

Enhancing maternal and child health in sub-Saharan Africa: the impact of economic growth, recessions, and COVID-19 pandemic mitigation measures

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## Abstract

**Background:** The Sub-Saharan Africa region records the highest number of pregnancy-related deaths and under-five deaths, presenting significant risks for women and children. Globally, ending preventable maternal and child deaths is recognized as a crucial objective and an essential part of global health initiatives. For many low-income countries, macroeconomic growth has been advocated as a policy instrument for enhancing maternal and child health outcomes as the benefits of such economic growth are channelled into investments in medical advancements aimed to enhance the health and wellbeing of the populace. However, the assumption that economic growth always leads to better maternal and child health has faced challenges. Additionally, given the adverse health and economic consequences resulting from the COVID-19 pandemic, it is now more imperative than ever for governments to formulate actionable plans to alleviate the impact and enhance maternal and health outcomes.

**Objective/Method:** This thesis is guided by three overarching objectives. Firstly, it conducts an in-depth examination by systematically reviewing, consolidating, and synthesizing literature at a sub-continental level to understand the impact of economic growth and recessions on maternal and child health outcomes in sub-Saharan Africa, while analyzing crucial socioeconomic factors highlighted in the included studies. Secondly, the research employs subnational data to examine the impacts of the COVID-19 pandemic on the utilization of maternal and child health services in Ghana. Additionally, it explores the impacts of the COVID-19 pandemic and the consequences of the pandemic-induced economic crisis on the nutrition and food security of women and children in Ghana. The study adopts a socio-economic interdisciplinary approach, drawing theoretical grounding from the social ecological theory, a multi-level nutritional framework, and demand and supply framework to analyze the interrelationships among these factors. Methodologically, the study utilizes data triangulation from diverse sources including structured journal searches, analysis of routinely collected secondary health data, and the analysis of 31 semi-structured interviews involving government officials, local NGO leaders, local leaders, frontline workers, female community members, and COVID-19 survivors and partners.

**Results:** The systematic review indicates that although economic growth could potentially enhance maternal and child health through investments, its positive effects are not assured due to various intervening socioeconomic factors at multiple levels, encompassing national, community, household, and individual levels. Additionally, the quantitative research demonstrates that the pandemic led to substantial declines in Maternal and Child Health (MCH) service utilization, however, with variations in severity linked to the rate of infections in a particular region. Intriguingly, further analysis to understand the contribution of the extra restrictions imposed by lockdowns on access and utilization of MCH suggest that the lockdown period did not contribute significant declines, as anticipated, in the rates of first and forth antenatal attendance in the Greater Accra region. The implementation of strategies at the institutional level mitigated the fear of

individuals and improved trust in healthcare professionals while ensuring continuous access to routine maternal and child health services. Lastly, the qualitative study underscores that the pandemic exacerbated nutrition and food security challenges among women and children, especially in hotspot areas, due to lockdowns, movement restrictions, prolonged school closures, and disruptions in the food value chain affecting incomes and food prices. The findings also highlight disparities, indicating that women with higher education levels and employment in government or major private sectors fared better economically than those with lower education levels in specific non-essential occupations.

**Conclusion:** Overall, this thesis asserts that for sub-Saharan African countries to leverage the full benefits of economic growth while addressing the adverse effects of recessions and pandemics on maternal and child health, it is significant to consider a range of socio-economic factors, tailored, and purposefully incorporated into health and economic policies and goals. In this present COVID-19 era where even affluent Western nations are facing challenges, it is apparent that sub-Saharan African countries cannot solely rely on achieving high economic growth rates to automatically guarantee a decline in maternal and child health outcomes. It is essential to carefully consider specific multi-level factors within each country and community.

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## Format of the thesis and co-authorship

This thesis follows an article-based format. There is some repetition in the text since two of the papers are based on the same study regions. I am the lead author of all the five chapters and the sole author of Chapter 5. I co-authored Chapters 2, 3, and 6 with my supervisor, Dr. Sanni Yaya. I co-authored Chapter 4, which is the systematic review with my supervisor, Dr. Sanni Yaya, and Dr. Olamuyiwa Omonaiye. I developed the research idea in my thesis proposal and developed the theoretical and analytical frameworks. I conducted the data analysis and wrote the first draft of each paper. Dr. Olamuyiwa Omonaiye and I independently screened and reviewed the studies included in the systematic review.

## Chapter 1: Introduction

Enhancing maternal and child health in a country requires a thorough consideration and comprehension of diverse multilevel factors, to facilitate the development of tailored strategies and policies. Over the years, economic and health shocks such as economic growth, recessions, and the recent COVID-19 pandemic, have altered the trajectories of policy objectives. It is essential to assess the impacts of these factors and determine how resources should be optimally allocated to mitigate adverse consequences while fostering the overall wellbeing of women and children in different nations.

Focussing on the sub-Saharan Africa region, this thesis systematically analysed and synthesized existing literature to comprehend the relationship between economic growth, recessions, and maternal and child health outcomes. Additionally, a quantitative analysis was conducted to evaluate the impact of the COVID-19 pandemic on the utilization of maternal and child health services, with Ghana as a case study. To gain a firsthand understanding of the impacts of the COVID-19 pandemic on the nutrition of women and children in Ghana, primary data were gathered through interviews with community and key informants. By employing an interdisciplinary approach and drawing on diverse theoretical and conceptual frameworks, this thesis delves deeper and offers insights into the interplay of these concepts in each chapter. This work does not only contribute to the advancement of knowledge of the field of maternal and child health, but it also addresses timely health and economic issues while offering recommendations for more targeted policies and strategies.

### 1.1 Thesis outline

This thesis consists of a two-part literature review (Chapters 2 and 3), three independent articles (4-6) and a concluding chapter (Chapter 7). These chapters are designed to collectively address the research questions and objectives. The introductory section (Chapter 1) provides an overview of economic growth and health discuss. This is followed by a broad overview of the research objectives and questions, theoretical and methodological frameworks, ethical consideration, and reflexivity statement.

Chapter 2 provides an overview and empirical evidence of how economic growth affect maternal and child health in Sub-Saharan African (SSA) countries. It constructs a conceptual framework that elucidates the pathways, both at the micro and macro levels, connecting economic growth and recessions to maternal and child health outcomes. This review situates and provides more depth to the introductory chapter and the systematic review (Chapter 4), which is one of the main articles. This chapter was published in the Routledge Handbook of African Demography (Yeboah & Yaya, 2022).

Chapter 3 examines the influence of the COVID-19 pandemic and its associated mitigative measures on women and children, exploring the interplay of health and economic factors and how they continue to impact health outcomes even after lifting the pandemic related lockdowns. This commentary situates two of the articles (Chapters 5 and 6). This chapter was published in Reproductive Health (Yeboah & Yaya, 2023).

The first article (Chapter 4) is a systematic review which synthesises the relationship between economic growth, recessions, and the health of mothers and children in Sub-Saharan African nations. Study findings indicate that while economic growth can potentially lead to improvements in maternal and child health, it is not a guaranteed outcome, as there are many intervening factors that influence the relationship. It emphasizes the significance of crucial multi-level socio-economic factors such as female education, inequalities, and governance structures. This article is yet to be submitted for publication.

The second article (Chapter 5) examines the impact of the COVID-19 pandemic on the utilization of maternal and child health services in Ghana by estimating changes in utilization before and during the pandemic. Findings highlighted the disruption of crucial maternal and child health services in Ghana due to the COVID-19 pandemic, with varied impacts observed across health services and regions. This chapter emphasizes the significant of considering region-specific and social ecological factors to comprehend the impact of the pandemic and to formulate efficient policy responses that address the lasting consequences and to prepare for potential future pandemics. This article is yet to be submitted for publication.

The third article (Chapter 6) explores the impact of the COVID-19 pandemic on the nutritional wellbeing and food security of women and children in Ghana by analyzing interviews with key and community informants. The study confirmed that the COVID-19 pandemic and its mitigative measures significantly affected food security and the socio-economic wellbeing of women and children, leading to lifestyle changes which influenced food demand and consumption. The chapter highlights the significance of recognizing the interplay between the pandemic, diverse socio-economic factors, and the circumstances of women, children, and vulnerable groups across various geographical areas to develop more targeted policy responses for future pandemics. This article is yet to be submitted for publication.

Each of the three articles (Chapters 4-6) delve into more detailed information about the study designs and methodological techniques.

## 1.2 Overview

The definition and measurements of health serve as the foundation for shaping health policies and promoting well-being of populations globally. The World Health Organization (WHO) offers a widely accepted definition of health, stating that “health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1995). Achieving this holistic state of health is closely tied to factors such as the environment, living conditions, lifestyles, health and social investments and policies implemented by governments (WHO, 2023; Jack & Lewis, 2009). Over the years, numerous studies have highlighted that optimal health is not only a fundamental goal but also an integral component of a nation's sustainable economic development. It enhances an individual's ability to contribute to the workforce, thereby boosting economic output and fostering the potential for economic growth. The health of women is particularly crucial as it correlates with better-educated children, increased labor force participation rates, and economic growth (Ridwan et. al., 2022; Bloom et. al., 2019; WHO, 2005). Evidently, the relationship between income and health is bidirectional. While the health of the population contributes to the economic growth of nations, economic growth is also seen as a fundamental indicator of the general well-being and functioning of an economy.

