Furthermore, the years of experience between participants had a large variation from 7-47 years. Setting more selective inclusion criteria associated with the years of experience would improve the representativeness and trustworthiness of the results. Arguably, radiographers with 47 years' experience may be more expert on image interpretation and abnormality detection compared to radiographers with seven years of experience.

Culpan et al. (2019) conducted a literature review to summarise the evidence about radiographer reporting to support cancer workforce planning in England. The literature review included 148 papers that have been published between 1992 and 2018. Similar to Snaith et al. (2015), the review found that although radiographers reporting in England covers a wide range of examinations and referral sources, the practice of radiographers reporting had evolved to meet service needs in the absence of radiologists. This review highlighted a significant point that all current UK higher education institutions are subject to quality assurance from external agencies, which

helped to improve extending radiographers' role recognition across NHS trust staff. The review also demonstrated similar accuracy of radiographers reporting compared to radiologists. One of the papers in Culpan's literature review, it was calculated that pooled sensitivity of a radiographer reporting was 92.6% and specificity 97.7% assessed against the gold standard diagnostic opinion of the radiologist (Brealey et al. 2015). Culpan (2019) added that the learning across trainees will be maximised by a combination of learning techniques. Furthermore, the review highlighted the outcomes of introducing reporting radiographers into services which included improvements to radiology service delivery, benefits for patients, improved cost effectiveness, benefits for imaging professionals. The review also discussed the importance of overcoming the barriers to expansion of radiographer reporting which involved radiographer shortage in some areas, lack of adequate funding for training, radiologists doubt of de-skilling associated with expansion of radiographer reporting. This review could be strengthened by including mammography and ultrasound, which could help to frame a complete image of the situation of radiographer reporting in England.

Results from previous studies which indicated that radiographers are a qualified resource for performing role extension tasks successfully, could be seen as a global driver for countries worldwide in extending the radiographers' role in mammography. Such practices may eliminate the issues associated with the radiologist shortage including the delay in mammography reports and long waiting time. Furthermore, extending the radiographers' role in mammography may enable earlier detection of BC at its early stage and save patient lives.

3.9. Impact of radiographers' RE

After demonstrating the historical context of extending the radiographers' role, areas of radiographers' RE, changing radiographers' role, and evaluating radiographers RE performance, it was also important to review literature exploring the impact of extending radiographers' role, its influence on the radiologist shortage and the quality of the provided service.

Field and Snaith (2013) discussed how successful skill mixing can benefit individuals, their departments and NHS organisation and how extending radiographers' role can

establish a more dynamic and resourceful workforce with a greater transferability of skills and attributes. The authors highlighted that developing and extending radiographers' role in the UK resulted from increased demand for healthcare services, radiologist shortage, and attempts to reduce waiting time and speed up the image reporting process. The authors, through their commentary, reflect their individual experience in an interprofessional context within bone health and osteoporosis, and emergency US, as both of them are radiographers. It was revealed that RE and independent reporting in Dual Energy x-ray Absorptiometry (DXA or DEXA) scan by radiographers was rare because of the gap in knowledge and education of DXA reporting and resistance from the medical team who had limited knowledge about the concept of radiographers' role development. However, this issue has been addressed by postgraduate education, audit of competency and involving radiographers in the multidisciplinary team meeting. Such practice significantly improved patient care by early diagnosis and treatment, which reduced the risk of future fractures. For emergency US, the authors revealed that unlike extending radiographers' role in DXA reporting, extending radiographers' role in US was encouraged by the physicians in the emergency department and they suggested that the longstanding work engagement between radiographers and physicians played a significant factor in blurring the boundaries within US practice. The authors concluded that radiographers' RE and skill mix benefit the staff in the medical and healthcare team. This paper highlighted important points about extending the radiographers role and the medical resistance against blurring boundaries between healthcare and medical fields. The authors highlighted that engagement and close working relationship between two professions in the healthcare and medical field may help support the blurring of the professional boundaries. Indeed, the current research looks to highlight the relationship between radiographers and radiologists, in order to evaluate the chances of blurring the boundaries between them in terms of the radiographers' RE in mammography in Kuwait.

Thom (2018) conducted a systematic review to establish whether advancing practice within radiography does benefit the healthcare system. The comprehensive search was completed using three databases: CINAHL, Science Direct and PubMed, 15 articles were reviewed after the filter was applied. The critical appraisal of the literature was

completed using the Parahoo framework (Parahoo 2006) and highlighted five main themes: workload, patient benefits, cost, job satisfaction and restriction. The author mentioned that the load of the radiologists caused a delay in a patients' report, therefore radiographers reporting medical images benefit the patients by speeding up their diagnosis and enhancing treatment. Furthermore, the author found that advanced practice led to financial saving. In addition, advanced practice is a significant factor to generate job satisfaction, and through the staff's flexibility, it enhanced inter-professional relations. Another crucial theme added by this systematic review was the restrictions. The author highlighted that the restrictions of advanced practice were due to the radiologists' and physicians' resistance, and the lack of support from radiologists in the setting. Indeed, the issue of restrictions due to radiologists' and physicians' resistance may also be applicable to the context of radiography in Kuwait. Anecdotally, radiographers in Kuwait do not have authority to discuss any request or issue associated with diagnosis and they are only expected to follow the imaging request. The systematic review by Thom (2018) highlighted major themes associated with the extended role and advanced practice, however, it was limited to a small number of 15 articles.

3.10. Perceptions of radiographers' and radiologists on changing the radiographers' role.

Despite the shortage of radiologists in Kuwait and the pressing need to enhance healthcare services and improve patient care, there is no extended role for radiographers. A radiographer's scope of practice is very limited in Kuwait. Their work is based on following the doctors' imaging requests and following the protocol of the department that has been developed by its manager (Ballani and Sukkar 2005). The current research aimed to explore the perceptions and opinions of both radiographers and radiologists towards radiographers' RE in mammography. The drivers behind this aim were the spread of BC in Kuwait among young women, the need to solve the issue of the radiologist shortage in general and the reliance on foreign national radiologists in particular, and improving patient care by decreasing the waiting time for patients. Indeed, highlighting the perceptions of radiographers and radiologists towards radiographers' RE within the literature allowed the researcher to provide an in-depth

comparison between radiographers and radiologists in Kuwait and how they perceived extending radiographers' role in mammography.

The literature highlights the opinions and attitudes of both radiographers and radiologists towards the RE of radiographers. Previous research has shown that the majority of radiographers are willing to accept the new responsibilities of RE and they have linked this to their job satisfaction (Howard 2013; KeKana et al. 2015). However, radiographers also revealed that the lack of knowledge and training, threats of litigation, higher workloads and the resistance of radiologists, act as barriers for them to extend their role (KeKana et al. 2015). In contrast, the majority of radiologists showed less support for radiographers to take on more responsibilities in reporting medical images, with some radiologists also showing concerns about losing clearly defined professional boundaries (Forsyth and Robertson 2007).

KeKana et al. (2015) conducted a quantitative study in South Africa using the ordinal scale to determine the willingness of radiographers to take up additional responsibilities by extending their professional role. They further analysed the opinions of radiographers and radiologists regarding the RE of radiographers, showing that 183 out of 300 radiographers (61%) support image reporting. However, 34 out of 38 radiologists (84%) did not support radiographers reporting images which acted as a barrier to RE. 81% of the radiologists were supportive of radiographers injecting contrast media. The study highlighted a significant variation of radiologists' opinion on opposing reporting images and supporting injecting contrast media. This could be justified by higher skills and education requirements to report diagnostic images comparing to injecting contrast media. However, the results from using the ordinal scale may be broad and not specific as the information gathered from the participants and their responses are often narrow in relation to the question, creating or magnifying bias that is not factored into the survey (Merbitz 1989). The data gathered could be strengthened by adding comments to allow the participants to explain their response.

Similarly, Moran and Warren-Forward (2011b), conducted a quantitative analysis study investigating the attitudes of breast-screening radiographers in Australia toward mammography screen readings, also determining other areas of interest in RE. A total of 253 out of 325 completed a questionnaire. The study revealed that 185 out of 253

radiographers (73%) would like to experience more variation in their work. Furthermore, most of the radiographers showed interest in undertaking more responsibility if they received appropriate training. Many of the radiographers moreover were interested in image interpretation above other areas in mammography. Interestingly, a low level of confidence acts as a barrier to radiographers taking on more responsibilities in BCS units. The results of the study have been strengthened by the high response rate of 78%. Portney and Watkins (2009) highlighted the importance of a high response rate to generalise the findings of the study and revealed that to generalise a study, it is important that the responses of sample participants are representative of the target population. In Moran and Warren-Forward's (2011b) study the approximate number of radiographers undertaking mammography were 300-350 and receiving 253 responses to their survey was a strength in their study.

As a continuation of Moran and Warren-Forward's work (2011b), Moran et al. (2013) conducted a qualitative analysis study to explore perceptions and opinions of Australian radiographers toward the RE of radiographers. The study included Australian radiographers who had completed their Certificate of Clinical Proficiency in Mammography. The survey included two main open-ended questions: "what are your thoughts of role extension in mammography?" (Moran et al. 2013, p. 131) and "have there been any important changes to your role within the last 5-10 years?" (Moran et al. 2013, p. 133).

Five main themes emerged for the first question: current workforce advantages (flexibility and skilled work), current workforce concerns (ageing workforce and radiographer shortage), potential workforce concerns (may increase the shortage of screening staff and litigation), potential workforce advantages (increased job satisfaction and alleviate radiologist shortage), patient care (maintain standards of care and reduce waiting time for the results). Similarly, five main themes emerged for the second question: technology (introduction to digital and computer literacy), duties (ultrasound and increasing responsibilities), patient care (less time with the patient and increased knowledge), flexibility (promotions and reduce work hours), and others (interaction with radiologists and distance a barrier). Although the study captured significant themes that clarify the current situation of Australian radiographers,

conducting one-to-one interviews with radiographers will allow more understanding of their opinions and perception towards RE. Furthermore, interviews allow the researcher to prompt the participant to explain and elaborate further, which may add valuable data to the results of the study. Additionally, the two questions were insufficient to achieve the research aim; other questions may add more value to the data gathered, such as exploring the areas of interest of RE in mammography, explore the barriers and the drivers and the current scope of practice in mammography.

Similar to KeKana et al. (2015) and Moran et al. (2013), Forsyth and Robertson (2007) conducted a quantitative study to survey the perceptions of the Scottish radiology community in relation to radiographer RD. Their study showed that the radiologists supported the RD of radiographers, that extending the role of radiographers would reduce their workload and would benefit radiography. However, 41 out of 132 (31%) radiologists showed concerns with losing control of professional boundaries, while 23 out of 132 (17%) radiologists showed a lack of trust in the radiographers' abilities in their RD. However, an understanding of such perceptions, thoughts and beliefs requires a qualitative study method (Merriam 2002). Using a qualitative method could allow the researcher to gain an in-depth understanding of radiologists' perspectives of radiographers' RD. Additionally, a qualitative approach with the help of thematic analysis may identify perceptions of the radiology community in relation to radiographer RD more clearly (Holloway and Wheeler 2002).

Howard (2013) conducted a qualitative exploratory study to explore the perceptions of community hospital-based radiographers in rural Aberdeenshire regarding their practice of commenting on musculoskeletal trauma images. A total number of eight radiographers were purposively selected to participate in one focus group and two semi-structured interviews. The author justified the sample size as being adequate to reflect the views of the study population. It has been argued that qualitative studies are conducted to gain an understanding of underlying reasons, opinions, and motivations, and a sample of eight participants was adequate to fulfil the aim and the approach of Howard's study. The study showed that all the participants perceived that commenting on musculoskeletal trauma images would be the driver for the RD of radiographers and it increased their job satisfaction. In addition, half of the participants claimed that the

radiologists were unsupportive of radiographers commenting in the community hospitals. This study was strengthened by combining the use of individual interviews and focus groups, as the focus groups could build a knowledge base that could be further explored in depth using one-to-one interviews (Ritchie and Lewis 2003).

Research by Brealey et al. (2002) explored the attitudes of different healthcare professionals towards radiographers reporting A&E films. Their focus was to identify the perceptions of radiographers, casualty consultants, radiology divisional managers and consultant radiologists towards radiographers' reporting A&E radiographs. Their strategy was to send questionnaires with Likert scales to professionals involved in the A&E reporting service. The study also involved open-ended questions. A total of two radiographers, two A&E consultants and three radiologists completed the questionnaire and the qualitative sections. Using open-ended questions was helpful for the study as it allowed participants from various professions to explain their responses to the questionnaire. The open-ended questions were well structured and supported the aim of the study:

- *How has radiographers reporting A&E films affected your workload?*
- *Should radiographers' reporting roles be expanded?*

(Brealey et al. 2002, p. 32)

The study highlighted that the radiographers showed interest in extending their role in reporting. In contrast, A&E consultants and radiologists achieved the lowest score in this question and opposed radiographers reporting. With regard to workload, both radiographers commented that extending their role in reporting would increase their workload and in contrast, it would only free up a little time for the radiologists. Radiologists and radiographers shared the opinion that radiographers RE and reporting could result in de-skilling radiologists. The participants highlighted that the reason for opposing radiographers RE is that it requires medical and radiological training to be able to report. The authors highlighted that the study could not be generalised as the participants were from one hospital. However, the study also could arguably not be generalised across the target hospital as the radiology divisional manager and also two radiologists failed to return the questionnaire.

Research by Elkhadir and Saeed (2018) aimed to provide a deep insight into the issue of image reporting by Sudanese Diagnostic Radiologic Technology Specialists (DRTSs) working in Kingdom of Saudi Arabia (KSA). This was a quantitative study, where 34 radiographers completed a questionnaire through the Facebook page of Sudanese DR technologists. The researchers also sent the survey link to the available email on the Facebook page. Although the researchers highlighted the response rate which was 67%, there was no clarification of the total number of the targeted population. Also, no power calculations were mentioned, which may have affected the generalisation of the study. The questionnaire involved both closed and open questions; however, they did not reflect a deep insight into the different experiences of DRTs who had a license to report diagnostic images in KSA. For example:

An estimated number of the written reports by the radiographer?

A total number of written reports per year?

Did you write any wrong reports?

Does the ability to succeed in image reporting depend on making extra personal efforts to improve knowledge or is the curriculum sufficient to allow this?

(Elkhadir and Saeed 2018, p. 145)

Elkhadir and Saeed previous questions reflected poor phrasing and did not add valuable and deep insight to the experience of DRTs on image reporting. The study revealed that most of the radiographers gained their reporting experience through personal efforts and that half of the responses highlighted that they had made incorrect reports. However, the study in general was poorly designed. Adopting a qualitative phenomenological approach may add valuable data (Savin-Baden and Major 2013) through exploring the lived experiences of image reporters in a country that has not yet established the RE of radiographers.

Research conducted by Culpan (2016) for the NHS in the UK, described the characteristics and practices of radiographers who interpret and report mammography images in NHS hospitals in the UK, in particular, to establish the extent of their practice beyond low-risk asymptomatic screening cases. A quantitative cross-sectional survey

using a self-administered questionnaire was used. It has been argued that differences in the understanding and interpretation of the self-administered questionnaire may affect the quality of the collected data where the participants may provide answers that do not actually reflect their opinions as a result of their misunderstanding (Creswell, 2014). However, the author strengthened the collected data by providing free text response boxes which allowed the participants to clearly and freely express their opinions and beliefs. The results highlighted that the participants were practising various types of mammography image interpretation such as mammography and BCS image interpretation, reporting biopsies, and performing a surgical specimen surgery. The study also showed that the majority of participants commented that they were involved in decision-making, either by being involved in the discussion with the medical team to make a decision or by casting votes to make the decision. Interestingly, RE in mammography is developing faster and better than other imaging modalities in the UK; the reason may be the high awareness of BC and the effort to improve the quality of breast diseases services associated with extending the radiographers' role in mammography services.

The study revealed that the majority of the participants were qualified to report mammogram images and to perform US and clinical examinations. However, the researcher highlighted that it was difficult to calculate the actual number of the radiographers involved in mammography image interpretation and reporting, therefore the response rate was not calculated, which may have affected the generalisability of the study. This study could be strengthened by using qualitative focus groups which would allow the generation of more detailed and in-depth data in regard to their roles and responsibilities in mammography image interpretation and reporting. It has been argued that using a qualitative focus group data collection tool with a focus group approach encourages participants to engage with each other and debate the subject matter so that their opinions become evident (Kitzinger 1995). Reasons for choosing interviews instead of focus groups for the current research will be discussed in depth in the methodology section (5.7.2).

In contrast to the UK and the USA, where the RE of radiographers has been established, the law in South Africa still restricts the radiographer's scope of practice. Gqweta (2012)

conducted a study to explore the current role of South African radiographers within clinical practice and to highlight challenges and gaps that may advocate their RE. Interpretive qualitative research using questionnaires was conducted to explore the lived experiences of radiographers working in primary healthcare centres in South Africa. A total of 26 radiographers out of 35 working in primary healthcare completed the questionnaires; that indicates a high response rate which strengthens the data gathered from the study. The author also highlighted themes that emerged from the study. The first is medico-legal aspects, where the majority of the participants indicated their willingness to provide a verbal opinion about diagnostic images, but the restriction of the legislation was a barrier. The second theme was education, where the radiographers indicated that their knowledge and skills were insufficient for report writing and image interpretation. Another interesting theme highlighted the benefits of radiographers' reporting; the participants mentioned that radiographers' RE would reduce patients' waiting times, enhance radiographers' job satisfaction and improve service delivery. The study has been enforced by the use of an interpretive qualitative method, which is an appropriate approach to explore the lived experience of phenomena (Savin-Baden and Major 2013). However, the use of questionnaires may be the main limitation of Gqweta's study, as his ability to ask prompt questions, notice body language and make deeper interpretations was limited, which could have been assessed using the interview approach (Savin-Baden and Major 2013).

Henderson et al. (2016) conducted a study to understand the impact of changing roles, skill mixing and the shortage of consultant radiologists on the profession of DR in Scotland. A total of 103 UK NHS acute and community hospitals and eight private hospitals were included in the study. The questionnaires were distributed to the lead radiographers in these hospitals. Only 42 hospitals responded to the questionnaire, giving a 36% response rate. A low response rate may have affected the reliability and validity of the study because of the non-response bias (Fincham 2008).

All the participants from phase one were invited for telephone interviews, but only eight participants (three from urban hospitals and five from remote hospitals) agreed to take part. The results highlighted that US was described as an established and advanced area of radiographers' RE. The majority of the participants mentioned that the radiologists'

resistance was the main barrier for them to extend and develop their role. The study also identified a number of barriers to post-qualification education such as lack of supervision, lack of support from radiologists, lack of interest from radiographers and insufficient training budgets. Despite the low response rate, the study was strengthened by using a mixed-method approach which provided a comprehensive understanding of the spectrum of DR across Scotland.

Williamson and Mundy (2010) conducted a descriptive cross-sectional survey to assess graduate radiographers' expectations for RD. The study sought to explore the potential impact of a misalignment of these expectations and their effect on service delivery and staff retention. A total of 36 purposively selected final-year radiographers completed the questionnaires. Results revealed that all the students expected their role to be extended and developed between two to five years and that they had the same opportunities and chances for RE and development. Furthermore, the results indicated that 30 participants linked job satisfaction with extending their role. The authors acknowledged that their aim was not to generalise either the results or the statistically representative sample of the population of radiography students, it was to investigate the RD expectations of graduate radiographers. However, adopting qualitative interviews would allow the researcher to gain valuable in-depth data to understand such phenomena and allow the students to express themselves and their expectations.

The literature review highlighted that one of the primary reasons and drivers for countries led by the UK to extend radiographers' role is the issue of radiologist shortage. The evidence at present showed that radiographers are capable of performing extended role tasks with no significant difference to radiologists. Furthermore, the literature demonstrates that extending radiographers' role alleviates the issue of radiologist shortage and reduces the radiologists' workload. Additionally, the literature highlighted that extending radiographers' role enhanced the quality of the healthcare services by reducing patients' waiting time and speeding up their diagnostic process. However, the majority of studies indicated that the main obstacles for extending radiographers' role are radiologists' resistance and insufficient training and education. Despite the fact that these obstacles are evident worldwide, there is a dearth of literature exploring reasoning and justifications for these obstacles. Moreover, despite the radiologist

shortage in Kuwait and the arguably severe shortage of Kuwaiti nationals working as radiologists, extending the radiographers role has not been considered as a solution to overcome this issue. Therefore, this study was one of the earliest studies to fill this gap within the literature. It aimed to investigate the attitudes and opinions of radiographers and radiologists in Kuwait towards the RE of radiographers in mammography, using a theoretical lens to provide an in-depth understanding of the participants' opinions and attitudes.

3.11 Further evidence

It is important to maintain an overview of literature throughout a study, being up to date, thus a further search was conducted towards the end of the study. This utilised the same approach as discussed earlier in the chapter (section 3.3). Three papers had the most relevance for this study. The importance of these papers was driven mainly by the geographical and cultural similarity to Kuwait. These studies were conducted in the Middle East, particularly in Oman and the United Arab Emirates (UAE), within the Gulf Cooperation Council (GCC) which consists of six countries, Kuwait, KSA, Bahrain, Oman, Qatar and UAE. Khoja et al. (2017) highlighted that GCC governments shared significant investments in healthcare infrastructure, which was observed in the past 25 years in the form of large medical complexes. Arguably, such cooperation between GCC countries including Kuwait, made it important to explore the situation of radiographers' role in these other countries.

At the beginning of conducting this study, the research highlighted an issue around the dearth of literature about extending the radiographers role within the region of the Middle East. However, updating the literature resulted in these related papers, which have added an important insight into the situation of radiographers' RE in the region.

Al Shiyadi and Wilkinson (2020) conducted a study to investigate the involvement of radiographers in RE activities in Oman and explore radiographers' and radiologists' attitudes towards radiographers' RE. A total of 152 out of 189 radiographers and 49 out of 77 radiologists from 13 major hospitals in Oman completed a questionnaire about current and future possibilities of radiographers' RE. The study highlighted that 53% of the radiographers revealed that they are performing an extended role, of these the most

common is in gastrointestinal and barium enemas examinations. Only 8.9% of radiographers indicated their involvement in US, while 21% of radiographers indicated their involvement in image interpretation, mainly in A&E images. The majority of radiologists supported radiographers' involvement in the extended role, however, they excluded mammography, NM, US, CT and MRI. Radiologists and radiographers highlighted that it is in the radiologists' role to train radiographers for RE, and radiologists showed positive responses in being involved in radiographers' training and education. The study also revealed that radiologists were supportive of extending the radiographers' role under the radiologists' supervision. The study was strengthened by a high response rate of 75.5%. However, this study did not illustrate whether or not the radiographers' engagement in performing extended roles is formal and authorised. Furthermore, the study did not provide details about the nature of the extended role that radiographers are involved in. It was also unclear about the extent of autonomy for radiographers performing these extended roles. Additionally, there was no explanation for the radiologists' opinion about excluding radiographers from extending their role in mammography, NM, MRI, CT and US modalities. Whilst the radiologists supported extending radiographers' role under their supervision, this arguably would not make an important difference in improving the quality of the service and solve the issue of the radiologist shortage. Therefore, using a qualitative study including individual interviews as the case in the current research could clarify important aspects of both radiographers' and radiologists' opinions about radiographers' RE.

Abuzaid et al. (2020) conducted a study in the UAE to assess the readiness and perceptions of radiographers working in mammography screening to accept RE and advanced practice. A total of 45 radiographers were asked to participate in the study and answer the online survey. The study showed a high response rate of 71% of radiographers. 81% of radiographers showed interest in extending their role after receiving formal training and qualification supported by academic institutes. 70% of radiographers showed interest to extend their role on image interpretation, 20% on breast US although only 10% showed interest to perform core biopsies and localisation. 55% of the participants highlighted that extending their role in mammography will increase their job and self-satisfaction. The study was limited to a small sample size,

however, the authors revealed that it was difficult to determine the actual number of radiographers undertaking a screening role in mammography. Furthermore, the authors did not mention the gender of the participants, as this is an important concept in practising screening mammography worldwide. Additionally, the engagement of radiologists and conducting qualitative research would have strengthened the study's outcomes and gain an in-depth understanding of radiographers' attitudes towards extending their role in mammography.

Furthermore, Abuzaid et al. (2021) found that radiographers in the UAE are facing challenges in training for continuing professional development as most of it is provided by the equipment vendors when installing new machines and system updates. However, 83.8% of radiographers revealed that they received training within the modality of CT, while there was no information about mammography training and education. The study also highlighted that radiographers are involved informally in RE and advanced practice (autonomous decision making). They indicated that they perform contrast media injections, support physicians with a verbal report for x-ray images and CT head images and informally perform barium swallows and meals. The study also showed that 69.7% of the participants are aware of the UK achievements in radiographers' RE and advanced practice. They concluded that there is a need for a professional body, as in the UK and Australia, to defend the development of radiographers' role. However, the authors did not add adequate details of the reasoning behind needing a professional body to defend radiographers RE, nor the challenges and obstacles that face radiographers to extend their scope of practice. This study could be strengthened by the involvement of radiologists in the study, which would enable the researcher to address challenges that face radiographers to extend their role, from two different perspectives.

3.12 Summary of the chapter

In this chapter, the relevant literature has been reviewed and the gap within the literature has been explored. The literature about the historical context and drivers of radiographers RE was explored. The researcher then moved to identify areas for extending the radiographers role in mammography and literature around changing radiographers' roles. Subsequently the researcher looked to explore literature that

evaluated radiographers' performance on RE followed by the impact of radiographers' RE and radiographers' and radiologists' perceptions towards extending radiographers' role. Towards the end of the study, the literature was revisited and updated with three papers giving further insights on the subject of extending the radiographers role within the GCC, as discussed in section (3.11). The next chapter will discuss a theoretical framework, and how it enabled deeper interpretation and investigation in occupying gaps within the literature.

Chapter 4: Theoretical framework

4.1 Theories, and the way they contribute to research

Alderson (1998) acknowledged that theories are integral to healthcare research, and it is essential for research and practice. It has been argued that recognition of the theoretical framework is a significant part of the research as it acts as a lens through which the researcher evaluates the research problem and research question (Waddington 2012). Developing a theoretical framework for PhD research helped to organise, guide and manage the study (Green 2014). The researcher will need to underpin the knowledge in the research area and developing a theoretical framework may help the researcher to help achieve remarkable outcomes (Sinclair 2007). Grant and Osanloo (2014) highlighted that the theoretical framework helps to explain and construct the study.

Although the shortage of radiologists is a worldwide issue and extending the radiographers' role was proposed as a solution to solve this issue more than twenty years ago, the progression level of RE is slow. One of the reasons for the slow progression may be radiologists' resistance to protect their role, which is well identified in the literature (Brealey et al. 2002; Henderson et al. 2016; KeKana et al. 2015). The literature highlighted that the main obstacle of radiographers RE is radiologists' resistance, however, there was no explanation behind the reasoning of such resistance. Using Abbott's (1988) theory may help to expand and explain this. There is a need to present a theoretical framework to allow deeper understanding and contribution in occupying the gap in the literature.

4.1.1 Abbott's perspective

Theory of professions

Abbott (1988, p. 8) defined professions as "exclusive occupational groups applying somewhat abstract knowledge to particular cases", while professionalism is "a skill that can be practised and learned over time" (Kanter et al. 2013 p. 87). Siegrist (1990, p.177) defined professionalisation as "divergent processes which occur within institutions of

learning, the division of labour, the economic market, and areas of political and social power to generate an end result known as profession". Indeed, the allied health professions such as physiotherapy, radiography and occupational therapy are in different stages of developing their occupational control and professionalisation to achieve complete control of their work. For instance, the allied health professions, particularly the radiographers in Kuwait have limited autonomy within their work and limited scope of practice. However, the high demand for the service opens doors for healthcare professions such as radiography to extend their role and blur boundaries between them and medical domain practitioners such as radiologists.

Professional boundaries have been one of the leading interests of most healthcare professions studies (King et al. 2015). Following Abbott (1988) in the system of professions, the nature of the relationship between professions and the forces that framed these relationships are well defined. Abbott (1988), further supported by Tolbert (1990), highlighted that professions appear in a complex system, in which each profession competes with each other to defend their jurisdictional boundary. He also suggests that professional boundaries are drawn when a group of people within a profession demarcate their field to maintain jurisdiction over their scope of practice and protect their role. From previously reviewed literature, radiologists' resistance may be an act to maintain the control of decision making within the radiology and radiography context. Abbott (1988) revealed that professional boundaries can be shifted by a contradictory role of professional-based knowledge and constant battles. In the current study, the researcher aimed to use Abbott as a lens to clarify and understand both radiologists' and radiographers' attitude toward changing the radiographers' role and blurring the boundaries between the two professions.

Abbott (1988) also argued that professionalism itself produces a way where professions can climb upward alongside other professions for status and power. Indeed, literature highlighted cases of radiographers who have claimed to extend their role due to their desire to improve their decision-making status, power and job satisfaction. This demonstrates how theories support the literature and this study is an example of boundaries being one of the challenges. The power of the professions' knowledge system is when the profession has the ability to develop abstract knowledge, using this

knowledge they then can claim new roles. Philosophically, the difficulty for radiographers to claim extending their role is not that they do not have the skills for it but because they do not have the abstract knowledge. From Abbott's perspective, if radiographers developed their abstract knowledge, then they will become in a position to claim to extend their role.

Larkin (1983) described the historical relationship between medical professions and allied health professions as occupational imperialism. Yet, after 38 years, such description could still be applied to the relationship between medical professions and allied health professions (Braithwaite et al. 2016). From the researcher's clinical experience and personal observation, Larkin's perspective can be noticed between radiographers and radiologists in Kuwait. Larkin (1983) highlighted that radiographers are excluded from diagnostic tasks and image interpretation. He added that radiographers work under routine supervision and control of radiologists. This, however, is not the actual current situation in some countries, such as the UK, that showed progression in extending radiographers' scope of practice. In contrast, the situation in Kuwait is similar to what Larkin described 38 years ago, in which radiographers work under radiologists' supervision with minimum autonomy.

4.1.2 Power and jurisdiction

A significant question raised by Abbott is: where do professions like medicine get their power? He argues that the control of knowledge enabled professions such as medicine to have power against outsiders. This ties in well with Larson (1990) who linked knowledge and power, she suggested that all professionals or professionalising phenomena must be theoretically linked to the social production and certification of knowledge (Larson 1990, p. 25). It is worth mentioning that after 28 years, Larson published a self-criticism paper on some of the concepts of her older work. However, she highlighted a similar opinion in regard to the certified knowledge when she defended the concept of the importance of certified knowledge for 'knowledge-based occupations' (Larson 2018). Indeed, the involvement of radiographers in extended roles in mammography in the UK is well established and highlighted a remarkable success. This success opposes Larson's perspective of the importance of having certified knowledge to practise extended role.

According to Abbott, the ethics codes were framed and drawn to exclude outsiders, this means that codes of ethics were created to be barriers to maintain exclusivity. He explains that the real concern is not the ethical dilemmas, the real concern is about marking the professional boundaries. Indeed, the codes of ethics are used as a political document to essentially protect the role or profession from encroachment or infiltration from other professions.

Abbott (1988) highlighted that jurisdiction is a tie that bonds the tasks of all professions and the strength and weakness of the tie are controlled by the process of the existing professional work. Jurisdiction can be explained as the official power for making decisions and determining the process of the occupation to become a profession. Abbott (1988) and Tolbert (1990) highlighted the significance of protecting the occupational jurisdiction and the importance of competing to maintain control over the profession's jurisdiction. Substantively, radiography and radiology are two professions that are prone to interprofessional conflict. Adams (2014) revealed that interprofessional conflict occurs when two professions share a related scope of practice with a continued contest for benefits, decision making, autonomy and responsibilities. According to Abbott (1988, p. 19), this is the conflict which is called the "*interplay of jurisdiction*". This interaction between professions determines the growth and the development of each profession itself as the profession develops because of this jurisdiction and clashes. When applying Abbott's (1988) perspective to the radiography profession in Kuwait the absence of this interplay of jurisdiction may be the reason for the absence of the concept of extending radiographers' role in Kuwait.

Abbott (1988) highlighted that interprofessional competition is very important for professional life continually encouraging and defending. Throughout the literature and in this study, Abbott's theories gave weight and substance to the findings. Professions exert control over their domains and in some circumstances, control over other professions. This may be exemplified by the situation between radiographers and radiologists. Using Abbot (1988) helped to explain the internal conflict and supports findings from the literature. Indeed, the radiology profession has control over radiography professions as the radiologists have the role of making the clinical decisions while radiographers perform a technical role such as positioning the patients and

producing diagnostic images. However, this cannot be applied to radiography professions worldwide because some radiographers have extended their role as mentioned previously in the literature review. In his book, Abbott (1988) highlighted that to understand how professions interact with each other there is a need to explore the conflict between them. Even after 32 years, the same issues are unfolding. Indeed, conflict may occur between physicians and radiographers, surgeons or physicians and healthcare professions. Ramsay (2001) highlighted that the conflict between professions negatively affects patient care and productivity. Yelder (2006) indicated that having authority due to one's position may lead to an attitude of power. She also added that the power attitude a result of a person's ego, could be a defence mechanism used by people who are anxious and less confident. Indeed, this may explain part of radiologists' reasons to resist blurring boundaries and allow radiographers to perform an extended role. Extending radiographers' role and crossing boundaries could affect radiologists' identity as they will be sharing tasks with radiographers who are not doctors.

In the current research, the conflict is between radiographers and radiologists, as the radiographers would be extending their role by handling tasks that are at present under radiologists' control, for example, image reporting and performing breast biopsies in mammography. This conflict between the two professions may be the focus that led to the radiologists' resistance to radiographers changing their role. Arguably, the existence of professional conflict draws the line between each professional task to protect it from blurring into one another (Abbott 1988). Abbott (1988) suggested that professions do not claim jurisdiction because they initiate it. It is more likely to deal with the fact that the previous profession has lost control over it or gave it up voluntarily or has done a poor job in it. Indeed, the radiologist shortage may have negatively affected the quality of the service provided, causing delays in reporting radiographic findings as mentioned in the literature. In this sense, radiographers' RE is perhaps a phenomenon that emerges due to a change in jurisdiction. If what Abbott (1988) said is true, then it will be hard for radiographers to extend their role if radiologists are not willing to blur the boundaries or share their role with radiographers. However, from Abbot's (1988) perspective, radiographers' RE could be possible because of the negative effect of radiologists' shortage on the service provided.

4.1.3 Knowledge

According to Abbott (1988) and LaMere (2012), abstract knowledge is what builds up and makes a profession alongside the techniques used by the profession. In the current research, the abstraction of knowledge is mainly under the control of radiologists while the technique is under the radiographers' control. For radiographers to be able to extend their role they need to extend their knowledge base into that of the radiologists. Indeed, radiology is a profession that is also a sub-profession categorised under medicine, while radiographers only have diagnostic radiography as their occupational knowledge base. Philosophically, from the researcher's point of view, the reason why radiographers claim to extend their role is that their profession stands on its own and achieving RE would mean a more secure position for them as a profession, unlike radiologists who have a strong secure job as their profession is rooted in them being physicians.

In the eyes of Abbott (1988), radiography may not be considered a profession because it has no abstract of knowledge, and the type of knowledge that radiographers have is part of radiologists' knowledge. In a way, this may be similar to Glazer's (1974) perspective. According to Glazer (1974), the professions can be divided into two categories, major professions and minor professions. From his perspective, the major professions possess a specific body of knowledge which is gained by formal education with some power controlling the access of the profession, such as medicine and law, while minor professions are other professions for example radiography and occupational therapy in the healthcare field. Although this perspective is 45 years old, his division of minor and major professions can be applied in Kuwait particularly, where within the medical field and healthcare professions, only medicine is identified as a major profession whereas all other professions are assistant and subordinate to it. The recognition of the major professions is based on the specific body of knowledge; these professions emerged from within the society because they have the knowledge that society requires to solve the problems the society is facing. In contrast, minor professions are minor because they do not have their own exclusive knowledge base; the body of knowledge of minor professions is a combination of knowledge bases from other professions. Indeed, within this concept of professionalisation, radiologists are

considered major professions, sitting above minor professions like radiographers in the medical/healthcare hierarchy.

Additionally, Glazer (1974) described the major professions as free professions with professionals who are working independently with the privilege of autonomy. Glazer (1974) did not take into account that some other professions such as radiography have a specific body of knowledge. Indeed, the education, knowledge and skills of radiographers are unique to their profession, for instance, the radiologists in Kuwait (or in many other countries) do not have the knowledge of the proper positioning of the patients to produce high-quality diagnostic images and they do not have the knowledge of operating medical imaging equipment. However, the privilege of autonomy and acting independently is not necessarily associated with the scope of radiographers' practice, especially in Kuwait where the radiographers are performing a limited role under the control of radiologists, despite the issue of radiologist shortage.

Glazer's work (1974) has been critiqued by Schön (1983) as he explained that minor and major professions are not shaped like Glazer's perspective, all professions apply different types of knowledge, explicit knowledge and implicit knowledge. Explicit knowledge is the knowledge gained from textbooks and lectures, while implicit knowledge is the knowledge that cannot be gained through books and lectures but from professional instinct and experience. Glazer (1974) concentrated only on explicit knowledge while Schön (1983) concentrated on both sources of knowledge. Indeed, during clinical work technical knowledge cannot stand on its own without implicit knowledge or professional experience. For instance, in the hospital, each patient is a unique case that requires a special protocol or a plan to complete the imaging procedure. Based on this researcher's clinical practice, some obese patients in mammography require special techniques in positioning to produce high-quality diagnostic images and some of such solutions are not taught in the radiography curriculum. The skills were gained from the clinical experience from dealing with different kinds of patients. The knowledge base on which professional judgment is formed is what makes each profession unique. On one hand, each profession has technical knowledge that Glazer explained, and on the other hand, professions have a different set of values/skills. For example, both radiologists and radiographers have a

different set of professional values and skills, those of radiologists are image interpretation and producing diagnostic reports, while the radiographers' task is producing a high-quality diagnostic image with the least radiation dose possible.

Schön (1983) explained that each profession uses its technical knowledge alongside the set of values or implicit knowledge which creates a professional identity. Indeed, the unique knowledge base plays a significant role in how we differentiate professions. Extending the radiographers' role requires the education and training of radiographers to perform extended tasks and handle responsibilities that are originally under the radiologists' scope of practice. This may lead radiologists to lose or/and share their knowledge base, challenging the radiologists' professional identity, autonomy and their own recognition as a unique profession.

The aim of the current research was to investigate the attitudes and opinions of radiographers and radiologists in Kuwait towards the RE of radiographers in mammography. The study involved interaction between two professions, blurring boundaries and mixing skills, therefore a broader theory was needed for better understanding, and this was found in Abbott's theory of professions. This included three main concepts used by the researcher: the system of professions, knowledge and power. The three concepts provided a useful framework that enabled the researcher to examine radiographers' and radiologists' attitudes towards radiographers' RE and understand the reasoning behind their opinions in light of the theoretical framework.

Abstract knowledge is the formal academic knowledge needed to perform a role or profession (LaMere 2012). According to Abbott (1988), abstract knowledge is a type of knowledge that does not reflect the actual complexity of the work. For example, radiography teaching is based on gold standards and patient-centred care, which all fall apart when radiographers move from the learning stage to the practice stage, where there is no time, ability and space to apply the learned gold standards (Job et al. 2019). However, practical knowledge is implicit knowledge, most of the radiographers' applicable knowledge is based on clinical experience and practice. Indeed, to train radiographers to perform RE they need practical knowledge, however, even if radiographers are trained to perform the extended role they will not be treated as experts because they do not have the same abstract knowledge as radiologists.

Therefore, radiologists are still differentiated from radiographers because they hold abstract knowledge and the practical professional knowledge that is required for these extended roles. Furthermore, radiographers need formal training to extend their role. If radiologists would provide radiographers with the training needed, according to Abbott's definition of the profession, they will slowly lose their claim on their jurisdiction, and perhaps this may result in the erosion of this jurisdiction over time. Interpreting Abbott's perspective in the context of radiology and radiography, when jurisdiction is lost from radiologists, radiographers and radiologists begin to share similar roles in decision making and control over work. This, therefore, makes it challenging for the radiologist profession, because sharing decision making with radiographers poses a threat to their professional identity. This may be one justification for the strong resistance from radiologists to protect their identity and oppose radiographers' RE over the past decades.

4.2 Foucault's perspective of power

The discussion of power and knowledge cannot exclude Foucault's (1976) canonical work. Indeed, the researcher believes in the importance of mentioning Foucault's perspective when talking about power as he is one of the most famous philosophers who primarily concentrated on the relationship between power and knowledge (Foucault 1991). Foucault focused on how knowledge about the world and oneself shapes and disciplines one. He highlighted that the theory of knowledge and power are intimately linked and concentrated on how power functions and how power and knowledge change their shape over time. According to Foucault (1977, p. 27): "there is no power relation without the correlative constitution of a field of knowledge, nor any knowledge that does not presuppose and constitute at the same power relations". In the context of the current research, the power of radiologists over radiographers is associated with their rich medical education and knowledge comparing to radiographers' knowledge.

To understand Foucault's perspective, two kinds of power will be discussed, repressive power and normalising power (Foucault 1990). Repressive power can be explained as a visible and clear practice of power such as judges making decisions and one country

ruling other countries using superior military force. From Foucault's perspective, repressive power forces one to what one does not want to do. In contrast, the normalising power, which is a less explicit demonstration of power determines what one sees as normal. Normalising power makes one do what one is expected to do, what society expects of one and what one has been taught to do and practice. This kind of power construct controls one's view of the world and oneself. Normalising power directs people's attitudes to do things they believe in, such as hierarchy and their desire to climb this hierarchy. Normalising power is everywhere, it is in families, schools and hospitals.

Indeed, normalising power is found between radiographers, radiologists and also patients in their daily basic communications. Radiographers are practising power, for example, during mammography examinations, through positioning of patients, giving them the instructions and controlling the mammography machine. Patients also practise power, by not attending for their appointment. Additionally, radiologists practise power through controlling the process of decision making and diagnosis.

