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Case Study Title

Navigating the Global Dietary Transition and its Impact on Planetary and Human Health: the Role of Middle-Income Countries

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Case Study Contents

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Short Summary

This case study explores how global dietary transitions affect health, environmental sustainability, and socio-economic inequality, with a focus on middle-income countries. It examines the influence of economic growth, cultural shifts, and urbanization, highlighting successful policy initiatives, private sector innovations, and community-driven efforts to promote sustainable and healthy diets.

Abstract

This case study examines global dietary transitions and their impact on environmental sustainability, nutritional well-being, and socio-economic inequalities, focusing on middle-income countries (MICs) like China, India, Brazil, Turkey, and Mexico. As economic expansion, urbanization, and cultural shifts drive changes in eating habits, MICs encounter both advantages and disadvantages. The study explores how socio-economic transformation influences dietary preferences, resulting in increased consumption of processed foods and animal-based products, linked to rising non-communicable diseases and environmental impacts such as greenhouse gas emissions and resource depletion. It delves into the influence of cultural heritage and social norms on dietary practices, alongside the impact of Western dietary patterns and media. Additionally, the case study underscores the role of governmental strategies in fostering sustainable and nutritious diets through policies that support local agriculture and public health. It also investigates contributions from the private sector and emphasizes the significance of community-driven and grassroots movements in promoting sustainable dietary habits and reinforcing food security. This study aims to provide insights into the interconnection between dietary transitions, their environmental and nutritional impacts, and the socio-economic drivers and disparities within and across MICs, offering guidance for sustainable development and public health improvement.

Which Sustainable Development Goals (SDGs) does your case support?

The dietary transition affects the environmental sustainability via the supply and demand of agri-food systems. It also impacts human nutrition security and thus the well-being. Characterised by the socio-economic status of countries, such transition could further concern social justice. As a result, this topic has the potential to influence many Sustainable Development Goals (SDGs) and particularly the following:

- **Goal 2:** Zero hunger
- **Goal 3:** Good Health and Well-being
- **Goal 6:** Clean water and sanitation
- **Goal 8:** Decent Work and Economic Growth
- **Goal 10:** Reduced Inequalities
- **Goal 12:** Responsible Consumption and Production
- **Goal 13:** Climate Action
- **Goal 14:** Life Below Water

- **Goal 15: Life on Land**

Learning Outcomes

1. Investigate the environmental and nutritional outcomes of dietary transition in middle-income countries (MICs), including the impact of economic growth, cultural shifts, and urbanization.
2. Examine the socio-economic heterogeneity within MICs and across countries, focusing on embedded inequality issues related to dietary patterns and access to healthy food.
3. Evaluate governmental strategies aimed at promoting healthy and sustainable diets in MICs, analysing their effectiveness and impact on health, environment, and equity.
4. Synthesize information to develop a comprehensive understanding of the complex interplay between dietary transitions, socio-economic factors, and environmental sustainability in MICs.

Background and Context

Diets have come under scrutiny for their potential detrimental effects on environmental sustainability¹. Food production accounts for approximately 26% of global greenhouse gas (GHG) emissions, with livestock alone responsible for 14.5% of these emissions^{2,3}. Additionally, agriculture uses about 70% of global freshwater resources^{4,5} and occupies around 40% of the world's land area⁵. Practices such as deforestation for agricultural expansion and the overuse of chemical fertilizers further exacerbate these issues, leading to biodiversity loss and soil degradation. These environmental impacts highlight the necessity for a shift towards sustainable food consumption to achieve the Sustainable Development Goals related to environmental sustainability.

Moreover, poor diets expose the global population to various forms of malnutrition, including overweight or obesity, which affects over 1.9 billion adults worldwide⁶⁻⁸, micronutrient deficiency suffered by approximately one-third of the world population, and micronutrient deficiencies that impact over 2 billion people^{2,3}. Non-communicable diseases such as heart disease, diabetes, and certain cancers are also closely linked to poor dietary habits and account for 71% of global deaths annually⁹. The nutritional inadequacies of current dietary patterns contribute significantly to these health issues, stressing the need for dietary improvements to enhance overall human health. Ensuring that diets provide adequate nutrition is critical to addressing these widespread health challenges and improving population well-being.