Earlier studies such as Pritchett & Summers' "Wealthier is Healthier" article published by the World Bank in 1993, confirmed the influence of economic growth on health (Pritchett & Summers, 1993). The authors of this study concluded that in 1990 alone, over half a million child deaths in developing countries could be attributed to poor economic performance in the 1980s, suggesting that increase in per capita income was a significant component in a country's health strategy (Pritchett & Summers, 1993). The argument is that it has the potential to enhance health outcomes, through both direct and indirect channels, notably increased health spending. Furthermore, Amartya Sen characterised economic growth as a crucial means for expanding the substantial freedoms individuals enjoy, which are strongly linked to improvements in overall living standards and provide opportunities for people to become healthier and live longer (Sen, 1999). A 2002 report by the WHO Commission also found that all other growth factors being equal, every 10% improvement in life expectancy is associated with approximately 0.3% to 0.4% increase in economic growth annually (Feachem, 2002). Also in recent years, several research outcomes have suggested that economic growth in countries result in higher health investments which in turn improves access to health care services, increases life expectancy, reduces child mortalities, and enhances nutrition, water, and sanitation (Biadgilign et. al., 2016; Bloom & Canning, 2009; Cole, 2019). Cole in particular revisited the 'wealthier is healthier' debate by analyzing data from 134 developing countries over a 45-year period (Cole, 2019). The conclusion was that economic growth improves infant mortality, life expectancy at birth and caloric consumption. However, these benefits tend to diminish as countries become more affluent (Cole, 2019).

The relationship between economic growth and health is, however, multifaceted and complex. The diverse measurements of these concepts provide different insights into their interrelationship and impacts. Economic growth is defined as "the increase in the amount of goods and services produced per head of the population over a period of time" and is conventionally measured by gross domestic product (GDP) per capita, or similar measures of wellbeing (Roser, 2023). Some researchers argue that relying on such traditional ways of measuring economic growth can pose challenges as it may not accurately reflect human development or well-being (Smith & Ingham, 2005; Pelsa & Balina, 2022). Despite the concerns, these measures are consistently and universally available for most countries and has become a useful summary variable to depict the general health of economies when compared to variables like poverty and unemployment which have varying

definitions and conventions (Ensor et. al., 2009). Again, health is generally analyzed through diverse indicators, often captured by the absence of mortality or morbidity. However, these indicators may produce different perspectives on the population's health status (Lange & Vollmer, 2017). For example, a country with higher prevalence of chronic diseases such as diabetes and heart disease but declining under five mortality rates might give a misleading impression when health is assessed solely based on under five deaths. Another argument from Amartya Sen is that while economic growth may contribute to the expansion of freedoms, focusing on it alone can have detrimental impact on majority of the population as it does not guarantee equal distribution of resources, and may even increase inequality, poverty, and unemployment (Sen, 1999). In essence, countries might have higher economic growth but lower life expectancy. The mechanism that links economic growth to maternal and child health is presumed to operate through a combination of multi-level factors. The impact, if present, as well as the direction and magnitude may vary depending on several factors, including the dimension of health outcomes being examined, how the gains of economic growth are distributed, the institutional environment, and household socioeconomic status, along with behavioral response to such changes (Bloom & Canning, 2009; Ensor et. al., 2010; Lange & Vollmer, 2017; Ensor & Cooper, 2004).

On the other side is the impact of declines in economic growth on both economic and health systems of nations. Since the deeper integration of the world economy in the 1970s, several recessionary periods have occurred and impacted populations worldwide. These include the 1975, 1982, 1991, 2008/9 recessions driven by series of factors such as oil supply shocks, collapse of commodity prices, and financial crises, as well as the 2020 recession induced by the COVID-19 pandemic (Kose, 2020; Gopinath, 2020). While the economic contraction during the COVID-19 pandemic was not as severe as initially predicted, it marked the first time since the Great Depression where advanced economies, emerging markets and developing economies simultaneously faced a recession. This situation led Africa into the worst economic downturn since statistics on Gross Domestic Product started being kept, and its first recession in 25 years, with a decline of averaging over -2 percent of GDP per capita (Gopinath, 2020; African Export-Import Bank, 2020). The level of global interconnection and interdependence Africa has with Europe and other parts of the world sent waves of economic shocks across many African countries, resulting in declines of economic growth (Africa Renewal, 2023). While the rate of poverty has been

persistently and historically high in the region, COVID-19-induced outcomes such as a significant rise in price levels due to disruption in supply chains, falling growth in per capita income and the accumulation of higher external debt, which have kept many economies and vulnerable population in poverty, leading to deep economic damage in many African economies (Africa Renewal, 2023).

Beyond the direct health impacts of the pandemic, the implementation of mitigative measures during the peak of the pandemic had negative health and economic implications on the most vulnerable groups, such as women and children (Schmidhuber, 2020; Shapira, 2021; Akseer, 2020). During this period, resources were diverted from critical routine health services, particularly those related to sexual and reproductive health services for women, to managing the COVID-19 pandemic. In many countries, this meant declines in facility-based deliveries, antenatal and post-natal care. Consequently, the risks of maternal mortality and morbidity, HIV/AIDS infections and related deaths, adolescent pregnancies, and sexually transmitted diseases were heightened (UNFPA, 2020; Women, 2020b). This will undoubtedly lead to significant long lasting negative impacts on the overall wellbeing of these vulnerable population. Other social problems including domestic violence, child, early and forced marriages and adolescent pregnancies increased as a result of prolonged school closures and loss of household income (Phillipose & Aika, 2020; Esho, 2022). With Africa being home to over 250 million undernourished people in 2019, another shock was the increase in food insecurity and undernutrition (WHO, 2019). This will certainly make it impossible for the continent to advance the achievement of the Sustainable Development Goal (SDGs) 2, which calls for an end to hunger and achieve food security, where individuals have reliable, consistent access to safe, nutritious food to live healthy lives.

Numerous Sub-Saharan African countries are actively exploring diverse solutions in their commitment to reducing mortality and morbidity rates among women and children. Nevertheless, considering the detrimental health and economic effects observed in prosperous Western nations due to the COVID-19 pandemic, it is increasingly crucial for governments in SSA to develop actionable strategies to mitigate the impact and improve maternal and health outcomes.

### 1.3 Research goals, objectives and questions

Recognizing the pivotal role of women and children's health in the global development agenda and its significance for human capital development and the economic growth of nations, this study explores the links between maternal and child health outcomes and economic growth in sub-Saharan Africa countries, where these health outcomes are already at lower levels. The research also presents an avenue to examine the impacts of the COVID-19 pandemic on maternal and child nutrition, as well as maternal and child health service utilization in Ghana. It specifically delves into the consequences of the pandemic-induced economic crisis and the impacts of the mitigation measures. The aim is to derive valuable lessons and best practices that could guide countries in strategically implementing impactful policies and tailoring socio-economic interventions to improve the health of women and children, ultimately contributing to the pursuit of the SDGs. Additionally, the findings could contribute to improving preparedness and response strategies for future outbreaks of a similar nature.

This research aims to:

1. Investigate the relationship between economic growth and recessions, and maternal and child health outcomes in sub-Saharan African countries. (Chapters 2 and 4)
2. Examine the impacts of the COVID-19 pandemic on the utilization of maternal and child health services in Ghana: (1) Total deliveries per month; (2) Antenatal care (ANC) 1 per month; (3) ANC 4 per month; (4) receipt of five infant vaccines. (Chapters 3 and 5)
3. Explore the impacts of the of the COVID-19 pandemic on the nutritional wellbeing and food security of women and children in Ghana (Chapters 3 and 6).

The research questions that guide the study are:

1. What is the relationship between economic growth and recessions, and the maternal and child health outcomes in sub-Saharan African countries? (Chapters 2 and 4)
2. What is the impact of the COVID-19 pandemic on the utilization of maternal and child health services in Ghana? (Chapters 3 and 5)
3. How did the COVID-19 outbreak impact the nutritional wellbeing and food security of women and children in Ghana? (Chapters 3 and 6)

## 1.4 Theoretical framework

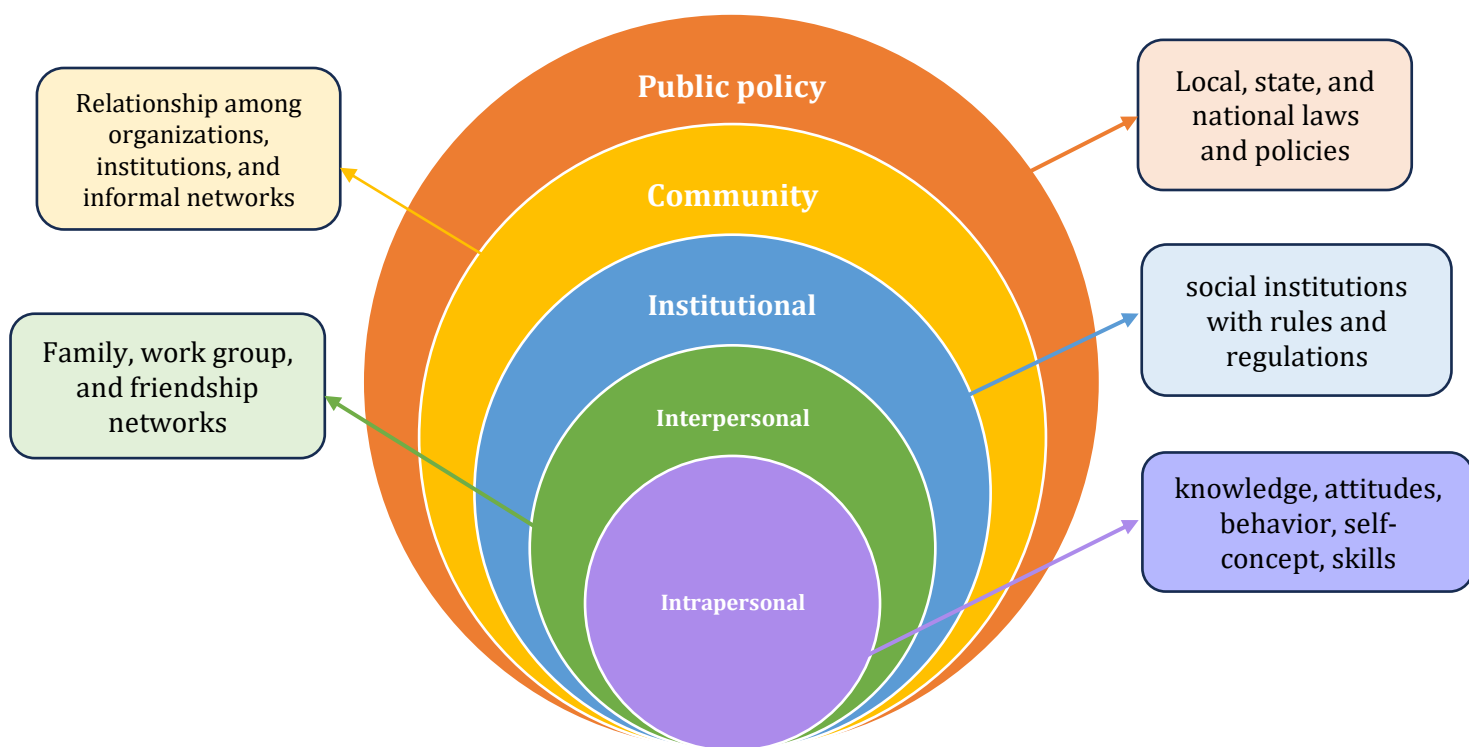
This research is conducted as a socio-economic interdisciplinary study approach that acknowledges that social and economic factors are often interconnected and that a comprehensive understanding of a problem or phenomenon requires insights from different fields (Smye & Frangi, 2021). It is premised on the assumption that population health outcomes are conceptualized as the function of the interrelation of numerous socio-economic factors that could range from individual to global levels. Based on this understanding, this research acknowledges that maternal and child health is not influenced by a single factor, but rather by multi-level factors and barriers including household and individual economic and environmental factors that influence health and healthcare-related decisions (Smye & Frangi, 2021).