Foucault (1990) illustrated important ideas of the concept of power that could be applied to understand the current research, however, Foucault's perspective was not applied in detail in the current study as it is not concerned primarily about power, rather it is concerned about the individual professions and professional identity. Power is only one element of the wider picture of the professional conflict between radiographers and radiologists. Therefore, Abbott (1988) appeared more appropriate for this research as a theoretical framework because of his perspectives on jurisdiction, professional boundaries and knowledge. Furthermore, Abbott's perspective highlighted an appropriate interpretation of power and jurisdiction between radiographers and radiologists, which suggests a more applicable theory to primarily use in this study rather than Foucault. Additionally, using Abbott's perspective of power and jurisdiction enabled the researcher to explore the concept of professional identity as an assistant concept and use it as a driver for practising power between radiologists and radiographers. Foucault's perspective is useful for understanding power in the current research; however, it is insufficient to serve as a broad theoretical framework for his research, therefore the researcher chose Abbott (1988) as the underpinning theoretical framework.

4.3 Freidson's theory

Freidson (2001, p19), a medical sociologist, defined professionalism as *"a set of institutions which permit the members of an occupation to make a living while controlling their own work"*. He highlighted that professionalism is an effective way to manage the work when the quality of the performed tasks does not meet the required standards (Freidson, 2001). This element is applicable to the central construct of the current research, where extending the radiographers role was one of the proposed solutions to enhance the quality of the service provided, which appears negatively affected by the shortage of radiologists. Freidson (2001) highlighted that the knowledge, and type of skills, is a core of professionalism and that professions are characterised by three factors: technical autonomy, knowledge/expertise and formal education. However, Freidson criticised Abbott's perspective of not suggesting a specific process of professionalisation (Freidson, 2001). It has been argued that Abbott's theory analysed *"the process by which occupations gain, maintain, adjust, and even lose their exclusive jurisdiction over particular tasks and the critical, largely functional factors involved in that process... His focus is primarily on the relation of occupations to each other in a division of labour, with the forces influencing their jurisdictional boundaries establishing their official and social identities as well as their economic fortunes. He does discuss the social, economic, and symbolic sources of challenge and support"* (Freidson 2001, p11).

The aim and the objectives of the current research suggest that Abbot's theory and his method of concentrating on occupations, maintaining jurisdiction and professional identity may serve a better theoretical lens to investigate the attitudes and opinions of radiographers and radiologists in Kuwait towards the RE of radiographers in mammography. Although Freidson's theory is remarkable within the medical sociology field, Abbott's work fits better in regard to the researcher interests around the concept of skill mix and extending the radiographers' role.

4.4 Professional identity

This section discusses ancillary concepts not covered by Abbott but focuses on professional identity. The researcher believed that having these concepts was necessary for the current study, to draw an in-depth understanding of the radiographers' and radiologists' attitudes towards radiographers' RE and the reasons behind their opinions and the drivers and barriers of radiographers' RE.

Introducing the skill mix programme, extending radiographers' role and interprofessional practice showed improvement in the quality of the service provided reducing radiologists' workload and enhancing patient care. However, in their paper, McNeil et al. (2013) argued that interprofessional practice was found to cause information-withholding conflicts and negatively affect team performance. McNeil et al. (2013) illustrated that the problems of interprofessional practice are driven by threats to professional identities. Professional identity can be defined as:

“relatively stable and enduring constellation of attributes, beliefs, values, motives, and experiences in term of which people define themselves in a professional role”

(Schein 1978 as cited in Ibarra 1999, p. 765)

It has been argued that professional identity can be threatened under certain circumstances such as changing roles or blurring professional boundaries (Rees and Monrouxe 2018). Within the radiology context, the conflict may be exacerbated by blurring boundaries between radiographers and radiologists, radiologists and surgeons, radiographers and nurses and physicists and nurses. Blurring boundaries between radiographers and radiologists enables radiographers to extend their role and perform tasks that used to be within radiologists' scope of practice. These tasks are one of the radiologists' sources of power as acknowledged professional medical practitioners and part of their independent decision making. When radiographers extend their role, they will be able to independently report mammography images, breast US and perform biopsies. This will change their professional identity to it being closer to radiologists. Such an act may initiate conflict between radiologists and radiographers, which could cause radiologists to resist extending or supporting the radiographers' RE.

Golder (2017) highlighted that radiologists always struggle to ensure that their patients recognise them as physicians rather than technicians. Extending the radiographers' role could make the situation worse; when radiographers, who are arguably technicians, are also diagnosing images and performing stereotactic biopsies. Additionally, the researcher believes that the opportunity of radiographers' RE may be coveted by radiographers because of positives associated with the extension such as autonomy, decision making and job satisfaction. Furthermore, extending the radiographers' role will extend and develop their professional identity. Extending the radiographers' role will strengthen radiographers' professional identification and recognition, however, this will cross the line between radiographers, and a profession that has a strong professional identity as "doctors" and particularly, radiologists. Rees and Monrouxe (2018) argued that having a strong professional identity enables people to consider their values and how they are associated with professional codes of conduct, to patients and colleagues.

The formation of professional identity starts through the studying stage via formal and informal curricula (Rees and Monrouxe 2018). For doctors, the professional identity is formed by formal curricula including the learning of anatomy, communication skills and case presentation. In contrast, the informal source which is also called the hidden curriculum includes the institutional culture and structure of the workplace (Rees and Monrouxe 2018; Rothlind et al. 2020).

In Kuwait, there is a big difference between the factors that build the professional identity of radiographers and radiologists. Indeed, based on anecdotal evidence and the researcher experience, the formal and informal curriculum of radiographers' education resulted in the current weak professional identity of the radiographers. Regarding the formal curricula, during the three years of radiography education in Kuwait the radiography students are used to hearing phrases such as "you are technicians", you are "image takers", and "do not ever think that you are a doctor". Furthermore, during their clinical education and training, radiography students are taught not to argue with doctors about anything and always obey their instructions. Additionally, focusing on the hidden or informal curricula, one finds the importance of the culture at the workplace and the beliefs of the society who only appreciate and trust doctors. According to the

researcher's clinical experience, in Kuwait, society believes that the radiographers' role is only to "press the button" to produce x-rays. Such factors have negatively affected the formation of the professional identity of the radiographers in Kuwait. In contrast, radiologists have a strong professional identity that was formed from both formal and informal curricula. Extending radiographers' role would initiate the formation of a new extended professional identity that could result in blurring the boundaries between them and radiologists. The current research indicated that the main driver for the radiologists' resistance as shown in the literature review, is protecting their strong professional identity, which may also be the reason behind radiologists' acts of power.

4.5 Adopted theoretical framework

Although Abbott provided a significant view of the profession, professionalisation, professional boundaries, jurisdiction and power, the current research used it as a theoretical lens through which to guide this study's findings. This is in spite of the contentions of some points that were not considered by Abbott such as the concept of professional identity. This is an abduction process adopted by this research, which is seeking and finding a theoretical explanation or re-description of the phenomenon that has been explored (Braun and Clarke 2006). Within critical realism, the idea is that all theories could be proven right, partially right or wrong (Scotland 2012).

However, Abbott (1988) has been criticised for not considering the possibility of jurisdiction over professions and his premise is that jurisdiction is exclusive to one profession (Isaksson and Larsson 2017). Yet, this does not reflect the situation of the mammographic profession, particularly in the UK, and the successful progression of extending radiographers' role and the broader range of independent mammographic image reporting and decision making. Another critique about Abbot's work is considering each profession as a unit, meaning that all people under the umbrella of a particular profession act in the same way (Nolin 2008), which does not reflect the actual situation. Indeed, radiographers worldwide behave in different ways in different hospitals because of the context role limitations and the circumstances they find themselves in. For example, the situation of radiographers in the Middle East is not like the situation in the UK and the USA, and the situation in Kuwait is also not the same as

in KSA. Despite the cultural and religious similarities between these two countries, there is a difference between the scope of radiographers' practice, radiographers in KSA are performing US while radiographers in Kuwait do not.

Using Abbott's (1988) theory has helped expand the author's understanding of the issue within the context. Using appropriate theories helped evaluate the research question and clarify some of the findings and should give reliability to the findings of the study.

4.6 Summary of the chapter

Writing the literature review enabled the researcher to position herself in relation to other researchers and theories. Indeed, two repeated themes in the reviewed literature were the concept of professionalism and radiologists' resistance to extending radiographers' role. The in-depth literature search guided the researcher to develop a theoretical framework that formed the backbone of this research. This framework informed the design of the research, the research decisions made, and the way data was interpreted. In the following chapter, the methods and methodology that was used to conduct this research are discussed.

Chapter 5: Methodology

5.1 Introduction

Research methodology can be described as the process outlining the way in which the research is to be conducted (Green and Thorogood 2014). The purpose of this chapter is to describe the reasons and processes through which the research was conducted. This will feature a discussion about the research paradigm and philosophical standpoint, which includes ontological and epistemological assumptions associated with the study. This chapter also explains how the ontological and epistemological assumption guided the choice of methodology, which was a case study approach. Additionally, this chapter highlights detailed information about case study methodological approaches, methods associated with them and how this approach was used in the study. This chapter also illustrates the sampling process and data collection details as well as the process of data analysis and ethical considerations.

5.2 Research paradigm and philosophical standpoint

Researchers among all healthcare professions face a common issue associated with deciding the methodological approach. A variety of frameworks can be adopted to answer different types of research questions. The research paradigm enables researchers to decide the best methodology to gain the data needed to answer the research question. Understanding the research paradigm is important for PhD researchers to design rigorous research to answer the research question. According to Kuhn (1962), the research paradigm is shared beliefs and agreements between scientists about addressing and solving problems appropriately. Guba (1990) revealed that deciding the research approach is controlled by ontological, epistemological and methodological questions. Hudson and Ozanne (1988) defined ontology as the nature of the knowledge created by contextual understanding; while epistemology is how researchers attempt to understand and capture the nature of knowledge (Carson et al. 2001). Willig (2012) argued that researchers need to develop a reflexive awareness of the research questions they are asking, and that their choice of methodological

approaches are affected by their ontological and epistemological assumptions, more details of reflexivity will be discussed in section (5.14.5).

According to McManus et al. (2017), the ontology concept can be divided into two main categories: objectivism and subjectivism. The objectivist ontological perspective assures the existence of objective reality, and it can be understood through the laws by which it is legitimised (Kuhn 1962). In contrast, the subjectivist ontological perspective asserts that knowledge about reality is created by contextual and social understanding (McManus et al. 2017). McManus et al. also suggested that objectivism mostly associated with quantitative methodologies and measurement of reality while subjectivism is associated with qualitative methodologies and understanding societal viewpoints, which is appropriate for the current research. Epistemologically, there are three main philosophies to understand knowledge: positivism, interpretivism, and critical realism (McManus et al. 2017) (figure 4).

A positivist philosophical stance is appropriate if the research aims to gather numerical data and answer questions involving numerical precision using a quantitative method, such as a quantitative survey. According to Broom and Willis (2007), within a positivist framework, healthcare researchers can advance their knowledge and collect data using randomised control trials and retrospective cohort. They also highlighted that positivism has a deterministic feature, where the researcher lays down hypotheses from a scientific perspective and tests these hypotheses. Furthermore, researchers using a positivist paradigm need to maintain minimal interaction with the research participants; indeed, this is not possible for researchers who aim to understand their participants' thoughts and attitudes towards a particular concept, as in the current research.

In reverse, an interpretivist philosophical stance, where there is a shift away from observing participants and recording data objectively, seeks to understand participants and explore what is in their minds, using a qualitative methodology (Broom and Willis 2007). They explained the interpretivist philosophy's feature as complexity, in which it is not associated with inference, it is more associated with deeper analyses. Scotland (2012, p.12) argued that the "nature of the interpretivist paradigm rejects a foundational base to knowledge", and the fragmented knowledge gained using the interpretivist paradigm has a limited transferability. Easton (2010) indicated that the

standards of how the interpretation is judged are not clear in the interpretivist paradigm, which is problematic when the researchers are at the stage of shaping the data gathered from the participants. However, comparing positivism where the scientific inquiry stands on solid ground, and interpretivism, where there is no possibility to find solid ground to stand on, the researcher sought to adopt a more appropriate and suitable philosophy that is known to be in between the two main stances mentioned earlier, which is critical realism.

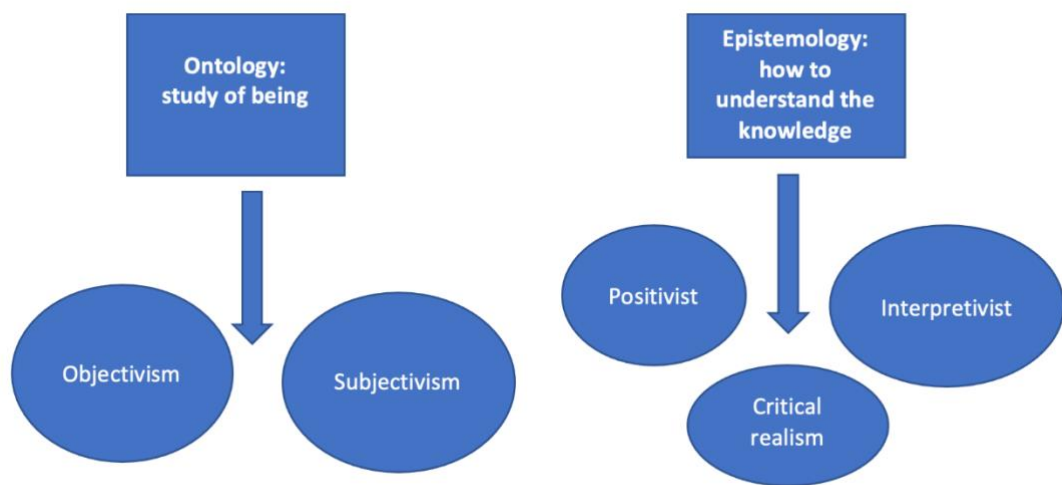


Figure 4 Ontology and epistemology

As defined by Bhaskar (1998) and followed by agreements of others (Easton 2010; Sayer 2000), critical realism is positioned as an alternative to positivism and interpretivism and is also called 'post positivism'. This approach enables the researcher to build a theoretical ground for critical realist explanation, which allows a deep understanding of people, attitudes, thoughts and relationship toward a phenomenon within a context (Easton 2010). It has been argued that critical realism epistemology "is one of subjectivism which is based on real world phenomena and linked with societal ideology. Knowledge is both socially constructed and influenced by power relations from within society" (Scotland 2012, p. 13). Sayer (1992, cited in Easton 2010, p 120) argues that "*Social science must be critical of its object. In order to be able to explain and understand social phenomena we have to evaluate them critically*". Indeed, the concept of extending the radiographers role is well known worldwide even in some countries that have not

established radiographers' RE officially. However, the concept of radiographers' RE is not common and not established in the Middle East, especially in Kuwait. The availability of previous research and literature around radiographers' RE enabled the researcher to build a theoretical framework that acts as a base and standpoint for a better understanding of the issue within context. This study aimed to understand a poorly explored research area and understand a new concept in Kuwait associated with RE. The critical realism approach was adopted to enable the researcher to build a deep understanding of radiologists' and radiographers' perceptions and attitudes towards radiographers' RE in mammography using a qualitative approach, taking into consideration the social science of health and medicine.

5.3 Methodologies

Research philosophy identifies two main research approaches, qualitative and quantitative, used independently or both together as in a mixed-method design (Creswell 2014). Quantitative research design enables the researcher to explore the research question using objective techniques (Robson 2011). Furthermore, quantitative methods draw information from a targeted population and involve the use of percentages, charts and hypotheses testing using numerical data (Robson 2011). McManus et al. (2017) suggested that quantitative research is often used in positivist research whilst qualitative studies are mostly aligned with the critical realist paradigm.

Qualitative methods in contrast are mainly aimed at interpreting situations, understanding human behaviours and attitudes (Green and Thorogood 2014). Punch (1998, p. 4) defined qualitative research as "empirical research where the data are not in the form of numbers". Qualitative methods allow the gathering of more depth and meaning, respecting an individual's beliefs and experiences (Newell and Burnard 2011), as opposed to a quantitative approach. Quantitative research employs structured techniques such as surveys and online questionnaires which allow the researcher to gain analytical and descriptive information about beliefs and attitudes (Creswell 2014; Jack et al. 2010). Holloway (1997) identifies qualitative research as aiming to understand the social realities of individuals, groups and cultures. Malterud (2001) further defines the

qualitative approach as including different strategies for systematic data collection and organisation through observing people and talking to them.

The chosen methods should be conducted rigorously to gain valuable data (Green and Thorogood 2014). The choice of the research method depends on the research question and the aims and objectives of the research. This study aimed to investigate the attitudes and opinions of radiographers and radiologists in Kuwait towards the RE of radiographers in mammography. Such an understanding of thoughts, experiences and reasoning suggested a qualitative approach as most suitable for the current research (Merriam 2002). Furthermore, this qualitative research aims to identify common themes in the attitudes of radiographers and radiologists in Kuwait towards the radiographers' RE in mammography and its benefits to patient care (Holloway and Wheeler 2002). Quantitative research was not wholly appropriate because it is primarily based on numbers and the researcher was aiming to gain in-depth information about the attitudes and perceptions of radiologists and radiographers towards radiographers' RE in Kuwait. Barbour (2000) argued that it can be difficult to explore interactions within healthcare services using quantitative methods. This justifies the use of a qualitative approach for the current study to gain in-depth information from the participants (Ritchie and Lewis 2003).

5.4 Case study research

5.4.1 Origin and description of case study research

The case study methodology was developed by the French sociologist and economist Le Play, who in 1829 used a case study in his statistical work examining family budgets (Savin-Baden and Major 2013). The case study approach was primarily introduced to the education field by Yin (1984) and Stake (1995) as a pragmatic position; followed by Merriam (1988) and Creswell (1998), who both identified case study as one of the primary research methods employed in qualitative research (Merriam 1988; Savin-Baden and Major 2013).

Stake (1995, p. 237) defined the case study methodology below:

"A case study is both the process of learning about the case and the product of our learning"

Yin (1994; 1999; 2009; 2018) however has more than one definition of the case study approach:

"The all-encompassing feature of a case study is its intense focus on a single phenomenon within its real-life context... Case studies are research situations where the number of variables of interest far outstrips the number of datapoints"

(Yin 1999, p.1211; 1994, p.13)

"A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident."

(Yin 2009, p. 18)

Both Stake (1995) and Yin (2009) acknowledged that conducting a case study requires a "case", which should be the focal point of the study. Merriam (1988) also concluded that the "case" is the single most determining characteristic of case study research and defined the case study approach as:

"case study is an intensive, holistic description and analysis of a single instance, phenomenon or social unit".

(Merriam 1988, p. 21)

5.4.2 Types of case studies by purpose

Case study research can be divided into three main types that have been identified by Yin (1994):

1. Exploratory case study; conducted for exploring.

Exploratory case study design is suitable for research that involves "what" questions and also for questions that aim to explore "how many" or "how much". The general idea is to identify a specific practice or explore a current situation or phenomenon in context (Schell 1992; Yin 2018). However, this type of case study was not applied to the current research which aims for an in-depth understanding of radiographers' and

radiologists' thoughts and beliefs about radiographers' RE in mammography. The exploratory approach appeared as an insufficient approach that draws a basic exploring of the issue within the context, without giving the research a wide space to understand in-depth perceptions of the participants.

2. Descriptive case study; conducted to gain an in-depth description of the case and context.

The descriptive case study has a broader scope to gain a deep understanding that involves better understanding and exploration of the practice. The descriptive design also allows the researcher to illustrate aspects of behaviours and attitudes. Indeed, this design may have been suitable for this research, however, it was rejected because a more appropriate design involving exploring, describing and explaining has been applied (Schell 1992).

3. Explanatory case study; allowing the researcher to gain an initial insight into a subject that is not well understood, was indeed the most sensible type for the current research.

It is "contextual", considering that the extension of the radiographers' role is a new concept in radiology in Kuwait that has not been discussed before the time of writing this thesis. Furthermore, an explanatory case study would allow the researcher to investigate the knowledge of both radiographers and radiologists about radiographers' RE. It would also allow the researcher to gain an understanding and explanation of radiologists' and radiographers' opinions towards the RE of radiographers in Kuwait, allowing the participants to draw their drivers and barriers regarding radiographers' RE in Kuwait that link to patient care, current radiographers' scope of practice and job satisfaction.

According to Yin (2018), there are no restrictions between the three types of case studies; moreover, some of the best case-studies combine the exploratory, the descriptive and the explanatory. Based on the aim and the objectives of the current research, this thesis looked to explore within Kuwait, the current scope of radiographers' practice and described areas of interest around radiographers' RE, to investigate the attitudes and opinions of radiographers and radiologists in Kuwait

towards the RE of radiographers in mammography. Therefore, a flexible explanatory study involving exploratory and descriptive elements has been adopted (Schell 1992). The researcher also believes that it is not possible to achieve the explanatory level independent of the exploratory and descriptive levels. The researcher needs to explore 'what', 'how' and finally 'why'. The explanatory case study method allowed the researcher to gain a deeper understanding of the phenomenon, especially when there is a paucity of studies in the Middle East to inform and guide the research (Stake 1995). The case study methodology provides the flexibility that is not supported by other qualitative approaches (Green and Thorogood 2014).

5.4.3 Reasons for adopting case study research

Case study research is a common method in healthcare research. Mariano (2001) suggested that the reason may be because the areas and units of interest (patient, staff, practice) are clearly bounded by the researcher as a case. Indeed, the case study methodology is primarily the most appropriate methodology for the current research as the guidelines to conduct a case study can be appropriately applied to it. To conduct a case study research, the research question needs to include 'where', 'how' 'what' and 'why' (Yin 2018). For the current research, the research question is how do radiographers and radiologists in Kuwait perceive radiographers' RE in mammography? It also involves exploring the current scope of practice of radiographers in Kuwait and investigates the barriers and drivers of radiographers and radiologists towards radiographers' RE in mammography. Another key factor in the selection of the case study methodology is having little or no control over the event. For the current research, radiographers' RE in Kuwait is an unknown subject that has not yet been explored, established and evaluated. It is also recommended that a case study is beneficial for contemporary events. This research was conducted within the real-life contemporary context of radiographers and radiologists. The researcher also attempted to use theories which are the system of professions (Abbott 1988) and professional identity (Rees and Monrouxe 2018) to guide the research rather than pre-supposing that theoretical perspectives were grounded and would emerge from the data. The case study approach allowed the researcher to use a theoretical framework that could loosely guide the process of the research. Another reason that underpins the choice of case study

research is Yin's (1994, p. 9) argument that case study helps to study a phenomenon such as changing roles in health management or health practice within a hospital context.

5.4.4 Designing the case study

Conducting case study research requires three main processes: defining the case, binding the case by time, place and context and deciding whether to use single or multiple cases (Savin-Baden and Major 2013). Defining the case is about deciding the units to be studied; it could be a programme, individuals or an organisation (Yin 2018). For the current research, the units to be studied were identified as radiologists and radiographers working in Kuwaiti government hospitals and screening clinics and the case is radiographers' RE in mammography in Kuwait.

The second process is binding the case by time, place and context, which may be explained as defining the case in terms of the time it was conducted, where it had occurred and the environment it existed in (Tight 2017). Baxter and Jack (2008) suggested that binding the case may allow the researcher to specify the scope of the research, to make it less broad and more reasonable. The researcher "bounded the case" by: (a) time and place (Creswell 2003); (b) time and activity (Stake 1995); and (c) definition and context (Miles & Huberman 1994). In this study, the time was scheduled from September-December 2019. The researcher chose that specific time because it was after the summer vacation and Eid-Al-Adha 2019 (the Islamic celebration during Hajj season which is one of the pillars of Islam). Conducting the study after the summer vacation and the holiday season offered the researcher adequate time with the participants, as there was no shortage of staff as most of them had ended their leave. Another reason to conduct the study at that time was that the researcher had gained ethical approval from Cardiff University and the MOH in Kuwait and completed the pilot study in May and June. Therefore, the researcher was ready to start the data collection stage at an appropriate time for the PhD time scale. Concerning the time, three to four months was appropriate for collecting data from 10 radiographers and 10 radiologists. The study was conducted in government hospitals in Kuwait as this had been approved earlier by the MOH in Kuwait. The context was the government radiology department and screening clinics in Kuwait. The third process is about deciding whether to use single

or multiple cases. The multiple case approach allows the researcher to test the theory by comparing different cases, while the single case approach allows the researcher to explore and understand its inner workings (Yin 2009). Since the current study aims to explore radiographers' and radiologists' perceptions of radiographers' RE in mammography to gain an in-depth understanding rather than making a comparison, it was argued that a single case study was the more sensible approach to adopt. The study is thus a single case (extending radiographers' role in mammography), with multiple sites (government hospitals and screening clinics in Kuwait) and multiple units (radiographers and radiologists). Furthermore, due to the narrow nature of the research, no other possible cases could be explored in the meantime, which made the single study an appropriate choice for the current research.

Dyer et al. (1991) explained that the single case study approach allows the researcher to gain a deeper understanding of the subject to be explored. Furthermore, Yin (2018) argued that the single case study design is more appropriate than the multiple case study design when the researcher aims to study a number of units as in the current research, where radiographers and radiologists are the targeted population and the units to be studied. According to Yin (2018), a single case study is also appropriate when the researcher is studying old theoretical relationships and may also explore new ones. For the current research, the topic guide of the data collection was built based on previous literature and theories such as the theory of professions and professional identity (Abbott 1988; Howard 2013; Kekana et al. 2015; Moran and Warren-Forward 2011; Moran et al. 2013; Rees and Monrouxe 2018).

Yin (2018) argued that the single case study design can be highly justifiable under five different conditions. The first condition is the critical testing of a theory, the second is unusual circumstances, the third is a common case that might be applied to the current research, the fourth is a revelatory case and the fifth is longitudinal purpose.

Xian and Meng-Lewis (2018) presented a simple explanation for each of the five conditions and highlighted a significant point, which is not all the single case studies meet all the five conditions. Xian and Meng-Lewis (2018) also added that the second condition (unusual circumstances) and (common case) are mutually exclusive. Mutually exclusive means that two things cannot be true or occur at the same time, therefore,

one research cannot include a single case that is both unusual and common. For the current research, the single case was a common case which was about extending the radiographers' role.

The critical testing of theory means that the case should enable the researcher to understand a phenomenon and answer the research question; hence the single case can make a notable contribution to knowledge and build theory by approving, challenging or extending existing theory (Xian and Meng-Lewis 2018). For the current research, the researcher explored the system of professions and its associated aspects which are the theory of professions, power and jurisdiction and knowledge (Abbott 1988). The researcher also used the concept of professional identity as a supporting concept for a deeper understanding of the phenomena. Theories were used to underpin the research question for understanding the attitudes of radiographers and radiologists in Kuwait towards radiographers' RE in mammography.

The other condition is a revelatory case; a revelatory case can enable the researcher to explore and understand a phenomenon that has not been explored previously (Xian and Meng-Lewis 2018). For the current research, the concept of extending radiographers' role in Kuwait and understand radiographers' and radiologists' attitudes and opinions towards it have not been explored previously. However, two rationales out of the previously mentioned five are not applied to this research, unusual circumstances and longitudinal purpose (Yin 2018). Indeed, extending radiographers' role is not an uncommon issue, it is a worldwide issue (Cowling 2008). Furthermore, the current research cannot adopt a longitudinal approach, which enables the researcher to collect the data over an extended period, because of the nature of the PhD time frame since the data collection had to be completed within three months.

Single case studies as designed may be holistic or embedded. The holistic case study is where the case is the unit of analysis (Yin 2018). The holistic single case study design is mostly based on the systematic approach of a phenomenon. Interestingly, in holistic design, the theory that underpins the study is usually holistic in nature (Yazan 2015). However, the holistic design provides the researcher with a broad and superficial view of the case, which may lead to missing changes in the unit of analysis (Rowley 2002).

In contrast, the embedded design involves more than one unit of analysis. The context, the case and units are distinguishable. Yin (2003) acknowledged that embedded design allows the researcher an extensive, therefore more focused analysis. A significant strength of the embedded design is enhancing the reliability of the research, which will be discussed further in the rigour section (Yazan 2015). For the current research, embedded research was arguably more appropriate than holistic design because the case and units to be studied are distinguishable. The case is radiographers' RE in mammography in Kuwait, and the units are radiographers and radiologists working in multiple sites in Kuwait (government hospitals and screening clinics).

5.4.5 Strengths of case study research

According to Tight (2017), case study research has more key strengths than key weaknesses. The first strength mentioned by Tight (2017) is that case study research aims for in-depth understanding, which provides the researcher with detailed data to answer the research question. The second point is that case study research allows the researcher to understand everything, or as much as possible, about the proposed case and the research question. Furthermore, the case study research bounded system allows the study to be more feasible (Tight 2017). Yin (2009) states that in all of the fields, case study research allows the understanding of complex phenomena and the investigation of units involving multiple variables. According to Yin (2018), the case study unique strength is using multiple sources of evidence such as observation, interviews, focus groups and field notes. The researcher used individual interviews, documents and notes taking, which provided a rich and in-depth understanding of the investigated issue. Case study research design enables the researcher to capture the information in a more explanatory way (Crowe et al. 2011). For instance, understanding how radiographers and radiologists perceive radiographers' RE in mammography, require such a design for in-depth understanding and interpretation.

5.4.6 Weaknesses of case study research

A major criticism of case study research is the lack of generalisability/transferability (Tight 2017). Indeed, such criticism has been applied to almost all types of qualitative approaches (Savin-Baden and Major 2013). For the current research, the researcher attempted to reduce the lack of transferability through the sampling method. The

purposive sampling method allowed some elements of the study to be generalised. In this study, the researcher purposively selected participants with a variety of years of experience, working place, hospital or screening clinic across all Kuwait. Such practice ensured that there was nothing that made the targeted participants unique in comparison to the broader study population, which therefore made the findings of the study more likely to reflect the views of the wider population. Additionally, the selected hospitals and screening clinics were not unique, reflecting the situation in other hospitals in Kuwait. Furthermore, case studies are applicable to be generalised to theoretical propositions (Yin 2018). Yin (2018) asserted that case study research enables the researcher to achieve analytical generalisation when adopting a theoretical framework, which is from the researcher's point of view, is arguably deeper than statistical generalisation achieved by quantitative researchers.

Another concern about a case study is the 'unmanageable level of effort' which suggests that case studies can be time-consuming and can accumulate unmanageable amounts of documents (Yin 2018, p. 21). In this study, the researcher needs to consider the principles of data collection, and the use of multiple sources for evidence. For example, in this study, the sources were documents, notes and individual interviews (which will be discussed in detail in the next section). The researcher did not use observations as a method of data collection because this source did not add valuable data to this research, as the researcher attempted to avoid and thus considered unnecessary for this research. From a cultural perspective, the participants (radiographers and radiologists) may not have acted normally if they were aware that they were being observed. Besides, it is not generally acceptable to use observational data without the participants' consent as this may not be acceptable to them, this would be discussed later (section 5.5.5). The third concern is 'confusion with "non-research" case studies', which means failing to clearly describe the methodologies. To avoid confusion, the current research aimed to carefully state the methods and procedures of the study, be transparent about eliminating all types of research biases and be reflective at all the research stages (Yin 2018). Another concern is the lack of reliability and validity of case study research (Tight 2017). In order to enhance the validity and reliability of the case study research, trustworthiness principles are addressed in detail in the section on rigour (5.14) (Tight 2017).

5.5 Schematic representation

To provide clarity to the current research and maintain the methodological rigour of the study, a schematic representation was applied as a map to identify the procedural stages of the study (Rosenberg and Yates 2007). Indeed, Rosenberg and Yates identified a number of procedural steps that allow the researcher to build up a protocol of the case study (figure 5), which were incorporated into this research as discussed below:

5.5.1 Presenting the research question

The main step in a case study is identifying the research question. For the current research, the research question was “how do radiographers and radiologists in Kuwait perceive radiographers’ RE in mammography?” Details about the formation of the research question was discussed in section 3.2 (Problem statement).

5.5.2 Identification of theories

One way to build a case study research is to identify theories that draw on the research design. Based on the literature review and the findings of previous studies, one main theory and the related concept was proposed to explore how they relate to the radiographers’ RE case: the system of professions and professional identity (Abbott 1988; Rees and Monrouxe 2018). Yin (2018) argued that using theories or theoretical propositions in case study research will enable the researcher to easily design the study and generalise the findings of the case study. Collins and Stockton (2018) revealed that despite the importance of a researcher using a theory, there is confusion and avoidance of theory among doctoral programme candidates. They also advocated the use of theory as a base for research because it enables the researcher to refine the research goals, describe the methodological choice, develop research questions and enhance the research validity. The concept of theory in Doty and Glick’s (1994, p. 231) perspective is: *“a series of logical arguments that specifies a set of relationships among concepts, constructs, or variables”*. The new knowledge of any research can be presented under two theory-related types: theory building and theory testing. Theory building requires the synthesis of a broad range of research and literature to provide evidence or establish explanations of a given phenomenon (Colquitt and Zapata-Phelan 2007). Indeed, it means that the researcher attempts to investigate a phenomenon through a different

perspective than has previously been suggested. Meanwhile, theory testing is the process of testing whether a specific theory or theories provide a reasonable and credible explanation of a phenomenon that the author aims to investigate (Colquitt and Zapata-Phelan 2007). For the current research, theory-testing was arguably the best choice for different reasons. First, the system of professions theory and professional identity concept in the medical domain have been long proven due to the hierarchy of professions in this context and have been revealed from the previous literature (Nancarrow and Borthwick 2005; Timmons and East 2011), anecdotally it appears to be a similar situation in Kuwait. The second reason is that the researcher believed that since the current research aims to understand the attitudes and opinions of radiographers and radiologists towards radiographers' RE, comparing the data that emerged from the participants to existing theories and previous literature (Abbott 1988; Brealey et al. 2002; Henderson et al. 2016; KeKana et al. 2015; Rees and Monrouxe 2018) would have allowed for an in-depth understanding of a phenomenon under investigation.

5.5.3 Determine the case, context and units to be studied

For the current study, the case is radiographers' RE in the context of government hospital and screening clinics and the units are radiographers and radiologists working in Kuwaiti government hospitals. Other cases and units could be radiographers and radiologists working in the private sector; however, they have been excluded for one main reason. People who visit private hospitals are self-paying patients, therefore, the services are usually faster and do not reflect the actual situation in all government hospitals in Kuwait. Additionally, because of the nature of the current research and time constraints, it will be time-consuming to be divided between these two sectors. Arguably, concentrating on the government sector which offers free services enabled the researcher to gain valuable data that reflected the experience of the majority of radiologists and radiographers in Kuwait.

5.5.4 Pose the specific case study approach

The approach used is a single case study design, as previously discussed in section 5.4.4 (Designing the case study).

5.5.5 Establishing the data collection methods

The current study used multiple sources for collecting data; documentation, note taking and semi-structured individual interviews. In order to gain the maximum benefits from the sources of data collection, Yin (2018) suggested four principles that would allow researchers to establish the trustworthiness of their study by enhancing the problems associated with validity and reliability:

1. Use multiple sources for evidence

One of the significant strengths of the case study is the use of multiple sources of evidence (triangulation). The multiple sources could be observations, documentation, interviews, focus groups, surveys, recorded evidence and note taking (Yin 2018). Triangulation enhances the quality of the study and confirms its findings (Yin 2018). For the current research, note taking and documentation from the MOH and radiology departments were used alongside individual semi-structured interviews with radiographers and radiologists. The observational approach was not useful for this study for cultural reasons. Participants who are of the Arab ethnicity will not reflect their real personality and attitudes if they are knowingly observed (Wickstrom and Bendix 2000). The issue of an individual not displaying their real personality and attitudes during observation is not only influenced by culture but it is a part of human nature, therefore, observations were not conducted. Additionally, the observations may result in information bias, which means an inaccurate assessment of the outcomes which will reduce the quality of the gathered data and negatively affect the credibility of the research (Boyko 2013).

2. Create a case study database.

The researcher needs to collect a database for case study research (Yin 2018). This can be explained by organising and documenting the data collected. Creating a case study database enhances the transparency of the findings and the repeatability of the research. Case study databases may involve transcripts of the interviews, notes that were taken during the interviews and notes completed while reviewing the documents. For the current research, a sample of the documents, samples of data transcription and coding and a sample of the themes are attached as appendices to the thesis (Yin 2018).

3. Maintain a chain of evidence.

This means the protocol of the study has been followed and the data collected for the case study is documented and organised (Yin 2018). For the current research, the researcher applied this by following the protocol that has been mentioned earlier schematic representation by Rosenberg and Yates (2007). Furthermore, samples of the documentation of the research, samples of coding, and samples of the interviews are attached as appendices to allow the reader to follow the interpretation of the data. This increases the reliability of the data in the research (Yin 2018).

4. Exercise care when using data from social media.

The researcher needs to avoid harm and mistakes while conducting the research by following three main points from Yin (2018). The first point involves setting limits, which includes a time limit, for the current research, the time chart was regularly reviewed and updated with the researcher's supervisory team agreement. Furthermore, a time limit was allocated for data collection from September to December 2019.

The second point is carefully choosing the sources of information including articles and research. The third point deals with the use of social media programmes including Facebook, Twitter, YouTube and individual blogs. The author should also deal carefully with information and data gained through social media programmes and ensure its reliability. For the current research, the researcher did not use any social media sources for the data collection, as all the gained data were from note taking, documents and individual interviews that will be further discussed later (section 5.7.1, 5.7.2 and 5.7.3).

5.5.6 Selecting appropriate data analysis method for each source

Thematic analysis has been identified as the most appropriate approach to analyse qualitative data. More detail is provided in the discussion about the data analysis (section 5.13.1).

5.5.7 Data filter and reduction

Rosenberg and Yates (2007) suggested that data filtering and reduction is not a necessary feature for all case study research. In this study, the researcher did not use this feature because the sources data were individual one-to-one interviews, documents

and note taking. As mentioned previously, an observational method was not used, therefore, there was no significant accumulation of data. However, unnecessary data from individual interviews, that did not answer the research question, were filtered.

5.5.8 Verifying conclusion

A verified conclusion was drawn after the data was analysed and discussed at the end of the thesis. The conclusion was drawn after a condensed presentation and analysis of the data from multiple sources to enable the reader to follow the flow of the chosen case.

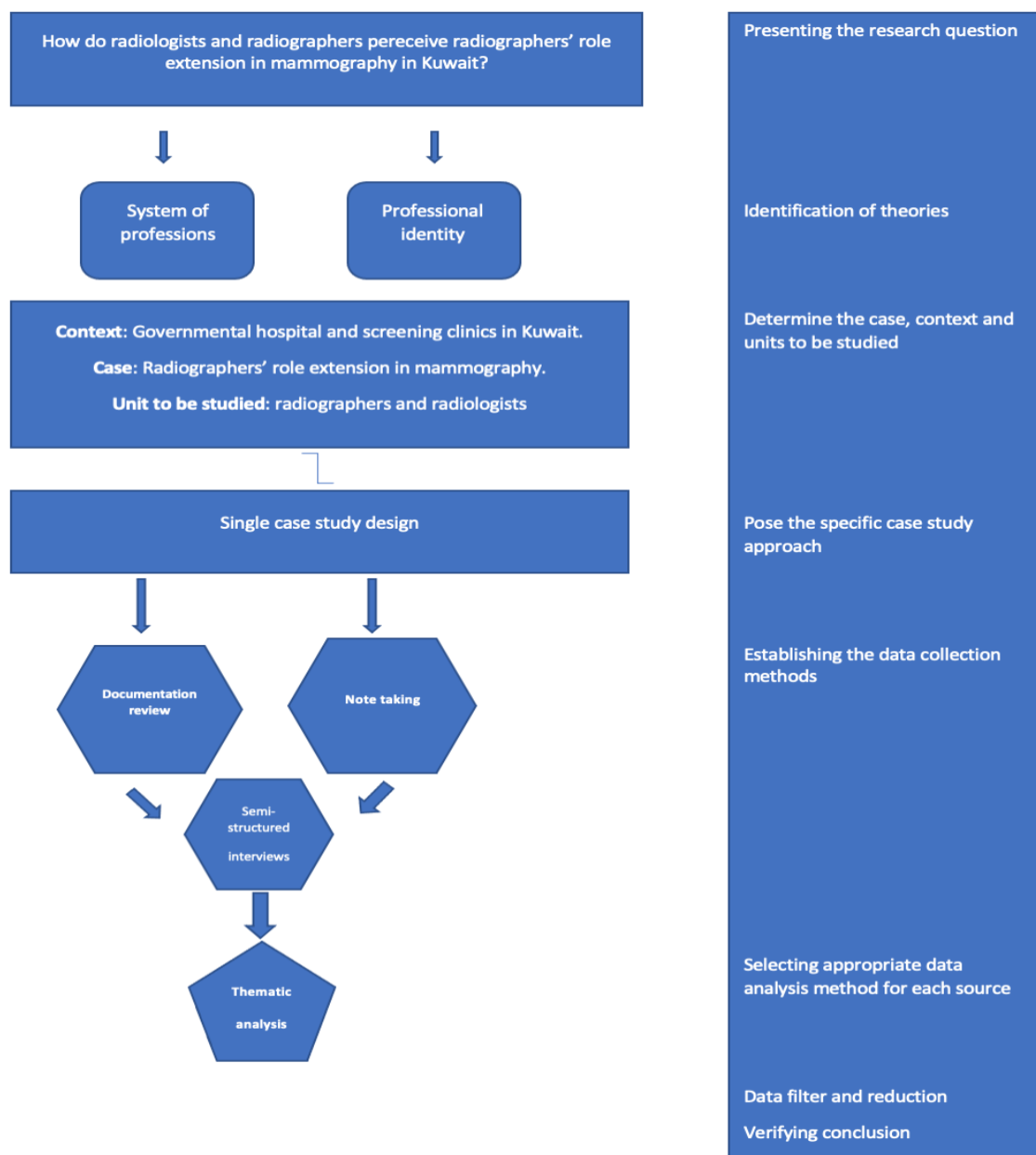


Figure 5: Schematic representation to conduct Case Study Research

5.6 Ethical approval

Ethical approval was sought from the Research Ethics Committee in the School of Healthcare Sciences, Cardiff University (Appendix 1) and the MOH in Kuwait (Appendix 2), to allow the researcher to access documents and statistics related to the radiographers and radiologists in government hospitals in Kuwait. The researcher was also allowed to contact radiologists and radiographers for a meeting to propose the study. Finally, the meeting rooms of the radiology department were used when needed. Ethical issues will be further discussed in detail in the Ethical considerations (section 5.15).

5.7 Research study design

The study was conducted over two phases, Phase 1 being the review of documentation and Phase 2 was the semi-structured interviews with radiologists and radiographers. Both phases included note taking as a third source for collecting data.