These outcomes are becoming increasingly critical as a result of the global dietary transition. The world has witnessed a transition of dietary patterns towards higher consumption of processed foods, refined sugars, refined fats, oils and meats over the past decades, primarily driven by an increase of the income level and food availability during the urbanization process^{1,10}. Such change happens more drastically in many developing countries experiencing rapid socio-economic transformation such as China, Brazil, and India, leading to increasing environmental impacts as well as health risks of multiple non-communicable disease such as diabetes, stroke and heart disease^{3,9,11-13}. These countries, often classified as Middle-Income Countries (MICs) by the World Bank, have stepped out of starvation and

undernourishment and have been shifting to more abundance and diverse food supply. According to the projection of Food and Agriculture Organization (FAO), the consumption of animal products, especially meat, will be continuing to grow in both developed and developing countries¹⁴. If no measures are taken, such trend will almost surely exacerbate the ecological stress while imposing a more significant burden of diet-relevant disease that causes tremendous loss of social-welfare.

In summary, it becomes evident that MICs play a pivotal role in shaping future dietary trends and their associated impacts. These countries are at a crossroads, balancing traditional dietary practices with the influx of Westernized eating habits. This transition not only influences individual health outcomes but also has far-reaching implications for environmental sustainability and socio-economic equity. By examining the complex interplay between these factors in MICs, we can gain valuable insights into how to navigate this transition effectively and promote healthier, more sustainable, and equitable food systems globally.

Project Description, Impact and Future Directions

Understanding Global Dietary Transitions

Dietary patterns have undergone significant evolution, as described by Popkin¹⁵, who outlines five phases characterizing major shifts in human diets. The first two phases are associated with hunter-gatherer societies and early labour-intensive agriculture, marked by periods of famine. Subsequent phases illustrate ongoing dietary transitions in modern societies. Phase 3 witnesses reduced famines as food security improves with rising personal incomes and advancements in agricultural technologies. Phase 4 sees diets shifting towards fewer starchy staples but more animal products, alongside increased consumption of sugar, high-fat products, and processed foods. Phase 5, driven by health considerations, prompts a shift towards more balanced diets with high-quality fats and proteins, increased fruits and vegetables, and reduced refined carbohydrates.

This dietary transition is primarily motivated, if not propelled, by various facets of socio-economic development. Improved agricultural productivity due to technological advancements has lowered the prices of energy-intensive foods like vegetable oils, thereby increasing their consumption levels^{10,16}. Openness to international trade has diversified food types and reduced seasonal food variations, alongside declining food prices¹⁷. The rise of women in the workforce has increased the opportunity costs associated with food preparation¹⁸. The popularity of easily accessible processed foods has grown due to their portability, storage convenience, and affordability, albeit at the cost of lower nutrient density compared to raw counterparts, potentially leading to additional environmental impacts^{19,20}. Conversely, healthy food choices such as vegetables and fruits are less favoured in daily diets due to their perishability, limited availability, and higher cost per calorie compared to calorically dense foods like meat, oils, or starchy staples, particularly in lower-income countries²¹. As countries develop, barriers like lack of cooking skills or high opportunity costs of preparation time become more significant²². The restructuring of the food environment further accelerates this change, with a proliferation of restaurants catering to the demand for dining out during rapid urbanization. However, these restaurant offerings often prioritize taste through high fat, sodium, and meat content, with limited vegetable inclusion to attract customers^{23,24}.

Middle-Income Countries at the Crossroads

While the under-developed world has been stepping out from the starvation and undernourishment to improve their food security (Phase 3), and the most developed countries

have largely completed the initial phases (in between of Phase 4 and 5), MICs are now transitioning rapidly towards a more Westernized diet²⁵ characterized by increased consumption of animal products replacing starchy foods, demonstrating typical performance in Phase 4. As MICs experience economic growth, disposable incomes rise, and people tend to spend more on diverse and convenient food options. For instance, China has quadrupled its meat consumption per capita since 1971²⁶. Meanwhile, the consumption of other non-carbohydrate foods in China have also been increasing including fruits, dairy products, seafood, nuts, cooking oil, etc.²⁷ As a result, it is estimated that the emission of three major GHGs (CO₂, NH₄, N₂O) from Chinese food chain system have grown from 489 Mt CO₂e to 732 Mt CO₂e during 1996 to 2010²⁸ while the rate of overweight and obesity are approaching to 30% and 11.9%, respectively^{29,30}. In India, individuals with higher income levels have less starchy foods but more animal products, particularly meat, in their daily diets compared with their poorer counterparts, which results in higher environmental impacts and disparities in malnutrition issues³¹.