The entire thesis is grounded on the social ecological theory, which has historical basis in various disciplines and is widely applied in interdisciplinary health studies, public health research and health intervention strategies. Ecology deals with the interaction between organisms and their environment, and as a result the purpose of this ecological perspective in the social sciences and health promotion is to focus attention on the environmental causes of behavior and identify environmental interventions (McLeroy et. al., 1988). The theory therefore emphasizes the need to understand and recognize that health of individuals is affected by the complex interaction of individual, community, physical, social environment, and other related factors (McLaren & Hawe, 2005; Israel et. al., 2005). Urie Bronfenbrenner, a developmental psychologist, is considered one of the most influential contributors to ecological thinking in health research (Eriksson, 2018). While Bronfenbrenner's theory of human development has undergone considerable changes since its proposition in the early 1970s until 2005, the second phase (1980- to mid-1990s) is based on the premise that human development occurs through constantly evolving interactions between individuals and their multiple, interconnected environmental contexts (Eriksson, 2018; Bronfenbrenner, 1979; Rosa, 2013). This framework describes various systems that influence individual's development and functioning: (i) individual: identities, gender, knowledge; (ii) microsystem: interactions between the individual and the immediate environment e.g., family, workplace; (iii) mesosystem: interactions between the various microsystems in the person's life; (iv) exosystem: broader social and environmental contexts that impact the individual indirectly but

do not involve the individual e.g., community resources, government policies; (v) macrosystem: broader cultural and societal structures that shape the individual's development e.g., culture, values; and (iv) chronosystem: the concept of time in shaping the individual's development, that is, the time the person lives and develops as well major events that may occur (Eriksson, 2018; Bronfenbrenner, 1979; Rosa, 2013; Crawford, 2020).

Many scholars have adopted Bronfenbrenner's theory and applied it to health promotion and disease prevention. McLeroy and colleagues proposed an ecological model for health promotion interventions by adopting a variation of Bronfenbrenner's model (McLeroy, 1988). With this model, health promotion focuses attention on both individual and social environmental factors. The determinants of health behavior include: (i) intrapersonal factors: characteristics of the individual such as knowledge, attitudes, behavior, self-concept, skills; (ii) interpersonal processes and primary groups: social network and social support systems (formal and informal), including the family, work group, and friendship networks; (iii) institutional factors: social institutions with organizational characteristics, and formal (and informal) rules and regulations for operation; (iv) community factors: relationships among organizations, institutions, and informal networks within defined boundaries; and (v) public policy: local, state, and national laws and policies (McLeroy et. al., 1988).

*Figure 1.1: Social ecological model for health promotion*



Source: Adapted from McLeroy et al. (1988)

In the scope of this thesis, the concentration on the nutrition, health access, and utilization of women and children necessitated the use of adapted versions of the social ecological theory. These models incorporate gender analysis to comprehend the interplay of how multi-level factors within the social ecology interplay and impact the maternal and child nutritional and health outcomes. Furthermore, this theory offers the flexibility to be integrated with other frameworks as necessary.

Specific to the chapters, the first literature review (Chapter 2) incorporates a conceptual framework which examines the pathways at the individual and macro levels to understand how the changes in national level income impact maternal and child health outcomes in the sub-Saharan African region. This conceptual framework captures the role of governments, households and individuals play in determining what impact economic growth and recessions could have on maternal and child health outcomes. The framework shows that although economic growth might play significant role on shaping favourable health outcomes, various community and individual socio-economic factors could either enhance or impede health outcomes despite national economic

growth. The systematic review study (Chapter 4) utilizes the conceptual framework introduced in chapter 2 to delve into the relationship between economic growth and maternal and child health in SSA by systematically examining existing literature. In Chapter 5 (quantitative research), the research is informed by the combination of the social ecological model and the economic framework of demand and supply side barriers of healthcare utilization (Ensor & Cooper, 2004; Jang 2022; Bah & Russo, 2022). These models position the pursuit of health utilization as the interrelation among multi-level, multifaceted, and intersectoral factors including those that impact both the actors that provide effective healthcare services and the users of these services. During the COVID-19 pandemic, various factors at the individual, interpersonal, community, institutional, and national levels interplayed and affected the utilization of maternal and child health services. Chapter 6 (qualitative research) is based on a multi-level framework which adapts the socio-ecological model to develop actions to maintain optimal nutrition during the COVID-19 pandemic (Naja & Hamadeh, 2020). Given the study's aim to explore the pandemic's impact on women and children, it drew insights from a gender based analytical framework which examines how gender power relations manifest as inequalities, including through access to resources, roles, norms, decision-making power, and policies. In this chapter, the framework provides evidence-based pathways of how the interaction between pandemic interventions and underlying gender norms, roles, and relationships impacts the nutritional outcomes of women and girls (Kalbarczyk et. al., 2022).

## 1.5 Methods

### 1.5.1 Methodology

Chapter 1 is an introductory section. Chapter 2 is a literature review, and it examines the impact of economic growth on maternal and child health in sub-Saharan Africa. Chapter 3 is a literature review which provides an extensive background on the health and economic implications of the ongoing coronavirus disease (COVID-19) pandemic on women and children in Africa.

Chapter 4 (Article 1) is a systematic review which consolidates studies that explore the impact of economic growth and recessions on maternal and child health outcomes in Sub-Saharan Africa. A

systematic review methodology involves identifying, evaluating, and interpreting a broad range of relevant research to address specific research questions, topics, or phenomena. This approach was employed to investigate the potential impact of economic growth and recessions on maternal and child health, as well as understand the relationships between economic growth, recessions, and maternal and child health outcomes in sub-Saharan African countries.

Chapter 5 employs a quantitative approach by analysing regional-level health data to quantify the impact of the COVID-19 pandemic and its mitigative measures on the health service access and utilization of women and children in Ghana. It employs a retrospective observational study which utilises existing data sources from present time to retrospectively examine outcomes and impacts of an event. Specifically, health data routinely collected by the Ghana Health Services (GHS) were obtained to analyze maternal and child health service utilization before the COVID-19 pandemic and during the pandemic.

In Chapter 6, which is the qualitative component, primary data was gathered through in-depth key and community informants' interviews conducted in communities in the Greater Accra and Bono regions. Following an interpretivist approach and employing interviews as a useful data collection tool, this method explores the feelings, experiences, and opinions of individuals to obtain cultural-specific information to understand a given problem within a sub-group or social context from the participants' perspective (Mack et. al., 2005). Utilizing this approach for this study facilitates the understanding of how the COVID-19 pandemic and its resulting economic hardships impacted nutrition and food security of women and children living in various communities in two of Ghana's regions.

Each of these chapters provides more in-depth information about the research approach, data collection, analysis, and results.

### 1.5.2 Study context

Sub-Saharan Africa is a region characterized by diverse economic landscapes, comprising countries with varying income levels. While economic growth is uneven across the region, it

recorded a strong average economic growth of 5.6% between 2000 and 2013 (International Monetary Fund, 2018). In 2017, some SSA countries demonstrated robust economic performance, including Burkina Faso with an estimated Real GDP growth of 6.7%, Cote d'Ivoire at 8%, Ghana at 6.3%, Guinea at 6.4%, Senegal at 6.8%, and Tanzania at 6.5% (African Development Bank Group, 2018). The report again indicates that in 2019, non-resource intensive countries recorded average GDP growth of 5.3% (African Development Bank Group, 2018). In 2022, Nigeria's GDP of over US\$477 billion ranked it as the 31st largest economies in the world, exceeding some developed countries like Austria, Denmark, and Finland (World Bank, 2023).

Within the health domain, Sub-Saharan Africa (SSA) has made notable advancements. Under-5 mortality experienced a substantial decline of 35%, neonatal death rates decreased by 21%, and maternal mortality exhibited a noteworthy reduction of 28% (WHO African Region, 2022). Nevertheless, SSA remains the region with the highest under-five mortality rate globally. In 2017, the average under-five mortality rate in the region stood at 76 deaths per 1,000 live births, a ratio of 1 in 13 children, which is 14 times higher than the average of 1 in 185 in high-income countries (UN Inter-Agency Group for Child Mortality Estimation, 2021). Approximately half of the world's maternal deaths occurred in SSA in 2020, accounting for 545 maternal deaths per 100,000 (WHO, 2023). Given the present trajectory of declining maternal and child health outcomes, numerous SSA countries are likely to fall short of achieving the Sustainable Development Goal targets—specifically, 25 or fewer deaths per 1,000 live births for under-5 mortality and less than 70 per 100,000 live births for Maternal Mortality Ratio (MMR) by 2030 (United Nations, n.d.). Such economic growth-health nexus calls into question the impact growth plays in advancing maternal and child health.