5.7.1 Documentation

Yin (2018) argued that documentary information is important to every case study research. This source of data allowed the researcher to explore the targeted population (radiographers and radiologists) in terms of their number and distribution in each hospital. Documentary data helped the researcher at the early stage of conducting the research to identify the shortage of radiologists, as there is a paucity of published research and statistics related to that matter. The researcher made multiple visits to the MOH in Kuwait after receiving approval in May 2019 to gain access to records and documents that describe the number of radiographers and radiologists in government hospitals, to further support the need for this study. Furthermore, the researcher made multiple visits to the government hospitals and screening clinics in Kuwait to seeking a written protocol of the current scope of practice of radiographers in Kuwait. Additionally, the researcher planned to obtain a copy of any document related to the continual education of radiographers. Furthermore, as one of the objectives of the current research is “Investigate the relevance of the diagnostic radiography curriculum

in Kuwait in 2005 and 2020”, therefore, an up-to-date copy of the radiography teaching curriculum in Kuwait was reviewed and analysed.

The researcher collected the data through two phases, the first phase enabled the researcher multiple visits to build a relationship with radiographers and radiologists, talk about the research and plan the targeted population. According to Yin (2018), documentation data sources involve multiple strengths that underpin the research. First, the data from the documentation is stable and can be reviewed frequently. Second, data from documents is independent of the results of the case study. Third, the data is accurate and depends on precise statistics and contain exact names, references and details of an event. The fourth point is that documents can cover many settings, events and a broad time frame. However, Yin (2018) also stated the weaknesses of documentation. Some documents may be difficult to access, however, this point was not an issue for the research since the researcher gained approval to access the needed statistics and documented protocols. Another weakness is reporting bias. The search criteria of the documents were based upon the research question, aim and objectives of the study. This means that only documents associated with the determined aim and objectives were reviewed and analysed.

5.7.2 Individual Interviews

The second phase was the one-to-one interviews. There are three main methods to collect data for qualitative studies: focus groups, observations and interviews (Savin-Baden and Major 2013). A focus group is a method to gain data from participants through their interactions with each other to answer the questions that serve the research’s aim (Muhanna and Floyd 2019). However, this data collection method was not appropriate for the current research mainly because of social and cultural context. Despite the fact that the focus group method is a valuable way to collect data through interactions among participants, Hollander (2004) argued that focus groups are extremely affected by the social contexts within which they are conducted. This issue cannot be omitted as it was substantially relevant to this research. Since the study was planned to be conducted in Kuwait, there was an important factor to be considered, which was the cultural context of the participants. The participants of the study were asked to answer questions about their current role, a new concept of extending

radiographers' role, their work relationship with each other, their opinion of radiographers' training and education and job satisfaction. Answering such questions in a group setting may have prevented them from revealing their thoughts truthfully. The social and cultural nature of the context could have contributed to participants withholding their opinions. For instance, the participants in this study are both Kuwaiti and non-Kuwaiti. Non-Kuwaiti employees may feel reticent in sharing their opinions and may feel unsafe to critique or criticise the MOH in Kuwait, their relationship with radiologists/radiographers and the nature of educating and training radiographers. Hollander (2004) highlighted that focus groups may make the disclosure less likely if disclosing would threaten the participant's comfort or presentation of self, which was a possibility in this research. Furthermore, it has been argued that focus groups may place participants under conformity pressure, which means that participants may withhold their opinions and share thoughts that do not reflect what they are feeling to match the group thinking of other participants (Hollander 2004). This was also possible in this research, especially since the researcher was exploring the participants' opinions and attitude towards blurring professional boundaries and extending the radiographers' role which is a new topic within the medical imaging field in Kuwait.

Beyond cultural reasons, another factor is the sensitive topic of professional boundaries and professional identity. The professional implications of the participant's views may also limit the disclosure of self-expression and free discussion about the barriers and drivers for radiographers' RE. The researcher, therefore, argues that conducting individual interviews was the most appropriate option to avoid any possible limitations associated with focus groups. Indeed, the researcher believed that it was more appropriate to assure the participants' confidentiality of data during the individual interviews compared to a focus group, where there is a greater possibility of compromising the confidentiality of the generated data.

The observational data was also inappropriate for the current research from the researcher's point of view, as mentioned in the previous section 5.5.5. The third data collection tool is individual interviews. Kvale (1996, p. 32-33) defined interviews as "*a qualitative research tool that seeks to describe the meanings of central themes in the life world of the subjects*". The main task in interviewing is to understand the meaning of

what the interviewees say. A qualitative research interview seeks to cover both a factual and a meaning level, though it is usually more difficult to interview on a meaning level.

It has been argued that the interview is primarily the most essential data collection tool for case study research. Such a method is vital to gaining an understanding of peoples' thoughts, attitudes and perceptions towards a phenomenon, which is the central point of the current research (Yin 2018). The interview is arguably the most sensible and appropriate data collection tool as it allowed the researcher to gain valuable information and deep insights into subjective aspects of the participants' thoughts, beliefs and attitudes. Interviews also allowed the researcher to take advantage of the social cues which can be verbal or non-verbal, such as voice, intonation and body language, which allowed the researcher to more accurately interpret and analyse the data from the participants (Kvale 1996). Furthermore, considering the aim of the current research to aims to investigate the attitudes and opinions of radiographers and radiologists in Kuwait towards the RE of radiographers in mammography, interviews allowed the researcher to ask prompting questions, which were useful to gain a better understanding of the participant's opinions, sometimes adding significant data that the researcher may not have thought about (Savin-Baden and Major 2013).

Moreover, the interview tool provided the researcher with a level of flexibility to clarify some of the questions and avoid any misunderstanding that may have led to an accumulation of unnecessary data. Although interviews appear to be an important data collection tool that provides the researcher with the advantages stated above, there are disadvantages associated with their use. Savin-Baden and Major (2013) mentioned that the process of analysing the interview data could take a long time. Furthermore, a lack of interviewing experience may undermine the quality of the collected data. However, the researcher has had experience in conducting a qualitative study during an MSc study (Muhanna and Floyd 2018) and the skills gained from that experience should mitigate the lack of experience. Another concern is that the data collected may be influenced by the circumstances and the moods of the participants, such as the participants' busy schedule, the inconvenient time of the interviews, early in the morning or late at the end of the working day. However, the researcher arranged all the interviews at the participants' convenience to minimise such issues, for example, all the participants were

free to decide the time and the venue of interviews to suit them. In addition, in an effort to make the environment more comfortable and hospitable, light refreshment was provided during the interviews.

There are three types of interviews: structured, unstructured and semi-structured. Wellington (2000) differentiates between the three types as follows:

1. Structured interviews are where the questions of the interviews are listed with a fixed phrasing, similar to a questionnaire, except structured interviews allow the participants to respond openly. This type was not appropriate for the current study as it would limit and restrict the gathered data from the participants as the interviewer would not be able to ask secondary follow-up prompt questions.
2. Unstructured interviews are where the researcher is provided with an open area of interest, without being obligated to follow the topic guide or prepare specific questions. However, this type may be associated with a lack of reliability, as it is almost impossible to replicate the study and obtain similar outcomes. Another concern is that this type of interview takes longer in comparison to other types, which also makes it more complex to analyse.
3. The semi-structured interview was deemed to be the most appropriate type for the current research. The researcher chose this as it is a compromise between the other two types of interviews, allowing the researcher to avoid their limitations. The researcher designed semi-structured interviews using a topic guide that loosely guided the process of interviewing the participants without limiting their responses and made sure that the interviews stayed within the parameters of the research.

The topic guide was developed and designed based on the previous literature (Howard 2013; Kekana et al. 2015; Moran et al. 2013) for the purpose of the current research related to the aim and objectives of the study and the review of the related literature. Two topic guides were developed to be used with both radiographers and radiologists, which were very similar except for some questions (Appendix 3 and 4). Both topic guides were developed in English and translated into Arabic for Arabic-speaking participants.

The first three questions were designed to set the scene and to explore both the radiographers' and radiologists' amount of experience and the modalities that they had been working with. The fourth question was mainly designed to explore the participants' knowledge of RE. The fifth was designed to explore the current scope of practice of radiographers. The sixth was the main question of the current research which is "how do you perceive training radiographers to perform an extended role in mammography" and was developed based on the previous literature (Howard 2013; Kekana et al. 2015; Moran et al. 2013). Questions 8-11 concentrated on the barriers, drivers, advantages and disadvantages associated with radiographers' RE. Asking those question after the main question "how do you perceive radiographers' RE after receiving training?" allowed the conversation to develop from the exploratory and descriptive level to the explanatory level and gain in-depth data in terms of ideas about radiographers' RE. Question number 12 was developed for radiographers based on previous research, which concentrated on understanding radiographers' levels of satisfaction with their current scope of practice (Moran and Warren-Forward 2011), while question 12 for radiologists was about their opinion about the current role and performance of radiographers' current role. Question 13 was about understanding the bachelor curriculum and its impact on radiographers' scope of practice. The researcher believes that qualifications and knowledge have a direct relationship with the participants' career progression and level of responsibility. Question 14 was designed by the researcher and discussed with her supervisors. It was about understanding the relationship and cooperation between radiographers and radiologists in the workplace context. This question was important as it was related to the theories that underpin the current research: the system of professions and professional identity. Moreover, as a major number of related studies revealed that the radiologists' resistance was one of the barriers to the radiographers' RE (Howard 2013; Kekana et al. 2015; Moran et al. 2013; Moran and Warren-Forward 2011), it was worth mentioning in order to understand this area associated with the current research. Question 15 was also designed by the researcher and discussed with the supervisors. The question was "how do you think extending the radiographers' role will affect cases of BC and attending screenings?" Asking such a question allowed the researcher to understand how radiographers and radiologists link the radiographers' RE and more responsibilities to BC and

mammography practice. The last question was designed to allow the interviewees to share any thoughts or opinions that they wanted to talk about and to allow them to suggest any recommendations that may serve the radiographers' role in the future. The researcher's supervisors reviewed and approved the English version of the topic guide.

5.7.3 Notes

Yin (2018) highlighted that researcher's notes are a common element of collected data. The forms of notes could be written, recorded through video or audiotape or saved through word's files electronically. In the current research, the notes were handwritten during the interviews, multiple visits to hospitals and screening clinics and analysing interviews and documents. Such a practice was recommended by Kvale and Brinkmann (2009), taking notes during the conversation helped the researcher to frame the questions, which was significant for the following interviews as it enabled the researcher to consider prompting questions inspired by the data obtained. The strategy of note taking enabled the researcher to remember what information in each interview can be used for analysis; it also helped to create initial codes and themes during the interviews (Muswazi and Nhamo 2013). Besides being one of the sources of collecting data, notes enabled the researcher to amend the topic guide, add prompts and follow the participant's discussion to develop a deeper understanding of the issue.

5.8 Pilot case study

A pilot case study is an important stage of conducting case study research, as it allows the researcher to improve the data collection strategies in respect of both the process to be followed for the data collection and the content of the data (Yin 2018). According to Yin (2018), the pilot case study should not be considered as a pre-test, it should be considered as a developmental procedure that guides and assists the process of data collection and allows the development of appropriate lines of questioning for the data collection (Yin 2018). The pilot case studies were conducted with two male radiologists and one female radiographer in June 2019, in a government hospital in Kuwait. The three participants were selected purposively as they consented to take part when the researcher had made multiple informal visits to one of the hospitals to explain the

reason for conducting the research and to talk about the aim and objectives of the research. The participants contacted the researcher via WhatsApp to express their consent to participate in the pilot study.

The pilot studies were conducted in the medium of Arabic, the first language of the participants, indeed, Fryer (2019) argued that the expression and the comprehension of the language are important concepts for in-depth research interviews. It has been argued that conducting the interviews in participants' first language serve as a fundamental part of in-depth interviews through appropriate communication and generating data (Fryer 2019). Conducting the current research in the participants' first language enabled them to extensively express their thoughts and opinions about the subject of the current research. Furthermore, it enabled the researcher to clearly understand their point of view for accurate data analysis and interpretation. The interviews were audiotaped using the "smart voice recorder", an iPhone application. The researcher used this application because of its simplicity of use and its high-quality recording system.

Each pilot interview time ranged between 33-42 minutes. Savin-Baden and Major (2013) suggested that interviews should not exceed 90 minutes. However, these interviews were shorter as they took place during Ramadhan. As the participants were Muslims, they were fasting and may have been tired during the interview time. However, for the main research, the interviews were conducted from September to November, after the holidays and summer vacation. This eliminated the chances of staff being on leave thus increasing pressure on the remaining staff. Also, the weather was also good in Kuwait, which the researcher believed may have affected the participants' desire to take part in the study and enhance the generated data.

The pilot study allowed the researcher to practise one-to-one interviews. It also prompted the researcher to consider the timing of the main study such as avoiding holiday times to avoid interviewing staff under pressure during that time of the year. The pilot study prompted the researcher to transcribe the interviews as they were conducted to avoid accumulation.

One interview question was modified after the pilot because it was felt to be leading. The question was “do you think the bachelor curriculum was good enough for the clinical practice?” It was modified to “how do you perceive your knowledge gained from the bachelor curriculum?” The other questions were deemed to be clear to the participants, no amendments were needed. However, one question was added to the topic guide “how do you think extending the radiographers’ role will affect cases of breast cancer and attending screenings?”. This was added because the researcher believed that this question was related to one of the impacts of extending radiographers’ role in patient care. Also, it was related to one of the drivers of conducting the current research which was the spread of BC among women in Kuwait and its link to attending BCS and radiographers’ RE in mammography. Adding the previous question also enabled the researcher an in-depth understanding of the participants’ thoughts about RE in mammography in particular and its impact on patient care.

5.9 Sample selection procedure

5.9.1 Research setting

The research was conducted in Kuwait, with interviews conducted across ten sites including two screening clinics, two speciality hospitals (maternity hospital and Kuwait Cancer Control Centre KCCC), and six government hospitals. The variation of this selection was to include all Kuwait communities and to avoid any uniqueness of the targeted population to capture a broader spectrum of perspectives from different settings. The interviews were conducted at the meeting room of each site, as permission was granted by the MOH, except for one interview that was conducted at a quiet coffee shop at the participant’s request. The reason for this was that the participant was busy, and it was more convenient for her to have the interview in the evening.

Study aim

To investigate the attitudes and opinions of radiographers and radiologists in Kuwait towards the RE of radiographers in mammography.

Objectives

The objectives of this research were to:

- describe radiographers' current scope of practice in mammography in Kuwait.
- evaluate radiologists' and radiographers' knowledge of 'radiographer RE.
- highlight clinical areas of interest in mammography for RE.
- understand the attitude of radiographers and radiologists towards RE in mammography.
- analyse the barriers and drivers to RE in mammography.
- investigate the relevance of the diagnostic radiography curriculum in Kuwait in 2005 and 2020.
- evaluate the job satisfaction level of radiographers.
- make suggestions for possible future RE of radiographers based upon the results of this study.

5.9.2 Inclusion criteria

The population for the study was radiographers and radiologists who are currently practising in mammography in the six main government hospitals, speciality hospitals and BCS clinics in Kuwait. Their experience in the mammography unit was vital in order to provide the current research with the required insights into extending the radiographers' role in mammography.

5.9.3 Exclusion criteria

Student radiographers were excluded from participating in the current study, as were non-clinical diagnostic radiographers. These two groups lacked the experience of clinical practice in mammography that would be required to recognise the obstacles that may or may not be present during the RE. Radiologists and radiographers who worked in private hospitals were also excluded from the study. This is because the researcher was focused on the government sector which provides free healthcare services to citizens.

Male radiographers were excluded from the study because they do not have experience in mammography imaging as only female radiographers perform mammography examinations in Kuwait. As Islam is the official religion in Kuwait, the Islamic rules are applied in practice. For instance, female radiographers perform mammography for women, as female patients are forbidden from showing the covered parts of their bodies

in front of male radiographers. Furthermore, due to the Kuwaiti culture, women are embarrassed to show intimate parts of their bodies to male practitioners for the purpose of diagnosis. Interestingly, in the UK, the mammography screening procedures should be completed by a female radiographer by law (Hodges 2017), as in Kuwait, despite the fact that both countries have different cultures and different religions.

5.9.4 Sampling strategy

Sampling in research is the selection of the participants or the units to be studied (Martínez-Mesa et al. 2016). While random sampling is the most appropriate sampling technique in quantitative research as it ensures that each stratum within the population has an equal chance of being selected, qualitative research strives to adopt non-random sampling techniques. This enables qualitative researchers to access a targeted population and focus on specific and particular issues to seek an in-depth understanding of specific phenomena. Savin-Baden and Major (2013) revealed that there are three common sampling approaches in qualitative research: the snowballing technique, convenience sampling and purposive sampling. In snowball sampling, the researcher relies on participants' referrals to complete the sampling procedure. This approach did not suit the current research as the targeted population was not unique and was easy to reach and identify. Furthermore, convenience sampling depends on recruiting participants from a conveniently available population. Convenience sampling was not adopted as it would negatively affect the attempts to generalise the findings of the research, as a result of the high probability of selection bias and sampling errors (Etikan et al. 2016).

The current research is a qualitative research study that looked for an in-depth understanding of the attitudes and thoughts about radiographers' RE in mammography in Kuwait. Palinkas et al. (2015) revealed that purposive sampling is one of the most common sampling methods in qualitative research. A purposive sample approach was determined as the most suitable approach to generate data and answer the research question for the case study, as it allows the researcher to reach a representative case (Seawright and Gerring 2008). According to Palinkas et al. (2015), the principles of purposive sampling are about choosing participants with knowledge that will help the researcher obtain rich data related to the phenomenon of interest, choosing expert

participants related to the topic of interest and their willingness to participate. Another important point added by Creswell and Plano Clark (2011) is that those expert and knowledgeable participants should be able to share their experiences and express their opinions regarding the research topic. Indeed, the radiographers' population is larger than the radiologists' population because of the issue of the radiologist shortage. To determine the sample size, the researcher used a disproportionate sampling technique. Disproportionate sampling can be explained as when the size of the recruited sample is not proportional to the relative size of that population (Law 2009). Using a disproportional sampling technique enabled the researcher to hear the voices of the radiologists as they represented the smaller population in the current study. Such a sampling technique is more representative of the targeted population as it allows the participants from each group to present their thoughts equally (Daniel 2012). A disproportionate sampling technique recruits a population small enough to be manageable and large enough to be of value, enabling the researcher to conduct an in-depth analysis of the emerged data.

5.10 Recruitment

In Kuwait, the government healthcare providers that perform mammography services are the seven main government hospitals, five screening clinics and more than ten specialist centres. Radiographers and radiologists were purposively chosen from 10 different venues. The researcher aimed to include different mammography imaging venues to avoid uniqueness in the targeted population as an attempt to generalise the study. The researcher targeted all the government hospitals, except one. One government hospital was excluded because the daily number of performed cases is small with a small staff size, mainly because most of the cases are transferred to KCCC which is a specialised cancer control centre in the same health district. KCCC performs a large number of mammography images per day based on the researcher's clinical experiences from 2012-2015. However, it was worth exploring the situation after seven years as it is the only cancer control centre that performs mammography in Kuwait. The maternity hospital was also included as it is the only hospital that has a special mammography department for pregnant women. Furthermore, two screening clinics

out of five were chosen as the radiographers working there met the inclusion criteria of the study. Therefore, the participants were recruited from six government hospitals, two specialised centres and two screening clinics.

5.10.1 Inviting participants

The researcher conducted multiple visits to the government hospitals, screening clinics, special medical centres and the MOH following the granting of ethical approval from both MOH in Kuwait and the School of Healthcare Science (HCARE) of Cardiff University. The primary multiple visits were to gain access to documents and planning the target population of the current study. The researcher prepared a list of radiographers and radiologists to be invited to take part in the research built upon a number of criteria. First being a senior radiographer in a mammography imaging department, the second having experience in a mammography department, and the third, a variation of years of experience. This was done to achieve a sample variation and looked to achieve a representative sample (Palinkas et al. 2015). The multiple visits enabled the researcher to build a relationship with radiographers and radiologists and gain their contact numbers. A total of ten radiographers and ten radiologists were invited via "WhatsApp" to take part in the current research. This was used as WhatsApp is the most popular communication social media tool in Kuwait, and people prefer it to emails. The researcher invited the selected radiographers and radiologists and sent them a participant information sheet in English (Appendix 5), there was no need for it to be translated to an Arabic copy as all the participants were fluent English speakers. The information sheet included all the information about the research, aim and objectives, the process of conducting the research, and all the questions that need answers for the target population who are interested in taking part in the research, more details can be found in ethical consideration section (5.15). Additionally, the participants were free to ask any questions that may have arisen at any time before, during and after the study. The researcher forwarded the participants' information sheet and allowed seven days for the participants to decide if they would like to take a part in the study. Those who agreed to take part in the study were contacted by telephone to arrange the date, time and location of the interview. All participants signed a formal written consent form before taking part in the study (Appendix 6).

5.10.2 Day of the Interviews

The interviews' processes and preparations were similar for all 20 interviews. On the day of the interview, the researcher arrived 45 minutes earlier to prepare the meeting room and ensure its readiness and cleanliness. All the participants arrived at the scheduled time except for two radiologists. The two radiologists apologised for being late and gave the researcher the option to re-schedule or wait, the researcher chose to wait to avoid rescheduling other interviews in the future and to adhere to the interview plan. For all the interviews, on the day of the interview, the researcher welcomed the participants and thanked them for their time and participation. The researcher started an informal conversation with the participant about their day, and about the researcher's own experience about being an employee and then a student in the UK, mainly to break the ice and encourage the participant to talk. The researcher also offered refreshment and coffee to the participants, creating a comfortable environment for a conversation. Following that, the researcher requested to start the interview and asked the participants to sign a formal written consent form and reminded the participant about the audio recording and their right to withdraw at any stage without reason. Interviews lasted from 45 to 130 minutes with an average of 70 minutes each. The 'smart voice recorder' app was used to record all the interviews using two iPhones; in case one of the apps did not work properly, the other recording would be still available as a backup. A total of 15 interviews were conducted in Arabic as it was the first language of the participants, while the rest of the interviews (five) were conducted in English, as the participants are non-Arab and fluent English speakers. It worth mentioning that conducting some of the interviews in Arabic did not impact the findings, as the transcripts of the interviews were directly translated into English by the researcher and checked by the researcher's supervisory team. The researcher took notes during all the interviews (section 5.7.3). The transcription was done by the researcher personally, and the transcripts were sent to the participants for member checking (section 5.14.1). The researcher aimed to avoid data accumulation and complete the process of transcribing and translating in between the interviews. Such practice enabled the researcher to be immersed within the data, in a way that influenced creating an initial map of codes and themes during the transcribing process.

During the interview period, the researcher created a word document file to keep the participants' name, pseudonym (number), hospital and contact information. This enabled the researcher to refer to direct quotes during the analysis and ease communication with the participants for member checking. The researcher felt data saturation was reached after interviewing ten radiographers and ten radiologists, as there was no new information discovered, therefore, 20 interviews were deemed adequate to meet the aim and objectives of the study.

5.11 Translation and transcribing process

All interviews were audio-recorded, and participants signed a written informed consent form as mentioned previously. The 15 Arabic audio-recorded interviews were transcribed in Arabic first (Appendix 7) and then, translated into English and checked by the researcher's supervisory team. The other five English audio-recorded interviews were directly transcribed and also were checked by the researcher's supervisory team. Since this study was part of a doctorate programme, all the Arabic transcripts and data need to be translated to the English language, the official language of Cardiff University (beside Welsh). The researcher initially planned to use professional translator services as an attempt to achieve high-quality translation. One of the Arabic interviews was sent to one of the translating centres in Kuwait, however, the quality of the translation was poor. The reason for poor translation was mainly because the participant's Kuwaiti accent caused changes to the meaning of some sentences. The researcher, therefore, undertook the translating process to secure the content of the data from any changes in their meaning and misinterpretation. Indeed, such a step was beneficial as it allowed the researcher to immerse herself into the data and developed notes about the code generation process.

Interviews can be transcribed by verbatim or non-verbatim transcription. The verbatim transcription is a word for word transcription including coughs, laughs, errors in spoken words, sentence structure problems and incomplete sentences. In contrast, the non-verbatim transcription or clean verbatim omits stutters, filler speech ("Umm", "Uh", "AAA"), errors in spoken words and non-verbal sounds such as coughing and laughing

(Halcomb and Davidson 2006). The researcher chose a non-verbatim data transcription, except for laughing, for various significant reasons.

Firstly, many of the interviews were conducted with participants who do not have English as their first language, therefore errors in their speech were detected. Although the interviews were conducted in English with non-Arabic speakers and in Arabic for Arabic speakers; some of them used English at some parts of the interviews and vice versa. Using Arabic by non-Arabic speakers created some sentences that were hard to be understood if transcribed verbatim. For instance, when one of the non-Arabic speakers were asked in English about extending the radiographers role to produce mammography reports and stereotactic biopsies, she replied in Arabic “poor for them”. With further prompting questions to understand what she meant, she explained that she felt sympathetic towards the patients if radiographers perform an extended role as they do not have the experience to do it.

Secondly, Halcomb and Davidson (2006) asserted that verbatim transcription is a time consuming and complicated process with technical dilemmas including human errors such as misinterpretation of the generated data, cultural differences and language errors. In the current research, the researcher mitigated this issue through note taking during all the interviews, which enabled the researcher to capture thoughts and interpretations of the data when listening to the recorded interviews. It had been argued that written field notes are superior to using verbatim transcribing (Halcomb and Davidson, 2006). However, it is worth mentioning that the researcher did not face complex issues of language and communication during the interviews, mainly because all the non-Arabic participants spoke English fluently.

Thirdly, one non-verbal category (laughs) was included in the transcription because laughter added meaning to the situations. For instance, some of the participants’ laughter indicated surprise or/and mockery. Including such a non-verbal category enabled the researcher to more accurately interpret and analyse the scenario during the interviews, assisted by the notes taken.

5.12 Documentary analysis

Yin (2018) advocated that documentary analysis is a significant source of data in qualitative case study research. It has been argued that like any qualitative data sources (interviews and observations), documents need to be analysed for the purpose of interpretation, gain understanding and achieve empirical knowledge. Bowen (2009) defined document analysis as the process of reviewing and evaluating documents whether printed or electronic materials. There are five specific functions of documents highlighted by (Bowen 2009, p. 29-30). The first function is *“documents can provide data on the context within which research participants operate”*. Indeed, this enabled the researcher to understand the current scope of practice of radiographers before conducting the individual interviews which helped to review the topic guide and interviewers’ questions. The second function is *“information contained in documents can suggest some questions that need to be asked”* (Bowen 2009, p. 30). This can be applied to the current research as the researcher added one question about the evaluation of the current performance of radiographers in mammography. This question was raised from one of the documents about monthly lectures of continuous education (Appendix 8). The third function is *“documents provide supplementary research data. Information and insights derived from documents can be valuable additions to a knowledge base”* (Bowen 2009, p. 30). Indeed, the documents in the current research provided the researcher with significant statistics information about the radiologists’ shortage. The fourth is that *“documents provide a means of tracking change and development”* (Bowen 2009, p. 30). This function enabled the researcher to explore the change and the development of the radiography teaching curriculum and compare the curriculum of 2005 and the changes over the next 15 years until 2020. The fifth function is *“documents can be analysed as a way to verify findings or corroborate evidence from other sources”* (Bowen 2009, p. 30). In this study, the documents were used to corroborate evidence from the individual interviews, therefore, achieve data triangulation.

To analyse the gathered documents (statistics from the MOH, radiography curriculum and radiographers job description), the researcher followed the process as advocated by Bowen (2009). He suggested that codes and themes that emerged from the

interviews can be applied to the content of documents. The researcher collected and reviewed documents as the first phase of the study, to help plan the topic guide as previously mentioned. However, the thematic analysis of documents was done after completing the thematic analysis of the interviews. Indeed, such a process saved time for the researcher and provided a simple way for document analysis. It is worth mentioning that since the criteria of collecting documents were based on the aim and objectives of the research, all the emerged themes from interviews were applicable for the documentary analysis and allowed an accurate interpretation of the data.

5.13 Data analysis

Data analysis is a major aspect of the research process. Harding (2018) identified the data analysis process as examining, comparing, pulling apart and putting together different pieces of data to draw a conclusion. According to Yin (2018), there are four general strategies for analysing case study research. The first strategy is relying on theoretical propositions. This strategy was not adopted in analysing the data within this research because the theoretical orientation strictly controlled the analysis. Relying on theoretical propositions compels researchers to follow a predetermined concept to analyse the data deductively, "*pointing to relevant contextual conditions*" (Yin 2018, p. 168). In contrast, the second strategy is working the data from the ground up. This strategy is an inductive approach, where the emerged data independently and freely speaks about itself without restrictions. This strategy allows the researcher to notice patterns and search for concept emerging from the data itself without predetermined concepts or frameworks. The third strategy suggested by Yin (2018) is developing a case description according to a specific framework that is organised based on an initial literature review. This was suggested as an alternative if the researcher faced difficulties using either of the first two strategies. The fourth strategy is examining plausible rival explanations, which is generally a combination of the three previous strategies. The fourth strategy means that the observed and emerged data is the result of other influences and not intervention, and the researcher should think of possible ways to organise and analyse the data. This strategy was not followed as it was highly prone to interpretation bias and the gathered data appeared understandable and reasonable.

Additionally, from the researcher's point of view, the research question did not involve a sensitive concept that may influence participants' opinions. Furthermore, the individual semi-structured interviews in protecting the privacy of the participants enabled the researcher to gain in-depth rich data without it being affected by external influences. Arguably, the second strategy (working the data from the ground up) was the most appropriate strategy for this research, as it enabled the researcher to examine the data through inductive strategy and highlighting key concepts free from theoretical propositions. Yin (2018) suggests that data analysis in case study research is a flexible process in which the researcher is not restricted or required to follow a particular analysis strategy. Single case study research including multiple units enables researchers to study the case with data analysis, within case analysis, and cross case analysis (Gustafsson 2017; Yin 2018). This research has therefore analysed the data inductively from the ground up, within and cross cases analysis.

It is important in case study design for the researcher to identify and highlight themes that are relevant to each case and across cases. Sandelowski (1996, p.525) as cited in Ayres et al. (2003) highlighted that *"looking at and through each case in a qualitative project is the basis of analytic interpretations and generalisation"*. Indeed, such a strategy enabled the researcher to identify and state unique themes relevant to some participants and highlight which themes are relevant to all of them (Ayres et al. 2003).

In this study, participants are radiographers and radiologists from government hospitals in Kuwait. All emerged codes and themes from each participant were applied to cross cases 'all participants' (Appendix 9) (Mills et al. 2010). The current study adopted a cross case approach through the application of thematic analysis (Braun and Clarke 2006). It has been argued that thematic analysis is a foundational method that is used in most, if not all, qualitative analysis (Boyatzis 1998). Braun and Clarke (2006) identified thematic analysis as the process of identifying, analysing and reporting themes and commonalities in the data. Since the current study has adopted a case study approach, the thematic analysis of the collected data was appropriate as it offered an accurate understanding of the emerged data and enabled the researcher to identify codes and patterns. The thematic analysis approach was chosen for its flexibility and its application in multiple methods of qualitative research (Braun and Clarke 2006). The researcher

adopted Braun and Clarke's approach for thematic analysis for two reasons. The first reason is that this approach presents a rigorous process to analyse the data with clear steps, and the second reason is that the researcher had practised this in her MSc project (Muhanna and Floyd 2019).

Braun and Clarke (2006) highlighted that thematic analysis can be either inductive or deductive. The inductive approach means that the themes are emerged and strongly linked to the data itself, while the deductive approach means that emerged themes are controlled by the researcher's theoretical interests and predetermined deductive themes. In this study, the researcher believes that it is impossible for researchers to free themselves from their theoretical perspectives, however, the adopted theoretical framework did not control the process of data analysis. The researcher adopted an inductive approach to enable the data to speak for itself and concentrated on the whole data. The role of theory in the current research was significant in understanding data relevant to the adopted theories (system of professions and professional identity). Furthermore, it influenced the process of coding, naming and renaming themes, as it was applied as a lens to loosely guide the researcher to understand the meaning and reasoning behind emerged data. Indeed, data analysis was guided by the research objectives and the adopted theoretical framework, and strongly dependent on the data itself.

5.13.1 Thematic analysis

Braun and Clarke (2006) proposed six phases of thematic analysis including familiarisation with the data, generating initial codes, searching for themes, reviewing themes, defining and naming the themes and producing the reports.

1. Familiarisation with the data

This stage involved the researcher listening to the audiotapes several times to be immersed in the data to become familiar with all its content and to ensure the accuracy of the data transcription. Green et al. (2007) suggested that immersion in the data provides the researcher with clarity of the subject discussed in each section in the interview between the researcher and the participant. This also enabled the researcher to connect disjointed parts of the conversation into a clearer picture. Furthermore,

Green et al. (2007) added that when the researcher is immersed in the data this will create more manageable analysis rather than confusion resulting from large amounts of data to be processed at the same time. During this stage, transcription of the audio data (excluding non-verbal data, such as coughs and deep breaths) was completed. Bailey (2008) suggested that non-verbal interaction such as coughs, noises such as (mmm) can be eliminated to avoid data accumulation. Furthermore, Green et al. (1997) highlighted that the researcher can judge the data based on the importance of its contents, therefore the researcher omitted the non-verbal data as they did not add anything to the data. Indeed, the participants are healthy people and not patients, so omitting non-verbal data such as coughing or breathing will not affect the quality of the data or the process of data transcription. Engaging in the data by reviewing the words and meanings critically and analytically enabled the author to gain a good understanding of the collected data and improved the accuracy of the following stages of generating the codes and searching for themes (Braun and Clarke 2006).

2. Generating initial codes

This phase involves the production of initial codes from the data. Codes can be defined as features of the data that appear interesting to a researcher and the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon (Boyatzis 1998; Braun and Clarke 2006). This phase also includes collating and combining data relevant to each generated code. Furthermore, the researcher repeatedly read the data transcription and took notes to enhance the process of code generation. The researcher completed this procedure manually and line by line coding for each interview using a Microsoft Word field notes document with codes in a right-margin text box (Saldana 2016), sample attached in Appendix 8. Following this step, the researcher printed out a hard copy of the interviews and reviewed and looked for more codes. Saldana (2016) advocated using hard copy and writing codes in pencil to give the researcher more control over and ownership of the work. Indeed, this process enabled the researcher to create an initial mental thematic map based on the codes. Yin (2018) highlighted that using software only assist the process of data analysis and do not complete the data analysis for the researcher. Therefore, manual coding was adopted for more accuracy in producing codes and

enabled the researcher to dive through the data and understand it appropriately. The current study produced a large volume of codes that were mainly driven by the data; they were inductive in nature as previously mentioned. The researcher coded each interview separately, then created two tables for all radiographers and another table for all radiologists. All the codes were arranged under each participant. Such a step enabled the researcher to conduct within and cross case analysis and allowed searching for sub-themes and themes smoothly (Appendix 10).

3. Searching for themes

Braun and Clarke (2006) defined themes as broader concepts that involve one or more categories depending on the research questions, aim and objectives. The researcher began to search for themes after the process of coding all the interviews. All the relevant codes were sorted into table of four columns (codes, arranged related codes, divided into segments (sub-themes) and themes, there were two tables, one for radiographers' data and one for radiologists' data (Appendix 10). Some of the codes became themes while others became sub-themes, and further themes, which were categorised under the sub-themes. There were also discarded codes that were not relevant to the research question.

4. Reviewing themes

In this stage, the researcher reviewed the emerged themes from the previous stage. This was important to ensure the quality of the categorisation made for codes, themes and sub-themes. During this stage, the researcher recognised that some of the themes were not independent themes, and could be categorised under other themes, while several sub-themes could be merged under one sub-theme. For example, the theme "areas of radiographers' RE in mammography" contained several sub-themes and codes that might fit better in another theme such as the "radiographers' RE in Kuwait". This was to make sure that every set of data within each theme consisted logically with the other set of data and categorised under the same theme. In this stage, the researcher focused on two main parts in reviewing the themes: the consistency of the data set within each theme and the entire thematic map. This was done to ensure that the thematic map and relationship between themes and sub-themes appropriately reflect the meaning

emerging from the entire data set and relevant to the research question and objectives. During this stage and previous stages, the researcher kept hard copies of all the interviews and the tables of the codes to make sure that no important data were missed or un-coded.

5. Defining and naming the themes

This stage involved the researcher further reviewing and defining the themes while generating a clearly defined name for each one. This was done by returning to the collated data extract for each theme and organising them into logical patterns with an accompanying narrative in order to identify the importance of each theme and why they were important. This analysis enhanced the procedure of finalising the named themes to reflect their content (Braun and Clarke 2006). The current study compared the themes that emerged from the previous literature (such as accepting new responsibilities, job satisfaction, lack of knowledge, threats of litigation and radiologists' resistance) (Appendix 11) with those that emerged from the current study. Any similarities or differences are discussed in depth in the findings chapter. It is worth mentioning that the lens of theoretical framework impacted the process of finalising the name of themes and sub-themes, for example, the theme "inter-relationship in radiology department" was changed to "protect the professional identity and boundaries" (Abbott 1988).

6. Producing the report

This stage included producing the final report. After completing the previous stages, the researcher completely understood the narratives and meanings of the themes and sub-themes. This guided the researcher to produce an analytical report that involved examples from the data extracted. Braun and Clarke (2006) advocated that the report should be logical, consistent and avoid repetition, to enhance that, the researcher combined the results and discussion together in one chapter. Additionally, data from all the sources (documents, notes and interviews) were presented together followed by discussion for each chapter. Integrating results with the discussion in qualitative research conveys the narratives more clearly and enhances the strength of the report (Holloway and Galvin 2017).

5.13.2 Data presentation and numerical data

Maxwell (2010) argued that using numbers in qualitative research is controversial. It has been suggested by some qualitative researchers that including numbers and counting in qualitative research is inconsistent with the goal of qualitative researchers and therefore reduces the quality (Fineman and Mangham 1983; Gephart 2004, as cited in Hannah and Lautsch 2010). However, others suggest that including numerical data in qualitative research improves the quality of the research and produces a stronger argument (Hannah and Lautsch 2010). It has been highlighted that there are two myths about qualitative research, which are qualitative researchers do not and cannot use counting and numerical data (Sandelowski 2001). In this research, the researcher used purely qualitative case study research, however, the data is also presented using the numerical form. For instance, the researcher used numerical data to indicate the number of radiologists and radiographers who showed knowledge about the subject of RE. Furthermore, the researcher used the style of mentioning numbers such as “a total of four radiologists” instead of using many, often, majority and some. Maxwell (2010) indicated that using numbers creates precise and stronger results than using approximate terms such as some and majority. The researcher believed that such an approach to data presentation enhanced the argument of the research and increased its credibility. From the researcher’s point of view, using numerical data may enable the reader to have a greater accurate understanding of the study findings and enable them to follow the way that the emerged themes have been constructed. One of the advantages of using numbers for qualitative research was that it contributes to internal generalisability (Maxwell 2010), who explained that internal generalisability does not mean generalising the conclusion to other settings, but generalisability within the participants studied. Maxwell (2010) suggests that internal generalisability is a critical issue for qualitative case studies and interviews and the validity of the final discussion of the research depends on the internal generalisability among participants. Indeed, such a perspective guided the researcher to use numbers to support the findings, enhancing the internal generalisability and therefore, improving the quality of the research.

5.14 Research trustworthiness (rigour of the study)

Trustworthiness of a study can be defined as the level of confidence in the data, data interpretation and methodological approach to verify the quality of the research (Connelly 2016). Unlike quantitative research where ensuring the rigour of the study is straight-forward through statistics and figures; rigour in qualitative research is a major concern resulting from a lack of discussion about it (Sandelowski 1986). For the past few decades, establishing the list of criteria for high-quality qualitative research has been a point of interest among many researchers (Loh 2013). One of these remarkable efforts was that of Lincoln and Guba (1985) who identified four questions that the researcher needs to ask him/herself to ensure achieving the trustworthiness of his/her research:

1. *“Truth-value”, are the findings true and reflect the emerged data?*
2. *“Applicability”, to what extent are the findings of the study applicable to other contexts?*
3. *“Consistency”, are the findings repeatable if the study is applied to the same population or a similar one?*
4. *“Neutrality”, do the findings truly reflect the participants’ opinions and has no bias affecting them?*

Lincoln and Guba (1985, p. 290)

In order to establish the trustworthiness criteria, Lincoln and Guba (1985) stated specific criteria that allow the researcher to ensure the rigour of the study.

5.14.1 Credibility

Lincoln and Guba (1985) defined credibility as the quality of the research to be trusted and believed. The term credibility is equal to internal validity in quantitative research. Lincoln and Guba (1985) suggested five major techniques that allow the researcher to enhance the production of credible data, as it is one of the most important criteria to achieve the trustworthiness of the research. The first technique is identifying *“activities increasing the probability that credible findings will be produced”* (Lincoln and Guba 1985, p. 301). The activities that enhance the credibility of the findings are prolonged engagement, persistent observation, triangulation, peer debriefing and member checks.

Indeed, persistent observation is not applicable in this research as the researcher did not adopt the observational method for collecting data as previously mentioned.

1. Prolonged engagement and persistent observation

This suggests that the researcher should immerse herself in the context for a better understanding of the culture and build trust with the participants of the study (Lincoln and Guba 1985). For the current study, the researcher had worked as a radiographer for two years in a government hospital in Kuwait and graduated from AHS College at Kuwait University. Studying and working in Kuwait where the project was conducted allowed the researcher to understand the environment that the participants were working in and to better understand the context. Furthermore, each participant of the study was interviewed for a minimum of 45 minutes, besides the multiple visits to the hospitals and clinics for the purpose of the documentation process, which enhanced the prolonged engagement. Mentioning that, guides the researcher to highlight significant issues associated with qualitative research, which are issues concerning the familiarity of researchers with the research setting. It has been argued that familiarity has a negative influence on the researcher's objectivity (Hanson 1994). Indeed, the researcher believes that it is not possible for a person to be free from her individual values or perspectives, however, to overcome familiarity issues, the researcher set clear aim and objectives as well as developing a clear topic guide for the interviews. This enhanced the objectivity of the researcher as the data gathered is built upon a piloted and validated topic guide as previously discussed. Furthermore, by the time the research was conducted, the researcher had not worked at the hospital for four years, as the researcher was on an MSc and PhD scholarship since 2016. Therefore, the researcher believes that 4 years is an adequate period to eliminate subjectivity associated with familiarity.