These changes in dietary patterns driven by economic growth, cultural shifts, and urbanization underscore the complex interplay between socio-economic development and nutrition. While economic progress brings about better access to food and potential improvements in food security, it also poses challenges in terms of maintaining healthy dietary practices and ensuring sustainable food systems. Income growth in MICs has led to a significant shift in dietary patterns, characterized by increased consumption of non-starchy foods, particularly animal products. This shift has complex implications for both the environment and public health. On one hand, the rise in meat consumption, especially red meat, contributes to higher greenhouse gas emissions and greater environmental degradation due to the intensive resource use associated with livestock production. For example, in China, the surge in meat consumption has substantially increased the country's carbon footprint. On the other hand, increased incomes also enable greater dietary diversity, with higher intakes of fruits, dairy products, and other nutrient-rich foods, which can improve nutritional outcomes. In Brazil, for instance, economic growth has facilitated greater access to a variety of foods, enhancing dietary diversity and providing more essential nutrients.

Additionally, agricultural technical progress and international trade have made a wider variety of foods more affordable and accessible, contributing to these dietary shifts. Improved agricultural productivity has lowered the prices of many non-starchy foods, making them more accessible to a larger portion of the population. This has been evident in Mexico, where increased agricultural efficiency and trade openness have diversified the food supply and reduced seasonal food price variations. However, the health impacts are mixed, as the excessive consumption of red and processed meats is associated with a higher risk of non-communicable diseases such as heart disease and cancer. In India, the growing middle class is consuming more animal products and dairy, contributing to both improved nutrition through increased protein intake and potential health risks from higher saturated fat consumption. Similarly, in Turkey, rising incomes have led to shifts in dietary patterns towards more diverse but also more environmentally taxing and health-impacting food choices. Balancing these dietary changes to promote health while mitigating environmental impacts remains a critical challenge for MICs.

Urbanization also has a profound impact on food consumption and food systems. Migration to urban areas often leads to lifestyle changes that include alterations in dietary patterns. Urban residents typically have higher incomes and greater access to a variety of food options compared to their rural counterparts. In China, urbanization has led to increased consumption

of convenience foods and a decline in home-cooked meals. The development of food retail systems, including the proliferation of supermarkets and fast-food outlets, further influences dietary choices. In Brazil, the expansion of supermarkets has made processed and packaged foods more accessible, contributing to a dietary shift away from fresh, locally sourced produce. Similarly, in India, the rise of supermarkets and fast-food chains in urban areas has facilitated a move towards more calorie-dense, processed foods, impacting the overall dietary landscape. Turkey and Mexico also face similar urbanization-related dietary changes, with an increase in the availability of fast food and processed foods in urban centres, leading to shifts in dietary habits and health outcomes.

Cultural heritage and social norms play a crucial role in shaping dietary habits. In many MICs, traditional foods and dietary practices are deeply embedded in cultural identities and social rituals. For example, India's dietary patterns are heavily influenced by religious and cultural practices, with vegetarianism being prevalent among certain communities. However, the influence of Western diets and media has been steadily increasing, especially among the younger population in urban areas. Western fast food chains like McDonald's and KFC have seen rapid expansion in countries like China and Brazil, promoting a shift towards higher consumption of fast food. This shift is often driven by aggressive marketing strategies and the perceived convenience and status associated with Western foods, which can lead to the erosion of traditional dietary practices. In Turkey, traditional Turkish cuisine remains an essential part of cultural identity, but Western influences are also noticeable, particularly in urban centres where fast food and processed foods are increasingly popular. Mexico's culinary heritage, including traditional dishes like tacos and tamales, coexists with the growing presence of global fast-food chains and convenience foods, reflecting a blend of cultural influences in dietary choices.

Policy Responses and Sustainable Solutions

Addressing these challenges requires a multifaceted approach that includes policy interventions, education, and the promotion of culturally appropriate, nutritious, and sustainable diets tailored to the specific contexts of MICs.