The case study focus of this thesis is Ghana, a low-middle income country situated in the western part of Africa and bordered by Burkina Faso to the North, Togo to the East, Ivory Coast to the West, and the Gulf of Guinea and Atlantic Ocean to the South. Even before the onset of the COVID-19 pandemic in Ghana, most women in the country, particularly those in the lowest quintile and residing in rural areas, faced challenges in accessing nutritious food for themselves and their children (Doku & Neupane, 2015). This situation exacerbated maternal and child morbidity and mortality rates (Doku & Neupane, 2015). Despite a reduction in the maternal mortality ratio (MMR) from 760 per 100,000 live births in 1990 to 320 in 2015, and a decline in

the under-five mortality rate from 122 per 1000 live births in 1990 to 55 per 1000 live births in 2015, Ghana fell short of achieving the MDG 4 and 5 goals by the end of 2015. The slow progress in maternal and child health hindered the attainment of the two-thirds reduction in the under-five mortality rate and a 75 percent reduction in MMR (World Bank, 2019).

Moreover, the COVID-19 pandemic, along with lockdown and movement restrictions, have had significant repercussions on these health outcomes. At the onset of the pandemic, schools were closed and social gatherings including festivals, conferences and religious activities were restricted to a maximum of 25 people (Kwame et. al., 2023). Lockdown measures were enforced for three weeks in the Greater Accra and Ashanti regions, where individuals were ordered to stay home except for obtaining essential items such as food, water and medicine. Non-essential businesses and restaurants were closed, and travel restrictions were enforced in these regions (Kenu et. al., 2020; Assan et. al., 2022). The associated health and economic challenges on reproductive health, as well as on food and nutritional intake of many vulnerable individuals in the country, are quite substantial. This could impede the country's progress towards achieving goals related to maternal and child health (SDG 3) and addressing hunger while ensuring access to sufficient nutrition for the impoverished (SDG 2) by 2030.

## 1.6 Ethical Consideration

For compliance with research policies and procedures, I obtained approval to collect the primary data and also to use the secondary data. For the primary data for this thesis, ethical clearance was obtained from the University of Ottawa Research Ethics Board (File number S-03-21-6577). Since data was collected within the community, I obtained clarity from a faculty member of the Kwame Nkrumah University of Science and Technology (KNUST) on whether ethical clearance was needed. My inquiry revealed that since my study presents little to no harm to study participants, I would not need any local institutional ethical clearance. All key informants and community informants that were interviewed provided informed consent. All activities were in conformity to all ethical requirement and protocols as stipulated in the ethics application, including but not limited to confidentiality, voluntary participation, the use of recruitment scripts and beneficence.

The secondary data were obtained from the Ghana Health Services (GHS). A letter of request for data outlining the purpose, type of data and objective of the study was sent to the Director General of GHS to request for data on maternal and child health indicators from six regions purposefully for research. Permission was granted and data was released by the Director of the Policy, Planning, Monitoring and Evaluation Division (PPMED) of GHS.

No permission or clearance was required for the secondary data for the systematic review.

### 1.7 Positionality and reflexivity

In qualitative research, researchers' social identities: class, ability, gender, location, employment status, political affiliation etc. can influence the way they interact with participants, and this may either pose challenges or become an asset in the research process (Jacobson, & Mustafa, 2019). Owing to travel constraints caused by COVID-19, I was unable to physically travel to Ghana for primary data collection. As an alternative, qualitative data was gathered through phone interviews. Being a Ghanaian woman who has spent most of my life in Ghana, I had an understanding of the economic vulnerability and life experiences of some of the women who participated in the study. However, as an educated woman residing in a developed country, I did not share certain social identities with them. Therefore, I approached the interviews with an open mind and respect, seeking to comprehend their unique experiences.

To ensure that these women did not feel intimidated and uncomfortable during interviews, I adopted a polite way of posing questions and actively engage them by repeating and probing further into their responses. Among the participants were community leaders and government officials holding influential positions, who expressed discomfort in sharing their perspectives due to concerns that their views might be associated with them in publications. While all participants were guaranteed anonymity and confidentiality, some declined to disclose their workplaces and full names. In two cases, government officials declined interviews and opted to provide written answers to interview questions to avoid potential implications during the interview process.

As a Ghanaian with a shared accent and proficiency in the prevalent local language, I was perceived as an insider, but my status as a graduate student residing in Canada made me an outsider. In initial interviews, participants commented on my pronunciation of certain words, which sometimes hindered their understanding of the questions asked. To address this, I consciously attempted to sound more "Ghanaian" in subsequent interviews. The complexity of my positionality in the research process is evident here, although my outsider status was somewhat mitigated by the involvement of research assistants who were acquainted with the community and facilitated the recruitment of participants, thereby aiding in the interview process.

## Chapter 2: Effect of economic growth on maternal and child health outcomes in Sub-Saharan Africa: A review of the empirical evidence

### 2.0 Abstract

Women who lack basic health care and education and are faced with life-threatening health issues and high rates of mortality, which do not affect only women themselves but their children, family and the community. To achieve reduction in maternal and child mortality as well as the Sustainable Development Goals (SDGs), there is the need for higher investments in evidenced-based health programs. Economic growth is however considered a necessary policy instrument for the improvement in health outcomes of population particularly in developing countries. For countries with high records of annual growth rates, it is expected that maternal and child health outcomes remain positive and high. This has however not been the case for most developing countries in sub-Saharan Africa. This chapter reviews the existing evidence on the impact of economic growth on maternal and child health outcomes in Sub-Saharan Africa to enable us to understand the extent and direction of the relationship and ways of improving maternal and child health outcomes in the region.

**Keywords:** Economic growth, maternal health, child health, Sub-Saharan Africa

### 2.1 Maternal and Child health trend in sub-Saharan Africa

More than 300,000 women died from pregnancy-related deaths in 2015 with two-third of this total occurring in Sub-Saharan Africa (SSA) (Roser & Ritchie, 2020). The lifetime risk of women dying due to pregnancy-related causes as at 2017 was about 1 in 38 in SSA compared to 1 in 240 in South Asia and 1 in 4,300 in Europe and Central Asia (WDI Data, 2020). Similarly, out of the global estimate of 5.42 million children who died before their fifth birthday in 2017, sub-Saharan Africa recorded 2.8 million, representing over 51 percent (Roser et al., 2013). This makes the SSA region the riskiest region of maternal and under- five child death occurrences than in all other regions in the world and this has become a key health challenge in the region. To this end, the global community recognizes the importance of ending preventable maternal and child deaths, making it an essential part of global health initiatives such as the Sustainable Development Goals (SDGs) which was adopted by all United Nations (UN) Member States in 2015 and has its third goal of

seeking to ensure healthy lives and to promote the wellbeing for all at all ages (WHO, 2020). Particularly on maternal and child health, some of the targets for SDG 3 are to address and reduce the global maternal mortality rates to less than 70 per 100,000 live births, reduce neonatal deaths to 12 per 1,000 livebirths and under-five deaths to at least 25 per 1,000 live births by 2030, and these are important targets for sub-Saharan African countries where maternal and child deaths are notably high (UN, n.d.).

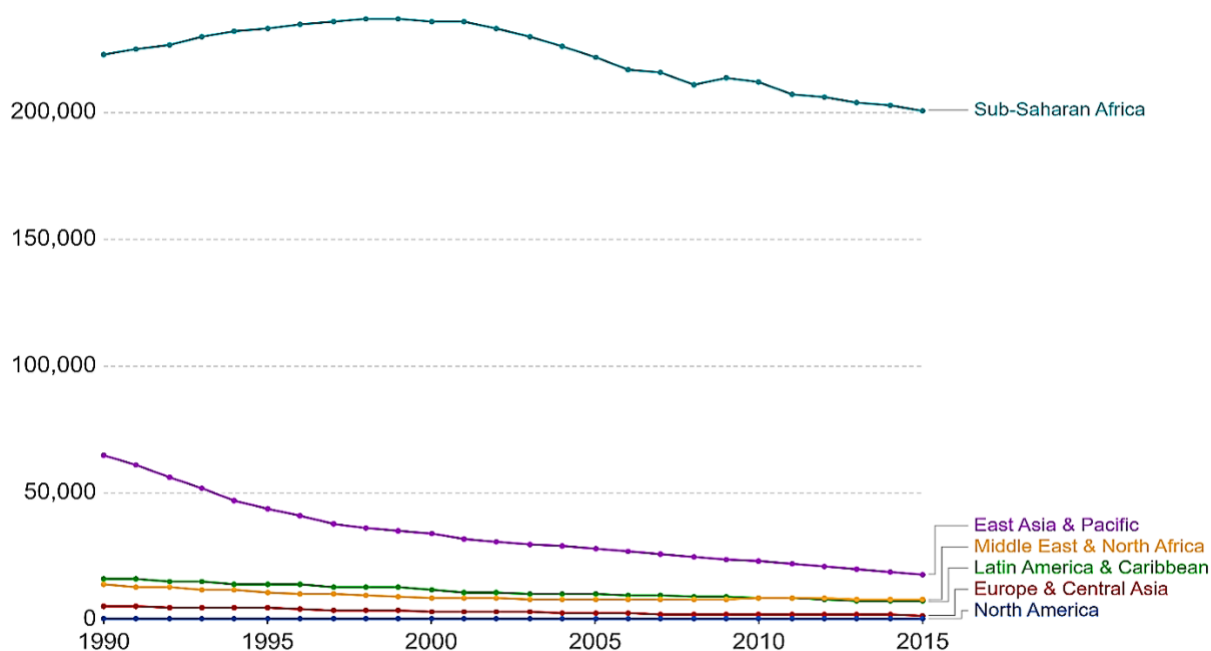
There have been concerted efforts by several governments of sub-Saharan African countries and international institutions including the World Health Organization (WHO), African Union (AU), the United Nations Population Fund (UNFPA) and the International Development Research Center (IDRC) to promote health and curb these high levels of child and maternal mortality in the region. This notwithstanding, many countries in the region continue to record some of the highest mortality rates compared to other world regions (IDRC, 2019; UNFPA, 2013b). Although good health is a goal in itself, reduction in maternal and child health is among the key indicators of maternal and child health, child nutrition, overall wellbeing of a country's population as well as the economic growth and development of nations (Frimpong & Adu, 2014; Reidpath & Allotey, 2003). Investment in population health in effect increases human capital, which is a key contributing factor to economic performance (Sharma, 2018). The health-growth relationship is however not unidirectional. While a healthy population increases productivity and national wealth, a growing economy also has the potential of increasing the health of the population (Ensor et al., 2010). For developing countries like those in SSA to achieve better health statuses, there is the need to invest in evidenced-based and sustainable health programs.