2. Triangulation

According to Yin (2018), a high degree of construct credibility can be achieved by using multiple sources of data, which is called triangulation. For the current study, the

researcher used three sources for collecting data including one-to-one interviews, field notes and documentary analysis.

3. Peer debriefing

Peer debriefing allows the peers to provide the researcher with feedback and comments. Lincoln and Guba (1985) argued that such a process allows the researcher to clear his/her mind from emotions that may cause bias and help to keep the research "honest". For the current study, in addition to the supervisory reviews, Cardiff University undertakes one or two-panel reviews per academic year that enabled the researcher to meet with staff reviewers to answer questions associated with the progress of the research. Such an opportunity allowed the maximal use of the reviewers' feedback and comments while constructing and conducting the current research.

4. Member checks

According to Lincoln and Guba (1985, p. 316), member checking is directed at a judgment of overall credibility. Member checking occurs when the participants who took part in a study are given the chance to review the transcribed data. It has been argued that applying member checking allows participants to confirm their individual data points, as well as offering them an immediate opportunity to volunteer additional information (Lincoln and Guba 1985). Conducting the member checking stage enhances the credibility of the research as it allows the participants to correct any errors in the interpretation. For the current study, all the participants received a word document file of the interview transcript via WhatsApp. A total of 16 participants confirmed checking their transcripts, while 4 participants revealed that they did not have time to look at the transcripts. They requested a summary of the transcripts by sending a voice record via WhatsApp, this was done, and the participants confirmed after one month of conducting the interviews.

5.14.2 Transferability

Transferability refers to the extent to which the findings of a study in a specific cohort can be transferable to other cohorts. The term transferability is a reconceptualisation of the term external validity in qualitative research, which refers to generalising from a sample to the entire population (Schreier 2018). Although both external validity

(generalisation) and transferability are dependent on the relationship between sample and population, the establishment of transferability by a qualitative researcher is different to external validity within quantitative research (Lincoln and Guba 1985). Indeed, achieving transferability is not impossible for qualitative research. Lincoln and Guba (1985) recommended the following two criteria to allow generalising the results of a study: a thick description of the research procedure and purposive sampling (discussed in section 5.4.6). The researcher argues that the findings of the current study may be transferable to all radiographers and radiologists in Kuwait to a large extent because of the reasons mentioned in section (5.4.6). Additionally, while there are many studies carried out worldwide around extending radiographers' role, this study is the first attempt to explore this issue in Kuwait according to the system of professions theory and professional identity which revealed important findings. Therefore, the current study findings may be transferable among radiographers and radiologists' population in Kuwait.

5.14.3 Dependability

Dependability, which is equivalent to reliability in quantitative research, is the third criteria to establish trustworthiness suggested by Lincoln and Guba (1985). Loh (2013) explained the term "dependability" as the findings of the research being consistent and repeatable. It has been advocated to use the audit trail to enhance the dependability of a study (Lincoln and Guba 1985). An audit trail can be explained as an in-depth approach that details all the stages of the research, including how and where the study was conducted, how the data was collected and kept so that other researchers can follow the trail (Lincoln and Guba 1985). For the current study, dependability was achieved by writing a thick description of all the stages of the research. Such a description allows the readers to understand the methods and their effectiveness (Shenton 2004). Furthermore, a schedule of all the supervisory meetings and what has been discussed during the meeting was kept to monitor the progress of the study.

5.14.4 Confirmability

Confirmability means objectivity in qualitative research. Lincoln and Guba (1985) advocated that the major criteria to achieve confirmability are triangulation, reflexivity and audit trail. For the current research as mentioned in the previous sections, the

researcher used three sources of data collection to achieve triangulation. Furthermore, the researcher also kept a diary that involved everything from day one of the PhD journey to the last days of the thesis submission. Halpern (1983) suggested six categories for an audit trail that enhance the confirmability of the research:

1. Raw data

Raw data includes recorded materials and documents. For the current research, the researcher audiotaped the interviews after receiving consent from the participants. Additionally, the notes and documents obtained during the data collection were documented and kept in files. However, complying with the ethical considerations, the audiotapes were deleted after completing the data analysis phase.

2. Data reduction and analysis products

This includes writing notes and the summary of the notes. For the current research, the researcher took notes during the data collection stage including interviews and documentations. These were kept and used later during the data analysis stage.

3. Data reconstruction and synthesis products

This stage involves coding, creating the themes and renaming them. For the current research, a thick description of the process of coding and creating the themes is mentioned in the data analysis section. Furthermore, samples of schedules illustrating how the coding process conducted and how themes emerged are attached (Appendix 9 and 10).

4. Process notes

This includes methodological notes and trustworthiness notes. For the current study, the researcher took notes on the literature on qualitative research, on conducting qualitative research and on the case study methodology (Merriam 1988; Savin-Baden and Major 2013; Stake 1995; Yin 2018). The note taking and summarising allowed the researcher a better understanding of conducting a qualitative case study and enhanced the overall quality of the project.

5. Materials relating to intentions and dispositions

This includes reflexive diary, section 5.2.

6. Instrument development information

This includes pilot forms. The researcher included the decisions that were made after the pilot studies. More information can be found in the pilot study section 5.8.

5.14.5 reflexivity

Incorporating research reflexivity is a common feature of qualitative research. This means that researchers need to pay particular attention to the way their own beliefs, assumptions and experiences may shape their reading of qualitative data (Willig 2019). It has been argued that demonstrating reflexivity requires answering key questions at all the stages of conducting the research (Patnaik 2013). The key questions are:

How has my personal history influenced the choice of topic?

How do my gender, culture and professional background influence my positioning in this topic and my relationship with the participants?

How are the emerging data assimilating with my prior knowledge?

(Patnaik 2013, p. 8,9)

The researcher attempted reflexivity at all stages of the data collection and analysis in particular, and other stages of the research in general, to minimise any possibility of bias. In order to maintain reflexivity when conducting the study, the researcher kept a reflective diary, which is common practice among qualitative researchers (Ortlipp 2008). According to Cleland et al. (2021, p.1139) "*reflexivity also plays a critical role in ensuring the rigour of case study research... Given the potential for observer partiality and bias, fieldwork demands a high degree of reflexivity*". In this research, the researcher acknowledges that she is part of the social world of phenomena she is studying, where the research is a radiographer sharing a same professional background with the participants (radiographers and radiologists).

The researcher personal history influence on the choice of topic.

The first reflective exercise was the researcher asking herself the reason behind conducting this study. Watt (2007) highlighted that the researcher should be aware of the personal drivers on the formation of the research question and conducting a study. The researcher's previous working experience in Kuwait and studying in the UK were key elements of conducting the current study. Based on the previous working experience in Kuwait, the researcher is aware of the issues around the radiologist shortage, and how the international recruitment of radiologists has been the only used solution by the MOH in Kuwait to solve the issue of radiologist shortage. After two years as a radiographer in Kuwait, the researcher obtained a scholarship in the UK, where the researcher explored the successful practice of extending radiographers' role, particularly in mammography. The researcher was inspired by how extending the radiographer role was achieved in the UK and the skill mix program of the NHS, however, there is no literature in Kuwait about the idea of RE; therefore, the researcher felt impelled to conduct a research to explore radiographers' RE further in Kuwait.

The researcher was also aware that being a female radiographer made her passionate in explore radiographers' RE in mammography and its influence on patient care. The situation is particularly problematic in Kuwait, where cancers are becoming more aggressive and the disease is found in younger women, most notably with a late presentation (Ramadhan 2017).

Researcher's positionality and relationship with participants

As the researcher worked as a radiographer in a governmental hospital in Kuwait, this positioned her as an insider, which meant that the researcher shares professional background and had intimate knowledge of the group being studied (Berger 2015). Being an insider researcher offered advantages to the researcher of easily gaining access to the required documents and contacting participants of the study (after gaining ethical approval). Furthermore, being familiar with the cultural background of the participants made the researcher aware that putting the participants in a friendly environment such as providing refreshments, helped to put participants at ease, improve openness in interviews, which in turn generated rich data. Additionally, the study participants were

female radiographers and both male and female radiologists. The researcher believed that being a female researcher had a positive influence in interviewing female participants. The cultural background of most of the participants and their ethnicity as Arab, made them more comfortable and open to talk with female researcher. However, it did not seem that being female researcher had effect on the male participants as they were open, clear, and expressive in their responses.

The researcher is a radiographer; however, this did not seem to effect radiologists' responses because they were able to give honest critique about radiographers' performance on radiographers' current scope of practice, and they were able to provide clear explanations as to why they were resisting extending radiographers' role. Additionally, it is important to mention that being a researcher may cause participants to be hesitant with their responses in consideration of the fact that it were recorded and analysed, however, the researcher assured the participants that the data will be protected and anonymised.

Emerging data assimilation with researcher's prior knowledge.

In line with the research objective-subjective ontology and considering the fact that the researcher is a radiographer, works in a Kuwaiti hospital, the researcher has made conscious research decisions and taken actions to maintain a more objective stance and allow the data and findings to emerge from the participants. These actions as previously mentioned in this chapter, included triangulation, member checking, prolong engagement and peer review (Berger 2015).

In this study, the researcher used freewriting to her feelings during all the stages of the project, starting from the first month. The reflexive diary involved some thoughts that emerged after each interview, to help overcome simple points of weakness for the interviews that followed. They involved important thoughts about the researcher's identity as a radiographer who had interviewed radiographers and radiologists and the fear of any bias that may have affected the participants' thoughts. Reflexive notes and the diary enabled the researcher to write detailed information about the process of conducting a pilot study, collecting documents, recruiting participants, and analysing and interpreting data.

During data interpretation, the researcher acknowledged her position as an Arabic female radiographer through reflective logs and diaries, which was regularly discussed with her supervisory team. Byrne (2021) suggested that explicit reflection with others during the research process enables the researcher to keep monitoring their thoughts and its influence on this research. Being Arabic speaker researcher interviewing most of the participants in Arabic, as it is their first language, aided the data interpretation process. Additionally, having worked with foreigners who are not fluent in English, helped the researcher to understand what they were trying to say even though the English may not be grammatically correct or clear in the interviews. However, to avoid misinterpreting, the researcher asked for further clarification, despite that the researcher already understood what they were saying because of her positionality.

5.15 Ethical considerations: Confidentiality and data protection, informed consent and autonomy

Before the study commenced, a detailed outline 'information sheet' was provided to the hospital managers, radiographers and radiologists who were purposively selected with the help of the supervisors of each department (Appendix 5). A transparent process was applied in the current study through being open, clear and honest with the participants about how their data would be used. Information about the current research allowed the participants to decide whether or not to participate in the study, as per the data protection act (DPA) (DPA 2018). The researcher used DPA regulations, which is a UK data protection regulation, in accordance with best practices and Cardiff University's regulations. Furthermore, there were no clear and official regulations for data protection in Kuwait for the researcher to follow.

The researcher emphasised that participation was voluntary and that all participants had the right to refuse to participate in the study at any time. Furthermore, the researcher sought informed consent from the participants to clarify that they understand that participation in the study was voluntary and that the researcher was allowed to use anonymised quotes for the study (Appendix 6).

In an effort to protect participants' privacy and identity, each of them was assigned a number and these were used when the researcher presented a direct quote from each participant. Furthermore, when participants mentioned their nationality, country or family members name, the researcher excluded this information to maintain the privacy of participants' identity.

The participants were informed that in the event of any information provided during the interviews suggesting that either malpractice or harm to patients, the public or workplace colleagues had occurred, the researcher may be obliged to disclose these details to others (internally or externally) who may wish to take further action. The researcher was obligated to do so by oath as a trained clinician. Furthermore, the researcher believes that there was a moral obligation to report any disclosed information involving harms to patients or malpractice. However, the nature of this research did not involve such disclosure thus there was no need for further consideration about breaking confidentiality.

The researcher reassured the participants that the principles of the DPA were being followed and explained the meaning of it to some participants who were not aware of what DPA was. All the research data was protected and kept in a locked filing cabinet as the researcher believed it was a requirement to maintain confidentiality. The researcher adhered to anonymity and confidentiality to protect the privacy of participants who agreed to take a part in this study. This enabled the participants to express their opinions and perceptions without restrictions. Identification numbers and codes were used to record all the participants' demographics and data. Storing the coded data would allow only the researcher to identify them (Gerrish and Lacey 2010). Furthermore, the researcher ensured the participants that all records of the interviews would be erased once the data was transcribed into paper copies. These transcribed copies will be destroyed after finalising the study.

All reasonable efforts to minimise any harm and the participants' safety were considered (Gerrish and Lacey 2010). In order to ensure comfort and privacy during the interviews, the researcher ensured that all the related environmental factors including the comfort of the rooms were appropriate.

In an effort to minimise any psychological harm to the participants resulting from discussing possibly sensitive issues about a radiographer's limited role, both radiographers and radiologists could look at the interview questions. They were reassured that they could withdraw from the research at any level of the study, and any data collected up to that point would be deleted.

5.16 Summary of the chapter

This chapter presented an in-depth description of the research design and methods that have been adopted to conduct this research. The researcher started with explaining the philosophical assumptions, followed by the methodologies and research paradigm. The researcher also highlighted the ethical issues and explained the process of data collection including the three sources of data collection (individual semi-structured interviews, documentary analysis and field notes). This chapter also presented the pilot study followed by the aim and objectives of the study and the sampling procedure. Furthermore, this chapter illustrated the data analysis process and discussed the trustworthiness of the research. In the following two chapters, the research will present the findings of the study, which will be the integration of results and discussion.

Chapter 6: Radiographers' role extension and activities of the extended role

6.1 Introduction

This chapter is the first of two findings and discussion chapters that explore the themes and sub-themes identified from the data. This chapter and the following chapter highlight the results from the semi-structured interviews, field notes and the analysis of the documents. The findings from the interviews, field notes and document analysis were used to build an in-depth understanding of the single case of the current study, 'extending the radiographers role in mammography' and an understanding of the current scope of practice of radiographers in mammography.

The research sought to understand how radiographers and radiologists perceive radiographers' RE in mammography in Kuwait. This chapter illustrates the main findings of semi-structured interviews and document analysis to identify emerged themes and sub-themes. All themes and related sub-themes are then explored and discussed in-depth, each theme and its related sub-themes are discussed in-depth separately within both chapters. The results and discussion of each theme have been put into separate chapters for two main reasons, the first to avoid repetition as this research included data from 20 semi-structured interviews, field notes and document analysis. The second reason is that integrating the results and discussion in qualitative research shows the storyline events more clearly and enhances the strength of the report (Holloway and Galvin 2017). Each theme and sub-theme discussed that is closely related to the central aim and objectives of the research and focused on the information gathered from the interview data and the documents.

6.2 Construction of the findings and analysing

The interviews transcripts were analysed following Braun and Clarke’s framework, which was explained earlier in the methodology section (Braun and Clarke 2006, p. 87). Each of the interviews was coded individually, all the codes allocated within one table for all radiographers and another table for all radiologists (Appendix 9 and 10). Each table included four columns: codes, arrange related codes, divided into sub-themes and initial themes (Appendix 10). Such an approach enabled the researcher to create a comparison between radiographers’ and radiologists’ perspectives, presenting a clear image of the results and analysing the data through within case and cross cases analyses.

The aim of the two findings chapters is firstly to present the theme and related sub-themes that emerged from multiple sources (interviews, notes and documents), and secondly to test the meanings of the main findings in relation to the reviewed literature through the theoretical lens. The process starts with the main theme and related sub-themes in-depth, followed by an explanation of results, interpretation and discussion of the implications through to acknowledged limitations and recommendations. A total of two main themes and 22 sub-themes emerged from the data gathered from semi-structured interviews and documents (table 2 Thematic framework). The presentation of the findings in this research is associated with the type of case study discussed in the methodology chapter: exploratory, descriptive and explanatory.

Theme	Sub-theme
1- Radiographers’ RE in Kuwait and activities of the extended role	<ul style="list-style-type: none"> • Knowledge of radiographers’ RE. • Current role of radiographers in Kuwait. • Areas of extended role in mammography: <ul style="list-style-type: none"> - Performing breast US. - Performing stereotactic biopsies. - Reporting mammography and breast US images. - Deciding the need for supplementary views mammography images.
2- Extending radiographers’ role, drivers and barriers	<p>Drivers:</p> <ul style="list-style-type: none"> • Shortage of radiologists • Shortage of female radiologists • Patient care • Job Satisfaction

	<p>Barriers</p> <ul style="list-style-type: none"> • Knowledge, education • Training courses • Radiography education in Kuwait • Current poor performance • Rotation and skills • Radiographers' resistance • Patient care • Patients' resistance • Medico-legal aspects • Trust and underestimation • Radiologists' resistance • Financial and competition • Leadership and power • Autonomy • Protecting the professional identity and boundaries
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Table 2 Thematic framework

6.3 Theme 1: Radiographers' scope of practice in Kuwait

The findings in this chapter address study objectives numbers one, two and three dealing with participants' knowledge of the concept of extending the radiographers role, describing the current scope of practice of radiographers in mammography units. Furthermore, this chapter highlights the clinical areas of interest for radiographers to extend their role in mammography. In this chapter, the researcher created an initial understanding of the current situation of radiographers' scope of practice, and radiographers' and radiologists' knowledge of what radiographers' RE means. This enabled the researcher to manage the flow of the interview better and gradually reaching a deep understanding of radiographers' and radiologists' perspective of extending radiographers' role in mammography. To assess this, participants were asked about what they know about radiographers' RE, radiographers' current scope of practice and the clinical areas of interest for radiographers' RE such as performing breast US, performing stereotactic biopsies, reporting mammography and breast US images and deciding the need for supplementary views mammography images.

6.3.1 Knowledge of radiographers' RE

Anecdotally, radiographers' RE is not a familiar concept in the Middle East and particularly in Kuwait. The researcher thought it would be useful to begin the interviews by asking the participants about their knowledge of the concept of radiographers' RE. Apart from three radiologists, most of the participants from both groups (radiographers and radiologists) had not heard about the concept of radiographers' RE, and they were surprised when the researcher explained the concept of it.

'I did not hear about this before....'

Radiographers 2

'Do you mean the job description?'

Radiographer 4

One of the radiologists revealed that she did not hear about this until she read the participants' information sheet for this research.

'Actually, I never heard of it before it was just when I saw your participants' information sheet...'

Radiologist 4

A senior radiologist asked the researcher what RE meant. When the concept was explained to her, she wondered how radiographers are able to do extended roles such as reporting images.

'This is the first time that I hear radiographers report images!'

Radiologist 8

However, a senior radiologist in one of the hospitals was familiar with the concept of the radiographer's RE. The radiologist explained that the knowledge of radiographers RE came from studying in a city in the UK, where radiographers RE is practised and recognised.

'I worked in Singapore, USA and the UK; the radiographers used to perform the ultrasound. I know in the UK radiographers are reporting mammography images, in the UK they are giving radiographers more responsibilities and the extended role. I respect radiographers, they have a significant role in the radiology department'.

Radiologist 9

The study findings in this section address objective two, which was to evaluate radiologists' and radiographers' knowledge of the radiographer RE. These findings highlighted a poor knowledge of the concept of radiographers' RE from both radiographers and radiologists. Indeed, such poor knowledge is expected from radiographers as the radiographers' RE is not established in Kuwait. However, it is surprising that radiologists showed poor knowledge of the concept of radiographers' RE especially when radiologists attend international radiology conferences which could have familiarised them with the concept.

The findings of the current research are broadly different to those in the UK, USA, Australia and Canada, where the concept of radiographers RE has been well identified, discussed, developed and introduced for several decades. For example, in the UK, which is seen as the leading country in extending radiographers' role, Swinburne (1971) suggested extending radiographers' role to overcome the issue of radiologist shortage and highlighted radiographers' ability to detect abnormalities in radiographic images. Furthermore, the results from the current research are contrary to the study by Williamson and Mundy (2010) who assessed radiographer graduates' expectation for their role. Their results showed that all the students expected their role to be extended by gaining experience within five years. Indeed, their paper showed that there was sound knowledge of radiographers' role, RE and role expectation within radiographers' scope of practice. Additionally, the results from the current study do not support the previous research by Abuzaid et al. (2021), which indicated that a majority of radiographers in their study were aware of radiographers' RE and the corresponding achievements in the UK. This was unlike the current research where all the radiographers and the majority of radiologists, including seniors, showed poor knowledge of radiographers' RE.

Furthermore, some of the participants were surprised when the concept of radiographers' RE was explained to them, they did not believe that in some areas around the world radiographers are reporting radiographic images independently and performing breast biopsies. The reason for the poor knowledge of the concept of radiographers' RE in the current research is not clear from the data, but it may be that in the greater geographical Middle East region in general, and Kuwait in particular, radiographers' RE is not established, and there is limited published research in the area around extending or developing radiographers' role, except in performing US. Indeed, there may be a link between a lack of research in this area and the concept of professional boundaries and the concept of power that will be explored in-depth in chapter 6. Kuwait, therefore, demonstrated to possess a poor foundation for the introduction of radiographers' RE. However, recently published research around extending radiographers' role in the Middle East and particularly GCC countries, which

was discussed in further evidence section (3.11), could be a promising step towards introducing radiographers' RE in the region in changing radiographers' scope of practice.

6.3.2 Current role of radiographers in mammography

In order to set the scene and proceed to the main part of the interview, both radiographers and radiologists were asked about the radiographers' current role in mammography. This question enabled the researcher to open the door to discuss the situation of moving away from the radiographer's current role to adopting more responsibilities. Radiographer 6, whose response broadly captured the essence of all other radiographers' responses, explained that the radiographers' role is significant and starts from giving the patients the questionnaire (routine form to be answered by the patient before the procedure asking about the signs and patient's history), followed by the imaging procedure, positioning, and communicating with the patient during the examination and after that when handing them their results.

'We do everything. When the patient come to mammography unit, we book her appointment, and we give her the questionnaire, even if she wants to hide something, we make her put the truth by communicating (some of the patients do not say the truth about the family history). We do the mammography with high-quality diagnostic images, we do the positioning and the instructions of the positioning, and we prepare the patient for the post mammography US, if the radiologists decided the patient needs biopsy, contrast or MRI, the radiographers communicate the patient to arrange that too.'

Radiographer 6

Radiographer 3 added that reviewing the image and checking the technical aspects is part of the radiographer's role and added that the proper positioning is an important part of the radiographer's scope of practice.

'When I see the image, I concentrate on the technical part, and part of my job is to critique the image, nipple in profile, positioning is appropriate, and the factors are good. Also, I should critique my image before showing it to the doctor, the technical part is my job, and I am good at this'...

Radiographer 3

Radiologist 8 gave some detailed description of the current role of radiographers in mammography, commenting that the performance of radiographers affected the quality of the images and thus influenced the diagnostic process. The radiologist focused

on the non-technical aspect of a radiographer's role and concentrated on patient communication and patient care.

'The radiographers in the mammography department the first people to see the patient. Their role is to introduce the patient to the service, tell them about the procedure, compression, and explain reasons for compression, the radiographers will take the patient's history, also perform the physical examination and mark any areas with abnormalities, give the patients the questionnaire with clarification if needed. This is a very important role with the major role being the proper positioning of the patient; they also need to be patient. It is very important because this is a sensitive area. The patients hate the compression and adequate communication between the radiographer and the patient reduces patients' stress, which will give them the strength to tolerate more compression, because the quality of the image is affected by the level of compression, and this depends on the radiographer. If we have excellent radiographers, we will have excellent and high-quality images, and it will be easy for us to pick the abnormalities.'

Radiologist 8

Some documents from a radiography department described the radiographers' scope of practice in Kuwait. Although the documents described the role of radiographers in the radiography department in general, there is no job description for radiographers in mammography. The relevant portions of the documents confirmed the following:

Radiography practitioner role:

- *Regularly attending training courses for new radiography machines and continuous education.*
- *Perform radiographic images based on requested positions and protocols; and assist radiologists to perform special radiographic images.*
- *Patients' care responsibility inside the radiology department including shifting the patient to and from radiographic examination rooms and hospital wards; and providing patients with the necessary protection (lead apron) during examinations.*
- *Quality control test for imaging modalities.*
- *Perform tasks based on the supervisors' request.*

Document

The findings in this section (current scope of practice of radiographers in mammography) from both radiographers' and radiologists' perspectives were supported by documents. The formal documentation from radiography departments demonstrated that a radiographers' role in Kuwait is mainly technical. The technical aspect is concentrated around performing radiographic images, as point two from the document noted 'based on what is requested', which meant that deciding the examination protocols and imaging projections was not within the radiographers' scope of practice. Furthermore, the last point from the previously mentioned document was general with no specification about what could be requested by supervisors. These results are broadly similar to anecdotal evidence about the radiographers' role in Kuwait as discussed in the introduction and literature review section. The findings of the current research are consistent with previous results by Ballani and Sukkar, (2005) who found that radiographers in Kuwait were performing a limited role with no autonomy and they followed what is requested from the departments' managers. Although their study is 16 years old, the current study confirmed that the situation is still the same with no change in the scope of practice of radiographers' and their autonomy.

When the researcher asked radiologist 8 about the current role of radiographers in mammography, she concentrated on the non-technical part of the role, and omitted the other part of performing diagnostic images, supplementary views, and performing 3D breast US. This focus indicated that the radiologist did not expect radiographers to perform extended roles and undertake more responsibilities. The results from this study opposed what was reported by Al Shiyadi and Wilkinson (2020), where the majority of radiologists from their study highlighted that radiographers should be involved in a wide range of extended role tasks, however, they excluded mammography, NM, CT, US and MRI. Despite not indicating what types of extended role tasks that radiographers could undertake, all participants were familiar with the concept of radiographers RE and showed an acceptance of radiographers' adopting more responsibilities after receiving a training and education programme. The findings from their study were important to this research as it was conducted in Oman where there are great similarities in the cultural perspectives and healthcare services status. Indeed, introducing the subject of the radiographers' RE in GCC countries can be seen as an important step towards

radiographers adopting more complex tasks. It is worth remembering that extending the radiographers' role in the UK took more than 50 years to reach the current state where radiographers are involved in an extended and advanced scope of practice (Swinburn, 1971).

Moreover, the current research findings are rather different to those of Price et al. (2002) and Price and Masurier (2007) who found that the radiographers' role in the UK has been changed and extended to include image reporting, performing US, and barium enemas. Furthermore, the current study does not support the findings from previous research in this area. Culpan (2016) found that radiographers in the UK were practising different tasks of extended roles in mammography including image reporting and performing surgical specimen surgeries. The big difference between the current study and other findings may be because extending the radiographers role is not known in Kuwait. In Kuwait, radiographers are known as technicians who perform technical functions in the radiology department including positioning and producing diagnostic images. It is important to highlight that the concept of radiographers' RE in the UK was introduced in 1971 when Swinburne illustrated radiographers' ability to detect abnormalities in radiographic images (Swinburne 1971). Furthermore, with respect to radiographers' RE, image reporting is an old and historical practice undertaken by UK radiographers before 1920 and was recognised among medical and healthcare teams, however, radiographers gave this up for professional recognition (Larkin 1983). Additionally, there has been more research conducted to explore changing the radiographers' role and evaluation of radiographers' performance in adopting more responsibilities in the countries that are suffering from radiologist shortage, aiming to improve the quality of the service and patient care (Hardy et al. 2008; Smith et al. 2008; Smith and Reeves 2010). The continuous research in the area of extending radiographers practice has provided the community, medical domain and healthcare staff with confidence to accept giving radiographers wider scope of practice. In contrast, such a concept is not familiar in Kuwait, where the current research highlighted insufficient knowledge of the concept of radiographers' RE. Exploring poor knowledge of radiographers' RE is expected to be due to the limited scope of practice as compared to other countries that went deeper into the context of RE such as the UK and the USA.

There are possible explanations for such a limited scope of practice; the first reason could be that the radiography profession in Kuwait is young compared to other countries that have adopted radiographers' RE such as the UK. The second reason may be that Kuwait is highly dependent upon a foreign workforce. When the MOH in Kuwait experienced a shortage of radiologists the only solution introduced was to recruit international experts from other countries. Al-Tubaikh (2010) revealed that Kuwait is suffering from a radiologist shortage and this is being treated by international recruitment however, he did not introduce extending the radiographers' role as a proposed solution.

6.3.3 Areas of extended role in mammography

The researcher clarified radiographers' RE as giving radiographers responsibilities and extended role to perform tasks that in this case are usually done by radiologists. The current research aimed to review radiographers' RE in mammography therefore the researcher gave four examples of radiographers' RE to the participants to clarify the concept and avoid any confusion, thus obtaining more accurate data despite their lack of knowledge. The four examples were performing breast ultrasound, biopsies, reporting of mammography and US images and deciding the need to perform supplementary mammography views.

6.3.3.1 Performing breast ultrasound

Radiographers performing breast US appeared to be the most commonly understood RE concept among the current study participants. Whilst the majority of participants were unaware of the concept of RE, they were aware of performing US by radiographers. Nine radiographers and six radiologists showed an interest in training radiographers to extend their role to perform breast US. Furthermore, participants from some hospitals revealed that there is an informal practice where radiographers, who had experience in performing US in their home country, such as the Philippines, carry out the US. Indeed, some of the radiographers explained that they also had experience performing 3D US in Kuwait, using the new machine and have been trained by technical support applicators and radiologists.

When radiographers and radiologists were asked about their opinion of training radiographers to perform breast US, they said:

'I think it is good to train radiographers to perform US, one of our radiographers used to perform US in her country, when I asked her about it, she told me that they receive special training to become a sonographer, but she came to Kuwait as a radiographer because we don't have sonographers and only radiologists perform US... I don't know why, even Saudi Arabia has radiographers performing US, it will help the radiologists and allow us to learn more things.'

Radiographer 2

Radiologist 4 argued that radiographers should only undertake roles that the radiologist does not want to do.

'I believe that technicians who had been working in mammography can be trained to do a breast ultrasound. I believe that we need sonographers that would take some of the bulk of work off the radiologists. In centres when we have the 3D breast ultrasounds is the radiographers who do it and the whole study is open so the radiologists can scroll through and get whatever information they might need. In the centre when we have 3D US, I think the radiographers can do that. But in terms of the radiographer reading the mammogram and US, for me, my response is a capital NO.'

Radiologist 4

Four radiologists out of ten showed doubts in training radiographers to perform US, explaining that performing US is "operator-dependent". These radiologists pointed out that they cannot produce reports for US images that were not undertaken by them. Furthermore, they highlighted that they would have doubts about whether the person who performed the US had covered all areas of the breast and did not miss any part of it.

'They could only take images, but we should put the protocol of how exactly to perform the US, for example, explain the exact steps starting with 1 o'clock, 2 o'clock, they would not be allowed to perform it like the radiologists do which varies from one radiologist to another based on what they see and feel. The radiographer should scan part of the breast every hour so that the radiologist is able to trust the radiographers' technique, and trust that every part of the breast has been covered. The US is operator dependent, so if the person who performs it is not well trained, he/she will miss something. However, I do not like to critique others' work in US. Sometimes when I receive US images that have been done by

other radiologists, I repeat the US as I don't have confidence in the US. My opinion is that I do not agree with allowing radiographers to perform US... When I started mammography reporting I did not start alone, I feel that this is a big responsibility, and it is the patients' right that the person who is performing the procedure and reporting has enough experience to do it. If you miss a lesion it is a disaster for the whole family not only the patient.'

Radiologist 8

However, the only radiographer who opposed the training to use US explained that she was against it because it was not their role, and radiographers did not receive the necessary training to perform US.

'I am totally against that it is the radiologists' role, and this is what they trained to do, if the radiographers take over this role what then is their role? The roles should be divided, I do not think radiographers will be perfect performing 2D ultrasound; the 3D ultrasound was fine because it scans the whole breast, my job is positioning the patient properly and taking exposures... but for 2D ultrasound I don't agree in training radiographers to do it. The radiologists' vision to US is different from ours.'

Radiographers 6

6.3.3.2 Performing stereotactic biopsies

A total of eight radiographers vetoed the idea of extending their role to perform stereotactic biopsies. The radiographers explained that such a role is invasive and should only be performed by radiologists who are qualified in medicine.

'We only perform US-guided biopsies, we don't perform stereotactic biopsies and I don't agree with giving radiographers authority to perform biopsies. We did not study surgery nor study medicine, we don't know to deal with the patient if she suddenly collapsed... we did not study diabetes and we don't know how to deal with diabetic patients or patients with high blood pressure, I don't know how their body would react during the procedure. Once, a patient fainted during me performing a mammography, I lost my mind and I was afraid... imagine such scenario happening during performing biopsies, omg I would die (laughter)... we didn't learn how to deal with such situations. If we had studied that, then why not; but we did not. This is sensitive, inserting the needle may hit an artery or vein causing patient complications... and some radiographers are not qualified to deal with such complicated things; the patient may move, and this is surgery, the radiologists should do that; for patients' sake and for my own sake (laughter).'

Radiographer 9

In contrast, two radiographers showed confidence in performing stereotactic biopsies. They stated that radiographers do most of the steps in this procedure, and it would be better if it came under the purview of the radiographer.

'... If you think about it, the radiographers do almost 80% of the examination. The doctor only takes the biopsy.'

Radiographer 4

'This will be useful actually, because most of the procedure is our job, if there are good training programs, radiographers can perform it perfectly and independently.'

Radiographer 6

When radiologists were asked their opinions of radiographers' performing stereotactic biopsies, nine radiologists refuted the idea, explaining that it was not a radiographers' job to deal with emergencies and complications, and such tasks needed a medical background, especially in pathology and physiology.

'I think it is part of the radiologists' job, and it is more like a minor surgery there is a risk of bleeding and a risk of hitting the lungs. However, it is a skill that can be learned unlike reporting; a large number of radiologists will refuse radiographers performing biopsies, because performing biopsies gives the radiologists prestige and power; even the surgeons are trying to take this task from radiologists I think for financial implications. They are thinking that performing biopsies inside their private clinic will raise their incomes and give them a variation for breast surgeries. There are different types of biopsies. US-guided, stereotactic guided, vacuum assistance and MRI guided biopsies. I don't feel comfortable giving them this responsibility.... '

Radiologist 3

'In stereotactic they (radiographers) have a big role; however, it does not mean that they can do it independently...'

Radiologist 8

Radiologist 9 highlighted that such a complicated and sensitive task which required long years of experience, maybe hard and stressful for radiographers to perform.

'No, no I don't agree. I had patient a while ago... her case was really complicated, and I felt bad for her and there was psychological pressure... it is not fair to put the radiographers under this psychological stress. I am a doctor, and it was

stressful for me. She had bilateral mass, the first mass was easy to take a biopsy from, the second mass was very deep. Even the radiologists need time to learn this very well. If the radiographer is senior with long years of experience, not less than 15 years or 20, they can perform biopsies. But still... I think it is stressful and it is not fair to put radiographers under this stress.'

Radiologist 9

However, one of the radiologists revealed that extending the radiographers' role to perform stereotactic biopsies was not a big issue if the radiographers were trained to it, but also mentioned that this must be under a radiologists' supervision.

'I don't think there will be a problem since they will be trained and will have attended conferences and lectures. First, they need to practice under supervision, they may be able to perform stereotactic and MR guided biopsies; but they should be trained to perform US... I don't think that it will be difficult to do with permanent supervision.'

Radiologists 6

6.3.3.3 Reporting mammography images

None of the radiographers or radiologists who participated in this research agreed to extend the radiographers role in reporting mammography images or reporting breast US. Indeed, the radiographers noted that even if they received training in reporting images it would not mean that they would be able to report mammography images independently without radiologists' supervision; the participants all said that the radiologists' validation for the diagnostic reports is always needed.

'The study and knowledge for radiologists is very broad, it is very sensitive part of the diagnosis stage knowing if this patient has cancer or not malignant or benign?'

Radiographer 3

One of the radiographers suggested that radiographers could provide radiologists with a verbal description of the diagnostic images but not provide a written report. The radiographers mentioned different reasons for opposing radiographers, which will be discussed further in the next section.

'From my point of view, I think giving radiologists a verbal description is ok, but I don't agree with allowing radiographers to report images at all... I think it is huge workload and a very hard thing to do also it is a huge responsibility... If I miss something the patient may complain that will cause me medico-legal issues... Our

study was, in general, more about image critique rather than discovering pathology. We do positioning, take exposures to produce high quality diagnostic images and critique the images; while radiologists study reporting in-depth, they know all the pathology, anatomy and physiology in-depth. Our job is about the technique, but their job is a purely medical role’.

Radiographer 6

Again, radiographer 7 stressed the importance of radiologists’ attending and supervision to validate reports if radiographers extended their role and report mammography images.

‘Image reporting is big responsibility for radiographers, it should not be done without radiologists’ supervision; maybe after years of experience the radiographers are able to point out diagnostic opinions for radiologists because they are human, and they may miss something. I also may be overprotective for the patients and think that normal things are suspicious. I think the radiographers who handle this role should be seniors only after attending many training courses. The radiographers need to know the phrase and style of medical reports because this requires training.... However, I would prefer that the final decision is for radiologists to take they should approve the reports. The qualification... if from the beginning radiographers were prepared to report images it would be fine, but the radiographers did not learn that within the Bachelor training... for me I can give you a complete verbal report, but I don’t have confidence to handle this responsibility 100% without radiologist’s validation....., I am not prepared by the college to do the extended role”

Radiographer 7

The researcher clarified the question to the radiographer and asked whether her opinion would be different if radiographers received appropriate training and education for extending their role. The radiographer doubted the ability of the training to prepare radiographers to extend their role without a radiologists’ supervision.

‘if they offered training courses, we would still be needing radiologists’ validation for our work because I did not study the medical school curriculum. If we studied at least deep pathology, our reporting might be independent. The qualification is important, if I called a radiologist to perform a magnification view; they would not be able do that because they are not qualified to do positioning. It is not that someone is better than another, it is about what I have studied, and what you have studied.’

Radiographer 7

Radiographer 9 pointed out that there is a need for radiographers to write a technical report that reflects any issue associated with their work and also explained that such a step would enhance the quality of the service and reduce misdiagnosis and image repeating.

'For reporting, I think it is possible, and it may be necessary too. In medical imaging, there are some things that appear as an abnormality, but actually, they are not, it could be some errors from factors and physics however, the radiologists don't know that, and they may think there is an abnormality. The radiographers should write a report from a technical perspective, but writing a diagnostic report, performing biopsies and touching patients' bodies from inside... no, this is not our role. We did not study that; we did not go deep into anatomy and pathology. If we trained for a specific procedure, we could not apply it for all patients, the human body varies from person to person and to be able to deal with this variation you should be qualified from medical school... we don't have the clinical experience we never touched patients. We studied basic anatomy which is adequate for technical reporting but not performing biopsies. For example, if the patient is obese, we do the image in two-views sometimes one of the projections shows a bright side and the radiologist might think that this is an abnormality in the patient's breast, but it is not... and usually radiologists request a repeat to ensure that there is a positioning error. Radiographers may write technical reports that are associated with various factors, maybe mentioning the patient's history and describing the patient, but radiologists should produce the diagnostic and final report.'

Radiographer 9

The radiologists' opinion was not different from the radiographers' opinion. They had doubts about the radiographers' ability to report independently even after training courses. However, some of the radiologists suggested that after training, radiographers might be able to filter cases, which means categorising the mammography images into normal/ abnormal and urgent/ not urgent cases.

'The radiographers can write an initial report, filter the cases to normal and urgent, but the radiologists still need to go through all the cases. For biopsies, the radiologists can decide on which lesion is suitable for the radiographer who should be trained on using the biopsy machine and how to use the needle, they can perform ultrasound, and write provisional reports.'

Radiologist 2

'I don't think I am ok with that; I don't agree. First of all, it is a huge responsibility on the radiographers, and they should not perform it without supervision. We (radiologists) depend on the BI-RADS for reporting. "BI-RADS stands for breast imaging-reporting and data system a quality assurance tool originally designed for use with mammography." I don't think that radiographers know anything about this system. We depend on the BI-RADS and we circulate it between us and update it continuously... are radiographers oriented to these updates? Of course, no.'

Radiologist 6

The researcher asked Radiologist 6 about her opinion if radiographers received training and education for extending their role and learned about the BI-RADS system?

'I think they will still need radiologists' attendance for approving their performance because there is no equivalence course to the medical education radiologists received'

Radiologist 6

Again, the concept of radiographers reporting images was a new subject for a majority of the participants,

'This is the first time that I hear radiographers report images! We took classes for that, we learned how to do that in a long training process. We are licensed and certified for that so I don't know about that, I am against it and I don't think that the radiographers are qualified to do that, even if there are training courses because no way can people do that with only training, I don't think it is reasonable.'

Radiologist 8

However, when Radiologist 4 was asked about her opinion of the suggestion made earlier from previous interviews of radiographers concerning filtering cases into normal and abnormal, she rejected the suggestion and said that such practice would negatively affect the quality of the service.

'That will not help at all, I think what you see is normal, but it might be abnormal from radiologists' perspective... that will put radiologists into big trouble, because you class an image as normal therefore, I will not bother spending too much time on it. Ideally a mammography should be looked at a minimum of twice before you report on, it for me, I see each mammogram three times, I see it before I do ultrasound, I see it when I am reporting on it and I look at it after reporting in case there is something missing.'

Radiologist 4

6.3.3.4 Deciding the need for supplementary views mammography images

In some cases, patients would need supplementary views of the breast; deciding the need for supplementary views in mammography units and screening clinics is formally within the radiologists' tasks and responsibilities. When the radiographers and radiologists were asked about the activities of RE in mammography, radiographers and radiologists showed variations in their opinions about the tasks. The responses showed that seven radiographers and six radiologists supported the idea of extending the radiographers' role to decide the need for supplementary mammography views. The radiographers and radiologists who supported that highlighted that radiographers needed appropriate training before enabling them to take the decision of performing supplementary views in mammography. Indeed, the participants mentioned that training radiographers to perform this task would save both patients' and radiologists' time. One of the radiographers added an interesting point about deciding the need for supplementary views in mammography and that it could reduce the psychological stress on the patients.

'In Kuwait, radiographers have no authority to decide the need for supplementary views or even decide if the patient has no symptoms and should be sent to the screening clinics... I think giving the radiographers the authority to decide the supplementary views is a good idea, it would save the time of the radiologist and patient... instead of asking the patient to wait in the waiting area and call her again if supplementary views were needed. The waiting time affects the patients, they panic and some of them cry... especially when we are in the cancer centre the patient certainly panics. But if I have the authority to decide the need for supplementary views at the same time as the routine views, this will reduce the psychological stress on the patients. If the patient asks, "I am used to doing only four images, why today more?", I can tell her that there is a need to make the image clearer for some areas in the breast, this better than telling her to wait outside please and I will call her if more images are needed'

Radiographer 4

However, one senior radiographer revealed that deciding the need for supplementary views is an informal practice in some mammography departments where the

radiologists allow senior radiographers to take this decision without making a formal request.