Governmental strategies play a crucial role in promoting sustainable and healthy diets through policy initiatives that address both nutritional and environmental impacts of food consumption. In Brazil, the National School Feeding Program mandates that a certain percentage of food served in schools must be sourced from local family farms. This policy supports local agriculture, reduces food miles, and ensures fresh, nutritious meals for children. Similarly, Mexico's sugar-sweetened beverage tax has significantly reduced the consumption of sugary drinks, contributing to lower obesity rates and encouraging healthier beverage production. India's Eat Right India campaign not only raises public awareness about healthy eating but also emphasizes the importance of sustainable food production, promoting safe, nutritious, and environmentally friendly food.

The private sector, particularly agribusinesses and food companies, plays a pivotal role in driving change towards more sustainable food systems. Companies like Unilever and Nestlé are investing in sustainability initiatives such as reducing greenhouse gas emissions in their supply chains and promoting regenerative agriculture practices. Precision agriculture, which uses data analytics, GPS, and IoT devices to optimize farming practices, is gaining traction in MICs. For instance, in China, precision agriculture has been widely adopted to enhance productivity and reduce environmental impacts. The development of alternative proteins,

such as plant-based and lab-grown meats, is also revolutionizing the food industry. Companies like Impossible Foods and Beyond Meat are making significant inroads in markets like Brazil and India, offering more sustainable protein sources that require fewer resources to produce than traditional animal agriculture.

Community and grassroots movements are essential for fostering sustainable dietary practices at the local level. Local communities often possess valuable knowledge and practices that can contribute to more sustainable food systems. For example, the Brazilian city of Belo Horizonte has implemented a comprehensive food security program that includes community gardens, subsidized restaurants, and farmers' markets. This initiative has significantly reduced hunger and malnutrition in the city while supporting local agriculture. In India, the Navdanya movement, founded by environmental activist Vandana Shiva, promotes biodiversity and organic farming through community seed banks and farmer training programs, preserving traditional agricultural practices and ensuring food sovereignty.

These strategies and initiatives underscore the importance of a collaborative approach involving governments, the private sector, and local communities to promote healthy and sustainable diets. By leveraging policy, innovation, and grassroots efforts, MICs can address the complex challenges of nutrition and environmental sustainability, paving the way for a healthier and more equitable future.

Conclusions

The global dietary transition presents both significant challenges and opportunities for MICs. Economic growth, cultural shifts, and urbanization have dramatically altered dietary patterns in these countries, leading to health and environmental consequences that require urgent attention. However, with targeted policy initiatives, innovative contributions from the private sector, and active engagement from local communities, there is potential to foster more sustainable and healthful food systems. Successful examples from these MICs highlight the importance of a multifaceted approach that includes governmental policies promoting local agriculture and healthy eating, technological advancements in agriculture, and grassroots movements that preserve traditional practices and promote food security.

Addressing the dual challenges of ensuring nutritional health and environmental sustainability in MICs is crucial for achieving the Sustainable Development Goals. By integrating efforts across various sectors and leveraging the unique cultural and economic contexts of these nations, it is possible to create food systems that are resilient, equitable, and capable of supporting both human and planetary health. The lessons learned from the practices and examples examined here can serve as valuable models for other MICs undergoing similar transitions, emphasizing the need for global cooperation and shared strategies to tackle the pressing issues of our time.

Exercises / Group Discussion Questions

1. **Case Analysis Exercise:** Divide into groups to analyse the specific case from Brazil, China, India, Turkey, and Mexico. How has economic growth, cultural shifts, and urbanization influenced dietary patterns in each country? Discuss the implications for health, environment, and socio-economic inequality.

2. **Policy Debate Activity:** Have a debate by taking on roles representing different stakeholders (government, private sector, local communities) and discuss the effectiveness of policies like the National School Feeding Program or the sugar-sweetened beverage tax. Argue for or against these policies based on their impact on health, sustainability, and equity.
3. **Technology Showcase Presentation:** Research and present on technological innovations such as precision agriculture and alternative proteins. How can these innovations contribute to more sustainable and healthful food systems in MICs? What challenges might they face in implementation?
4. **Community Action Plan Assignment:** Develop a community action plan for promoting sustainable and healthy diets in a hypothetical MIC. Consider the role of local communities, grassroots movements, and partnerships with government and private sectors. What strategies would be most effective?
5. **Critical Reflection Discussion:** Share your personal insights and reactions to the case study. How do your cultural background and experiences relate to themes like dietary transitions, health, sustainability, and socio-economic inequality in MICs? What have you learned from this study?

Further reading

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