Despite about 41 percent decline in maternal deaths between 1990 and 2010 in the African region, poor maternal health outcomes continue to be a key health concern in the sub-Saharan African region (UNFPA, 2013b). Maternal deaths often occur while a woman is pregnant, while giving birth or within 42 days of termination of pregnancy, caused by birth complications (UNFPA, 2013b; WHO, 2011). Such peculiar health challenges and conditions that increase women's morbidity and mortality include direct obstetric causes such as hemorrhage, pregnancy hypertensive disorders, obstructed labor, sepsis, and major infectious diseases. Preterm birth complications and birth asphyxia and trauma for instance are ranked fifth and sixth respectively as causes of morbidity and are among the top ten causes of mortality in the African region. It has

been recorded that for every death, about 20 to 30 women suffer from short or long-term disabilities and illnesses like obstetric fistula, chronic pain, damage to reproductive organs or anemia (UNFPA, 2013b). These deaths and illnesses are preventable and treatable, but the lack of basic health care and education for many women in the developing countries often lead to such life-threatening health issues which affect them and their children, families, and community.

Figure 2.1 shows the number of maternal deaths by world regions. At a glance, the numbers for the sub-Saharan African region is disconcerting, and it clearly shows the regional disparities women face in their chances of survival. Since 1990, the numbers have remained high compared to any of the other regions. In 1990, the number of maternal deaths were 223,000, increasing to 237,000 in 1999. A decline was experienced afterwards until 2008 at a value of 211,000. There was a slight increase in 2009 but a decline thereafter to a value of 201,000 in 2015. On the other hand, East Asia and the Pacific in the early 1990s had around 65,000 deaths but declined continuously along the years to 18,000 in 2015. Latin America and the Caribbean, and Europe and Central Asia have also made similar significant progress, with the 2015 values representing a decline of 50 percent and over. Middle East and North Africa experienced falling numbers from 14,000 in 1990 to 8,200 in 2006 after which it obtained constant values until 2009. The numbers increased to 8,400 but declined to its 2015 value of 8000. In comparison, while the other regions have maintained low figures and/or recorded greater percentage declines in their numbers, the sub-Saharan African region has only seen less than 10 percent decline in the number of maternal deaths.

*Figure 2.1 Number of Maternal Deaths by World Regions*



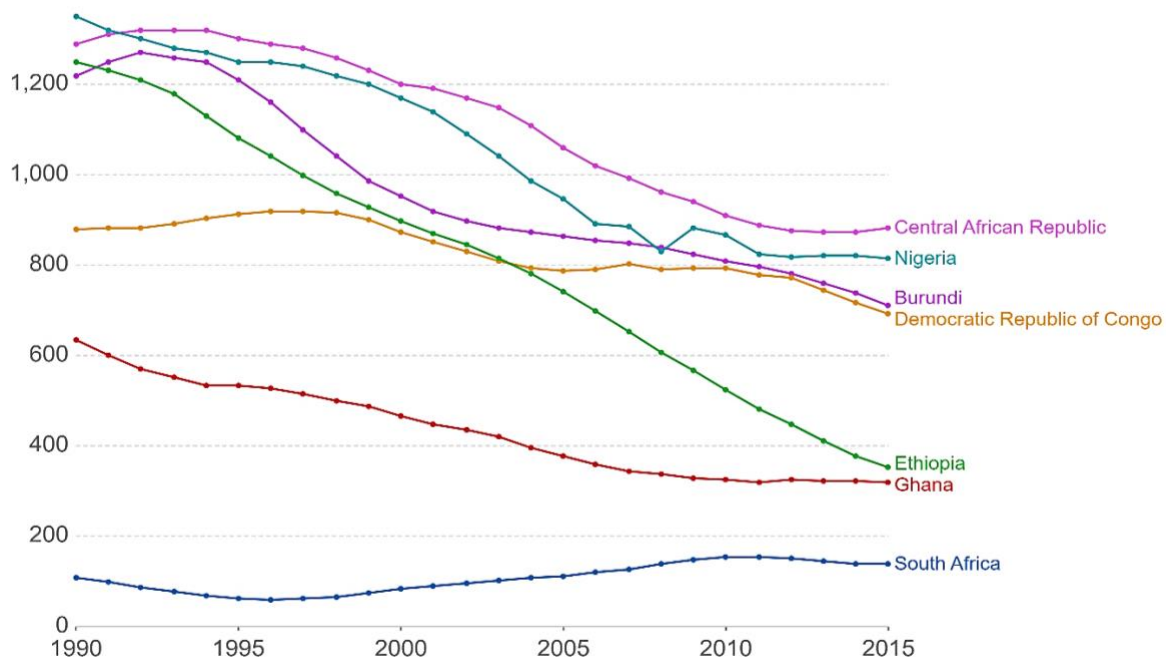
Source: World Bank (2015)

Sub-Saharan African countries are however diverse and therefore bear different burdens of maternal deaths. Figure 2.2 shows the maternal mortality ratio (MMR), which is the number of maternal deaths in a given time period per 100,000 live births during the same time period. Central African Republic in 1992 recorded MMR of 1,320 per 100,000 live births, but this declined to 882 in 2015. The decline notwithstanding, it has been the country with the highest MMR since 1992 among selected countries. Ethiopia records a steep decline in the MMR, in 1990, 1,250 per 100,000 live births was recorded which decreased to 353 per 100,000 live births in 2015. Remarkably, South Africa has obtained the lowest MMR values since 1990. The Central African Republic holds the highest MMR, but the actual number of maternal deaths has been the lowest and this is due to the low population of the country (World Bank, 2019). Ethiopia has also recorded a continuous decline in the number of maternal deaths, but the numbers are still high with 11,000 maternal deaths in 2015. While it has an upward trend of maternal deaths, Nigeria's trend is more volatile. Like DRC where the number of maternal deaths increased from 15,000 in 1990 to 20,000 in 2000 and up to 22,000 in 2015, Nigeria's 2015 value of 58,000 was higher than that of 1990. This means that for these two countries, no significant improvements have been made in reducing the number

of deaths (Roser & Ritchie, 2020). Nigeria, Ethiopia and DRC were among the five countries with the highest number of maternal deaths in the world as at 2015 (Roser & Ritchie, 2020).

This makes the burden of maternal mortality in sub-Saharan very high in relation to the prevalence and incidence in other world regions. The impact of maternal deaths on the family and particularly on the children is huge. In addition to the psychological and emotional impacts and the loss of household incomes, newborns are more likely to die, and for surviving children, school participation and enrollment decrease substantially; older children are more likely to face higher rates of undernutrition, lower levels of education and therefore lower future incomes and health (Moucheraud et al., 2015; Roser & Ritchie, 2020). Banerjee & Duflo (2011) point out that when unborn babies and children receive better nourishment in the first two years of life, they tend to gain a lifetime income of US\$3,269 PPP. This makes the optimal health of women an essential factor in child survival and improves overall health and wellbeing.

*Figure 2.2 Maternal Mortality Ratio, 1990 to 2015*

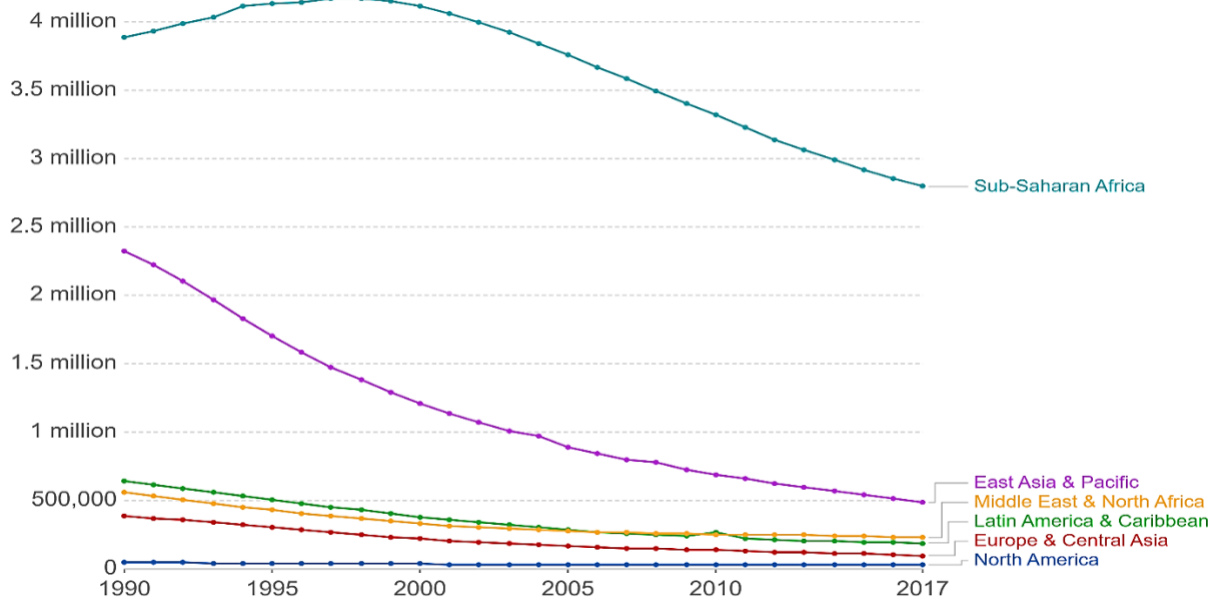


Source: Gapminder (2010) and World Bank (2015)