'This is the current situation for me as a senior, if I see a suspicious mass, I do mag view without asking the radiologist, the radiologists I am working with are used to accept this and happy about it because it really saves their time. When I see calcifications, I do a spot view and when the patient has a small breast, I do an exaggerated view and inform the radiologist that the breast is small, and the image is not perfect in the CC view. I totally agree with giving radiographers the option to decide the need for supplementary views. If the decision is difficult to take there is no harm in asking the radiologists, but they should be allowed to take the decision regarding the need for supplementary views.'

Radiographer 7

Although half of the radiographers were interested in handling the responsibilities of deciding the need for supplementary mammographic views, some of the radiographers had doubts about their ability to perform this task properly. Radiographers who had doubts linked that to their knowledge and the fact that this may expose the patients to unnecessary radiation doses.

'Our protocol is to ask the radiologists, especially because we are a diagnostic department not screening... I think it is better to ask the radiologists to decide because they will decide the views, and every radiologist has a different protocol. I like our protocol it helps us save our patients from unnecessary radiation exposure, sometimes they will ask for mag spot or other views but for the patients' interest I prefer to go back to the radiologists and find out their decision.'

Radiographer 8

'I don't think it is necessary or will make a positive difference, especially with the tomosynthesis... however, if there is any abnormality I can go and ask the radiologist because the patients' wellbeing is number one for me and I don't want to expose the patient to an unnecessary radiation dose and cause her more discomfort from compression. '

Radiographer 6

Four radiologists did not agree with allowing radiographers to decide the need for supplementary mammographic views without their permission. They justified their

opinion by explaining that a medical qualification is needed to handle that responsibility. Radiologist 5 linked that decision with the US examination, which is also in the radiologists' job description and responsibilities.

'No... because it is part of the same cycle. If it is a technical factor like if part of the breast missing or they did not show axilla in the MLO view they can decide... but if it is something related to the pathology like calcification you need magnification, or you see asymmetry and you need a spot compression or 'roll-over' view, I feel it is part of the diagnosis process that is there with comparing the mammogram to US ... again it should be left to the radiologists to decide.'

Radiologist 5

Radiologist 7 revealed that deciding the need for supplementary mammography views requires medical knowledge and linking it to patients' history. In addition, the radiologist stated that the use of tomosynthesis reduced the need for supplementary projection generally.

'This involves radiation, so as far as possible it should be minimised, and it should not hinder the diagnosis, for example, the compress view and magnification view, you have to justify... so if the radiologists think that he/she looks at the old mammograms and same thing was there he will not perform additional views, but after the tomosynthesis the need for the supplementary projections become less, magnification, compression and tangential views are less needed with the tomosynthesis. Again, this goes back to experience... it is better to stay under the radiologists' authority ... for the patients' benefit.'

Radiologist 7

Radiologist 8 linked their opinion to the current performance of radiographers with basic views. The radiologists revealed that the low performance of the basic views is a barrier for giving radiographers more responsibilities.

'This is management, they will not make the decision. The radiologist should see the image and decide, the radiologists will decide if the skin is abnormal or whatever. Exposing the patient to extra radiation is not the best thing. The problem is that they are not able to get the basic views, and the special views may come up after 2-3 times of trying; this is the disaster (laughter). We don't do supplementary views, only if we see something suspicious, we request it and most of the time we depend on the magnification in the technology. Sometimes I need

more views, I ask for it, the radiographer does 3,4 or even 5 images to get what I am asking for.'

Radiologist 8

Although these four radiologists did not accept the idea of radiographers' deciding the need for supplementary mammography views, radiologist 9 had a positive perspective about such a task. She explained that she allowed radiographers in her department to decide on the need for supplementary mammography views and she is encouraging them.

'I allowed radiographers who worked with me, and when they perform it properly, I encourage them by saying well done and bravo... their performance is good. Sometimes the radiographer makes a mistake, but I always tell them that a mistake is not the end of the world and this will teach them for the future.'

Radiologist 9

The findings from this section addressed the third objective of the current study which is understanding the attitude of radiographers and radiologists towards RE in mammography. Currently, there is no published evidence or literature in the areas of interest for radiographers to extend their role in mammography in Kuwait. Therefore, the discussion in this section depended upon the findings of this study, anecdotal evidence and related literature from the literature review chapter.

The researcher highlighted areas of interest for extending the role of the radiographer in mammography into two sections: the first section is the familiar practice in Kuwait, such as performing US and deciding the need for supplementary views in mammography. These practices are familiar because anecdotally it is being informally performed in some hospitals in Kuwait under radiologists' supervision and formally in other areas in the Middle East e.g., KSA. Some of the radiographers and radiologists indicated that they trusted senior radiographers to decide on the need for performing supplementary reviews under radiologists' supervision. These findings further support the idea of Field and Snaith (2012) who revealed that a long history of engagement between two professions working together has an important influence on blurring

boundaries between professions. Moreover, the results from the current research match those observed in an earlier study by Al Shiyadi and Wilkinson (2020), who reported that radiographers in the UAE are performing extended role informally. However, their study did not address any details about the areas of the extended role that radiographers are performing.

The second section demonstrates unfamiliar areas of extending the radiographers' role in Kuwait and the Middle East such as reporting on US and mammography images and performing stereotactic biopsies. Informal practice means performing tasks that are not officially listed in radiographers' job/role description.

Both radiographers and radiologists revealed that performing breast US is not within the radiographers' job/role description in Kuwait. Overall, these findings are different from the situation in other countries such as the UK, the USA, Canada and Australia where performing breast US is a part of radiographers' scope of practice (The Royal Australian and New Zealand College of Radiologists 2002; Berg and Mendelson 2014; NHS Breast Screening Programme 2019; The Royal Canadian Association of Radiologists 2016). The literature highlighted that the main driver for training radiographers to perform US is a shortage of radiologists (McKenzie et al. 2000). This is particularly important when investigating the situation in Kuwait where the MOH is heavily reliant on recruiting international radiologists to cover the shortage. This appears to be a significant issue as international recruitment is not a stable long-term solution for the shortage of radiologists because of the temporary nature of immigrant workers. In line with this idea, Al-Tubaikh (2010) revealed that the radiologist shortage is a serious issue in Kuwait and the author proposed attracting Kuwaiti medical graduates to consider radiology as a profession to overcome this shortage. However, there is no published literature in Kuwait that highlighted training radiographers to perform US as a solution for the radiologist shortage.

Radiographers and radiologists showed some interest in radiographers performing breast US and revealed that there is a need to train radiographers to perform breast US. Indeed, the familiarity of radiographers performing US influenced radiographers' opinion. The fact that radiographers in KSA are performing US was mentioned by the six radiographers. Indeed, the similarity of the cultural background with Kuwait and KSA

being geographically close may have encouraged radiographers to perform breast US. In the current research, the radiologists who supported radiographers performing breast US revealed that such practice will reduce the workload of the radiologists and help to enhance the situation during the shortage of radiologists.

Furthermore, the present study highlighted that some radiographers in Kuwait were trained in performing 3D breast US. When participants were asked about the idea of training radiographers to perform 3D US and not the 2D US, they mentioned that 3D US is a simple procedure which is not operator dependent and does not require high-level skills to image the breast. A similar idea was demonstrated by Arslan et al. (2019), where the researchers explained the difference between the 2D and 3D US and revealed that 2D is operator-dependent and requires higher skills to avoid missing any part of the breast. Additionally, Berg and Mendelson (2014) suggested that categorising 2D US as operator-dependent is a concern for medical and healthcare staff and such an issue could be solved by offering radiographers intensive training to enhance their performance. An explanation for the lack of trust from radiologists towards radiographers performing 2D yet being in support of them performing 3D US could be the lack of accredited training courses. Indeed, it could be argued that radiologists trust radiographers with producing diagnostic images because they have been trained formally to perform these tasks. Indeed, the existence of intensive and accredited training courses for US may change this situation.

In the current research, it was notable that radiologists found it difficult to trust the accuracy of US images performed by others. Indeed, they mentioned that they even repeat the US examination performed by junior radiologists. Radiologists argued that unlike imaging modalities such as CT, MRI and mammography, it is difficult for them to report US images that were done by others as it depends on the skills of the practitioner. This point ties in well with a previous study by Wise (2008, p. 1043) which demonstrated that not all trainee practitioners perform US at the same level of skills and stated:

“It must be recognised that not all trainees have the aptitude to undertake ultrasound scanning and that some, despite undergoing training, may not acquire the appropriate skill ever to practice independently”.

Again, the reason for these trust issues between practitioners may be because there is no accredited training to perform US within Kuwait. If accredited training existed with high standards and criteria supervised by experts in this field, the issue of trust and the claim that US is primarily operator-dependent may be enhanced.

When participants were asked about their opinion of extending radiographers' role to perform stereotactic biopsies, the majority of them rejected this idea. The radiographers revealed that allowing them to perform this examination would negatively affect the quality of the service provided and patient care. Radiographers in the current study explained that such a task is sensitive and requires a medical background to be able to perform it. However, a small number of participants showed positive attitudes towards radiographers performing biopsies after undergoing thorough well-developed training courses. Contrary to the findings of the current research, Dixon and Dearnely (2008) found that radiographers showed a positive attitude towards performing stereotactic biopsies. Their study also highlighted that training radiographers to perform such a task has a positive influence on patient care and the quality of the service. Furthermore, radiographers revealed that an extended role increased their confidence and professional recognition. It is important to highlight the fact that in the current study, radiographers showed poor knowledge of the concept of radiographers RE, and they did not have experience of performing extended roles. Indeed, this could justify the doubt in their ability to handle performing stereotactic biopsies. Radiologists in the current study also opposed training radiographers to perform stereotactic biopsies, they highlighted that such procedures should be performed by radiologists who had strong medical background knowledge. However, the concept of knowledge was not the only reason for rejection, some of the radiologists mentioned that this is their role and their profession. Radiologists in the current study showed reluctance to blur the boundaries between their profession and the radiographic profession, the explanation for this is well identified in the literature and the theoretical framework section and will be explored in greater depth in Chapter seven.

When radiologists and radiographers were asked about their opinion of extending the radiographers' role to report breast US and mammography images, they rejected the idea. All the radiographers and radiologists explained that radiographers could perform

as 'first readers' after training and permanent supervision from radiologists. This idea is similar to Torres-Mejia et al. (2015) who reported that radiographers can interpret mammography images as first readers after formal training under a radiologist's supervision and approval. Furthermore, this was proposed by Wivell et al. (2003), who highlighted that by training radiographers to perform as first readers, it enables the department to keep their routine of "double-reading" and reduces radiologists' workload. However, such a practice was rejected by one of the radiologists in the current study who suggested that this could be confusing and might increase reporting errors, false-positives and false-negative reports.

Interestingly, such ideas around filtering cases, identifying abnormalities and using a red dot (identification) system, have been discussed in the literature since nearly 30 years ago (Hughes et al. 1996; Loughran 1994; Renwick et al. 1991; Wilson 1995). A more recent study by Buskov et al. (2013) examined radiographers' performance in identifying abnormalities on plain images. This is similar to the current research's participants who suggested extending their role to filter the cases and decide which mammography images are urgent and need to be reported immediately.

Indeed, the radiologists' opinion was predicted, based on the concept of protecting identity and professional boundaries, which will be discussed in depth in chapter seven. According to previous literature, the majority of radiologists within previously published literature showed negative attitudes and resistance towards radiographers RE in reporting images (Forsyth and Robertson 2007). In line with the current research, Kekana et al.'s (2015) study in Africa showed that 83% of radiologist opposed the idea of radiographers reporting diagnostic images. Furthermore, Gqweta (2012), also in Africa, showed that the main barrier to extending the radiographers' role was radiologists' resistance. However, unlike the results of the current study, Forsyth and Robertson (2007) highlighted that radiologists in the UK supported extending radiographers' role in reducing their workload.

However, surprising results emerged from the data based on the radiographers' perspective. Unlike the majority of studies in this area where radiographers showed an interest in adapting to having more responsibilities and an extended role (Abuzaid et al. 2020; Al Shiyadi and Wilkinson 2020; Brealey et al. 2002; Kekana et al. 2015; Moran et

al. 2013; Moran-Forward 2011), radiographers in the current study showed negative attitudes about extending their role in reporting mammography and US images. This may be explained by radiographers' poor educational awareness and knowledge. The literature highlighted that radiography teaching in Kuwait is highly related to radiographic techniques and positioning rather than medical education. Ballani and Sukkar (2005) provided a detailed curriculum of radiography teaching in Kuwait that showed a limited education in pathology and physiology. Such superficial medical knowledge may be the reason behind radiographers' lack of confidence to adopt more responsibilities in mammography which will be discussed further in the following chapter. Although Ballani and Sukkar (2005) study is 16 years old the findings from the current study, based on the documents sourced, showed that the curriculum of teaching radiography has not been changed or developed up to the day of writing this thesis. This will be discussed further in the knowledge and education sub-theme (section 7.3.1).

Another reason may be the nature of Kuwait as a developing country. Developing countries have been aware of the importance of progressing the quality of the healthcare service provided, as it is directly associated with the population's health which itself affects the development of society and the country (Han 2012). For instance, in Tanzania in 2016, the country had 20 radiologists for 49 million people; therefore, they trained sonographers and radiographers to taken on an extended and developed role (Mollura 2016). Mollura (2016) reported Tanzania to be a poor and developing country and such a situation may have justified training sonographers and radiographers to extend their role to overcome the issue of radiologist shortage. However, the situation is slightly different in Kuwait which could be considered a "rich country", its income derived from oil. Being a rich developing country with no strong history of medical training and education may be one of the reasons it adopts the policy of international recruitment. Therefore, being a rich country and being willing to pay for international recruitment may have led the MOH in Kuwait to exclude the idea of training radiographers to perform an extended role as a solution for the radiologist shortage.

6.4 Summary of the chapter

This chapter discussed the first main theme that emerged from the data: “Radiographers’ RE in Kuwait and activities of the extended role”, and its related four sub-themes. It highlighted radiographers’ and radiologists’ knowledge of the concept of radiographers’ RE in mammography. Furthermore, this chapter identified radiographers’ opinions of extending their role in particular clinical areas in mammography. The exploratory stage of this case study was completed and will be followed by the describing and explanatory stages to gain in-depth understanding of radiographers’ opinions in the next chapter.

Chapter 7: Extending radiographers' role in mammography; drivers and barriers

7.1 Introduction

The findings in this chapter address study objectives numbers 4 and 5, dealing with understanding the attitude of radiographers and radiologists towards RE in mammography and analysis of the barriers and drivers to RE. In this chapter, the researcher moves from exploring to developing a deep understanding of the explanations and justifications of the participants' opinions. To assess this, the radiographers and radiologists were asked to explain the drivers and barriers to radiographers' RE. Four sub-themes emerged under the drivers and advantages of RE in mammography. The more frequently mentioned drivers for extended radiographers' role were the shortage of radiologists followed by a shortage of female radiologists in particular. In addition, patient care was one of the drivers of extending the radiographers' role. Participants in the current study highlighted that job satisfaction associated with helping patients and having autonomy in practice is one of the drivers for radiographers' RE. Moreover, this chapter discusses a total of 15 sub-themes that emerged under the barriers and disadvantages of extending the radiographers' role in mammography.

7.2 Drivers

7.2.1 Radiologist shortage

The first sub-theme is based around radiologist shortage and the participants' opinion about the drivers for training radiographers for RE in mammography. Radiographer 1 highlighted that there was a continuous shortage of radiologists in Kuwait, the

participant supported her opinion with her personal experience of having a family member who is a radiologist who shared the critical situation in Kuwait with her:

'We have a severe shortage of radiologists, a family member is a radiologist and she told me that the physicians and surgeons are fighting over them (laughter), some of the radiologists are doing higher studies, training courses and attending conferences which is causing a continuous shortage of radiologists... To solve such an issue needs training radiographer to have some autonomy to be able to do some tasks and reduce their workload.'

Radiographer 1

Radiologist 2 highlighted that radiographers need to be trained to perform some tasks as an extended role to reduce the radiologists' workload and that the reason and driver for radiographers' RE is the shortage of radiologists.

'Radiologist shortage is the reason for RE, having radiographers who can perform ultrasounds filter the cases (urgent-normal) for the radiologists will reduce the workload of the radiologists and save the patients' and the radiologists' time. For example, instead of calling the radiologists to see the images and decide if there is any need for supplementary projections the radiographers may decide that and save the radiologists' time. Instead of having the radiologists to take the biopsies, the radiographers can take the instructions and the localisation to take the biopsies which will save the radiologists' time and reduce the workload.'

Radiologist 2

However, radiologist 4 had a different opinion, she explained that radiologist shortage has been a driver for extending the radiographers role in some countries such as in the UK, but this should not be done in Kuwait. She added that the situation is not as severe as in the UK and training more radiologists is the only solution to radiologist shortage.

'In terms of the radiographer reading the mammogram, for me, my response is big NO, because I believe that you should be a physician first to be able to do that because you are relating that to disease and whenever we look at this mammogram it is pathology oriented so if that background is not there, in which base would you want that? I know that in the UK there is an acute shortage the NHS is in trouble so that may be the stop gap solution but even then, I think it is wrong. To solve radiologist shortage, train more radiologists (laughter)...

Why a number of people run away from it? because of physics you have to do whole paper in physics and an oral exam in physics... So many people are happy to get rid of physics when they finish their high school however the radiologists are one of the most highly paid specialities.'

Radiologist 4

Furthermore, a document collected from the MOH about the distribution of staff by regions and occupation shows that there are a total number of 141 radiologists working in the government hospitals in Kuwait. However, there were no statistics available on the distribution of the number of Kuwaiti and non-Kuwaiti radiologists. Based on anecdotal evidence and note taken by the researcher during multiple visits to hospitals in Kuwait, less than 20% of the 141 radiologists are Kuwaiti nationals. Indeed, the number of Kuwaiti radiologists (nearly 28 radiologists) is considered very small to serve a population of 4,309,257 people in Kuwait based on the latest statistics (World population review 2021).

<i>Senior specialist of diagnosis X-Ray</i>	<i>28</i>
<i>Specialist of X-Ray</i>	<i>37</i>
<i>Senior registrar of X-Ray</i>	<i>40</i>
<i>Assistant registrar of X-Ray</i>	<i>36</i>
<i>Total</i>	<i>141</i>

Document

The findings from this section highlighted one of the main drivers for extending radiographers' role as being a shortage of radiologists, and particularly Kuwaiti nationals. All radiographers and the majority of radiologists reiterated that radiologist shortage is a global issue including in Kuwait. The results from this section are similar to Rose and Gallivan (1991) who noted that the issue of radiologist shortage caused unreported images, and this was the main driver behind training radiographers to extend their role. Furthermore, Loughran (1994) and Wilson (1995) also found that the main driver to initiate radiographers' RE was the shortage of radiologists. However, in

this study, two of the radiologists did not see that there was any need for a driver to extend the radiographers' role in Kuwait and revealed that extending radiographers' role was not the solution for the radiologist shortage issue. The opinion of the two radiologists who mentioned that there were no drivers to extend radiographers' role was very similar to The Royal Australian and New Zealand College of Radiologists (2018) who revealed that extending the radiographers role is not a solution to radiologist shortage, as this practice will negatively affect patient care. Additionally, their study highlighted that the education and training of radiographers (in Australia and New Zealand) is not adequate to support an extended role.

The idea of the existence of radiologist shortage is frequently mentioned in the literature, however, the reason behind this issue was not clear. Indeed, radiology is one of the least popular specialities within the medical domain. In Kuwait, a study by Al-Tubaikh (2010) highlighted that the country does not offer a structured radiology programme, therefore any physician who was interested in becoming a radiologist needed to search for a training programme outside Kuwait. This may be difficult for most physicians because of their family commitments. Furthermore, Al-Tubaikh (2010) highlighted that radiology is a rapidly changing field that requires continuous education and rapid updating to keep pace with its evolution, which may be one reason why physicians worldwide chose another speciality. Another possible reason for the lack of popularity in the radiology field is the development of artificial intelligence. Presently, with the fast evolution of technology within the radiology field, artificial intelligence programmes are being developed to detect abnormalities within diagnostic images and to produce some diagnostic reports (Hosny et al. 2018). This may put the role of radiologists under pressure to being replaced in the future by technology and machines or at least reduce the need for radiologists. Arguably, the development of artificial intelligence could reduce the workload of radiologists and enable them to concentrate on more complex techniques.

Interestingly, when radiologists were asked about the drivers for radiographers' RE, two non-Kuwaiti radiologists from the medical recruitment specialists mentioned that radiologist shortage in Kuwait is not critical and can be manageable. Indeed, such opinions contradict the statistical data from the MOH, documents analysis, and other

participants' opinions which indicated the issue of the radiologists shortage among government hospitals in Kuwait. One possible explanation for their opinion was job protection. The radiologist shortage may result in the role extension of radiographers in Kuwait. This may reduce the need for non-Kuwaiti radiologists thus endangering the jobs of these participants and others in the same circumstance.

7.2.2 Female radiologist shortage

Participants also highlighted that one of the drivers toward radiographers' RE is the shortage of female radiologists. This creates a real issue in a country like Kuwait which is an Islamic country with a conservative society. Because of cultural and religious perspectives, female patients always request female radiologists to perform the US and other related examinations such as a physical examination and undertaking biopsies. Indeed, there is a law in Islam that if a female doctor is available it is forbidden for the female patient to be treated or uncover herself in front of a male doctor (The Holy Qur'an, surah Alnoor). As highlighted by participants these cultural practices increase the workload of radiologists and may cause a delay in appointments and reports.

Radiologist 1 showed an interest in training female radiographers to perform breast US.

'If they give chances to radiographers to perform US a lot of them will be interested especially for breast US. Because of the radiologist shortage and shortage of females in particular, a majority of the patients with breast disease prefer a female practitioner to perform their examination.'

Radiologist 1

A male radiologist, radiologist 2, revealed that because of cultural reasons female patients usually feel embarrassed talking to him, showing how female radiographers play a significant role as communicators between female patients and male radiologists.

'Honestly the female radiographers help me a lot especially because the female patients usually feel embarrassed to talk to me about the breast disease (cultural issues) and the radiographer helps me as she communicates with the patient and then tells me everything'.

Radiologist 2

In addition,

'The shortage is severe, all the patients want female radiologists for cultural and religious reasons, and few radiologists are attracted to mammography.'

Radiologist 3

One of the radiographers showed an interest in learning to perform US and illustrated that this would reduce the radiologists' workload.

'I wish to learn how to perform breast US, why not! It is really simple and not a big deal. We may learn to perform breast US and write primary reports this will help to use us as radiographers to cover the shortage of female radiologists ... all patients want females, and a large number of female radiographers are free most of the time...'

Radiographer 9

The study findings suggested that there is a female radiologist shortage in Kuwait and one of the radiologists highlighted that there is also a shortage of radiologists specialised in mammography. The researcher did not find any available documented or published statistics about female radiologists and gender distribution through online search and personal visits to the MOH. Therefore, this section is mainly driven by the participants' opinions.

Extending radiographers' role in mammography could begin to balance the radiologists' workload and female radiologist shortage. The study findings highlighted an interest in the training of radiographers to perform breast US by the majority of participants. Participants presented a strong link between the female radiologist shortage and the need to train radiographers to perform US and demonstrated that this is an available solution that is not used by the MOH. It is worth mentioning that performing breast US is the only area of the extended role that the majority of participants showed an interest in adopting and highlighted it as a solution to the radiologist shortage. The reasons for the female radiologist shortage are similar to the male radiologist shortage previously

mentioned. Additionally, the female radiologist shortage may result from a lack of interest in this field or their concerns about the risks of medical radiation exposure such as damage to the foetus during pregnancy (Vu and Elder 2013).

7.2.3 Patient care

In the data under this sub-theme, both radiologists and radiographers talked about the positive impact and the potential benefit of radiographers' RE in mammography. Nine radiographers and six radiologists revealed that extending the radiographers role to perform breast US, write descriptive initial reports and filter the reports (normal and abnormal) would enhance the quality of the patient care. Furthermore, the findings demonstrated that seven radiographers and six radiologists thought giving radiographers the authority to decide the need for supplementary mammographic projections would also improve patient care. However, all radiographers and radiologists explained that allowing radiographers to report radiography and US images independently would negatively impact patient care. Additionally, nine radiographers and eight radiologists mentioned that giving radiographers the authority to perform stereotactic biopsies would have a negative influence on patient care.

One of the radiographers highlighted the importance of extending the radiographers' role on patients care and its impact on BC detection.

'The shortage of radiologists is wasting the patients' time, especially the patients with suspicious cases, who need supplementary projections, biopsies and ultrasound. If they give us authority to do more tasks the patient will not wait longer for her reports, reduce the diagnostic recall cases, and the ultrasound is ready for the radiologists with the mammography images which would enhance the early detection of the breast cancer.'

Radiographer 1

Another radiographer explained that extending the radiographers' role would have a positive influence on the patients' convenience as radiographers, unlike radiologists, spend more time with the patients which makes it easy for them to trust them and continue their examination with the radiographer.

'This will affect the patient care. When the patient spends time with the radiographer during the procedure and trusts her it is more convenient for the patient to complete the procedure with the same radiographer too, like deciding the need for supplementary views performing them directly and performing the US... It is much better than going back and forth to ask the radiologist which I can make the patient feel that we don't have enough knowledge and we are not qualified therefore the patient will not trust me. However, when I perform the examination from A-Z the patient would be calm and relax and this is very important for patients. Trust from the patients is very important, sometimes patients are allergic or asthmatic and they hide it to avoid postponing the procedure but when they trust the radiographers they open up and say everything. When the patient feels that I am strong and am controlling the examination they will trust me, it is much better than when the patient asks me something, I have to ask her to wait until I ask the radiologist, I don't like that. If the radiographers are trained to perform US, they will cover almost half of the work and cover the radiologist shortage. I don't think we will have appointments the service will be much better, and we will be able to accept walk-in cases because we have large number of radiographers, and we are using this large number... When radiographers perform breast US this will enable radiologists to concentrate more on image reporting and performing biopsies.'

Radiographer 9

In addition,

'In regard to the ultrasound and mammography the radiographer can write a primary report to classify the cases into (urgent-need biopsy- normal) this would enhance the detection rate and prognosis... giving them this responsibility at least to manage the urgent cases from the normal cases instead of wasting the radiologist's time looking at all the images without knowing which case has priority to be diagnosed first will improve the quality of the service given to the patients.'

Radiologist 1

Radiologist 9 pointed out that training radiographers to do less complicated extra roles such as filtering cases to normal and abnormal would benefit the patients.

'Radiographers did not study deep pathology, but training radiographers to differentiate between normal and abnormal cases would be great to filter the cases for the radiologists and speed up the diagnosis process and will benefit the patients in the first place.'

Radiologist 9

There was unanimous agreement from the two radiographers working in screening clinics that the importance of giving radiographers extended roles and having the authority to decide the need for supplementary mammography views would reduce the psychological harm that is caused by the recall for more views and ultrasound.

'The shortage of radiologists is wasting the patients' time, the patient with a suspicious case, who needs supplementary projection, biopsies and ultrasound. If they give us authority to do more tasks, the patient will not wait longer for her reports, reduce the diagnostic recall cases, and the ultrasound is ready for the radiologists with the mammography images which will enhance the early detection of the breast cancer. The ultrasound makes the radiologists exhausted, requiring lifting and special arm movements, if you cause this stress in one or two radiologists they will suffer burn-out, a family member is a radiologist and she had an injury, she had an injection and was advised to stop working with ultrasound for a while, so all the stress went to the other radiologist who might end up like my relative.'

Radiographer 1

'Giving radiographers the authority to decide the need for supplementary views is 100% for the patients' sake. It is much easier for the patients to have supplementary views performed if needed at the same time instead of calling the patient to come back and in a different centre. The recall causes the patients extreme anxiety despite the fact that I explain everything for the patients, and I tell them about the possibility to attend again, not because something is wrong, it is just because it is a routine process still the patients come with anxiety, some patients come with all the family members thinking that she will receive bad news... If they don't want to give any radiographer this authority, give it to the seniors first, it will make a huge significant difference in term of convincing the patients.'

Radiographer 4

Internationally, radiographers' RE was established because of the shortage of radiologists which negatively affected patient care by causing delays in reporting images (Saxton 1992). Indeed, the literature highlighted that extending the radiographers' role has enhanced patient care and patient management (Field and Snaith 2013; Gqweta 2012; Hardy et al. 2008; Hardy et al. 2013; Smith and Reeves 2010). Similar to the current study, the literature highlighted that extending the radiographers' role will enhance patient care by reducing waiting time, speed the process of producing the diagnostic reports, and enhance BC detection rate.

The participants in the current study also explained that extending radiographers' role will protect patients from unnecessary psychological harm caused by 'call back' for more breast images or US. These findings further support the idea of (Feig 1988) who indicated that asking patients to return for supplementary reviews caused them anxiety and required more time to manage appointments.

However, there is one major difference between the literature previously mentioned and the current findings. Participants in the current research revealed that extending the radiographers' role should be limited to only specific areas, which are performing breast US, initial reporting, and deciding the need for supplementary mammographic images. The participants explained that such practices will enhance patient care. However, all of the participants opposed the independent reporting by radiographers and claimed that such a practice would negatively affect patient care and the quality of the service provided. Furthermore, the majority of the participants (nine radiographers and eight radiologists) opposed training radiographers to perform stereotactic biopsies, and one of the radiographers described the situation as a "disaster". Responses from both radiographers and radiologists indicated a lack of confidence to perform the extended role independently. The majority of radiographers and radiologists leaned towards the simpler tasks of the extended role such as deciding the need for supplementary views or performing breast US. They opposed any other extended role that may be completed without radiologists' supervision.

In contrast, there was a group of radiographers and radiologists, who thought that extending radiographers' role would have a negative impact on the patient care and quality of the service provided. The main reason for radiologists against training radiographers is that US is an operator-dependent procedure, this may lead to missing abnormal lesions causing misdiagnosis. The radiologists who are against performing US also added that they did not feel comfortable reporting on images that they did not perform, justifying that US is a different imaging modality compared to CT, mammography and MRI because the image taken is dependent on the knowledge of the person performing the examination. Furthermore, 90% of radiographers added that performing stereotactic biopsies would negatively affect patient care and they explained

that they do not have a medical background to deal with urgent circumstances which may threaten the patients' lives.

'The US is operator dependent, so if the person who performs it is not well trained, he/she might miss something. However, I don't like to report others work in US, sometimes I receive US images that have been done by other radiologists. I repeat the US I don't have the confidence, my opinion is that I don't prefer allowing radiographers to perform US, If you miss a lesion it is a disaster for the whole family not only the patient.'

Radiologist 8

'The US is very sensitive, and it is operator dependent, how can I be sure that the person who performed the US examination covered the whole breast? Maybe they missed one part of the breast... especially for young patients because we don't perform mammographies for them before they are 40, we depend on US only. If I missed the pathology the consequences would be dramatic that's why radiologists are rejecting this idea; they are afraid that the performance of US and the images of the patients' breasts may not be representative of the case.'

Radiologist 3

Regarding giving radiographers the authority to decide the need for supplementary mammography views, three senior radiologists rejected the idea; they revealed that this would lead to exposing patients to unnecessary extra radiation doses.

'This is management, they will not make the decision. The radiologist should see the image and decide, the radiologists will decide if is skin abnormal or whatever. Exposing the patient to extra radiation is not the best thing'.

Radiologist 8

The findings from the current study highlighted that not all participants viewed extending radiographers' role in mammography positively. The participants showed variations in their opinions for extending radiographers' role in performing several tasks. Indeed, 90% of the participants found that training radiographers to perform stereotactic biopsies and independent mammography reporting will negatively influence patient care and patient management. Only 10% of radiographers and 40% of

radiologists stated that performing breast US will negatively impact patient care. A similar pattern of results was obtained by The Royal Australian and New Zealand College of Radiologists (2018), who suggested that extending the radiographers role has a negative impact on patient care. The author demonstrated that extending the radiographers' role requires lengthy training, which is not achievable within the present radiographers' training and curriculum. Similar to this study, The Royal Australian and New Zealand College of Radiologists (2018) highlighted that the radiographers did not undergo medical training, study the nature of the diseases in-depth, do not have the knowledge of diseases extent and prognosis and cannot offer guidance to a referring doctor, all of which are necessary factors to improve patient care and the quality of the service. The findings highlighted a strong relationship between opposing radiographers' RE to maintain patient care and the concept of knowledge and education. Participants revealed that their knowledge was limited compared to radiologists' knowledge who had medical backgrounds and received intensive training to practice their current role. More details about the concept of knowledge and education will be discussed in chapter seven.

7.2.4 Job satisfaction

The current research aimed to understand reasons around changing the radiographers' role therefore only radiographers were asked about their current job satisfaction. 40% of radiographers revealed that they were not satisfied in their current positions as radiographers. They explained that their limited scope of practice was negatively affecting their job satisfaction. Furthermore, radiographers explained that they did not have any power to make decisions to help the patients such as accepting more cases per day which is also negatively affecting job satisfaction.

'The only thing that make me less satisfied when I don't have the power to help them (patients), when I can't accept a patient because the radiologists' list is full, I love to take 'walk in' cases, and I am ready for more responsibilities, me dealing with patient, me helping the patient is satisfying.'

Radiographer 1

One of the radiographers revealed that the main reason for not being satisfied is lack of patient communication and having poor skills and education to deal with patients, especially cancer patients, which negatively affect the chances of extending radiographers' role,

'I am not satisfied... I want to be a better radiographer..... Most of the cases the patients are in a very bad mood, but we are communicating with patients and performing their examination, so we need to know how to deal with a patient psychologically. The patient used to come very stressed, disappointed and sad they are always afraid to discover a new mass, so it needs education and knowledge.'

Radiographer 4

In contrast, 60% of participants (six radiographers) revealed that they were satisfied with their job and their current role. The participants who said that they were satisfied mentioned that the main source of their satisfaction is helping patients and communicating with them.

'I am satisfied really... because of my patients especially. You know the procedure... if you work with your heart and give all the care to the patient you will send your patient home happy... also dealing with the patients and making them comfortable will make their body relax and reduce the mammography pain, I feel happy when they tell me 'you are good I did not feel pain this time'... it is also the trust the radiologists give me really makes me happy ... '

Radiographer 3

'I like to be close to patients especially when I give them the questionnaire, I feel I am close to them and that makes me happy. The best part is when the patients are comfortable with me, I like communicating with the patients and I like to care for my patients.'

Radiographer 6

The findings in this chapter highlighted that 60% of radiographers are satisfied with their jobs, while 40% of radiographers mentioned that they are not satisfied for three main reasons. The first reason is limited autonomy to help patients and reduce their waiting

time for mammography appointments, as they do not have the authority to accept more cases per day. The second reason is the lack of skills and knowledge and the third reason is the poor salary compared to their role. These explanations showed a major difference between the findings of the current research against previous literature, where radiographers highlighted a strong relationship between extending their role and job satisfaction (Howard 2013; Hughes 1996; KeKana et al. 2015; Moran et al. 2013; Thom 2018). The participants who expressed their job satisfaction mentioned that the reason for it was they were experts in the field and trusted by colleagues, patients and radiologists. These are indeed important points, however, this does not reflect the unsatisfactory aspect which resulted from the current limited scope of practice. The reason for the difference between the current findings and other findings in the literature is that radiographers in the current research have not experienced RE. Additionally, the fear of independent reporting without supervision is daunting and this was an obvious issue presented in all previous and upcoming sections of the thesis. This fear may be due to the lack of knowledge and training; or because of the radiologists' power which will be discussed further in chapter seven.

7.3 Difficulties and barriers to the radiographers' RE

This section discusses the sub-themes that represent the difficulties and the barriers to extending radiographers' role, including the main areas of the extension in mammography (reporting mammography images, performing US and stereotactic biopsies, and deciding the need for supplementary mammography views). It is important to mention that all the barriers of radiographers' RE in this section associated with the knowledge concept, followed by highlighting the barriers of radiographers' RE that associated with the concept of power and jurisdiction which was mentioned in the theoretical framework.

7.3.1 Knowledge and education

Insufficient relevant knowledge and understanding, the nature of the education and type of qualification were the barriers that were most frequently mentioned by both radiographers and radiologists. Lack of knowledge acted as a strong barrier that controlled both radiographers' and radiologists' beliefs, that extending radiographers'

role and giving them more responsibilities is unattainable, especially without radiologists' supervision and validation. All radiographers compared their knowledge with the radiologists' knowledge to explain their reasons for opposing independent RE.

'A close family member is radiologist, so my opinion is realistic because I know what I am about to say (laughter)... their (radiologists) amount of knowledge in pathology is great... I have experience in all modalities, and I worked with a lot of radiologists however, sometimes when she is talking to me about a particular case, I don't understand the pathology she is talking about, so if we are given the extended role, where is our knowledge of the necessary pathology? We studied pathology at the final year in the bachelor's degree, but it was a small chapter not as deep as what radiologists studied. Their knowledge is not similar to ours; the radiologists are expert in almost all the medical fields, surgeries, and they have the ability to link everything anatomy, pathology, diagnosis and perform the requested procedure to show the disease. Do we have this knowledge? We can learn something through years of experience, but most of the tasks require qualification, if you see the number of books that my relative (the radiologists) read, and the research she conducts... a lot of work.'

Radiographer 1

All radiographers in this study indicated that their education was inadequate for them to perform an extended role. They revealed that their knowledge is superficial when compared to the radiologists' knowledge.

'The radiologists went through a long process to be able to report images, we did not do that. We are perfect in dealing with imaging machines and patient care, also do the positioning technique and produce images. My knowledge about pathology has come from years of experience and working with radiologists, it is not gained from qualification... reporting should not be given to anybody. I may see 1000 abnormal cases, another radiographer may also see 1000 cases, but the cases he/she saw were normal... this is tricky, choosing radiographers to perform the extended role should be a precise process. For the current situation, I am not prepared by the college to do the extended role, if they offered training courses, we would still be needing radiologists' validation for our work because I did not study the medical school curriculum. If we had studied at least deep pathology, our reporting might be independent. The qualification is important.'

Radiographer 7

In addition, a radiographer explained that performing biopsies is one of the tasks that require a medical qualification,

'It is an invasive procedure, something for doctors to do... should be doctors' role. Our training was about positioning and producing high quality diagnostic images, performing biopsies requires a medical study. The radiologists are trained and have deep medical knowledge starting from anatomy to pharmacology; it would be difficult for radiographers to handle this role... '

Radiographer 10

In seeking to investigate and analyse radiologists' attitude and perspective towards radiographers' RE, radiologists were also asked about the barriers to radiographers' RE. In line with radiographers' opinions and thoughts, radiologists revealed that the strongest difficulty for extending radiographers' role is their lack of qualification and poor medical knowledge. All radiologists who participated in this study explained that the nature of radiographers' qualification is mainly focused on the technical part. Their medical knowledge was superficial so that it hardly qualified them to handle extended role tasks such as image reporting and performing US.

'You know the radiologists studied medicine for years, we studied 7 years after that general practice then sub-speciality so its 12 years studying, there is no way to cover all this knowledge through 2 or 4 years training courses, and you should know that the breast is not an organ on its own, it is a part of the human body and linked to many system in the body, so the person who wants to write a diagnostic report should study medicine from the beginning, anatomy, pathology, physiology and pharmacology to know the effect of the medicine on the human body. Because the radiographers' study is only concentrated on positioning the patient and special projection how to take a medical image.'

Radiologist 2

The same radiologist added,

'The radiographers can write initial reports, filter the cases into normal and urgent but the radiologists need to go through all the cases any way. For the biopsies, the radiologists can decide the lesion for the radiographers, they should be trained about the machine for taking biopsies and how to use the needle, they can perform ultrasound, and write provisional reports.'

Radiologist 2

Another radiologist stressed that the person who handles the responsibility of reporting mammography images should go through medical school and have the exact knowledge and qualification to become a radiologist.

'I mean that radiographers can only describe what they are looking at, it is easy and doable; now, the artificial intelligent is giving a description also... but sometimes when it comes to complicated cases I need to dig more deeply into the patient's history, for example patients with rheumatoid I know that I need bilateral reactive.... We as radiologists link the signs together with other diseases and pathology, which would be impossible to come into a radiographer's mind. If you want to give the radiographers the responsibility of writing reports, you should put them into medical school to learn everything related to pathology and diagnosing. My relative is a radiographer, I know she studied pathology, but it was very superficial and only a "touch" of knowledge.'

Radiologists 3

The radiologist also added,

'Reporting mammography images relies on a knowledge base, put the radiographer through the medical school and they will do well.'

Radiologists 3

A senior radiologist also explained that in order to report mammography images and perform biopsies, the person should study medicine, be a physician and then radiologist.

'In terms of the radiographer reading the mammogram, for me, my response is NO, because I believe that you should be a physician first to be able to do that because you are relating that to disease, and whenever we look at this study it is pathology oriented, so if that background is not there, on which base could radiographers base their knowledge and extend their role.'

Radiologist 4

Furthermore, a specialist mammography radiologist compared the training of radiographers and radiologists. She also mentioned the structure of the curriculum discussing how different it is between radiographers and radiologists.

'As far as I know, the training of radiographers is very different to the training of the radiologists. I am not too aware about the curriculum but I don't think they have any hands on experience on reporting and biopsies, the anatomy, physiology and pathology of the radiographers is limited to allow them maybe to read the request, imaging and positioning, whereas as radiologists we are supposed to report mammograms on our own under supervision, it is part of our training curriculum... not just academic, it is also hands on experience, I don't think radiographers have studied all that.'

Radiologist 5

The specialist radiologist explained that the knowledge is not only from the books and the medical schools, it was also gained from the basis of daily experiences and types of cases they diagnose and deal with.

'The knowledge is not only reading books but also that you have to keep updated with the current scenario because medicine does not end at a particular point, it is continuous knowledge and education. Some of the concepts that we have learned earlier maybe very different from radiographers... it is not just knowledge during the training, it is ongoing process and attending conferences to keep up to date with the latest developments... and then it is application of this knowledge to your practical experience because at the end of the day medicine is something that does not follow the textbook. We have so many exceptions to the role, so it is experience that we acquire by seeing so many cases during our work, and sometimes it is like intuition. '

Radiologist 5

A senior radiologist mentioned a scenario that illustrating how radiographers are unable to differentiate between normal and abnormal cases.