Just as maternal health outcomes in SSA are disturbing, child health outcomes in the region are alarming (UNFPA, 2013a). Africa reduced under-five child deaths by 33 percent between the period of 1990 and 2010, but SSA continues to record the highest under-five mortality rates compared to other world regions (as shown in Figure 2.3 below). The region had an average of 2.8 million child deaths in 2017 compared to 28,861 child deaths in North America, representing an average ratio of 1 in 99 in favor of North American countries. Undernutrition is one of the key indicators of child health which leaves long-term consequences on the wellbeing and survival of children and according to the WHO (2014), it should be a priority for policy-makers and development concern for governments. Undernutrition is measured by three anthropometric dimensions of childhood nutrition: weight-for-age (underweight), height-for-age (stunting), and weight-for-height (wasting), however, unlike wasting and underweight, stunting is the most prevalent form of severe childhood malnutrition (Biadgilign et al, 2016) Stunting is defined as the percentage of children between 0 to 59 months whose height for age is below minus two standard deviation from the median of the WHO Child Growth Standards (de Onis & Branca, 2016).

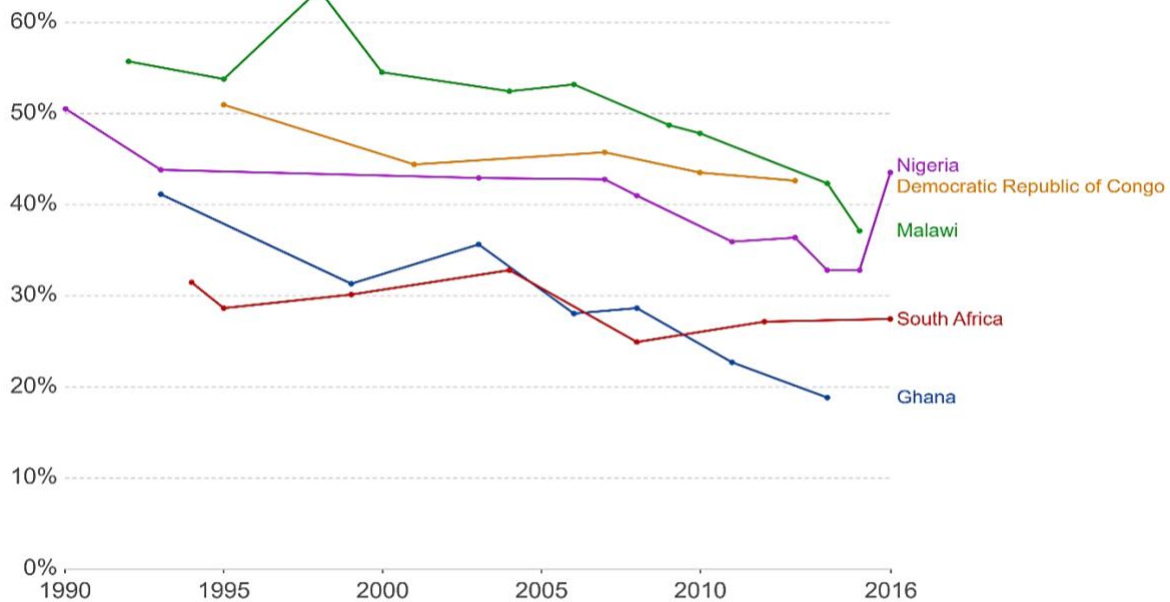
Stunting is associated with increased risk of death from infectious diseases including pneumonia, diarrhea, and measles, and for those who may survive, there is a long-term impact on their physical and cognitive development which is considered irreversible beyond the first 1000 days of the child's life (de Onis & Branca, 2016; Roser & Ritchie, 2013). Such irreparable impact also results in reduced mental abilities, poor school performance, and this means lower education, incomes, and health in their adult life. As shown in Figure 4, all the selected SSA countries recorded more than 30 percent of stunted growth before 1995 but show declining trends afterwards. Ghana recorded a continuous decline from 43.8 percent in 1993 to 18.8 percent in 2014. Similarly, Malawi recorded declining rates in stunting from 55.8 percent in 1992 to 37.1 percent in 2015. These represent a decline of about 57 percent and 33.5 percent respectively in the share of children under-five who are stunted. Although this shows promising improvements, the rates are comparatively high. Nigeria on the other hand saw a sharp rise in stunting, recording a rate of 43.6 percent in 2016 and this value is only 6.9 percent less of its 1990 stunting rate.

Figure 2.3. Number of Under-5 Child Deaths by World Regions



Source: UN Inter-agency Group for Child Mortality Estimation (2019)

Figure 2.4. Share of Children (under 5) who are Stunted, 1990 to 2016



Source: UNICEF/WHO/The World Bank (2018)

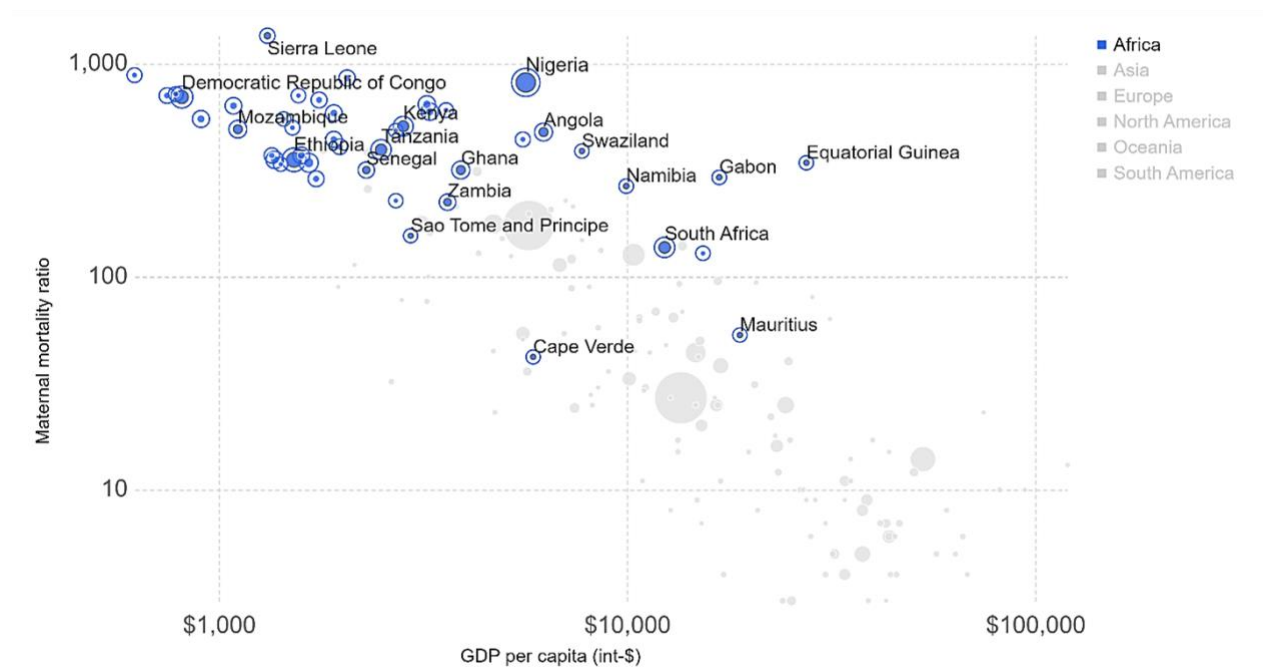
## 2.2 Economic Growth and Maternal and Child Health in Sub-Saharan Africa

Economic growth has been found to substantially reduce undernutrition in Ethiopia through the increase in health investment, public infrastructure, and improved households' per capita income (Biadgilign et al., 2016). Lange & Vollmer (2017) did an empirical review on the effect of economic development on population health by analyzing published economic journals between 1990 and 2015 on Google Scholar and PubMed. A total of 18 studies that considered mortality, life expectancy and malnutrition as the dependent variable and GDP, GDP per capita, growth in GDP, growth in GDP per capita or unemployment rate as the main independent variable were selected. The authors concluded that there exists a strong and positive relationship between incomes and population health status within and across countries. Ensor et al. (2010) also investigated the impact of previous economic recessions and booms on maternal and infant health outcomes for 14 high and middle-income countries between 1936 to 2005. The authors separately used maternal mortality and infant mortality as the dependent variables, with GDP per capita as the main explanatory variable. They found that for both maternal and infant mortality, there exists a negative relationship between income and health outcomes, but when countries were analyzed individually, the relationships were not consistent across board. Ensor et al. (2010) however argued that the reasons for such differences are not clear, and that for countries in the early stages of development, health gains are vulnerable to fluctuating GDP. This notwithstanding, they concluded that the relationship between economic growth and health outcomes is important for countries in the early stages of development. For countries with high records of annual growth rates, it is expected that maternal and child health outcomes remain positive. Moreover, differences in health outcomes in many countries have been partly attributed to differences in economic growth (Ensor et al., 2010). However, this is sometimes not the case, particularly in sub-Saharan African countries.