'Once a radiographer asked me if she can perform CT brain for one of her relatives, I accepted the case. She performed the examination and sent him home. When I checked the reports, I was shocked by his CT images, I saw a big mass in the brain with oedema. I called her and asked her to call the patient as soon as possible and informed her that the patient needed admission. The radiographer did not differentiate between a normal and abnormal case. I don't blame her, it is not her business and radiographers did not study deep pathology, but training radiographers to differentiate between normal and abnormal cases would be great to filter the cases for the radiologists.'

Radiologist 9

The findings from the current study highlighted that the insufficient knowledge of radiographers and their qualification acts as a barrier to extending their role. All radiographers and radiologists mentioned that independent reporting and performing stereotactic biopsies require supervision from radiologists. As radiographers are technicians, and such tasks require medical background. Additionally, radiographers revealed that their training did not include enough details about pathology and physiology which made it impossible for radiographers to perform the extended role without radiologists' supervision. Furthermore, radiologists showed a similar perspective as they stressed that independent practice of further extended tasks required a medical qualification from a school of medicine. For instance, Radiologist 9 supported training radiographers to recognise abnormal appearance in diagnostic images, but not independent reporting. Even though these results differ from earlier studies where radiographers showed interest to extend their role (Field and Snaith 2013; Gqweta 2012; Henderson et al. 2016; Smith et al. 2008), they are consistent with the current study findings which indicated that knowledge and education are one of the most important barriers for radiographers to extend their role. Additionally, these results tie well with Larson (2018), who stressed that certified knowledge is a necessary concept for any profession to perform a wider scope of practice within another profession.

Indeed, the concept of knowledge and education being a barrier for radiographers' RE is not a surprising finding and this has been explored in the literature as mentioned above. There is a remarkable difference between radiographers' and radiologists' education, training and period of qualification. However, countries that implemented the radiographers' RE overcame this barrier with postgraduate training of radiographers to perform tasks that were normally under the radiologists' scope of practice. Interestingly, participants in the current study doubted that training courses could prepare radiographers to perform extended roles such as mammography reporting and performing stereotactic biopsies independently without radiologists' supervision.

7.3.2 Training courses

The current sub-theme will be divided into two main further areas, the first is the doubts about training courses, and the second is the lack of training courses and conferences,

that enhance the radiographers' performance, knowledge, and train them for more responsibilities and extended role.

7.3.2.1 Doubt about training courses

All radiographers and radiologists who participated in this study showed doubts about the ability of training courses whether in Kuwait or worldwide, to enable radiographers to perform the extended role independently such as mammography image reporting, breast US reporting and performing stereotactic biopsies except performing breast US. They revealed that the shorter length of training for radiographers compared to radiologists' qualification and knowledge was not enough to enable radiographers to perform complicated medical tasks.

'I can't judge before they do the planning and training courses and evaluate the outcomes, does the level of knowledge gained allow the radiographer to write a diagnostic report? The patients' lives are not a game... for now even if they allow radiographers to write a description of what they think, it is bad idea, we don't have that knowledge... but I think if they allow the radiographers to schedule the cases, I mean put red stickers on the urgent cases so that the doctor can give it priority to look at would be good idea. We don't have the knowledge to handle such extended roles, and to be honest with you I don't have the trust that there is a training courses, even if a very long one can train radiographers to have equal knowledge to radiologists, to do biopsies and image reporting. You have to go through all that radiologists studied and learned. How could the course cover everything that radiologists have learned to make us reach the level of knowledge of radiologists! My brain is rejecting the idea (laughter)... it is not our role to report images this idea needs deep thinking and planning...'

Radiographer 2

'Maybe after training we will transcend radiologists and produce final reports too, it is really depending on the training, after the training courses the vision will be clearer for what you are saying is totally new. For the current situation, I am not prepared by the college to do an extended role, if they offered training courses, we will still be needing radiologists' validation for our work because we did not study the medical school curriculum. If we studied at least deep pathology, our reporting might be independent.'

Radiographer 7

'If there are intensive training courses that would be great... why not. However, this should always be under radiologists' supervision because of our knowledge, the things that we studied from the beginning are not as deep as what radiologists learned.'

Radiographer 10

Indeed, radiologists also showed doubts in the ability of courses to train radiographers to perform extended roles, they stated that no training course could enable radiographers to perform radiologists' tasks without first obtaining the medical qualification.

'Radiologists' field is one of the hardest fields in the medical domain and very accurate. To work independently you need to be qualified in all medical fields starting from terminology to pathology and all are subject related. I think that there is no qualification that comes from training courses that could be equal to what the radiologists studied.'

Radiologist 1

'It (training course) will not be short course; I think not less than 4 years to make the radiographers able to write a diagnostic report. They could study two years intensive anatomy, after that physiology, and pathology which is the largest part. I don't know about the curriculum of radiography study in Kuwait, but I know it is general and superficial, and for mammography they may train the radiographer for an additional year to the bachelor's degree program to teach them about the anatomy of the breast and pathology, and after that, one year of practice under supervision until radiographers are able to do the extended role.... After training they will be able to perform ultrasound, biopsies and reporting but again not final reports.'

Radiologist 2

'Part of the radiologists' training is a very deep and intensive learning of pathology and knowing differential pathology and plan management. Training radiographers may only enable them to describe the findings; but to interpret full and complete findings would need a full medical qualification. We studied for 3-4 years to link the clinical data with the findings. If the RE in reporting is limited to describe the findings that will be fine but to link that with the diagnosis this needs backup from the medical school.'

Radiologist 3

'I think it (extending the radiographers role) is a disaster because radiographers did not train for that, even training courses are not enough this will harm the patients.'

Radiologist 4

'They may be able to perform US and biopsies after training, they may do it; however, reporting I don't think so, maybe primary descriptive reports only same thing for US reports which should be descriptive and primary. We as radiologists need each other to validate the medical report so it will be even harder for radiographers to do that.... The qualification of radiographers is different they were trained to be technicians and they concentrate on the radiographic technique... while radiologists went through medical school with intensive learning and training including anatomy, pathology and physiology. The radiographers' knowledge is very limited. I don't think the training of radiographers enable them to link the patients' history with the diagnosis and treatment. The thing is not training for few months, it is knowledge that has been built over years during the radiologists' journey... Training and lectures may enable radiographers to write a primary descriptive report which will ease it for the radiologists.'

Radiologist 6

The study findings highlighted that both radiographers and radiologists doubted the training courses and their ability to prepare radiographers for independent RE. Participants from both groups highlighted that even undergoing training courses, radiologists' validation and supervision should always exist. The findings from the current study did not agree with that of previous research by McLachlan (1975), who demonstrated the radiographers' capability to report diagnostic images after being involved in a short training program. Furthermore, the current findings do not support that of studies conducted by Loughran (1995), Booth and Mannion (2005) and Murphy et al. (2002) who revealed that with structured training, radiographers could report images at as high a level as consultant radiologists. Additionally, the current findings widely differ from Wivell et al. (2003), who found that training radiographers showed a high level of the cancer detection rate comparable to the radiologists.

Such great differences between the current study findings and research findings may be because of the unfamiliarity of the concept of extending radiographers' role. The current

research demonstrated insufficient knowledge of what extending the radiographers' role entails from both groups of radiographers and radiologists. Indeed, inadequate knowledge of radiographers' RE is associated with being unaware of the availability of training/education courses in countries such as in the UK. Furthermore, participants from the current study are not aware of the number of radiographers who practice RE worldwide. Another reason for doubting training courses may be the radiographers' fear of change and the radiologists' protection of their professional identity.

The lack of an available structured program for radiographers' RE might have driven radiographers in the current study to oppose extending the radiographers role without radiologists' supervision. Indeed, the fear may also be because of lack of knowledge; radiographers frequently mentioned the difference between their qualification and years of studying comparing to radiologists.

Radiographers doubting training courses and their ability to extend their role and perform the extended scope of practice independently may be a result of radiologists' power, which will be discussed further in utilising the theory to understand findings (chapter seven).

According to the radiologists, they are not influenced by the training courses especially when there is no information about the structure of training courses or what these training courses might include. This may be an attempt by radiologists to protect their identity and boundaries. Radiologists strongly explained that their long years of study and their deep knowledge cannot be compared to training courses. These ideas can be seen, for example, from radiologist 8, who revealed:

'we learned how to convert clinical anatomy into radiological anatomy, we know how the abnormal things will appear in the skin or parenchyma. Some of the radiologists took a sub-speciality and fellowship for more than two years, if they will add now only training courses for radiographers to do even primary reporting that will ruin the basics of the medical teaching. If we started that, assistance engineering will also want to maintain infrastructure projects. It is not like this; we are objecting when doctors from other specialties come to take and practice our job.'

Radiologist 8

7.3.2.2 Lack of training courses

Participants from both groups added that there is a lack of training courses to improve radiographers' knowledge. Some of the radiographers explained that the opportunities to attend training courses and conferences are not fairly distributed and affected by nepotism; while some of the radiographers mentioned that the training courses are only available outside Kuwait and there are no local courses, which made it hard for them to attend because of their commitments. Some of the radiographers mentioned the continuous education training lectures in the department are simple and not keeping pace with the changes within the radiology field.

'We used to conduct continuous educating training in the hospital between us, but it is very simple and there is a fast development of the modalities. There is not enough training for that, my supervisor sent me on training courses but when I attended, usually, I am the only radiographer all the rest are radiologists, where are the radiographers? Why their supervisors do not ask them to attend? Even if the course is from a company of one of the modalities machines, major part of the radiology department are the radiographers, they are dealing with the machines and we need to be up to date about the development of the imaging modalities and the best use of the machines. The Ministry of Health needs to provide radiographers with continuous training and education because everything is changing very fast, in Kuwait they don't care about educating radiographers there is a lack of training even for new modalities and machines. Before extending radiographers' role, educate them and teach them.'

Radiographer 1

'We don't have training courses and conferences in Kuwait for every radiographer, the head of the department chooses a specific number of radiographers to attend because it is not possible to send everyone, so it is the personal responsibility to improve yourself as a radiographer. There is no MSc of radiography in Kuwait university, no training courses, so if you want to develop yourself you need to travel, and this is hard for about 70% of radiographers.'

Radiographer 4

'Because we are not sent regularly for conferences and training. They don't care about educating us. If I feel I am valuable in my workplace, I will have self-confidence, I don't have self-confidence, and I am always afraid of the radiologists' reaction if I am wrong, I need to be confident and educated with rich knowledge about my field, we need equal chances for training courses and

conferences that are equal to radiologists. We need a special office in the ministry to take care of us and our request same as the doctors.'

Radiographer 5

'There are no chances for radiographers to enhance their knowledge because there are no training courses or conferences. It is all about nepotism, I love you, I choose you to go to this course, you are my relative, I will put your name in for this course... the mammography program training in the USA was like that, the recruitment was unfair, and people who went to USA most of them relatives of the bosses. They trained radiographers who don't care and some of them did not work at mammography at all!'

Radiographer 9

Both radiographers and radiologists illustrated that any training courses would not be enough for radiographers to perform the extended role independently as long as they have not been through the same education as radiologists. Radiologists and radiographers also mentioned that the lack of training courses and conferences act as barriers to enhance radiographers' current knowledge in their current role, which affects the chances for them to extend their role. Furthermore, radiographers highlighted that most of the training courses are available abroad, not in Kuwait, which makes it hard for the radiographers as they have families and responsibilities within Kuwait. Radiographers mentioned that their departments are conducting continual education lectures, however, they are not enough to keep pace with the technological evolution in radiography. This compares well with previous studies by (Elkhadir and Saeed, 2018; Henderson, 2016; Kekana et al. 2015), who highlighted that a dearth of education and training negatively affects the radiographers' chances to extend their role. Moreover, these findings further support the idea of Abuzaid et al. (2021), in which radiographers in the UAE reported the need for training and continuous professional education, as most of the training they received was from equipment vendors when installing new machines or system updates. Additionally, six of the Kuwaiti radiographers in this study mentioned that the chances for training and educating courses was not equally distributed for all radiographers and recruitment is usually influenced by nepotism and favouritism. The current findings suggest that there is a

pressing need to offer accredited training courses for radiographers in Kuwait for all interested radiographers equally as the initial step is to initiate radiographers' RE. Indeed, without offering accredited training courses radiographers will not have a driver pushing them to educate themselves and encourage them to perform an extended scope of practice.

7.3.3 Radiography education in Kuwait and the need for curriculum review and update.

Exploring radiography teaching and education in Kuwait was one of the current research objectives therefore the participants were asked about the appropriateness of the Bachelor curriculum of radiography at Kuwait University. All the radiologists revealed that they did not have in-depth knowledge about the radiographers' training, however, they mentioned that it included superficial medical knowledge about pathology and physiology and knowledge about their technical role. Focusing on radiographers, 60% of radiographers explained that radiography teaching in Kuwait is superficial and not in pace with radiography evolution and technology. Two of the radiographers mentioned that the lecturers are still teaching old methods in processing, which was useless and a waste of time, it would be better if they created a small unit under 'History of radiography practice' instead of wasting much time on subjects that are obsolete.

'I don't think it is related to what we are doing now at all (laughter)... the huge amount of physics... why??? Linking the physics to the modalities and the pathology will make sense and train the radiography student to be better radiographers. The lectures are old they need to update their information they are still following old books ... life and technology has changed! They have to concentrate on the other modalities, general x-ray is not everything. They have to train the student to work with CT, MRI and mammography. The teaching staff in Kuwait university insist on teaching the student to do general x-ray (conventional) and now everything is digital. For the students to examine, they search for an old room to perform examinations using conventional machines (cassettes) and using the digitalis not allowed! if you like to teach them that put a subject name such as history of radiography and move on... they are still teaching them about developer and fixer, we don't have this process in Kuwait hospitals anymore, why is time still being wasted teaching the student that!'

Radiographer 1

Radiographer 10 explained that the teaching was very superficial, and the mammography component was not sufficient for radiographers which were affecting their practice and it took a long time for senior radiographers to train newly graduated radiographers.

'Honestly the curriculum is not sufficient. The clinical part needs experience but the theoretical part should be more detailed. The teaching years should be more. There is pressure on the students because teaching radiography is limited to three years including clinical. The materials are superficial especially the part of physiology and pathology. When you bring a graduate student radiographer and point at the anatomy on CT or the mammography image, they will not answer... they don't have sufficient knowledge. The mammography part was brief it should be more detailed. This is wrong... the new graduated radiographers have weak knowledge, and this harder for seniors to train them...'

Radiographer 10

The researcher reviewed the curriculum of radiography teaching at Kuwait University. The document was available only in Arabic. However, it was translated into English using Ballani and Sukkar (2005) previously mentioned curriculum in the literature to achieve accurate translation of the subjects (Table 3).

First year	Second year	Third year	Fourth year
English 180	Anatomy 155	Imaging procedures and lab 354	Radiation protection 432
English 181	Introduction to medical physics 204	Clinical practicum 361	Imaging procedures and lab 455
Chemistry 110 and chemistry lab	Introduction to health information administration and lab 105	Digital imaging techniques 365	Computer applications in imaging 466
Biology 101 statistics	Patient care	Physic of medical imaging 374	Clinical practicum 472
Statistics 115	English 250	Radiologic imaging and processing 376	Quality assurance 481
Physics 121 and physics lab	Psychology	Imaging procedures and lab 362	Special imaging procedures 450
Elective	Anatomy 210	Clinical practicum 373	Clinical practicum 473
Emergency and first aid 106	Physiology 152	Physic of medical imaging 375	Radiologic pathology 478
	Fundamentals of radiologic technology 205	Radiologic pathology 378	Research 495

Table 3 Radiography teaching curriculum in Kuwait

A documentary review of the current study found that the issue of superficial radiography training is real. The current research showed a general agreement between the participants and the documentary review showing that radiography education and teaching in Kuwait is superficial and does not fit the purpose of the extended role. For instance, most of the universities in the UK teach radiography students ‘image interpretation’ while this is not included in radiography education in Kuwait. Indeed, the absence of teaching image interpretation may be the main reason for the low acceptance of adopting the independent extended role by radiographers as they did not experience performing such practice.

The current research findings from the documentary review highlighted that there are no significant differences between the curriculum of radiography teaching in Kuwait in 2005 (Ballani and Sukkar, 2005) and the current curriculum of 2020. Radiography evolution and its further involvement in various areas of healthcare is happening quickly, indicating the need to update the radiography education to improve the quality of the service and patient care. Furthermore, all the teaching staff in the Allied Health College

radiography department are radiographers. The researcher believed that the involvement of radiologists in teaching radiographers could enhance the knowledge and education of graduated radiographers and build a stronger base of initiating the concept of radiographers' RE. The reason for this is that image interpretation and extended role are not established in Kuwait nor laid out in the radiographers' job description, therefore the involvement of radiologists would add to the education for extended roles and adopting further responsibilities such as mammography image interpretation and performing breast US and stereotactic biopsies.

7.3.4 Current poor performance

The radiologists were asked about their opinion of radiographers' current performance of their role. Seven radiologists out of ten raised this point. Most of the radiologists were annoyed about radiographers' current poor performance and they explained that such an issue had a negative influence on the quality of the service provided and patient care.

'Sometimes radiographers perform low quality MLO view, and we end up with request repeat, sometimes they take time to get used to the machine, so we had problems where the images have not been sent and mistakes about right and left breast..... they are not familiar with the machine, and technique wise maybe lack of experience... sometimes a heavy patient who is not cooperative makes it difficult to capture a good image for new technologists..... whatever, at the moment they should do their role appropriately with least number of errors.'

Radiologist 5

'To extend the radiographers' role, they need to know what they are doing when to make a compression and when to make a magnification; the majority of the radiographers when I ask them to perform magnification they don't know where and how. This is dealing with radiation and the radiation is not a simple thing, mistakes in this field are not accepted, we are talking about patients.... I have to check after they perform the mammography and before the patient leaves the room because most of them give me bad quality images when I ask for a magnification view after mammography 70% ask me where? Although it is clear they can't pick the abnormal area.'

Radiologist 6

One of the radiologists suggested that radiographers needed special training to enhance their poor performance in the current role instead of thinking about extending the radiographers' role. The radiologist highlighted that radiographers need to gain more skills in performing supplementary reviews and applying appropriate compression during mammography examination to achieve high-quality diagnostic images.

'We have a shortage of qualified radiographers I think radiographers need to do their job properly, instead of extending their role, let them do their role properly. Mammography is not only medio-lateral and cranio-caudal images, but there are also special views that we really need and when I ask for these views, I can't get anything, so we are in a mess. They don't know how to perform the supplementary special views; the radiographers need training to learn how to perform proper images (standard and special) for mammography in order to improve the service. We are not at a stage to extend their role being pioneers in the field of radiography we need to teach them tricks to show the whole breast and how to deal with big patients. The skills of radiographers are weak even for compression, they always say that the patients cannot tolerate more compression, but with proper communication and technique they can tolerate more. The new technology is giving the radiologists CAD, but the radiologists are always alerted that this alarm may be false and nothing to worry about. I think radiographers need special training in their current role.'

Radiologist 8

In contrast, radiologists show doubts about radiographers' RE, because of lack of communication between them and the patients, which negatively affects the workflow.

'They are in contact with the patients, they need to get the patient's history, previous images and biopsy, it will help to enhance the workflow, sometimes they don't bring such information, then they have to go back and call the patient which causing delay. There was a scenario where a radiographer told me there were no old images, I checked the file that stated there was a report, so I told the radiographer there was a report so there should be images, go and ask the patient. Sometimes the patients don't have but sometime the patients have the images with them, and the radiographer tell me there are no old images...'

Radiologist 5

Radiologists raised the issue of the current poor performance of radiographers in their current role. They highlighted that radiographers' poor performance will act as a barrier for radiographers' RE. Such results highlight a significant barrier for RE in Kuwait. Indeed, radiographers' RE requires expert and skilled radiographers to be able to handle more responsibilities and perform more complicated tasks in mammography. These findings can be explained in two ways, the first explanation is there is a poor performance from current radiographers for various reasons as discussed in the different sections of this thesis, such as poor knowledge, the curriculum, lack of training courses and rotation among modalities. The second explanation may be that such an opinion raised by radiologists is part of the radiologists' resistance to protect their professional identity.

A document review from one of the hospitals stated the existence of continuous education for radiographers, it was available in Arabic only (Appendix 8). The researcher highlighted important points associated with the lectures provided to the radiographers.

'The content of provided lectures for the continuous education is superficial and simple. Lectures involve basic information about patient care, proper hygiene, proper positioning for chest x-ray and patient identification. The lecturers are P.h.D holders radiographers from radiography department in Kuwait university, who used to teach radiographers the same content in the bachelor. This situation will not add any significant change of radiographers' performance and education. There is a pressing need to update the lectures provided to maximise the benefits to radiographers which will be reflected on the quality of the service provided. Furthermore, the involvement of radiologists is important to extend radiographers' knowledge on performing new tasks and extended scope of practice.'

Field note

None of the radiologists who participated in this study supported the radiographers' independent RE. A total of 70% of the radiologists revealed that the current poor performance of radiographers is one of the barriers to extending their role. The radiologists indicated that radiographers should improve their performance in their current role before thinking of RE. Radiologists stated that radiographers are not producing high-quality mammography images causing repeat images with increased radiation dose for patients and waste of radiologists' time. Radiologists also mentioned

that they are suffering from the poor knowledge of radiographers in performing supplementary mammography views and suggested that there was a pressing need to offer training courses to enhance radiographers' current performance. However, as demonstrated from the documents and field notes, continual education lectures are not leading to better practice. There is a need to review the radiography teaching curriculum to keep up with the evolution of radiography and technology. Furthermore, offering training courses and continuing education lectures led by radiologists would make a significant difference as extended role tasks are part of radiologists' scope of practice. The academic staff, even those with PhDs at Kuwait University's radiography department do not have the knowledge and education for teaching radiographers the RE tasks.

7.3.5 Rotation and skills

Radiographers and radiologists share the opinion that rotations among radiographic modalities are negatively affecting the experience gained by radiographers in mammography. Rotation among imaging modalities is a routine process within the radiography department, which means that every three months, radiographers are moved from one imaging modality to another (MRI, CT, Mammography and general x-ray), based on a schedule managed by the radiography department's supervisor.

As revealed by participants, continuous rotation of radiographers among modalities was wasting the senior radiographers' time. Training radiographers for three months then after that the radiographers move to the next modality can cause radiographers to forget everything they learned from the previous rotation. A solution proposed by radiographers and radiologists was to have more posts with "fixed" radiographers in a mammography unit after the radiographer has done one or multiple rotations among modalities instead of having a rotation every three months. This would enable radiographers to gain more experience in a modality and enhance their performance.

'There is something important they should re-consider the duration of the rotations three months is really short, the radiographers would not care about

the place because they know they will be leaving the place after three months, I don't know how to explain... if you rent house, you will not love it and take care of it as if it was your own house. They should allow more time for radiographers to be responsible in one place especially mammography, three months is short period of time, and if the radiographer is qualified and likes the modality why not fix her in mammography. Three months will not add anything to the modalities besides the senior the radiographers will be very tiered from starting from the beginning every time as most of the radiographers forget most of the basics after the duration of long rotations. '

Radiographer 9

'It is possible for senior radiographers to do that (deciding the need for supplementary mammography views). If the radiographer stays in the mammography unit for three months in year of her rotation, I cannot say that this radiographer has one year experience.... The rotation between modalities also affects the experience of radiographers in mammography. The radiographer should be posted (fixed) in mammography unit for a long time, no less than 10 years continuously working in the mammography unit, some radiographers have 20 years' experience, and only 6 months in mammography....'

Radiographer 10

According to radiologists who revealed that the three months rotation among modalities is affecting the experience gained by radiographers, there should be fixed posts for radiographers who are interested in mammography to gain the experience and achieve better performance and skills.

'...The rotation of the radiographers around the modalities is affecting their knowledge and experience, there should be a fixed group in mammography which would enhance the radiographers' performance... They should fix a specific group in mammography, the rotation around imaging modalities is affecting the radiographers' experience... They should be allowed to handle more responsibilities in the imaging modalities. The radiographers working with me are performing tasks that are beyond their job description, and they are willing to learn.'

Radiologist 3

'Generally, in our department we have one or two senior radiographers fixed in mammography so over the years they gained full experience, their work is good, and they are very responsible, but new radiographers need experience in all fields. What is happening here is that before they gain the experience, they are rotated to other modality, to be an expert in breast imaging, it is better to be in the same field so one day you perform CT and one day perform MRI, the technologists can lose their touch however I can trust the senior radiographers who are fixed there.'

Radiologist 7

Another radiologist also illustrated that the current performance of radiographers performing supplementary mammography images does not meet the targeted high standard and pointed out that the continuous rotation among modalities may be the reason for that.

'We don't do supplementary views, only when we see something suspicious, we request special views, most of the times we depend on the magnification in the technology. Sometimes if I need more views, I ask for it, the radiographer will do 3, 4 or even five images to get what I am asking for and sometimes they do not so we have to abort the attempts, the patient will be upset, and the quality of the image is not what we hoped for. It is a skill and by the time hopefully they will get it... radiographers need to be smart. I do not know... maybe the radiographers are doing rotations among other imaging modalities. We should fix radiographers in the mammography department to improve their skills. I am not satisfied... they are not bad, but not perfect, I know they could do better.'

Radiologist 8

The findings from this section illustrate how the routine rotation among radiography modalities negatively affects radiographers' performance and experience, thus negatively affecting the chances for extending their role. Radiographers revealed that rotation is causing them delays in gaining experience in mammography. Furthermore, radiographers added that such routine was wasting senior radiographers' time having to train radiographers and that radiographers gain the knowledge through doing the job and they have to be retrained in the mammography modality when rotating back into the department again. Radiologists also mentioned that the rotation among modalities

is affecting radiographers' performance in mammography. One of the radiologists revealed the rotation among modalities may be the reason for poor performance in taking the supplementary mammography views such as spot and magnification views. The findings suggested a need to fix the number of skilled and expert radiographers in the mammography modality and offer them continuous education in taking supplementary mammographic views to enhance their performance, which will improve the quality of the service and patient care.

7.3.6 Radiographers' resistance

Both radiographers and radiologists mentioned that radiographers' resistance may be one of the important barriers to the radiographers' RE. Radiographers mentioned that some radiographers may refuse the idea of extending their role because they are comfortable with the current situation. Some of them mentioned that their responsibilities and social life limited their chances to educate themselves. In regard to radiologists, they mentioned that radiographers' resistance may be a barrier to the concept of radiographers' RE. They explained that some of the radiographers are lazy and they have no interest or passion to learn. Some radiologists also mentioned that radiographers do not have the confidence to accept more responsibilities.

'Some of the radiographers are lazy and don't want more responsibilities, not all the radiographers will be happy to have an extended role for example in CT, for the contrast reaction it is the radiologists' responsibility with the nurses in the CT room. I know how to inject contrast, but I don't want to be responsible for it because it is not in my job description.'

Radiographer 1

The radiologists mentioned that the radiographers' attitude may barrier for RE,

'It will also depend in the person himself (radiographer), is he/she willing to handle more responsibilities? The radiographer should be willing to educate himself/herself and improve his/her knowledge. Some radiographers don't have the courage to learn they only want easy job and salary. I think same situation is there for you, the opportunity to study master's degree and PhD is already there from the ministry of health, but only radiographers who want to improve

themselves decide to study and learn, and I don't see a good number of radiographers who are interested in travelling for studying.'

Radiologist 1

'There was an idea to initiate sonography in Kuwait but there was rejection from both sides radiologists and radiographers. The radiographers do not want to learn, and the radiologists are saying how can we report images that we did not perform using our own hands. They (radiographers) chose this field because it is comfortable, when I asked for any extra things, they don't show me they have the courage to work. They don't show discipline and responsibility that affects the trust of the radiologists towards radiographers. I think the new generation now don't want responsibilities and stress, they want things easy and fast.'

Radiologist 3

'The radiographers themselves, are they willing and ready to take more responsibilities? I did not notice that the radiographers were willing to learn, to be honest with you.'

Radiologist 6

'I allowed radiographers to perform it (3D US) because I saw radiographers in Singapore doing 3D US and it is not complex. The head of radiographers objected, and we had a fight because she refused to let radiographers perform US, but I still want to give this job to the radiographers. I heard that one radiographer complained that she is stressed and doing task work which is not in the radiographers' job description.'

Radiologist 9

Radiologist 9 added a financial justification for radiographers' resistance, doubting that radiographers would accept performing an extended role with their salary being lower than radiologists,

'Anyway, I think it is not fair, their salary would be less than radiologists' salaries, and we will be doing almost the same tasks. Would the radiographer accept performing radiologists' tasks and have less salary than radiologists?'

Radiologist 9

The study findings suggest that radiographers' resistance is one of the barriers for radiographers' RE in Kuwait. Participants explained that there are different reasons for radiographers resisting changing their role. The first reason is social life and family commitments. If radiographers' RE is established in Kuwait, radiographers think there would be training courses abroad which would be hard for most of them. The second reason is the radiographers' fear. Radiographers showed poor confidence in their ability to extend their role, this may be because of the poor knowledge and the nature of their education, and also could be the effect on the radiologists' attitude. This point was in good agreement with Moran and Warren-Forward, (2011b) who highlighted that the poor confidence acted as a barrier to extend the radiographers' role. The third reason mentioned by one of the radiographers was that they were not prepared for a big role in the clinical practice, their main role was producing high-quality diagnostic images and they are pleased to be performing this scope of practice. Additionally, 60% of the radiologists revealed that radiographers' attitude was the main reason for not extending their role as they resist educating themselves, do not have the courage for RE and are too lazy to learn new things. This study did not confirm previous research findings where radiographers in other countries showed courage to extend their role and scope of practice (Abuzaid et al. 2021; Kekana et al. 2015; Moran et al. 2013; Moran and Warren-Forward 2011; Wuni et al. 2021).

7.3.7 Patient care

As patient care was one of the drivers to extend radiographers' role, all the radiologists and radiographers mentioned that patient care and the quality of the service will be negatively affected if radiographers are trained to perform extended roles independently (mammography images and breast US reporting and performing stereotactic biopsies).

Radiographer 2 explained poor knowledge and lack of experience in performing an extended role may result in errors that would negatively affect patient care; however, the radiographer excluded performing breast US from this consideration.

'I wish it could be useful, but I think it will have a negative influence, misdiagnosed by radiographers might cause the breast cancer to be detected at a later stage and the relationship between radiographers and radiologists would be worse because of mistakes and errors made by radiographers. But for US, it could reduce the workload of the radiologists and allow them to accept more cases per day.'

Radiographer 2

'It would be very negative if it is in reporting and biopsies... I told you (laughter), but for US it is good for patient care, radiologist shortage and workload...'

Radiographer 3

'I think the effect would be negative, missing pathology especially for the early detection cases where the pathology or the abnormality needs expert and a trained eye to detect it. Doctors make mistakes despite of their intensive learning; the situation would be worse with radiographers.'

Radiographer 8

Radiographer 9 explained her point of view about the negative impact of extending radiographers' role in performing breast biopsies. She revealed that the radiographers do not have adequate knowledge to perform this procedure and to deal with complications associated with this procedure in case of emergencies.

'This is sensitive, inserting the needle may hit arteries or veins causing patient complications.'

Radiographer 9

One of the radiologists described radiographers performing an independent extended role as a disaster and revealed that there are no benefits for patients at all. The radiologist explained that even filtering out abnormal cases was not useful for patient care and may be misleading for the radiologist.

'I think it is a disaster because radiographers do not train for that (extended role), even training courses are not enough it would harm the patients. Because if there is a lesion, they might not see it, then you have cut the life of the patient short, the earlier you catch the cancer, the better the survival rate, and vice versa. That (radiographers' RE) will not help at all, I think what radiographers see as normal may not be normal, that will put the radiologists in big trouble because the radiologist puts an image as a normal, I would not bother spending too much time looking at it'.

Radiologist 4

Another radiologist added that the current performance of radiographers is not showing a promising future for image interpretation of mammography images. The radiologist added that any harm to patients should be avoided and extending radiographers' role may be harmful to the patient,

'Picking up lesions early is difficult so I feel it should be limited to the radiologists because it will negatively affect the quality of the service... I am not saying it is a rare thing and very difficult, but we should avoid any possible harm for the patient... Missing early disease and improper performance of a biopsy causing bleeding and complications are harm to the patients. I don't know what kind of training radiographers got but as far as I know, looking at the current scenario the detection rate will be worse.'

Radiologist 5

One of the radiologists highlighted that the concept of image interpretation and reporting is for radiologists and should not be given to radiographers who are "image takers". The radiologist added that medical education is essential for reporting mammography images and breast US. Furthermore, the radiologist mentioned that performing breast US will also negatively affect patient care and the quality of the service.

'It will be negative, very harmful. The breast screening aims to detect the cancer at a very early stage which is really hard to do. You are not talking about a doctor doing this you are talking about "breast imager", they can't do this (radiographers). Even for me, I am not equal to a radiologist who has been working for 25 years. However, it is very common for senior radiographers not to detect abnormalities because it is not their job. Detecting cancer in breast screening requires a good medical knowledge and long years of experience. This

is a big responsibility, you are sending the patient home for one year, she will not come during this year, if radiographer mis-diagnose the patient, a disaster could occur within one year. This requires a person who reports mammography images equal to the amount of their head of hair.... On ultrasound, if the radiographer missed something and caused me to write a false report why should I handle this responsibility. And if they are allowed to perform US and report it that will be negative for the patient and the accuracy of the report could be incorrect because people who are reporting did not study MEDICINE.'

Radiologist 10

The radiographers and radiologists who participated in the current study highlighted that independent RE in breast US and mammography images reporting and performing stereotactic biopsies would have a negative effect on patient care and the quality of the service provided. Radiographers and radiologists explained that a medical background and education is necessary to perform an extended role independently. Again, the findings of the current research substantiate previous findings in the literature by the Royal Australian and New Zealand College of Radiologists (2018), which revealed that extending the radiographers role had a negative impact on patient care and the quality of the service. Additionally, the Australian and New Zealand studies and the current study shared the opinion of the need for lengthy medical training to be able to perform RE tasks successfully. Indeed, the current findings are vastly different from all the reviewed studies in the literature except Australian and New Zealand studies, which found that extending the radiographers role has a negative impact on patient care and the quality of the service. In fact, the literature highlighted that one of the drivers for radiographers' RE was to enhance patient care which was negatively affected by the radiologist shortage.

7.3.8 Patients' resistance

In addition to radiographers' and radiologists' resistance to radiographers' RE, participants in both groups pointed out the possibility of resistance from patients against the radiographers' RE practice in Kuwait. The participants linked that to the issue of knowledge and qualification, while some of the participants from both groups linked

that attitude to a cultural perspective. They explained that the Middle Eastern people trust doctors in the first place, and they will refuse the idea to the RE and reject the decisions made by radiographers.

Radiographer 8 suggested that if the practice of RE applied in Kuwait the patients will refuse this mainly because patients know that radiographers are not doctors, she said:

'The patients will not accept... They know we are not doctors; it is important for them, I think it is worldwide even myself I will not trust radiographers to do US for me, I know it is not what we studied, they may miss something, I will always choose radiologists to do my US if I ever need it (laughter)...'

Radiographer 8

'The patients will not trust radiographers; they would always request radiologists to perform their examinations. Our society trusts doctors only.'

Radiographer 5

While the radiologist added that the patients trust radiologists only when it comes to mammography reporting. The radiologist also explained that women in Kuwait trust the mammography examination that is performed in the hospitals because they are referred by doctors and they can contact radiologists any time, while in the screening clinics there are no radiologists in the workstation.

'Sometimes when I have concerns about anything related to diagnosis, I ask one or two of my colleagues in order to have another opinion, and I give the patient a second chance with another modality so we can clarify certain ambiguous areas or areas that are not well examined by the US... The patients trust the radiologists and are sure that they will receive the accurate and the exact information about their case' women are not accepting the idea of screening by radiographers, they prefer to be referred by doctors, so the physicians are writing their patients a request mentioning that there is a breast pain, but this is not true they are just doing this to avoid sending their patients to screening clinics; especially now we are in October most of the cases are not diagnostic, but women feel more comfortable to do mammography in the hospital based on a doctor's referral.'

Radiologist 8

Regarding the cultural perspective, radiologist 10 revealed,

'In some countries, like our countries (Middle East) the patient only wants a radiologist to touch him/her and treat him/her. They only trust doctors so we can't lie to the patients (laughter) ... In Kuwait, are they allowing nurses to do simple stitches in the surgery room? It is the same thing in the radiology department, it is not easy for radiographers to perform biopsies. In Saudi Arabia and East Asia, the radiographers are performing US and they are specialised as sonographers, but in Saudi Arabia it is still not standardised, radiographers are not writing reports for US.'

Radiologist 10

Participants in the current study highlighted that patients will refuse radiographers performing their examinations and report their diagnostic images and linked patients' resistance with cultural perspectives. They highlighted that Middle Eastern societies trust doctors only. Indeed, this result fits well with Abbott's (1988) idea of jurisdiction. Abbott (1988) suggested that social recognition is one of the factors of gaining jurisdiction and having control over a profession. In Kuwait, radiographers are recognised by society and patients in particular as technicians, people who only produce their diagnostic images. Such perceptions will act as an obstacle to introducing radiographers' RE, and patients will only accept radiologists to perform their US, biopsies and reporting their mammography images. This could be changed over time by starting radiographers' RE officially and giving radiographers authority to handle responsibilities and make decisions within the context.

Radiographer 9 revealed that their restricted role and inability to make decisions that would significantly affect patients trusting radiographers. She highlighted that no patient would trust her if her response to everything is *"please wait, let me ask the radiologist"*.

7.3.9 Medico-legal aspects

Concerns about liability and medico-legal issues were one of the reasons that were revealed by participants as a barrier for radiographers' RE. Both radiographers and radiologists said that radiographers may have these concerns about performing the extended role independently.

'Despite of their knowledge (radiologists) and training they sometimes made mistakes and handled medicolegal issues incorrectly; can you imagine the situation for radiographers who don't have knowledge as much as them? It will be worse, if we miss a lesion, this could kill the patient within four months, medicolegal issues could develop because mammography is very sensitive.'

Radiographer 2

'Misdiagnosis will be one of the significant disadvantages, the accuracy will be weak and the medico-legal issues for radiographers be very invasive. I don't think there is a reason to give radiographers such huge responsibility, bring in more radiologists is the best thing to do for the patients.'

Radiographer 8

'For my sake because I don't want to hurt the patients and would hate my job forever, I am very sensitive. I also don't want to have record any medico-legal issue for a mistake that harmed a patient... it is good be honest with myself, when I don't know... I don't know it.... And also, there is big responsibilities in case a medical error happened, and the radiographer may face medicolegal issues.'

Radiographer 9

Radiologist 1 also added that depending on radiographers to perform the extended role may lead to medical errors causing misdiagnosis and medico-legal issues and also felt the supervision of radiologists would reduce this issue. The radiologist justified that by explaining that since extended roles such as mammography reporting is a radiologists' job the misdiagnosis and liability issues are rare.

'The problem is if we depend on the radiographer only that might cause a misdiagnosis which could lead to legal complications, while under radiologist supervision the legal complications would be rare because it is the radiologists' job, and he/she has the qualification and the experience to do this job.'

Radiologist 1

'Allowing the radiographers to validate the final report will increase the mistakes associated with diagnosing which might cause the radiographer and the radiologist going through a medico-legal issue.'

Radiologist 2

Radiologists revealed that supervising radiographers was necessary because in the end the final report will be validated by the radiologist, not radiographers. However, the radiologists are against giving the radiographers independence to perform extended roles.

'I need to check their work, if the sonographers take the images, I have to check before the patient leaves; because I am the one who will write the report and the report will be under my name, for the medicolegal aspect I need to check.'

Radiologist 6

'The patient may complain and cause the radiographer medico-legal issues because she/he was misleading, and this responsibility is huge for radiographers and may cause them medico-legal issues because of their poor knowledge.'

Radiologist 10

Another barrier to radiographers' RE is the medico-legal issues that may arise from radiographers performing more responsibilities independently. Both radiographers and radiologists revealed that medico-legal issues may be a significant issue to radiographers' RE. Radiographers highlighted that their poor knowledge compared to radiologists' knowledge may increase the errors while practising RE thus causing medico-legal issues. Radiologists highlighted that radiographers' poor performance may increase the rate of errors therefore increasing medico-legal issues. They also added that radiographers should be able to handle the medico-legal aspects as do the radiologists in case they perform any extended role. One radiologist explained that if radiographers were trained to perform breast US, they should be involved in handling any responsibilities associated with errors in reporting that resulted from missing lesions while performing the US. The current findings are consistent with previous results of Gqweta (2012) who found that medico-legal aspects act as a barrier in extending the radiographers' role. Fear of medico-legal issues was expected and normal during this stage in Kuwait. In Kuwait radiographers' RE has not yet been established and there have been no attempts to introduce radiographers' RE. Enhancing radiography education in

Kuwait and offering continuous education and training courses might eliminate the fear of making errors and the issue of medico-legal issues.

7.3.10 Lack of trust and underestimating radiographers

Under this sub-theme, the radiographers explained that one of the barriers to radiographers' RE is that radiologists do not trust them and underestimate them. Radiographers revealed that radiologists do not think that radiographers are capable to handle an extended role in addition to their actual role of positioning patients and producing diagnostic images. Radiologists divulged that they cannot trust radiographers for RE, mainly because their qualification only prepared them to do the technical part of medical imaging.

A radiographer explained that the senior radiologists have issues with trusting junior radiologists and she wondered how the situation would be with the radiographers.

'If the junior radiologist performs ultrasound the senior radiologist will discuss the ultrasound and sometimes repeat the examination because she did not trust the junior radiologist; how then they are going to trust us? If they decided to repeat every case we perform, what should we do? We are wasting time instead of saving time.'

Radiographer 1

In line with radiographer 1's opinion, radiographers 7 and 10 have the same opinion about the issue of radiologists not trusting radiographers and that the radiographers' RE will not add anything to the quality of the service and will be a waste of time.

'For US I can perform it but are radiologists going to trust us! I don't think so, they will keep repeating it. It does not make sense to train radiographers to perform US and report images, radiologists will not trust us.'

Radiographer 7

'If there are junior radiologists, the senior will always supervise them and validate their reports, imagine how would it be for radiographers! They will take forever to trust us (laughter)...'

Radiographer 10

Radiographer 7 mentioned that even if radiographers perform the extended role, society and other medical professionals will not change their attitudes of underestimating radiographers.