With the exception of Nigeria and South Africa, sub-Saharan African region obtained an average growth rate of 2.4 percent in 2018, and for countries like Rwanda, Guinea, Ghana and Ethiopia, economic growth rate has averaged over 5 percent since 2016. For instance, in 2017, Ethiopia was named the fastest growing economy in sub-Saharan Africa with an accelerated growth rate of 9.5 percent, followed by Ghana with a rate 8.5 percent (WDI Data, 2020). Despite these achievements in economic growth and several declines in the maternal and child death rates since the 1990s, the

SSA region still could not advance the achievement of the MDGs 4 and 5, which targeted 75 percent reduction in Maternal Mortality Rates (MMR) and 67 percent reduction in under-five mortality rates by the end of 2015 (UN, 2015). Moreover, the maternal and child death rates are still high. Overall, SSA accounted for 66 percent of global maternal deaths in 2015, and by 2017, the region's record showed that 1 in 13 children died before their fifth birthday, representing 50 percent of global under-five deaths (UNFPA, 2013b; UNICEF, 2018). While many countries have already met the Sustainable Development Goal (SDG) target on under-5 mortality, which aims to reduce under-five deaths to 25 or fewer deaths per 1,000 live births by 2030, about 53 countries including over 30 SSA countries are yet to make any progress (UNICEF, 2019). For these countries to meet the target, it has been recommended that they accelerate the decline in child deaths and for some of these countries, more than double of their current declines will be needed.

*Figure 2.5. Maternal Mortality Ratio vs GDP per Capita, 2015*



Source: World Bank (2015)

Figure 2.5 shows the relationship between maternal mortality ratio and GDP per capita. GDP per capita divides the total economic output of a country by its population. Equatorial Guinea, a country in the central part of Africa in 2015 recorded the highest GDP per capita of \$27,554 in

2015 and MMR of 342 deaths per 100,000, Cape Verde had \$5,915 GDP per capita but recorded a lower MMR of 42 deaths per 100,000. The difference between the MMRs of Tanzania and Swaziland was 9 deaths per 100,000; however, Swaziland recorded \$5,267 more of GDP per capita than Tanzania. This uncertain relationship raises questions on the impact of economic growth on maternal and child health outcomes in sub-Saharan African countries.

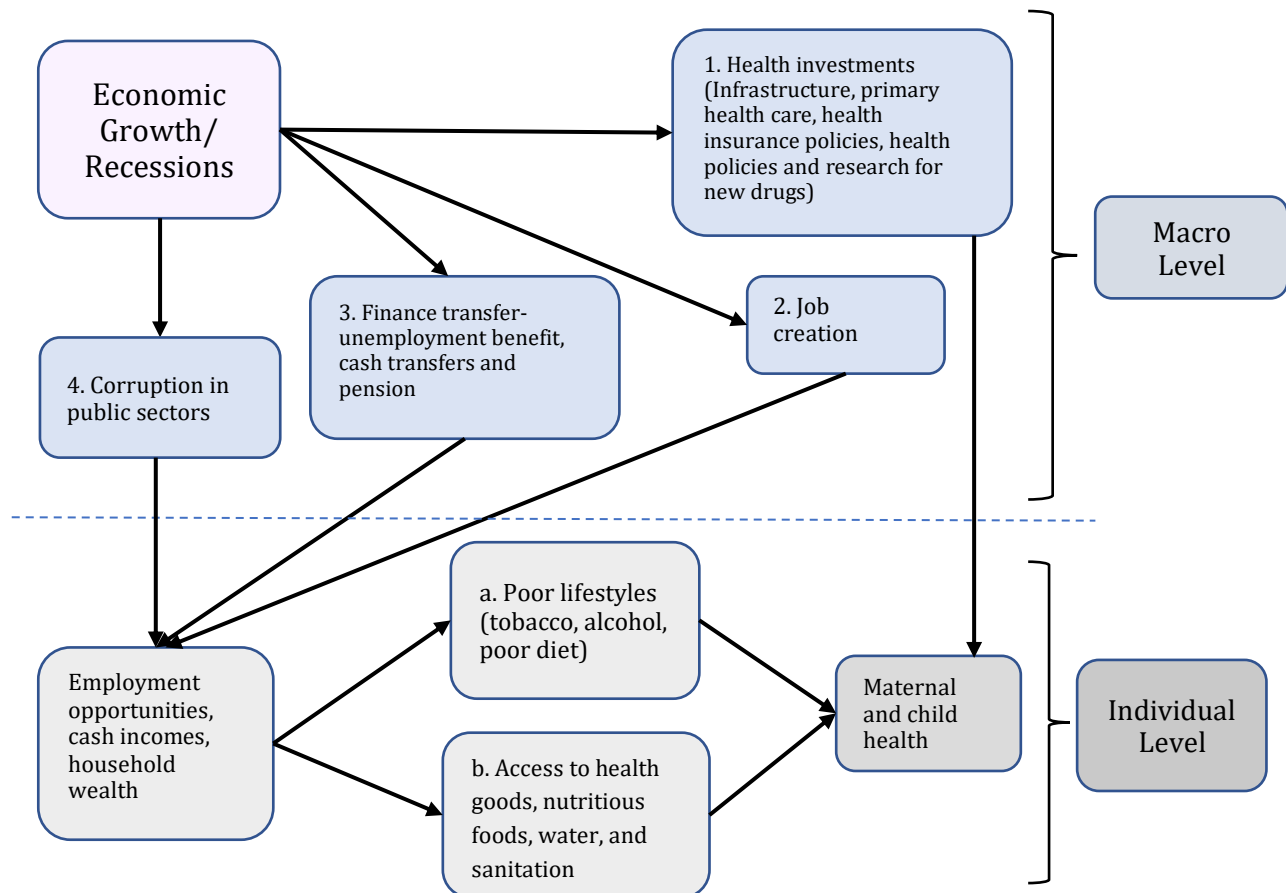
These differences and variability in health outcomes point to the fact that although economic growth is important, it is not enough. It should be combined with the distribution of income and other prevailing factors such as information on health care services/providers, education, income, household expectations, community, religious and cultural preferences, as these factors impact maternal and child health outcomes (Ensor & Cooper, 2004). It is important to understand the overall relationship and direction between economic growth and maternal and child health outcomes in SSA, but more so, it is very vital to understand the reasons for the differences in maternal and child health outcomes in these countries. This will enable a more comprehensive and effective policy interventions and community acceptable programs which will aid in the reduction and prevention of maternal and child deaths and undernutrition in these countries and the region at large.

### 2.3 Conceptual framework: Economic Growth and Maternal and Child Health

Evidence shows that economic growth may have an impact or no impact on maternal and child health outcomes. No relationship between these variables means that an increase in economic growth will have no effect on maternal and child health outcomes. An impact of economic growth on maternal and child health outcomes on the other hand signifies that economic growth can either increase or decrease the maternal and child health outcomes of countries. The recent COVID-19 pandemic has been recognized not only as a global health issue which has increased mortality and morbidity but also as a global economic issue, with its impact on economic growth and its influence on global recession. Figure 4 below shows the pathways through which state-level economic growth and the COVID-19 pandemic, and its induced global recession may impact maternal and child health outcomes, both at the individual and the macro level.

In Figure 2.6 below, we examine the pathways at the individual and macro levels to understand how the changes in income impact maternal and child health outcomes in the sub-Saharan African region.

Figure 2.6. Conceptual Framework



Source: elaborated by the author(s)

At the individual level, the changes in income may have either positive or negative impact on maternal and child health outcomes. When household income increases, household nutrition also increases. Foods that contain more micronutrients and calories will be consumed and this will put them in a better position to fight against infectious diseases, as well as low nutritional content provide a greater chance of recovering from illnesses. The household will be able to cover out of pocket health costs, invest in preventive and curative health goods, water and sanitation, which tackles factors that impede health care utilization, thereby improving maternal and child health

outcomes (Ensor et al., 2010; Lange & Vollmer, 2017). However, the COVID-19 pandemic with its accompanied recession and job losses have reduced the disposable incomes of households and this has resulted in limited access to nutritious food particularly for women and children in the household (Kakaei et al., 2022). On the other hand, the increase in household income can also heighten maternal and child health problems, as certain illnesses and deaths commonly associated with prosperity, also called ‘diseases of the affluent’ come with poor lifestyles including tobacco use and poor diets, which tend to increase in some households as income increases (Lange & Vollmer, 2017). The lockdowns, job losses and social isolations resulting from the COVID-19 pandemic may either result in high levels of depression/anxiety and other mental health conditions that impact their psychological wellbeing; and poor diet, increased alcohol consumption and smoking; and low levels of physical activities which can lead to increased risks of cardiovascular diseases, or may restrain individuals from engaging in risky health behaviors due to confinement and limited income levels (Sønderskov et al., 2020; López-Bueno et al., 2020).

On the macro level, the link between economic growth and maternal and child health outcomes takes several pathways through the state’s investment and interventions in different sectors of the country. Economic growth increases the state’s ability to invest in many aspects of the economy such as (1) The state can increase direct and indirect health investment which includes investments in policies on health insurance, child health, immunization and nutrition, clinics, hospitals and roads, and primary healthcare and policies on research for new drugs and diseases, which have a direct positive impact on maternal and child health outcome. However, the COVID-19 pandemic has also put pressure on the economy and impacted both the direct and indirect health investments such as nutrition, water and sanitation, infrastructure development like clinics, hospitals and roads, and primary and reproductive healthcare services (Africa Renewal, 2020b). Resources are being shifted to the current urgent need for PPEs, including masks, gloves and ventilators, and this can have a negative impact on women’s healthcare access.

(2) The government can invest in creating jobs and job training which will increase household incomes. This increase in income will follow the path at the individual level. In the wake of the crisis, lockdowns and movement restrictions have led to the closure of businesses and schools and this means losses of jobs and income, and therefore the inability for households to access food and sufficient nutrients, preventive and curative health goods, clean drinking water and sanitation,

resulting in negative impacts on their health and living conditions (UNDP, 2020). The increase in household burden in this period is borne by women, and at the same time the stress of job losses and financial difficulties in the household reduces nutritional intake and can increase the domestic or spousal violent incidents (Campbell, 2020).