'I will still be a radiographer (image taker) in the eyes of society although we will be performing double work What authority we will have? In other countries like USA and the UK, nurses teach doctors. But our colleagues in other specialties like radiologists, physicians and surgeons, will they respect us and trust us, I don't think so!'

Radiographer 7

Furthermore, radiographer 9 added that lack of trust affects radiographers' performance in their current role. She added that trust in radiographers will enable them to be creative.

'It is also about giving radiographers the trust... giving radiographers the trust will enable them to be creative and give more to their role. It is not like when the radiologist always questions my performance and underestimates my knowledge, this is my role let me be creative and you be creative in yours (radiologists) Once you give radiographers authority and autonomy that means you are giving them trust, when you trust them, they will show you the best performance they will feel that they are responsible they will educate themselves they will read and study. When they trusted me inside the room first time I went to MRI, I did the best examination but when the senior and radiologists were standing on my head, I can't do anything... and I made mistakes. When they depend on me and trust me, I did not make mistakes and perform the examination faster. When the person is always supervised and restricted the level of creativity will be limited. Giving radiographers the opportunities will enhance their performance and increase the creativity.'

Radiographer 9

According to radiologists they mentioned that they cannot trust radiographers because of their poor knowledge.

'The feeling is there that the radiographer is not well-qualified enough to discuss the cases with the radiologists and they feel it is wasting time, I don't think it is personal thing.'

Radiologist 2

'For myself, I don't agree that one person should perform US, and another person report it. This is operator dependent in general, radiographers are not qualified to write reports and I don't agree with allowing them to do US.'

Radiologist 10

In addition, another radiologist highlighted that a radiologists' way of thinking is different from a radiographer because of the nature of education and the medical background. She also added that radiographers' knowledge is not adequate to enable them to detect abnormalities in mammography images reporting.

'The mind set of radiographers is different than that of radiologists. When I see the image, I don't just say this is mass, I am worried is this ductal is this ..., the radiographer will not think like that and this thinking will inform how I will perform the ultrasound for the patient, it is not one single thing it is one thing that leads to another thing that leads to another thing. '

Radiologist 4

Another radiologist added that even for senior radiographers they will still not be able to detect macrocalcifications and small abnormality.

'Senior radiographers cannot write mammography reports or perform biopsies, they are also radiographers... they maybe could notice something very grossly evident on the mammogram like a large mass, anyone can pick up.'

Radiologist 5

Radiologist 8 revealed that the reason for authorising radiographers to perform 3D US is because it was an easy task.

'The radiographers performed 3D US because it is easy, I don't think it is necessary'

Radiologist 8

Radiologist 3 mentioned that lack of trust in radiographers and underestimating them was a negative attitude that should be changed.

'Radiologists underestimate radiographers' knowledge, giving radiographers trust is very hard, we have to learn how to trust them. I also cannot trust junior radiologists when they perform the US, one junior radiologist gave me the US report without findings, when I repeated it, I discovered three missing lesions.'

Radiologist 3

The findings highlighted that lack of trust from radiologists toward radiographers is one of the barriers to radiographers' RE. Radiographers mentioned that the issue of trust will be a strong barrier especially in that senior radiologists do not trust junior radiologists and they commonly repeat their US to validate the written report. These results match those observed by Forsyth and Robertson, (2007), who indicated that radiologists did not trust the radiographers' ability to handle role development. The radiographers highlighted that they also feel they were underestimated when they wanted to give an opinion on the diagnosis or discuss pathology with the radiologists.

One of the radiographers mentioned that radiologists trusted radiographers to perform 3D breast US because it was easy and did not require high skills. As pointed by Arslan et al. (2019), 3D US is operator-independent which meant it does not require high level skills to perform it like a 2D operator-dependent US. This may justify the reason why radiologists in Kuwait trusted and agreed to train radiographers to perform 3D US. In this research, 70% of the radiologists felt that radiographers had poor pathology

knowledge and any discussion about patient's diagnosis was wasting the radiologists' time. Both groups highlighted radiographers' poor medical knowledge as a reason for lack of trust and underestimation of their performance. However, radiographers mentioned that radiologists did not even trust junior radiologists and sometimes they repeated the US because they did not trust junior radiologists and did not feel comfortable reporting images that were not taken by themselves. This position was supported by literature (Forsyth and Robertson 2007) which argued that the lack of trust in the radiographers' ability was one of the radiologists' anxieties about radiographers' RD. The lack of trust may be based upon the concept of radiographers' knowledge and lack of medical education which radiologists and radiographers in the current study considered only came from studying medicine. However, a lack of trust from radiologists towards radiographers was not surprising, as this was an issue in the UK for more than 30 years when Renwick et al. (1991) reported that radiographers could not extend their role because of the high rate of false positives on categorising diagnostic images to normal or abnormal. However, similar to Kuwait, during that time in the UK, radiographers did not receive any type of training to enhance their skills in detecting abnormalities in diagnostic images.

It was understandable that radiologists do not trust radiographers reporting images or performing stereotactic biopsies, however, it was not clear why there was a lack of trust in junior radiologists by senior radiologists. The reason for the lack of trust from senior radiologists to junior radiologists may be because of their lack of experience. Indeed, the researcher noted the system in Kuwait, where senior radiologists always validate junior radiologists and assess the two-readers routine in radiology departments in Kuwait. As discussed in the theoretical framework section, knowledge and education may influence radiologists' opinion around radiographers RE. Interestingly, another concept mentioned in the theoretical framework which may be an explanation of radiologists' strong resistance to radiographers' RE, is power and jurisdiction. More details of this issue will be discussed in Chapter 7.

This section highlights the barrier of radiographers' RE that is associated with the concept of power and jurisdiction. The concept of power and jurisdiction between the

medical professions and healthcare professions providers was not a novel finding. Indeed, the power relationship between members in the medical field and members within other healthcare professions is well established and supported by the literature (Abbott 1988; Foucault 1976; Nancarrow and Borthwick 2005; Timmons and East 2011). In fact, the findings in the current research demonstrated a strong existence of power from radiologists exercised on radiographers in a way that was negatively affecting radiographers' autonomy to perform their current role. This section also discusses the radiologists' resistance sub-theme and further themes: finances and competition, practice power, and autonomy.

All the radiographers who participated in the study explained that radiologists' resistance to the radiographers' RE in mammography is one of the main barriers for radiographers' RE. Some of the radiographers justified this and considered that radiologists were using their power to protect their role, while another group of participants linked radiologists' resistance to the qualification of radiographers. Another group explained that radiologists would be against radiographers' RE because they did not trust radiographers and they underestimated their knowledge and performance.

7.3.11 Radiologists' resistance

Radiographer 1 showed doubt about radiologists' reaction to radiographers' RE. She mentioned that radiologists may object to the idea of radiographers sharing or taking on part of their role. Radiographer 1 also added that Kuwait is different to other countries where radiographers have extended their role,

'We also have to think about something important, are the radiologists ok with radiographers' role extension? I don't think Kuwait is the same as in other countries abroad. We used to have a Philippine radiographer who used to perform ultrasound in her country one of the radiologists gave her the authority to perform ultrasound and the radiologist checked the images, after a while one of the radiologists objected and said this was not allowed and we don't have sonographers in Kuwait, I don't know why, maybe because of the liability... '

Radiographer 1

'Also, here in Kuwait, some radiologists reject the fact that radiographers depend on themselves or try to perform US themselves. They don't like that; they prefer that radiographers do their job only.'

Radiographer 4

One of the radiographers highlighted that radiologists will reject the idea that radiographers perform extended tasks that are usually under radiologists' control, as by doing this, radiographers maybe become equal to radiologists,

'The doctors also will not agree about extending our role... They do not want us to be equal to them...'

Radiographer 6

Radiographer 9 revealed that radiologists prefer to have control in deciding the need for supplementary mammography views and not give the authority to the radiographers.

'Not all the radiologists will accept radiographers performing supplementary views without their permission even if there was need for that.'

Radiographer 9

Interestingly, radiologists showed strong resistance towards the idea of radiographers' RE as expected by radiographers. Radiologist 4 highlighted that performing tasks of the radiographers' RE such as image reporting and performing stereotactic biopsies is not the radiographers' job.

'In terms of the radiographer reading the mammogram, for me, my response is capital NO. I believe that you should be a physician first to be able to do that because you are relating that to disease. I left my home country (x years) ago and I never go there I don't know about the current situation, all my family are in the (x country), I don't know what the practice is now, but I don't think that the radiologists in (my country) would allow that.'

Radiologist 4

Radiologist 9 mentioned a scenario about a radiologist colleague who was not happy when a radiographer decided that there was a need for a supplementary mammography view.

'The radiographer performed a spot view without asking the radiologist, the radiologist got mad and said there was no need... and there is a strong resistance from the radiologists towards radiographers taking a decision without asking. I would like radiographers to extend their role and learn more things for performing US, but not reporting. To be able to write a report the radiographer should be able to take a decision... an accurate decision. Their training program for radiography is not focused enough to report images'

Radiologist 9

Radiologist 3 added that extending radiographers' role and training them to perform US, will take the only modality that enables radiologists to communicate with patients.

'... if the radiographers extended their role, I will have no communication with patients at all... the radiographers will take everything. What else left for us to do? I like talking with my patients for example about the importance of 6 months follow up if needed or the importance of screening or self-examination and I like asking about the patient's history. I do that during the US... I don't think I would be ok with giving the radiographers these responsibilities thus cutting the communication with the patients.'

Radiologist 3

The study findings suggested that radiologists' resistance was one of the significant obstacles for radiographers' RE in Kuwait. This finding was strongly aligned with previous literature (Brealey et al. 2002; Henderson et al. 2016; Howard 2013; KeKana et al. 2015; Milner et al. 2016; Smith and Reeves 2010). The findings indicated that there are various explanations for the radiologists' resistance to radiographers' RE, and all were associated with the previously mentioned theoretical framework. These findings also corroborated with the findings of Al Shiyadi and Wilkinson's study (2020) which indicated that radiologists excluded the possibility of radiographers' RE in mammography, US, NM, CT and MRI.

The driver for radiologists' resistance may be radiographers' poor knowledge which was mentioned previously. Another explanation is the concept of power and practice of power between the medical domain members and healthcare providers. Last but not least, protection of professional identity and professional boundaries, which will be discussed in-depth in utilising theory to understand the findings, chapter seven.

Several further themes emerged from radiologists' resistance sub-themes such as finances and competition, practising power and autonomy.

7.3.12 Finances and competition

Some of the radiographers and radiologists revealed that Kuwait is a rich country and training radiographers was not the best option to overcome the radiologist shortage, they can always recruit radiologists.

'In Kuwait, the radiologist shortage problem can be solved by recruiting radiologists from other countries... maybe some countries can't afford the cost of recruiting radiologists, so decided to train radiographers'

Radiographer 2

Indeed, some radiographers mentioned that the extended radiographers' role will influence them positively by enabling them to run their own clinics which will create competition with radiologists, causing them to resist the concept of radiographers' RE.

'In my country, radiographers perform the US after the Honours degree and master's qualifications in US, that would also allow the radiographers to open their own clinics without radiologists. The radiologists are not at all happy with that (laughter)... that creates a competition between radiographers and radiologists and would break the radiologists' financial position, especially because the US clinics are easy to open in (my country) and bring in good money comparing to other modalities.'

Radiographer 4

'Actually, the situation in my country is a competitive process because the major dependence is on the private sector, for example, I am a radiologist specialised in

mammography and don't want anybody to compete with me in the private sector. It is a financial issue; if they allow radiographers to extend their role in Kuwait, then they will compete with radiologists in reporting, taking biopsies and performing ultrasounds, this may reduce the income of radiologists. However, in Kuwait the situation is different because the government sectors provide patients with a high-quality service We don't have sonographers in country X because of financial issues.'

Radiologist 1

Radiologist 3 mentioned that one of the barriers for radiographers' RE was finances; the radiologists want to keep their role for example performing breast biopsies and be able to do this in their private clinics.

'I think financial wise ... They are thinking that performing biopsies inside their private clinics will raise their incomes and give them variation for breast surgeries. There are different types of biopsies: US guided, stereotactic guided, vacuum assistance and MRI guided biopsies.'

Radiologist 3

Radiographer 5 explained that one of the barriers to radiographers RE was the cost associated with training radiographers for more responsibilities.

'Another thing is the financial issues and cost of training programs; they will not take it seriously because they don't want the idea of radiographers' RE'.

Radiographer 5

In contrast, a senior radiologist pointed out that training radiographers for an extended role may have a positive impact financially.

'Maybe it will also speed up the process for the patients... also financially, I am not a financial advisor, but I think it will be good.'

Radiologist 7

One of the radiologists added that financially, training Kuwaiti radiographers to perform extended role was better than training non-Kuwaiti radiologists who then migrate or retire, which means the MOH loses money and personnel.

'Taking the decision to perform mammography supplementary views, breast US and doppler, will reduce the stress and the workload of the radiologists it is the best thing to do to cover the radiologist shortage. We bring X nationality and other nationalities and spend money on training them, then they leave Kuwait, it is better to train Kuwaitis who will not leave their country, they will deserve the cost of the training.'

Radiologist 9

Radiologist 10 explained that the idea of radiographers' RE will negatively affect the radiologists' income. She added that training radiographers to extend their role will be costly for the MOH.

'This idea reduces the workload of the radiologists and helps with the radiologist shortage issue... the disadvantage of that is that it could reduce the need for radiologists and reduce the radiologists' income. This of course is advantage for other places like the place that you are studying in the UK or Wales, not in Kuwait where radiographers have poor knowledge ... about the training, this will need a plane and a huge budget'

Radiologist 10

Different opinions have emerged around the financial implications. One of the radiographers mentioned that Kuwait is a rich country and will always be able to recruit radiologists from other countries. In contrast, a senior radiologist opposed dependency upon international radiologists and suggested that training radiographers to perform the extended role would be better to cover the shortage of radiologists. The senior radiologist highlighted the issue of migrating radiologists, leaving after they received training and gained experience in Kuwait was a waste of money, and training Kuwaiti radiographers would be the best solution. This supported Thom (2018), who suggested that training radiographers for RE will lead to financial savings. However, the same radiologist opposed radiographers performing biopsies and reporting mammography images independently because of the nature of their education and their poor

knowledge. Strengthening the radiography teaching curriculum and training radiographers to perform some extended roles during the bachelor's degree could enhance the situation and enable the medical team to trust radiographers.

Another group of radiographers and radiologists thought that one of the reasons for radiologists' resistance was to avoid competition. The findings indicated that training radiographers to extend their role would enable them to open their private clinics and practise independently. This poses a threat to the radiologists' business and income. Interestingly such competition does exist currently between radiologists, gynaecologists, urologists and surgeons as mentioned by three radiologists. The three radiologists highlighted that gynaecologists, urologists and surgeons are trying to perform stereotactic biopsies and different types of US as part of their role. This will enable them to practise these roles in their private clinics, thus directly competing with radiologists.

7.3.13 Leadership and power

All the radiographers felt that power was controlling the relationship between them and radiologists. Radiographers indicated that they could not start examinations without the radiologists' presence, while other radiographers mentioned that they could not make the decision to perform supplementary mammography projections without a radiologists' request. Furthermore, one of the radiographers mentioned a scenario about talking to a patient about his diagnosis and told the patient that he had a fracture. Even though the radiographer was right about the fracture, the radiographer was reported by the doctor and received a warning.

Radiographer 1 revealed that radiologists treat radiographers as people to follow their commands, she also mentioned a scenario where the radiologist did not listen to the radiographers' opinion,

'When the radiologists start to deal with us as people who just should follow their commands it is really annoying, some radiologists talk to us, some of them ask about our opinions of the protocol and the images, and some do not talk to us at all... For example, one time the radiologist asked me to do a spot view for the patient, it was very hard to do it because of the size of the patient's breast. I did it anyway, but it was not in the centre of the paddle, she (the radiologist) asked me to repeat because of that. I told her there was no need and the spot view

was already clear and not cut but she insisted on me repeating the image, I repeated the image which was really hard for me because of the patient's size and because I knew this was an unnecessary radiation dose. When I brought the image to the radiologist, she did not look at it and told me to inform the patient she could leave and come back later for her report! she did not need the repeated image... maybe because I told her there was no need she wanted to show me her power'

Radiographer 1

Radiographer 9 added that some radiologists insisted to be present at all imaging procedures at the workstation to monitor the radiographer's work at the MRI. Even though radiologists were busy, they refused to allow the MRI examinations to start without their presence. The participant added that radiographers will face strong rejection from radiologists about radiographers' RE.

'In MRI, if I started the examination without calling the radiologists, he will shout at us, without any reason, asking just why you did not call me when you started! Out of 10 radiologists I can tell you that there are 3 nice radiologists who appreciate what are we doing and give us some authorisations. They want us to have their permission to start the examination... they have no reasons; it is just to show their power and control over us. They always say that when the report is produced with your name on it, do what you want... this is because I started the examination in the MRI without letting them know, this happens a lot. I think if radiographers' RE is introduced in Kuwait they would strike and protest (laughter)....'

Radiographer 9

The current findings refute previous findings reported in the literature by Culpan (2016), who revealed that radiographers working in mammography in the UK are involved in the decision making of diagnosing. Indeed, the literature highlighted that radiographers' RE in mammography showed the fastest progression as compared to other modalities. Additionally, radiographers in the UK are receiving training to extend their role and practice independently. Such practice has provided radiographers in the UK with the power and the confidence to be involved in decision making. This situation is not seen in Kuwait, where radiographers do not have autonomy within their current role which in itself makes it harder to be involved in decision making. Additionally, a lack of training

courses and unfamiliarity with the concept of extended role may keep radiographers away from extending their role and sharing the power of decision making with radiologists. However, these findings are a demonstration of normalising power, where Foucault (1976) explained that doctors control the decision making in the hospital, and everything should be under their approval and supervision.

One of the radiographers revealed that in one country where the radiographer worked, the radiologists were rejecting of the radiographers with bachelor's degrees. She added that radiographers were facing power issues not only from radiologists but also from members from other medical professions.

'In X country, the radiologists fought the radiographers who have bachelor's degrees they don't want strong radiographers' ... There was one situation when I refused to perform a case before our radiologist accepted it, the surgeon shouted at me and said you will perform the case now against your will; he used his power to disrespect me. I wrote a complaint, but nothing is taken seriously against surgeons... My colleagues always complain about surgeons' attitudes during performing angiography and other interventions. Most of them disrespect radiographers and this is rejected but what should we do! Nobody can talk to them because they are important and qualified working for the hospital.'

Radiographer 5

The radiographer also added that extended radiographers' role would change the power divide between these two professions.

'This (radiographers' RE) will reduce the superiority feeling of the radiologists towards radiographers (laughter)... Now they see themselves as superior to radiographers and radiographers are inferior. The radiologists will not accept that radiographers who studied for four years could share their job with them.'

Radiographer 5

Radiographer 6 highlighted that radiologists always mentioned their long period of studying medicine compared to that of the radiographers' education. She added that radiologists want radiographers to assist and help them, instead of changing the radiographers' role officially, which might impact their power within that context.

'They want everything under their control they always mention their long years of studying and travel abroad for studying. On top of that the fellowship, how they 'Radiologists' will allow people from other profession who studied less years to share their job with them! ... The radiologists want us to learn and help them when they command, but they will fight any official plan of giving radiographers more responsibilities. They want to be the decision makers! ... We heard a while ago that Kuwait university academic staff are planning to introduce a programme for sonography teaching, they went crazy (laughter). They said this is our role and what would be the radiographers' job title! Doctors! They were worried about their role and the job title'

Radiographer 6

One of the radiographers mentioned that the radiologists' desire in having power and control would make them oppose radiographers' RE,

'Their mentality will make them refuse radiographers sharing their role with them, some radiologists love to feel the power, some radiologist underestimate radiographers. All doctors in general want to be the decision makers with technicians and nurses in all fields to obey their commands ... The senior radiographers should be given a power and rights to make some decisions, we don't have any rights compared to physiotherapists and nurses.'

Radiographer 7

Additionally, radiologists mentioned that radiographers should concentrate on their current role which was a significant one. They mentioned that radiographers do not have adequate knowledge for the RE. Even after training, image reporting, performing US and stereotactic biopsies should never be under the technicians' control, as these are a doctor's task.

One of the radiologists showed a good relationship between her and her radiography team, she revealed that radiographers in her team are given the authority to decide the need for supplementary mammography views and shared their opinions verbally about the diagnoses. Radiologist 3 added that training could teach radiographers to perform RE, but she was against that because it is the radiologists' role.

'The radiologists will reject all the faces of RE that we have discussed, their prestige, their power and their decision making... My team is perfect... I gave

them the power to do supplementary views with decision making, managing priority of patients' appointments, and performing clinical examinations. Sometimes I feel that I am overloading my team.... The radiologists and doctors, in general, think that they are the only ones who are right, they are the bosses, it is strange that I am saying that, and I am a radiologist (laughter), but this is true... They have the power, they have the decision making, they have control of everything. I believe that we should involve the radiographers in our decisions and discuss it with them, I can guarantee that some of the radiographers working with me are better than some radiologists... They may learn I am not underestimating them, but can we give this responsibility... no. I don't think that radiographers are able to perform minor surgeries, it is still a skill, but it should remain the radiologists' job, can the radiographers learn? Yes, do I want to give this to them? No!

Radiologist 3

Other radiologists added that issues between radiographers and radiologists will start when radiographers wanted to cross the boundaries and become doctors. Radiologist 4 added that each profession should perform their own roles and not mix roles between professions,

'I tell them you are professionals, this is your profession you should be glad that you are skilled to do it but the problem comes when they want to divert to something else, when the technician wants to be a doctor, then the problem comes, the differences come, when you are happy to do what are you doing when you are happy being what you are, then problems will not come at all, because everyone has their own work. That why it is teamwork, the technicians have their role, the nurses in mammography have their role, everyone has their role, so one person cannot get the job done, and when credit comes, it comes to the whole team.'

Radiologist 4

Radiologist 8 mentioned that it is unacceptable for radiographers to extend their role and mentioned that mammography is very sensitive and only radiologists should work in this field. In fact, she raised an interesting point about training radiologists to perform radiographers' role which might enhance the quality of the service. The radiologist revealed that training radiographers to perform breast US may be fine but not for

diagnosing; she highlighted that such a role needs strength and knowledge to make decisions and having to face surgeons and physicians, which is something radiographers cannot do.

'It is not a radiographers' job even if they open the field for radiographers for reporting, the radiographers take the images and the radiologists write the medical reports, how come! Especially for mammography which is really a very sensitive examination and depends on the person's qualification, even for us (radiologists) we don't allow anyone to work in mammography' ... 'we need training for us for positioning, teach radiologists to do positioning in mammography using all views. It would be useful if there were no skilled radiographers, radiologists could give tips and instructions about positioning, share that with them, I may be able to improve the quality of the service' ...'I heard that the Allied Health Science College is preparing something about US for radiographers, it is ok, however image interpretation in the radiologists' role, this is not a radiographers' job.' ... 'Radiologists should control the input from the physicians and surgeons (examinations request), the radiographers would not be able to control the doctors, but the radiologists can... we decide to accept or reject the case and the imaging request.'

Radiologist 8

Radiologist 10 highlighted the importance that every profession should know their limits and not cross the boundaries between professions. She added that radiographers are not allowed to touch the patients for any other reason rather than positioning.

'The radiologist shortage is the only thing that made people in the radiology profession plan to give the radiographers the extended role. Cancelling the radiologists' role requires a high standard using a perfect physician and perfect qualified radiographers, and this is hard; because the radiologists link both the clinical and the technique.... I choose x technique because y clinical issue will be demonstrated that way, nobody will be able to do this but radiologists. The radiographers are not allowed to touch the patients only for positioning... Because they are not doctors, and this is none of their business, this is the radiologists' role and radiographers need to know their limits. Even the nurses have limits, they only take vital signs, did you ever hear about patients who left before the doctor sees her/him?! Of course, no.'

Radiologist 10

The finding in this section supported the previous findings in the literature and in the theoretical framework in particular, where Yelder (2006) found that the medical imaging profession has power over the radiographic healthcare profession. Yelder (2006) highlighted the factors used to maintain medical power: a valued form of knowledge and control over diagnosis. Indeed, training radiographers for RE will give them adequate knowledge to be involved in the decision making and diagnostic process. Therefore, this will cause radiologists to lose control over the decision making and blur the boundaries. The researcher thinks that there is a strong relationship between radiologists practising power and protecting professional boundaries and professional identity. Indeed, the main driver for practising power and resisting change is protecting the professional identity. This is reminiscent of the year 1920, when UK radiographers lost reporting rights to gain professional recognition, causing the de-skilling and de-professionalisation of radiographers (Larkin 1983).

7.3.14 Autonomy

Results show that the radiographers' role is proper positioning of patients for imaging procedures and patient communication to understand the patient's history. However, it was clear that the radiographers have limited autonomy as they cannot decide anything without the radiologists' permission, such as deciding to perform supplementary mammography views, sending asymptomatic women for screening clinics or talking to the patients about their diagnosis.

' we have to search for the radiologist to decide simple things that the radiographer could decide it and save the time of the radiologist and the patient....' And when we started the screening program in 2014, we had the authority to decide doing "spot" view for the lesion, this was not allowed in the USA. I saw that during the training course. However, one of the radiologists objected to that, so deciding the need to perform "spot" view for the patient by the radiographer was removed. We have to wait for the radiologists' report to perform any supplementary projection ... the only thing that makes me less satisfied when I don't have the power to help them is when I can't accept a patient because the radiologists' list is full. I love to take walk-in cases and I am ready for more responsibilities, me dealing with a patient... me helping the patient is satisfying'

Radiographer 1

'Away from performing biopsies and image reporting, I wish I had the authority to arrange my schedule and my patients, I wish I had the authority to accept more cases per day especially if I think it is urgent case. Sometimes the patient come to me crying to perform urgent mammography, I could do a walk-in appointment because I finished my list early, but I can't do that because the radiologist had decided to perform a specific number of cases that day. When the patient says, 'please calm me, is everything normal in the image?', I wish I had enough knowledge to tell the patient if she is normal or not. But I am not allowed to do that even if I have the knowledge by the years of experience and it is annoying to just say to the patient "I can't say anything, please wait your report" I feel I am a machine not human! I mean give us more responsibility; our current role is very limited'

Radiographer 2

Radiologist 10 frequently repeated that radiographers are image takers, and they should not touch the patients to perform US or stereotactic biopsies, which led the researcher to ask her about her opinion of radiographers performing a physical examination. The radiologist explained that it is not the radiographers' role, and again, radiographers are not allowed to touch patients,

'The radiographers are not allowed to touch the patients for US, biopsies or physical examinations, only for positioning. Because they are not doctors, and this is none of their business, this is radiologists' role, and they need to know their limits'

Radiologist 10

The findings in the current study highlighted the restricted professional autonomy of radiographers in Kuwait. Radiographers revealed that their autonomy was restricted by radiologists, some of them refused to start the imaging procedure without a radiologist in attendance. This was supported by the literature (Ballani and Sukkar 2005) who explained that radiographers in Kuwait are faced with a limited scope of practice and a lack of autonomy. The current findings create a major difference between radiographers' autonomy in Kuwait and the situation in the UK, where radiographers have broader autonomy to report mammography images independently, performing breast US and stereotactic biopsies. The creation of a four-tier model and the

introduction of skill mix programs in the UK enabled radiographers to extend their role with a high level of autonomy.

7.3.15 Protecting professional identity in practice and Professional boundaries

The current section highlighted the last emerged sub-theme under the barriers and difficulties of radiographers' RE. The results indicated that protecting professional identity was one of the reasons for radiologists resisting extending the radiographers' role. Radiographers felt that extending their role will cause a potential loss of radiologists' identity. Radiologists revealed that extending the radiographers' role was not the ideal solution to the issue of radiologist shortage. They mentioned that even after training, radiographers should not perform tasks without radiologists' supervision; this point was also agreed upon by all radiographers in the current research. However, six out of ten radiographers highlighted that the relationship between radiographers and radiologists was more of a superior and inferior relationship. Furthermore, they added that radiologists were annoyed by radiographers who voice their opinions about diagnosis or diagnostic protocol. In contrast, four of the radiographers revealed that the relationship between radiographers and radiologists was much better currently compared to the past. Radiographers added that radiologists did listen to their opinions about diagnosis and whether they had any comment about the protocol. However, all radiographers revealed that extending the radiographers' role officially would negatively affect the relationship between radiologists and radiographers because radiologists would only accept verbal opinions (not written diagnostic reports by the radiographers). The researcher noticed during the interviews and note taking process that the years of experience of radiographers did not impact the relationship between them and radiologists.

'They will say that this is our profession and this what we studied for long years, why share it with radiographers?'

Radiographer 1

Radiographer 2 indicated that lack of interaction with radiologists was annoying and the relationship should not be autocratic,

'It is annoying when radiologists don't interact with radiographers and don't accept their point of view. In mammography, the radiologists encourage us and give us positive comments and compliments when we do a hard case, some doctors never do that and "command" us in a negative way.'

Radiographer 2

One of the radiographers revealed that radiologists do not accept it when radiographers expressed their opinion about the diagnosis and discuss cases with them,

'The radiologists don't like it when the radiographers argue with them or discuss the case with them, some of them like to explain to you even if you did not ask while some radiologists treat us as if we are nothing... just put the envelope down and go ...'

Radiographer 4

Radiographer 10 added that blurring boundaries and intermediate areas between professions would create a negative relationship between radiographers and radiologists.

'The relationship is negatively affected when radiographers or radiologists try to interfere in each other's job.'

Radiographer 10

One of the radiologists indicated that some of her radiologists' colleagues have a very limited relationship with radiographers during working hours and she highlighted that such an attitude has a negative impact on the quality of the service provided.

'Some doctors only like a very limited relationship around imaging they don't like friendly relationships. I prefer the teamwork and the friendly relationship. I like

it when the radiographer talks to me, gives me a proper patient history, tells what she thinks is to be done and I tell her the best thing to do..... The radiographers obey the radiologist orders that's why the relationship is good.'

Radiologist 2

Another radiologist highlighted that practitioners in the medical domain underestimate radiographers. She highlighted that this attitude was not acceptable, and also emphasised the significance of training Kuwaiti radiographers for RE.

'I think the community and the medical domain staff have contempt for the radiographers. One of the staff (radiologist) always says the radiologist is the radiologist and the radiographer is the radiographer, there is a difference between the technician and the doctor' 'RE is the best thing to do to cover the radiologist shortage. We bring x nationality and other nationalities into Kuwait and spend money on training them then after that they leave Kuwait. It is better to train Kuwaitis, Kuwaitis will not leave their country, they will deserve the money spent on training them.'

Radiologist 9

Radiologist 7 added that training radiographers for RE would be phasing radiologists out of their profession. She added that this was not possible, and radiologists should guide and supervise all radiological examinations.

'Maybe it is like phasing the radiologists out, but I don't think it is possible, because radiologists should supervise every examination and approve every report...'

Radiologist 7

Radiographers highlighted that the radiologists would fight to protect their profession and they will refuse to extend the radiographers' role and even sharing similar tasks with radiologists. Despite that, 40% of the radiographers in the current study mentioned that radiologists accept radiographers who talk to radiologists about the diagnosis of the patient and give their opinion about the protocol; all radiographers said that this will be negatively affected when radiographers have the formal extended role. Six out of ten

radiographers mentioned that the relationship between them and radiologists was autocratic, and radiographers were not allowed to give their opinion about the examination protocol or diagnosis, as some radiologists considered this as a waste of their time. One of the radiologists mentioned that training radiographers should not be considered as a solution for the radiologist shortage. Other radiologists revealed that they should be training radiologists in mammography positioning, which will help radiologists receive high-quality images and to supervise radiographers when needed. Such an opinion was surprising, especially when there is already a heavy workload for radiologists in mammography and a shortage of radiologists. Additionally, one of the radiologists said that extending radiographers' role was phasing the radiologists out, which cannot be done as no qualified radiographer could completely replace radiologists. These findings did not support the idea of Field and Snaith (2013), who found that longstanding work engagements between radiographers and radiologists enabled radiographers to blur boundaries and extend their role and perform a broader scope of practice.

Interestingly five of the seven non-Kuwaiti radiologists who participated in the current study showed a strong reaction opposing the introduction of the radiographers' RE. Two reasons for this could be the use of power to protect the professional identity and fear of being phased out as a foreign workforce. The latter was not considered within Abbott's (1988) perspective in the theoretical framework. The foreign national radiologists showed strong resistance against training radiographers to perform even simpler tasks such as performing supplementary mammography views. The driver of their strong reaction may be to protect their jobs in Kuwait, besides protecting their professional identity in general. Indeed, training Kuwaiti radiographers to perform the extended role would reduce the need for an international workforce in the radiology department, which poses a threat to their current positions.

Refusing formal and authorised radiographers' RE by radiologists, refusing to share opinions about diagnosis and the autocratic relationship, can all be categorised under the umbrella of protecting identity and refusing to blur professional boundaries. This result tied in well with a previous study by Forsyth and Robertson (2007), who found that radiologists showed concerns about losing control over their professional

boundaries. Furthermore, it supported Brealey et al.'s (2002) work, which reported that radiologists opposed extending the radiographers role because they thought it would de-skill radiologists.

It is worth mentioning that the majority of the previously reviewed studies in the literature highlighted radiologists' resistance as one of the main obstacles for radiographers' RE. However, there were no further details behind the reasoning for this resistance. Indeed, controlling the jurisdiction over the profession, protecting professional identity and professional were explanations for radiologists' resistance to radiographers' RE. The theoretical framework highlighted this point from Abbott's (1988) perspective, and it can be applied to the current results. The next chapter utilises the theory to understand the findings.

7.4 Summary of the chapter

This chapter discussed the second main theme from the data "extending radiographers' role, drivers and barriers". The researcher discussed sub-themes that emerged from the main theme including drivers and barriers for radiographers' RE in mammography. Theme and sub-themes were discussed in-depth and compared to the related reviewed literature. The next chapter will explore a theory-led interpretation of the emerged data through the lens of the adopted theoretical framework.

Chapter 8: Discussion and utilising theory

8.1 Introduction

This chapter discusses the main findings presented in Chapter five and six and examines their meaning in relation to the drawn theoretical framework. It discusses the two main themes that emerged from the collected data.

1. Radiographers' RE in Kuwait and activities of the extended role
 - a. Knowledge of radiographers' RE
 - b. Current role of radiographers in Kuwait
 - c. Areas of extended role in mammography
2. Extending radiographers' role, drivers and barriers
 - a. Drivers:
 - i. Radiologist shortage
 - ii. Female radiologist shortage
 - iii. Patient care
 - iv. Job Satisfaction
 - b. Barriers:
 - i. Knowledge and qualification
 - ii. Training courses
 - iii. Radiography education in Kuwait and the need for curriculum review and update
 - iv. Current poor performance of radiographers performing their current role.
 - v. Rotation and skills
 - vi. Radiographers' resistance
 - vii. Patient care
 - viii. Patients' resistance
 - ix. Medico-legal aspects

- x. Trust and underestimation
- xi. Radiologists' resistance
- xii. Finances and competition
- xiii. Leadership and power
- xiv. Autonomy
- xv. Protecting the professional identity and boundaries

To understand the meaning of the findings theoretically, the researcher adopted a theoretical framework to gain an in-depth understanding of both radiologists' and radiographers' reasons and attitudes toward radiographers RE in mammography. The researcher adopted one main theoretical framework which concentrated on Abbott's (1988) perspective about the system of professions. Abbott's (1988) theory included several discussions of the system of professions such as the theory of profession, power and jurisdiction and knowledge. These various discussions enabled the researcher to build an in-depth understanding of the data from a theoretical perspective. The associated theoretical framework concentrated on professional identity which also created an in-depth understanding of both radiographers' and radiologists' opinions and explored the reason for their opinions. This chapter discusses the findings of the current research according to the previously mentioned theoretical framework to gain a philosophical understanding of the issue under investigation.

The system of professions theory (Abbott 1988) was used to enable the researcher to understand the concept of professionalism and professionalisation and highlighted the situation between radiographers and radiologists. Understanding these meanings enabled the researcher to understand the relationship as to how radiographers and radiologists perceived radiographers RE in mammography and the concept of jurisdiction and knowledge.

The current study has offered new knowledge to help fill the gap in the literature. While there had been research conducted on the barriers for radiographers' RE, there was no philosophical explanation of the reason behind the radiographers' and radiologists' attitudes toward radiographers' RE (Abuzaid et al. 2021; Brealey et al. 2002; Forsyth and Robertson 2007; Howard 2013; Kekana et al. 2015; Moran and Warren-Forward 2011).

8.2 Abstract knowledge

Radiographers revealed through the previously discussed themes that they were against performing extended tasks independently and explained that the main reason was their limited education and knowledge comparing to radiologists'. However, this could be justified using the lens of the adopted theories.

Firstly, the nature of radiographers' profession and the hierarchical system between radiologists and radiographers. A frequent opinion offered by all radiographers to oppose extending their role and perform tasks independently was their inadequate knowledge of pathology, physiology and general medical knowledge compared to radiologists as previously mention (section 6.3.1). According to Abbott (1988), the evolution and interrelations of each profession were controlled by the way in which each profession controlled its own knowledge and skills.

Clearly, the radiography participants of the current study highlighted their limited knowledge and poor autonomy in their profession. Indeed, all of these participants indicated that they were not allowed to take any decision about the imaging procedure without the radiologists' permission (section 7.3.13). Furthermore, some radiographers revealed that some radiologists refused any discussion about diagnosis and some radiologists ignore radiographers' questions if it was about a patients' diagnosis and pathology. Additionally, three of the radiologists explained that the interaction between radiographers and radiologists about patients' diagnosis was a waste of the radiologists' time, and it was not the radiographers' role, (section 7.3.15).

This attitude was linkable to Abbott's (1988) perspective of controlling knowledge and skills, which enable radiologists to control the jurisdiction of their profession and prevent blurring boundaries. Abbott (1988) highlighted that controlling the abstract knowledge will help to control practical skills, therefore, radiologists in Kuwait are controlling everything in the profession, not only diagnosing and writing reports, but also imaging technique used, the protocol of the examinations, deciding the need for supplementary views, and the decision of sending patients to screening clinics if the patients are asymptomatic. The practical knowledge that emerged from abstract knowledge within the radiology profession involved the ability to produce diagnostic

reports, performing breast US and stereotactic biopsies. Indeed, controlling abstract knowledge was associated with controlling practical knowledge and preventing radiographers' RE.

Besides Abbott's abstract knowledge concept, the radiography curriculum in Kuwait was also poor in equipping radiographers with the necessary knowledge as discussed earlier (section 7.3.3).

Radiologists showed similar opinions about radiographers' RE and one of the reasons to oppose such practice is the radiographers' limited knowledge and education (section 7.3.1). Radiologists highlighted that extending radiographers' role to perform tasks such as reporting mammography images, performing stereotactic biopsies independently was not possible. Theoretically, the lack of knowledge may not be the main reason for opposing radiographers' RE, especially when the researcher asked about their opinion of training radiographers through formal courses to perform extended tasks and RE. Again, Abbott's (1988) lens may be used to justify the radiologists' opinion, which was controlling the abstract knowledge and practical skills, therefore securing the jurisdiction over their profession.

8.3 Power and jurisdiction

Study interviews established that radiologists' act of power and jurisdiction was one of the barriers for radiographers' RE in mammography. Indeed, this was demonstrated by both radiographers and radiologists (section 7.3.13). Radiographers revealed that radiologists used their power as doctors to command and radiographers should obey. They also mentioned that radiologists want to be the decision makers of everything, even the study protocol and the procedure steps. However, such an opinion was not exclusive to radiographers only, radiologists highlighted themselves that they are the doctors, and they should be the decision makers and radiographers should be cooperative and obey their commands to avoid wasting both patients and radiologists' time.

Abbott's perspective enabled the researcher to understand this attitude and gain an in-depth philosophical explanation of the issue within the context. According to Abbott

(1988), each independent major profession has jurisdiction within their field, for example, nurses have jurisdiction over monitoring vital signs, lawyers have jurisdiction over the law, and doctors have jurisdiction over medicine and healing. Jurisdiction gives rights to power and controls the duties and the decision making within the profession. Theoretically, using Abbott's lens, the radiologists are using their power and jurisdiction over radiographers who are subordinated within the profession, to protect their role and prevent radiographers' role from arising.

However, Abbott (1988) highlighted several significant ways of claiming jurisdiction between professions. Abbott (1988) argued that the jurisdiction can be won, lost, challenged or given up freely. Winning jurisdiction happens when a new task or technique emerges, for instance, the results highlighted that when 3D breast US was introduced in Kuwait, radiographers received training to perform it although performing US was not under radiographers' job description in Kuwait. Winning jurisdiction can also mean gaining society's recognition to perform a certain role.

In contrast, losing jurisdiction can be explained by giving up the jurisdiction of a specific task or role (Abbott, 1988). Indeed, professions such as radiologists arguably do not lose jurisdiction because they stand on a strong medical base and legitimate role. However, the reasons for losing jurisdiction may be that there is a need to concentrate on more complex tasks which cause one profession to give up part of its role to another profession. Losing jurisdiction in Abbott's (1988) theory enabled a clear understanding of the situation of the radiologist shortage, introducing skill mix and extending radiographers' role. One of the radiographers mentioned that it is important to train radiographers to perform breast US to avoid burnout in radiologists, as she revealed that two radiologists developed shoulder injuries because of the workload.

Additionally, challenged jurisdiction can be explained by losing jurisdiction over a specific role because productivity is no longer acceptable and does not meet the gold standard for performing the task. This can be used to justify the question raised by Saxton (1992) about the accumulation of unreported diagnostic radiographs because of the radiologist shortage which negatively affected the quality of the service provided, and maybe a sign to initiate the process of losing jurisdiction from radiologists to radiographers.

The results of the current study showed that radiologists are protecting their role to protect the jurisdiction over the profession, for instance when one of the radiographers mentioned that they are not allowed to start the imaging procedure without the radiologist being in attendance. This move may be used to remind the subordinate profession (radiographers) that they cannot do anything without radiologists' supervision, therefore, allowing radiologists to protect their role. Furthermore, radiologists in this study highlighted that training radiographers for an extended role was not the appropriate solution for the radiologist shortage. They highlighted that since Kuwait is a rich country, Kuwait can always recruit radiologists from abroad (section 7.3.12). Again, this attitude illustrated how radiologists in Kuwait are controlling jurisdiction over their profession to protect their role. Interestingly, one of the radiologists suggested training radiologists to perform mammography positioning to supervise radiographers with inadequate skills, which indicated a strong desire for complete control over radiographers' scope of practice to maintain jurisdiction.

Understanding winning, losing and challenging the jurisdiction over professional role enabled an in-depth understanding of radiographers' RE and illustrated a theoretical explanation of RE. A clear theoretical understanding of how RE started enabled the researcher to draw recommendations to initiate introducing radiographers' RE in Kuwait especially as Kuwait is one of the countries suffering from the radiologist shortage.

Abbott (1988) highlighted that jurisdiction is not only a culture of professions, it is also about social structure. Social structure can be explained by asking society to recognise radiographers' ability to perform an extended role. The findings of the current study showed that radiologists are eliminating the social recognition of radiographers' ability to perform extended tasks by not allowing radiographers to make decisions, for example, on the need for supplementary mammography views. Furthermore, one of the radiographers mentioned that talking with patients about the diagnosis or answering patients' questions is an illegal practice in Kuwait (section 7.3.14). According to Abbott (1988), societal recognition is as significant as cultural recognition and societal recognition has a positive impact on changing the law and switching the radiographers' extended role from illegal to legal. In the current study, it is not possible to gain societal recognition before having a legal and formal new extended role of radiographers.

Indeed, gaining radiologists' trust to extend radiographers' role may be a start point to introduce a formal and legal extended role, thereby, overcoming patients' resistance to extending the radiographers role and gain societal recognition.

8.4 Professional identity

The results from the interviews established an important explanation behind radiographers' and radiologists' resistance to independent extended radiographers' role and the justification ties in well with the concept of professional identity (section 4.4).

The high demand for the healthcare service and workload of radiologists leads the radiography profession to grow in an attempt to solve the issue of the radiologist shortage. However, two significant issues may prevent the growth of the radiography profession. Firstly, radiologists protecting their professional identity, and secondly the formation and the nature of both radiologists' and radiographers' professional identity in Kuwait.

The current findings showed that radiologists are afraid to blur the boundaries and lose the uniqueness of their profession by sharing tasks with radiographers. Radiologists revealed that mixing tasks is not a solution to the radiologist shortage, for instance, one of the radiologists stated that extending the radiographers role is similar to training nurses to perform surgery. Indeed, protecting professional identity may be a strong driver for radiologists practising power and jurisdiction. Golder (2017) highlighted that radiologists struggle to highlight their professional identity to their patients as doctors, not technicians. Indeed, extending the radiographers' role will cause blurred boundaries and extending radiographers' scope of practice may lead to confusion of identity recognition with radiologists, as radiographers are performing similar tasks (image reporting, stereotactic biopsies and breast US).

Another reason shown in the study was the way that radiologists' identity was formed. Interestingly, the concept of identity formation of radiologists has a strong effect on radiologists' attitudes and the manner of their interaction with radiographers. Rees and Monrouxe (2018) suggested that identity formation is shaped through formal curriculum and informal sources such as society and the culture of the context. In

Kuwait, anecdotally, social and cultural perspectives believe that doctors are always right, and they are at the top of all professions across all organisations. This has a negative influence on the interaction between radiologists and radiographers. For instance, during the interviews, radiographers were frequently described as “image takers” by radiologists. Furthermore, one of the radiologists believed that the mindset of radiographers was different from the mindset of radiologists, and there are no training courses that could prepare radiographers to perform radiologists’ task. Such attitudes enable radiologists to maintain power and control the jurisdiction over their profession. However, the results showed that the identity formation of radiologists negatively affected radiographers’ self-esteem and also the radiographers’ professional identity.

Radiographers showed very little confidence in performing extended tasks independently, and all doubted the ability of training courses to enable them to perform RE successfully. Following the concept of professional identity enabled the researcher to introduce an explanation for this attitude. Indeed, the formation of radiographers’ professional identity in Kuwait has produced employees with low self-esteem. Furthermore, the results showed that the current role of radiographers was not well identified, and any task is based on their supervisors’ request at each radiography department. Additionally, radiographers mentioned that they did not have a formal association to protect them and the MOH in Kuwait was the doctors’ ministry and as such, radiographers’ do not have the same rights as radiologists. Furthermore, the way radiologists used their power on a daily basis to protect their professional identity caused radiographers to doubt their own ability to perform any extended task independently. All previously mentioned reasons created an understanding of both radiologists and radiographers’ attitudes towards radiographers’ RE in mammography.

Understanding the reasons behind the radiologists’ and radiographers’ attitude of opposing radiographers’ RE enabled the researcher to draw an important justification of their opposition of independent RE and allowed to highlight recommendations to enhance the current situation (sections 9.4 and 9.5).

8.5 Summary of the chapter

This chapter created a theoretical interpretation of findings drawn from the results. Abbott's theory of profession and the concept of professional identity provided an in-depth explanation and justification of radiographers' and radiologists' attitude towards radiographers' RE in mammography. It filled the gap within the literature and highlighted a justification of barriers for radiographers' RE, radiographers' and radiologists' resistance particularly. Indeed, such understanding enabled the researcher to highlight a contribution to knowledge and theory, implications for policy and practice and suggestions for future recommendations, which will all be discussed in the following conclusion chapter.

Chapter 9: Conclusion

9.1 Introduction

This chapter concludes the thesis by highlighting an overview of the study and its main findings. Contribution to knowledge, including the theoretical contribution, is discussed. It also highlighted the limitations and how the researcher dealt with these limitations. The chapter presents the implications for policy makers, radiography educators (academic) and radiographers and radiologists (profession). Last but not least, the researcher highlights recommendations for future research.

9.2 The study

The study sought to understand how radiographers and radiologists in Kuwait perceived radiographers' RE in mammography. Radiographers' and radiologists' opinions and attitudes towards radiographers RE were examined in-depth under the lens of the study's theoretical framework. This took the form of single case study research, with multiple units (radiographers and radiologists) and multiple sites (government hospitals, screening clinics and specialist centres). The generated data included individual semi-structured interviews, documentary analysis and field notes. The data analysis stage was completed through within case and cross cases analysis under the umbrella of Braun and Clarke's (2006) model of thematic analysis. The main findings of the study were embodied by two main themes, and the key elements of the results integrated within the discussion in the findings chapter five, six and seven with reference to the relevant literature and theoretical framework.

9.3 Main findings

The study findings highlighted two main themes, the first was radiographers RE in Kuwait and activities of extended role in mammography. The second was the drivers and barriers for radiographers RE in mammography. The study illustrated that both radiographers and radiologists had poor knowledge of the concept of radiographers' RE. Furthermore, the study showed that radiographers in Kuwait were not performing an

extended role in mammography. Attitudes of radiographers and radiologists towards radiographers RE in mammography were the main findings of the study. Both radiographers' and radiologists' groups showed negative perceptions of the idea of extending radiographers' role in mammography. The findings demonstrated that the reasons behind their negative perceptions were mainly knowledge and education, the resistance of patients, the resistance of radiographers and radiologists, leadership and jurisdiction, and reasons associated with the concept of professional identity. Participants from both groups explained that extending the radiographers role in mammography may have negative influences on the quality of the service provided patient care and increased medicolegal issues. Considering job satisfaction, the majority of radiographers highlighted that they are satisfied in their job mainly because of the nature of their job which was communicating with patients and helping them. However, 40% of the radiographers revealed that they were not satisfied in their job because of their limited autonomy and inability to make decisions associated with their scope of practice.

In order to discuss the findings and understand their meanings theoretically, the researcher adopted a theoretical framework to focus on radiographers' and radiologists' perceptions and explain these perceptions and attitudes. Abbott's (1988) system of professions including several discussions of the theory of professions, power, jurisdiction and knowledge, were used to understand the radiographers' and radiologists' attitudes towards radiographers' RE in mammography. Indeed, adopting a theoretical framework enabled the researcher to undertake a deep interpretation of the reasoning behind participants' attitudes and perceptions towards RE. Additionally, the researcher used professional identity as an associated theoretical framework to understand its effect on participants' attitudes towards RE, and how the concept of professional identity influenced the relationship between the two professions.

Although radiographers and radiologists opposed radiographers' RE in mammography and performing extended role independently, the majority of the participants from both groups highlighted the need to train radiographers to perform breast US. They indicated that the radiologist shortage, in particular that of female radiologists, was the main driver to extend the radiographers role in this area. Furthermore, radiographers added

that such an extended role will enhance their job satisfaction, and both radiographers and radiologists illustrated that performing breast US will enhance patient care by reducing the waiting time of patients. It is worth mentioning that both groups of participants opposed any independent practice of radiographers RE and highlighted that any extended role should always be under the radiologists' supervision. Indeed, this research provided an important perspective about extending the radiographer role in mammography which may be transferable to other radiographers and radiologists practising mammography in Kuwait. The main reason for that is the subset of the utilised population does not appear different from the wider population.

9.4 Contribution to knowledge and theory

This study was conducted to understand radiographers' and radiologists' attitudes and perceptions towards radiographers' RE in mammography. According to the aim and objectives of the study, the findings emerge from the data and the discussion, the researcher argues that the study added significant contributions to theory and implications to the practice. These contributions can be implemented by radiographers and radiologists, academic staff in Allied Health College in Kuwait University and the MOH in Kuwait. More details on this follow in the implications section.

This study highlighted an important concept about the poor knowledge in Kuwait of radiographers' RE from both radiographers' and radiologists' perspectives. Furthermore, the study found unique results in which both radiographers and radiologists opposed extending radiographers' role without radiologists' supervision. Such findings guided the researcher toward an interesting link between participants' attitude and the adopted theoretical framework. For instance, radiographers' resisting RE is justified by their poor knowledge and education, which was previously highlighted by Abbott (1988). The findings of the study suggested that the formation of radiographers' identity should be considered carefully during their education.

The results make an important contribution to the understanding of radiographers' attitudes and lack of confidence to handle extended roles independently in the way which their identity developed. Starting from the educational process of radiographers

through to clinical practice, the concept of being a technician and always dependent on radiologists is well identified.

Additionally, the power and jurisdiction of radiologists have negatively influenced radiographers' attitudes in Kuwait, and this could be further impacted by the low confidence of radiographers to independently perform an extended role. Radiologists seemed to refuse a blurring of boundaries in order to maintain and control the jurisdiction of their profession; as discussed in Abbott's (1988) theory, thus limiting any impact on workload or waiting times.

This study highlighted that extending the radiographers role to perform breast US, training radiographers to filter the cases to urgent/not urgent and decide the need for supplementary mammography reviews may enhance the patient care and improve the early detection of BC by speeding the diagnosis procedure and reduce the waiting time.

9.5 Implications for policy and practice

The findings of the study have highlighted important implications for policy makers, radiographers, radiologists, academics educating student radiographers and MOH. The study findings show that:

- Radiographers in Kuwait are performing a limited scope of practice with no RE opportunities and that there is a need to amend the policy and train radiographers to perform breast US. There is, therefore, a necessity for the MOH to introduce training programmes for radiographers to perform breast US, which will enhance the quality of the service provided and improve patient care. Additionally, training radiographers to perform breast US might be a positive step to solve the radiologist shortage issue and might reduce the need to recruit radiologists from other countries.
- Insufficient development of the radiography teaching curriculum, in which there was no significant development in educational content between 15 years ago and now. There is a need for international collaboration between policy makers. Such a collaboration could enhance radiography education in Kuwait and identify any gaps in knowledge, in particular those that have

caused radiographers in Kuwait to oppose extending their role compared to radiographers' roles in the UK.

- There is a need to have a sub-speciality mammography programme, as an additional educational programme for radiographers who are interested in specialising in mammography. Such a step would be seen as very important in extending the radiographers' role in mammography.
- Results indicate that radiographers in Kuwait requested extensive training in mammography practice, and the opportunity for training should be distributed equally among all radiographers.
- The rotation of radiographers across the various radiography modalities negatively affected radiographers' performance. Therefore, a specific number of well-trained radiographers should be posted in the mammography department to gain experience and the appropriate skills.

9.6 Limitations of the study

This study has made important contributions to theory and has implications for practice in the field of mammography and extending the radiographers role as discussed previously. However, several limitations were highlighted as this research was a PhD study with time and resources restrictions.

Firstly, the study relies mainly on the perspectives of radiographers and radiologists, this may be seen as a limitation, as it could be useful to interview other stakeholders such as physicians, surgeons, and academic lecturers from the university. Including other stakeholders would provide the researcher with wider insights about the concept of extending the radiographers role in mammography, however, this was not applicable due to time and resources constrictions.

Secondly, this study adopted a theoretical framework that used Abbott's (1988) system of professions as a lens to conduct the study. Despite the importance of adopting the theoretical framework as discussed in the literature review, it has been argued that this may restrict the process of the study by controlling the gathered data (Braun and Clarke, 2006). Controlling the gathered data may be explained by concentrating on the data and the ideas that are only associated with the adopted theoretical framework. However, to

avoid such a limitation, the theoretical framework did not restrict the process of collecting and analysing the data as the researcher inductively analysed the data without being obligated to follow predetermined themes (deductive method). Indeed, the theoretical framework was (kept in mind) during the research to manage the production of the entire thesis and did not restrict the collected data, which enabled the collected data to speak for itself freely with no restrictions.

Thirdly, the subject area of the targeted population could be considered another limitation of the study. This study targeted radiographers and radiologists who had experience practising mammography imaging and explored radiographers' RE in the mammography field only. This was because of the personal interest of the researcher about the widespread issue of BC in Kuwait. Furthermore, because of the important success of extending the radiographers role in mammography in the UK, this guided the researcher to explore the situation in Kuwait. However, including radiographers' RE in other imaging modalities such as general x-ray, MRI, and CT would provide a broader view of radiographers' and radiologists' perceptions in Kuwait towards extending the radiographers' role.

The fourth limitation of the study was the gender of the sample from within the radiographers' group. In this study, only female radiographers participated because only female radiographers perform breast imaging procedures for patients in all mammography departments in Kuwait. It was not possible to include male radiographers in the study as they had no experience practising mammography and communicating with such patients. Including males may enrich the gathered data and may provide the researcher with different perspectives and attitudes associated with cultural perspectives and gender.

Finally, qualitative research, in general, is criticised for its small sample sizes. However, the researcher used a disproportionate sampling technique to decide the sample size of each unit. Using such a technique enabled both groups of participants equally to express themselves and their point of view.

9.7 Future research

This study could provide other researchers with baseline data to conduct wider areas of research within a radiography context and explore radiographers' RE among other imaging modalities such as MRI, CT and general x-ray. As this research used a case study methodology that relies mainly on the perspectives of the participants, adopting other methods such as an ethnographic study design would enable researchers to be part of, and closer to, the context under investigation. An ethnographic study about radiographers' RE could be conducted to observe radiographers' scope of practice and to trace any development of the role in more depth. Furthermore, ethnographic study during the student radiographers' education period in Kuwait University could provide valuable insight into the radiographers' identity formation and understand how it can be developed to handle the extended role.

It would be of interest to the field to conduct a comparative study between the radiography curriculum in Kuwait and the UK. Such a comparison could highlight explanations and reasoning behind the ability of radiographers in the UK to handle extended role independently, and the reason why radiographers in Kuwait showed resistance and a lack of confidence in such practice. Additionally, it would be worth exploring the experience of sonographers in KSA and the influence of radiographers performing US on the quality of the service provided. Their experience can be used to initiate a similar programme in Kuwait. KSA has been chosen particularly because of its similarities to Kuwait in its cultural background and the organisation of its health services.

A study involving both female and male radiographers to understand how they perceive radiographers RE would be valuable and can explore potential differences in their opinions associated with cultural factors and gender.

Additionally, a study to explore the reasons behind the absence of initiating a sonographers' programme in Kuwait is very important. Indeed, training radiographers to perform US is an important step to reduce the workload on radiologists and could be a primary step toward the internal development of Kuwaiti radiographers and eliminate

the need for recruiting radiologists from abroad in order to solve the radiologist shortage issue.

Another recommendation for future research relates to the targeted population. As this research was concentrated on radiologists' and radiographers' perceptions towards radiographers' RE as mentioned in the limitations (section 9.6), it worth to include other stakeholders such as academic radiographers in Kuwait University, surgeons and physicians to create a broader image of the subject of radiographers' RE.

Furthermore, this study could be repeated in five or ten years to monitor if there has been any change in the practice.

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Appendix 1: Ethical approval from the Research Ethics Committee in the School of Healthcare Sciences, Cardiff University

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



11 April 2019

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Altaf Muhanna
Cardiff University
School of Healthcare Sciences

Dear Altaf

A Qualitative Study of the Attitudes of Radiographers and Radiologists in Kuwait Towards Radiographers' Role Extension in Mammography.

At its meeting of *April 9th 2019*, the School's Research Ethics Committee considered your research proposal. The decision of the Committee is that your work should:

Pass –and that you proceed with your Research in collaboration with your supervisor

The Committee has asked that the lead reviewers' comments be passed onto you and your supervisor, please see below.

The letter of access needs to be translated
Please clarify how long the data will be kept for, it mentions a couple of different time-scales

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

A handwritten signature in blue ink, appearing to be 'LH'.

Mrs Liz Harmer – Griebel
Research Administration Manager

Cc :Paul Brown

Cardiff University is a registered charity, no. 1136855
Mae Prifysgol Caerdydd yn elusen gofrestrdedig, rhif 1136855

Appendix 2: Ethical approval from the Ministry of Health Kuwait

Appendix 3: Topic guide radiographers

1. How long have you been working as a radiographer?
2. Which modalities do you work with?
3. How long have you worked in mammography?
4. What do you know about radiographers' role extension and in mammography?
5. Do you do any extended role in your practice? How about mammography?
6. How do you perceive radiographers' role extension in mammography after training?
7. Are you willing to have more responsibilities in mammography practice and extend your role after training? And what areas in mammography do you think the radiographers can extend their role in?
8. What are the barriers of radiographers' role extension?
9. What are the drivers for radiographers' role extension in mammography?
10. What are the advantages of radiographers' role extension in mammography?
11. What are the advantages and dis-advantages of radiographers' role extension in mammography?
12. Are you satisfied with your current situation and current role in your job?
13. How do you perceive your knowledge gained from the bachelor curriculum?
14. Can you explain your relationship with radiologists?
15. How do you think extending the radiographers' role will affect cases of BC and attending screenings?
16. Do you have any future recommendations for radiographers' scope of practice?
Do you like to add anything?

Appendix 4: Topic guide radiologists

1. How long have you been working as a radiologist?
2. Which modalities do you work with?
3. How long have you worked in mammography?
4. What do you know about radiographers' role extension? In mammography?
5. Do radiographers do role extension in their current scope of practice in general?
In mammography?
6. How do you perceive radiographers' role extension in mammography after training?
7. What do you think of giving radiographers' more responsibilities in their job after training them? How do you perceive radiographers' role extension in mammography?
8. What are the barriers of radiographers' role extension in mammography?
9. What are the drivers for radiographers' role extension in mammography?
10. What are the advantages of radiographers' role extension in mammography?
11. What are the dis-advantages of radiographers' role extension in mammography?
12. What do you think about the current scope of practice and performance of radiographers in mammography?
13. How do you evaluate radiographers' knowledge based on bachelor curriculum? And in general, after experience and practice?
14. Can you explain your relationship with radiographers?
15. How do you think extending the radiographers' role will affect cases of breast cancer and attending screenings?
16. Do you have any future recommendation for radiographers' scope of practice?
Do you like to add anything?

Appendix 5: Participants' information sheet

TEMPLATE PARTICIPANTS INFORMATION SHEET



A Qualitative Study of the Attitudes of Radiographers and Radiologists in Kuwait Towards Radiographers' Role Extension in Mammography.

PARTICIPANT INFORMATION SHEET

You are being invited to take part in a research study. Before you decide whether or not to take part it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish.

Thank you for reading this.

1. What is the purpose of this research?

To help understand radiographers' and radiologists' opinions and attitudes toward radiographers' role extension in mammography.

2. Why have I been invited?

Because you are radiographer/radiologist working in mammography. You have been chosen to help in this study so that I might understand and explore in-depth your opinion and thoughts about radiographers' role extension. The discussions we may have during the interview will be private and confidential.

3. Do I have to take part?

No, it is up to you to decide whether or not to take part. If you do decide to take part, I will discuss the study with you and ask you to sign a consent form. If you decide not to

take part, you do not have to explain your reasons. participation is voluntary, and any participant can withdraw at any stage and any time of the study.

4. What will happen to me if I take part?

I have organized an interview to be held in different locations. These one-to-one interviews will be held in several locations which will be convenient to you and will be held in safe and private rooms. If you would like to volunteer, I will arrange to meet you at a time that fit your schedule. The interview will be held in a meeting room of your hospital that you work in. During this interview you will be encouraged to discuss your thoughts, ideas and beliefs around radiographers' role extension in Kuwait. The interview will last about 45-90 minutes, only once at a location which is suitable to you. During the interview we will discuss the current role of radiographers, barriers and drivers towards radiographers' role extension and your opinion about radiographers' role extension in the mammography unit. The interviewee will be provided with verbatim transcript of their interviews for the purpose of verifying accuracy.

5. Will I be paid anything for taking part?

No

6. What are the possible benefits of taking part?

I cannot promise that participating in the study will help you, but the information we get from the study will help to explore the current scope of practice of radiographers in Kuwait, assess the opinions and attitudes towards radiographers' role extension and provide us with your recommendations and comments about the concept of role extension in Kuwait.

7. What are the possible risks of taking part?

There are no risks identified, however, if you have any concerns or questions please let me know and I will answer all the questions.

8. Will my taking part in this study be kept confidential?

All information collected during the study will be kept strictly confidential in accordance with the General Data Protection Regulation (GDPR)(2018). Your name, address or any

other identifying information will not be passed onto anyone and your data will be assigned an anonymous identification code. You will not be identified in any published study results.

9. What happens to my Data at the end of the study?

All the recorded data will be erased after being fully transcribed and all the information will be kept in a lockable cabinet.

10. What will happen to the results of the study?

It is our intention to publish the results of this study in academic journals and present findings at conferences. Participants will not be identified in any report, publication or presentation.

11. What if there is a problem?

It is not anticipated that will be problem, but if you are harmed by taking part in this research study, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for legal action, but you may have to pay for it.

For studies recruiting volunteers independent of the NHS:

If you wish to complain or have grounds for concerns about any aspect of the way you have been approached or treated during the course of this research. If you have a concern about any aspect of this study, you should ask to contact the researcher who will do their best to answer your questions and will be happy to solve the problem and all the contact details will be provided.

Researcher's Name: Altaf Muhanna

E-mail address:

Phone number:

If you remain unhappy and wish to complain formally you can contact the researcher's supervisors and the Director of Research Governance.

Supervisor's name:

E-mail address:

Phone number:

Supervisor's name:

E-mail address:

Phone number:

Director of research governance:

E-mail address:

Phone number:

12. Who is organising and funding this research?

The researcher is the main organiser; the project is being completed as part of PhD study at Cardiff university.

The research is organised by [Altaf Muhanna] in Cardiff University. The research is currently funded by [Altaf Muhanna].

13. Who has reviewed this study?

This study has been reviewed by the research supervisors and will be submitted for ethical review by School of Healthcare Science, Research Ethics Committee, Cardiff University.

We would like to thank you for considering taking part in this study. If you decide to participate, you will be given a copy of the information sheet and a signed consent form to keep.

Appendix 6: Formal written consent sheet

Participant ID Do not include
 Number box for anonymised samples



Consent Form

Title of study: **A Qualitative Study of the Attitudes of Radiographers and Radiologists in Kuwait Towards Radiographers' Role Extension in Mammography**

REC/SREC reference and committee: **School of Health Care Science, Cardiff University, Research Ethics Committee**

Name of Chief/Principal Investigator: **Altaf Muhanna**



Please initial
box

I confirm that I have read and understood the information sheet for the above study and have had the opportunity to ask questions and these have been answered satisfactorily.	
I understand that my participation is voluntary, and I am free to withdraw at any time without giving a reason.	
I understand that all information about me will be kept in a confidential way and destroyed once the study is completed.	
I agree to take part in this study.	
I agree to have the interview recorded, so it can be transcribed after the interview is held. I am aware that I have the right to edit the transcript of the interview once it has been completed.	
I agree that the researcher is allowed to use anonymized quotes for the study.	
I understand that in the event of information provided during the interviews suggesting that either malpractice or harm to patients, the public or workplace colleagues has occurred, the researcher may be obliged to disclose these details to others (internally or externally) who may wish to take further action.	

Name of participant (print)

Date

Signature

Name of person taking consent (print)

Date

Signature

**THANK YOU FOR PARTICIPATING IN OUR RESEARCH
 YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP**

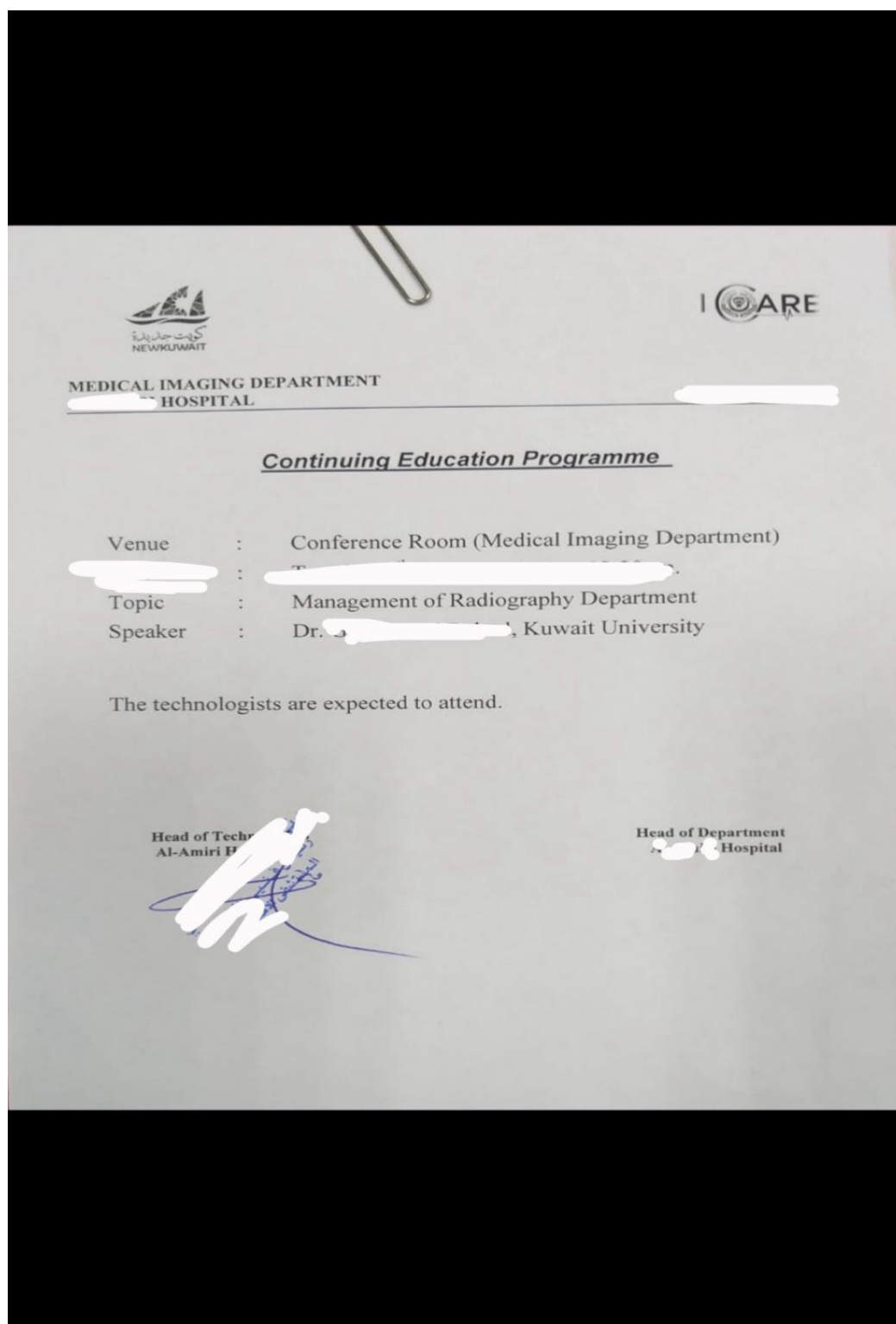
Appendix 7: Arabic interview transcript sample

ستين رجب... الدكتور لصنعه المحطات حول العالم... وعلى فكرة معالجة الاطباء لنا
كمنه والاندازه الوضوح بأمرنا... دينا العتي أجوعت مست لاسحة... على فكرة
أقوليه دكتورنا لجادوه لتدريهه فتاعة انه شطلم كيشه ليليسه وعيناه
to have ... وعيناه زرقهم بالقل ديمعوه عيناه لكون ال recall وال contrast و post
processings وشغل كفضهم وصاير نام... وعيناه ستين رجب بعد reputation... الأهل يعرفون
انه المعروضات اصار يسهل له... ال radiologist ليقويه العتي لحد علم reputation
مضيقا الكمين والعرب... أكونيه عنيه (عني) المكنه حاليوا العتي كلمة الكاليزيل
يشكل كبير... الوضع عينا أفضل سوي... اللهم انما نظامه فيه نقه وعيناه interced
و recall للمالك الوافيه وهو dense breast لانه كبير... ولا يكون لا seniors فقط...
شكوه بالديه لا... ان ال الله اذا فيه تدبير... ال أريد ممتاز الوضع... ليس يطلع
تعاليم كتاب المقارن مثل ماقلت لي كعنه مدينه... انه ال Knowledge حليها... كنت ادارا
ال منارة كرم كعنه شغل العتي بعد دورات... ليش عتني جدي؟ أحسن ايه فيه rejected
request... ال radiologist كمن ما كوهما به وكنت لا ال اول ما كوه وقت... كمن اذا
جبار شغل العتي سوي مرات يزيد الحالات اللي ما كوهها علمه هال علم... تطوير موضوع الكف
الكبير... وكنت كحيف من لعنه الكرضه اللي في هاله diagnostic تليس وتفضح وتظفر
يوم قائل رضيع بس عتانه موضوع كوه عام... والاستشارات كعنه للموظفات... وغير
الضبط اللي طرح كتحف عالها حليها... وفي ستين رجب ودي اوله العتي اصل ال لازم
وبده العتي... رولس radiologist... كوه كوه لهم اذا اوجعنا... كوه وحيلنا موعه عامه
تسطوره... غلط بطوره ال reception مواعيد كايه ما يعرفونه priority... دينا
انطب الدعارة ما كوه ما وليه صعب مع ايه مارتيا اكسو افضل... ستين رجب RE كان
BC و patient care و early data
ال patient care تتغير لانه كسا كوه حالات كثره وبالتالي بقاه موضوع الكف الكبير و
كذلك فترة الانتظار للمرضيه... عين نفسه الكرضه كس قلت لي ايه recall وايه ياد ليهم
save time... بس احتمال... شعور كلافه الاطبيب بالعني... ليش ستين رجب كعدم تقبل
الطبيب... كايه تقود العتي حاله دور... وكذلك الدكتور مرات كمن ال superiority كاي العتي
اذا العتي جبارله دور أكبر... أهمها كمن وايه كتنالين كالفنيس... فاراح
يحمده ايه فتح درس بس 5 سنوات... فانه ريار كهم مهالهم... ستين
عني رجبها كورد... يعني الكرضه عتيا بال streak كتنالين رجا ساعه ولا

فالبنوع تعلمها junior ... لانهم سيقومون senior عنها منهم وتدريب طاقم الكيفية
 الاربعة وفقدان الالسان مفهوم RF بال mammo اذا في دورات ...
 biopsy ... اذا جيتوا technology as لسوي 80% العوضا الدكتور ليس
 ياخذ sample لكنه لا فاستظنا منط ما عمن inkrested ... وكذلك لو عملونا
 على الالسنه ومثلنا وكذلك التقارير على تدريب ولطيفه ال biopsy سهل جدا
 guide mama لكل التي اخلو فامولادون في ستر ... لكنه الالسنه على الالسنه ...
 لانهم تقصير على تكويه متازة للناس التي عندهم خبره و knowledge كم مرة تدريب
علم الفين يكتب تقارير؟ اعتقد سنه training course قبل في الماستر ... و لكنه
 practical في كل سنين ... والامولادون pathology على تدريب 3 ... مستقر ...
 طاقم لا pathology الخاص بالذي فقط يعني بصري كصفه لا modality ...
ممن تاهين مسؤوليات اجناس؟ نعم لشمو الالسنه اكثر سهر ... لشمو
 الالسنه مستقره ... ولو في وقت الطبيب والذين ولذلك على بالودا اعيت تقارير
 تقارير المافودي على صبي له knowledge ال pathology والدكتور سوي approved
 لكنه ال biopsy لقراري stereotactic قابل ... الى A-2
سواء الحوانات الصائغ؟ radiologist كصفه لشمو على human nature
 عيونه اهم نياصرتهم يعني بالتقارير يكونه radiologist لشمو ما كان
 اعل reader الفين يشي ما في خبر اذ ... و لشمو عن الفين حرة التي
 والمبارك approved حيث المبرفد فاستاذي اذا فيه منط ... اصب روضهم
 human nature كصفه فاستاذي ... شاه تفسير وضهم على الالسنه لكونه لكونه
 اهم درسا اقردي وبدانهم qualified اكثر حسب البراه نعم اجنا نقول ان
 درست 6 سنوات هو ... له كصفه ال radiology فقط سنين لكنه اجنادار سنين في
 فوات يعني الفين دارسين اكثر ... اجنانه الى الفين دارس عن ال radiology
 from A-2 كيم ال radiology دارس فقط 2, 3, 4, 5 قبل radiographic reporting
 pathology كيم الفين فورا عن استقبال مبرفد ماول كصفه ان مراتب العوضا فاعتقد
 جو فوضه اجد لقال في دور الثاني ويعتقد وهو البسة نفسها فوضه
لشمو ... انان العال كويله صح الفوات ... بالاجنانه الى سوريات البسة والكوت
 حاجي master لا radiology ... انادري ادرين MSc + PhD وطاقم داخل الكوت
 فاعتد اسانز ثرا ... وهم فاقم لشمو لشمو بالكوت لشمو في الوداه
 description
 آقدر اصف

US diagnostic والبرك اكل ... وتكونين بيه فتم فترقيات

Appendix 8: lectures of continuous education



Appendix 9: Sample of manual coding

I can't accept the idea of radiographers report images ... it is not easy, even if they offer training courses, how could the course cover everything that radiologists have learned to make us reach the level of knowledge of radiologists! My brain is rejecting the idea hhhh... it is not our role to report images, this idea needs a deep thinking and planning...

After planning?
I can't judge before they do the planning and training courses and evaluate the outcomes, does the level of knowledge gained allow the radiographer to write diagnostic report?, the patients' lives is not a game... for now even if they allow radiographers to write descriptive of what they think is bad idea, we don't have that knowledge... but I think if they allow the radiographers to schedule the cases, I mean put red sticker in the urgent cases so that the doctor can give it priority to look at will be good idea...

Do like to add anything about your opinion of radiographers' RE?
Yes, I think because I performed 3D ultrasound, it will be useful if we are trained to perform 2D ultrasound, we can save radiologists' time and reduce their workload, also save the patients' time and it is not dangerous, there is no radiation associated with the US. We tried the 3D US, why not step forward and perform 2D US...

What are the barriers to the radiographers' RE?
We don't have the knowledge to handle such extended roles, and to be honest with you I don't have the trust that there is a training courses, even if long ones, can train radiographers to have equal knowledge to radiologists, to do biopsies and image reporting, you have to go through all what radiologists studied and learned. Also, the radiologists will not give the approval for that because it is their role...

What else?
I think radiologists' rejection, because they have strong reason against radiographers, that we (radiographers) don't have knowledge of pathology and strong medical knowledge in general, they that they are indispensable, and we have to go back to them and ask them about the images all the time. The radiologists know that we cannot write a complete report, they will also use the patients' benefit, because the mammography report decide major things like receiving chemotherapy and surgeries, this is very Very ... sensitive and should be under radiologists' control, who was trained from the beginning to do this role.

What do you think of senior radiographers' knowledge?

No acceptance of reporting idea
altaf almeahanna
Fear

altaf almeahanna
Knowledge
November 28, 2019

altaf almeahanna
Refuse radiographers reporting

altaf almeahanna
Reporting and radiographers

altaf almeahanna
Doubts about training of RE

altaf almeahanna
Patient and RE

altaf almeahanna
Refuse reporting/ agree filter cases

altaf almeahanna
Desire perform US

altaf almeahanna
Knowledge barrier

altaf almeahanna
Doubts training courses

altaf almeahanna
Extend role when equal radiologists knowledge
Radiologists' resistance

altaf almeahanna
Radiologists' resistance/ barrier

altaf almeahanna
Radiographers' knowledge
Asking radiologists all the time

altaf almeahanna
Reporting/ patients / knowledge

altaf almeahanna
Reporting mammography sensitive

Appendix 10: Sample of creating themes

Code	Arrange related codes / rename code	Divide into (sub themes) segments	Initial themes
RE knowledge, non situation in Kuwait	RE knowledge situation 98	*knowledge of radiographers RE	Radiographers RE in Kuwait and activities of the extended role
US RE area	US RE	Reporting	
Radiologists' shortage	Filter cases	*current role of radiographers in Kuwait	
Female radiologists shortage	case priority support role extra views	*Area for RE in Kuwait	
Cultural	Primary report		
Preferring female radiologists	Poor knowledge extra view dec		
Advantages of RE	Poor knowledge	- Breast US - stereotactic biopsies	
Radiology - difficult profession	US	- reporting - supplementary views	
RE - not reporting	radiology in K		
Filter cases	Filter cases		
RE positive influence	US		
Enhance detection	radiology in K		
Decide priority	extra views		
Radiographers not ready	physical exam		
Intensive training needed	extra views		
Accuracy	***		
Long-time training	radiologists shortage	* Drivers	
Validation required	female radiologist shortage	- radiologists' shortage	Drivers for radiographer
Physiology	shortage	- female radiologist shortage	RE
Trained radiographers train their colleagues	cultural	- patient care	
Barriers	prefer female advantages	- job satisfaction	
Passion	RE position		
better	enhance detect		
Rich country	financial		
Financial	US experience KSA		
Radiologists' resistance	better service		
Supplementary role	patient's convenience		
No independent role	speed workflow		
Training and independent role	better process		
Hard field	speed flow		
Medical school qualification	faster diagnosis		
Basic knowledge	assist radiologist		
Doubts training courses	save money		
Radiologists' resistance	same family		
Competitive	sonographers' experience KSA		
Private sector	radiographers' need radiologists' help		
Financial aspect	difficult pro		
Reduce radiologists' income	radiographer not ready		
High quality government service	training		
Sonographers' experience KSA	accurate pro		
Radiographers' need radiologists' help	validation require		
Same field	training		
Solve issues	barriers		
Better service	knowledge		
Patients' convenience	hard field		
Speed workflow	medical school		
Primary reports	knowledge		
Better diagnosis process	competitiveness		
Better detection	financial		
Radiologists' validation - necessary	attitude		
Faster diagnosis	protect		
Urgent cases	doubt ability		
Managing	underestimation		
Breast cancer	attitude		
Serious issue	boundaries		
Assist radiologists	relationships		
Saves family	attitude		
Post and fix radiographers	training		
Interest			
Concentrate			

Appendix 11: Compared the themes that emerged from the previous literature

Name of the article	Year	Type of research	Themes/ results	Codes if existed
A survey of South African Radiographers' and Radiologists' opinions on role extension for radiographers	2015	Quantitative	1-Radiologists' resistance 2-Radiographers willing to take 12 months training/ radiologists don't support that. 3- radiographers support RE and believe it in scope of radiographers' job.	
An assessment of different healthcare professionals' attitudes towards radiographers' reporting A&E films	2002	Quantitative	1-radiographers' workload. 2-training needed. 3-medicolegal Implications. 4-de-skill radiologists. 5-radiologists' resistance 6-radiologists believe the need of medical and radiological background to report images.	
Role extension: The needs, perceptions and experiences of South African radiographers in primary health care	2012	Qualitative	1-medico legal aspects. 2-education 3-newly qualified and inexperienced medical officers 4-improving service delivery 5-the radiographers' experience 6- benefits of reporting radiographers.	
Assessment of the willingness of radiographers in	2011	Quantitative	1-majority 79% prepared for more training.	

mammography to accept new responsibilities in role extension: Part one e Quantitative analysis			<p>2- 39% increase the pay for extra responsibilities.</p> <p>2- 47% professional equity.</p> <p>3- 66% increase interest in mammography.</p>	
Assessment of the willingness of Australian radiographers in mammography to accept new responsibilities in role extension: Part two e qualitative analysis	2013	<p>Quantitative</p> <p>Qualitative Descriptive Analysis</p>	<p>1-Current workforce advantages</p> <p>2-Current workforce concerns</p> <p>3-Potential workforce concerns</p> <p>4-Potential workforce advantages</p> <p>5-patient care</p> <p>(see article for details)</p> <p>Similar with my study results</p>	
An exploratory study of radiographer's perceptions of radiographer commenting on musculo-skeletal trauma images in rural community-based hospitals	2013	Qualitative	<p>1-feelings of professional pride (Impact on Diagnostic Radiography Profession)</p> <p>2-impact on profession (job satisfaction)</p> <p>3- patient care</p> <p>4-Impact on continuing professional development for radiography staff</p> <p>"Details in the article"</p>	
Radiologist perceptions of radiographer role development in Scotland	2007	Quantitative	<p>1-Perceived advantages of radiographer role development P53</p> <p>2-Radiologists' anxieties of radiographer role development p53</p> <p>3- perceived barriers:</p> <p>1. A shortage of staff critical mass to ensure safe delivery of the existing service whilst new initiatives were being developed.</p> <p>2. Lack of education and training resources within Scotland, creating serious cost and backfill problems to cover radiographers studying at</p>	

			<p>institutions in England and Wales.</p> <p>3. A perceived lack of funding to adequately reward radiographers assuming additional responsibilities.</p> <p>4. Traditional views of firmly demarcated professional boundaries.</p> <p>5. Resistance to change</p> <p>6-82% of respondents expressed support for further role extension reflecting over half of the Scottish consultant radiologist population</p>	
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Appendix 12: Publication (UKIO 2020, online poster).

Found at:

<https://edition.pagesuite.com/html5/reader/production/default.aspx?pubname=&pubid=86b914f4-de3a-4670-99f7-cf5f0c90c5f6> page 50.