(3) The state can increase economic investments in the form of financial incentives for employment, cash transfers and microfinance targeted at women. It is a well-established fact that an increase in the income of women in the household directly impacts the health and overall wellbeing of the household (Morrison et al., 2007). With the onset of the pandemic, there are two possibilities. On one hand, the economic power of governments to provide unemployment support and pension benefits may decline or delay, and for developing countries, the ability of financial institutions like microfinance to provide credit and other financial services particularly for women, may halt (Bull & Ogden, 2020). On the other hand, the government can increase social interventions, as has been done in Ghana, such as soft loans to businesses, free or subsidized water and electricity, provision of food and other essentials in areas experiencing lockdowns to improve their overall wellbeing (Dadzie & Raju, 2020).

(4) The increase in corruption in public sectors channel investments in health and employment policies and developmental projects into the pockets of government officials and individuals while reducing the capacity of the government. Several corrupt practices, such as pilfering the already scarce supply of health equipment and selling in black markets at higher prices, and improper procurement decisions which increase the risk of corruption due to emergency, can increase in the health system (Madrigal, 2020). Directly, this can increase out-of-pocket costs when households access health services, and it can also impact the opportunities of households to access employment opportunities and education which can negatively impact incomes and thereby having an impact on their ability to access health (García, 2019). For instance, during the Ebola outbreak in West Africa, the Red Cross lost \$5 million of its donor funds to fraud and corruption. With the surge in emergency funds to many developing countries to fight the COVID-19 health crisis, corruption in various forms is likely to increase and this will have crippling impacts on the health outcomes.

While the conceptual framework above may indicate causality, it also presents many possible ways by which economic growth and recessions can impact the maternal and child health outcomes in

countries. Different countries can take similar pathways but may have different health outcomes due to different ways and attitudes by which governments and citizens handle economic growth and recessions. As indicated in figure 5, countries such as Equatorial Guinea, recorded a GDP per capita of \$27,554 in 2015 and an MMR of 342 deaths per 100,000 while Cape Verde had \$5,915 GDP per capita but recorded a lower MMR of 42 deaths per 100,000. This goes to show that although economic growth may be an important factor in positive health outcomes, it is not enough. There may be other country-specific factors that led to such health outcomes. It therefore becomes important to understand the relationships and mechanisms between economic growth and maternal and child health outcomes among developing countries to enable us to understand the factors and complex mechanisms that relate economic growth and recession to maternal and child health outcomes to enable more country-specific, comprehensive and sound policies, and community-acceptable programs. Based on this framework and the pathways, we will examine the mechanisms through which economic growth impacts maternal and child health outcomes in SSA countries.

## 2.4 Exploring pathways and mechanisms

As shown in the first pathway, an increase in economic growth results in both direct and indirect health investments which will eventually increase maternal and child health outcomes. Evidently this has not been the case. According to WHO Regional Office for Africa, (2018), many health systems in SSA underperform when it comes to availability of essential services, coverage of essential interventions, financial risk protection from catastrophic health expenditures, service satisfaction and health security. Such an underperformance has resulted in health deficit in SSA. To achieve universal health coverage among citizens, good population health outcomes and efficient health system performance, countries need to invest in both tangible and intangible inputs such as workforce, infrastructure, research and technologies, insurance and health information, to provide the essential health services needed by the population (WHO Regional Office for Africa, 2018). It has however been recognized that poor economies tend to record significantly lower health expenditures, whereas those with larger per capita GDP are more probable to spend greater portions of their income on healthcare (Ortiz-Ospina & Roser, 2016). The World Bank has classified its member states into four income groups namely, low-income countries (LIC), lower

middle-income countries (LMIC), upper middle-income countries (UMIC) and high-income countries (HIC) (World Bank, 2020a). For the 2020 fiscal year, countries with gross national income (GNI) per capita of \$1,025 or less is low-income country; lower middle-income have GNI per capita between \$1,026 and \$3,995; upper middle-income countries are those with GNI per capita between \$3,996 and \$12,375; countries with GNI per capita of \$12,376 or above are classified as high-income countries. SSA has 27 LICs, 13 LMICs, 7 UMICs and only one HIC which is Seychelles, a country in the eastern part of the region.

Table 2.1 below shows the GNI per capita and current health expenditure per capita (CHE pc) of selected countries in the SSA region and their income classifications. Seychelles as a high-income country spends more of its income on each individual in the country compared to South Africa, Nigeria and Guinea.

*Table 2.1: GNI per capita and Current Health Expenditure for selected SSA countries*

| Country | Guinea (LIC) |          | Nigeria (LMIC) |          | South Africa (HIC) |          | Seychelles (HIC) |          |
|---------|--------------|----------|----------------|----------|--------------------|----------|------------------|----------|
| Year    | GNI pc       | CHE pc   | GNI pc         | CHE pc   | GNI pc             | CHE pc   | GNI pc           | CHE pc   |
| 2000    | 400          | 52.71524 | 470            | 75.90919 | 3070               | 562.2164 | 7290             | 674.0007 |
| 2001    | 360          | 57.01679 | 530            | 80.91418 | 2860               | 583.2636 | 7310             | 774.8258 |
| 2002    | 350          | 67.91682 | 630            | 71.96352 | 2670               | 559.5637 | 6850             | 659.8343 |
| 2003    | 340          | 61.0823  | 710            | 155.2128 | 2920               | 582.5018 | 7490             | 729.5383 |
| 2004    | 370          | 58.19341 | 870            | 151.6796 | 3720               | 608.8408 | 9280             | 693.5063 |
| 2005    | 360          | 63.43512 | 1030           | 157.7279 | 4990               | 643.6844 | 11140            | 736.8481 |
| 2006    | 400          | 40.31287 | 1350           | 156.9027 | 5630               | 680.6531 | 12580            | 772.9899 |
| 2007    | 470          | 44.82782 | 1610           | 154.8648 | 5910               | 711.2873 | 12270            | 760.8051 |
| 2008    | 620          | 44.01995 | 1960           | 159.8381 | 5980               | 753.7684 | 11130            | 737.3047 |
| 2009    | 670          | 44.05439 | 2040           | 170.6391 | 5850               | 803.8869 | 10220            | 712.4122 |
| 2010    | 690          | 46.58384 | 2140           | 166.7103 | 6190               | 863.4855 | 10190            | 945.83   |
| 2011    | 680          | 61.6019  | 2190           | 174.6496 | 6990               | 908.5803 | 11060            | 984.8821 |
| 2012    | 700          | 58.16825 | 2460           | 181.7129 | 7570               | 965.1554 | 11540            | 1264.078 |

|      |     |          |      |          |      |          |       |          |
|------|-----|----------|------|----------|------|----------|-------|----------|
| 2013 | 700 | 61.43481 | 2720 | 194.8448 | 7350 | 988.0589 | 12650 | 1067.165 |
| 2014 | 740 | 87.7672  | 2990 | 201.1753 | 6760 | 1038.216 | 13290 | 1187.87  |
| 2015 | 760 | 109.0881 | 2880 | 217.4599 | 6050 | 1083.678 | 14020 | 1213.827 |
| 2016 | 780 | 109.2372 | 2470 | 214.562  | 5470 | 1076.11  | 13830 | 1439.928 |
| 2017 | 820 | 89.17005 | 2100 | 221.095  | 5410 | 1097.819 | 14220 | 1485.474 |
| 2018 | 850 | -        | 1960 | -        | 5750 | -        | 15600 | -        |

Source: WDI Data (2020)

One debatable phenomenon is the relationship between health expenditure and health outcomes. This is because Rwanda as a low-income country in 2018, recorded life expectancy of 68, which is higher than that of LMICs like Congo Republic, Ghana and Kenya as well as UMICs including Botswana and Namibia (WDI Data, 2020). Similarly, the MMR of Guinea as of 2017 was 576 compared to Nigeria's rate of 917 in the same year. This may be the consequence of the inefficiencies in the way these countries apportion their resources in the health system. This may include poor governance which results in bribery and corruption, poor targeting, misallocation of resources and poor management (Makuta & O'Hare, 2015). According to Transparency International (2020), the sub-Saharan Africa region has an average corruption perception index of 32, with some countries like Somalia recording as low as 9. This means there are high corruption and bribery actions, where public officials tend to embezzle monies meant for the healthcare system, including funds for the acquisition of medicines, improving healthcare facilities, and hiring qualified health workers, which would have improved the health of the population, particularly the poorest who cannot afford high out-of-pocket costs (Hsiao et al., 2019).

Witvliet et al. (2013) analyzed 20 African countries, including 18 sub-Saharan African countries, and found that perceived higher national corruption contributes to the increase in poor health outcomes among the population. For countries with higher quality governance, increase in public health spending lowers under-five mortality and increases life expectancy; as such, governments can pursue and implement quality policies, and efficiently target and use resources in healthcare delivery. However, for countries with bad governance, increase in public health spending has no or low impact on the rate of under-five mortality (Makuta & O'Hare, 2015).

Many SSA countries have borne and continue to face health shocks due to outbreaks and deaths which increase household risks and vulnerability, and lead to significant reduction in health service outcomes as this reduces the health system capacity and resilience (WHO Regional Office for Africa, 2018). Atake (2018) reveals that health shocks in the form of unpredictable diseases, deteriorate the health of individuals, especially the poor and uninsured. For instance, in countries like South Africa where HIV is highly prevalent, households with HIV infections earn 35 percent to 50 percent lower incomes and tend to incur higher out-of-pocket costs compared to unaffected households (Alam & Mahal, 2014). While labor participation declines due to sickness and deaths of infected individuals, labor supply among adolescents and women in the household increase to offset the income losses.

Similarly, the 2014 Ebola outbreak in West Africa presented significant health shocks to the health system due to deaths of many health workers and the closure of several health facilities (Brolin Ribacke et al., 2016). The total fiscal cost for the three most infected countries: Guinea, Liberia and Sierra Leone in 2014 was almost 5 percent of their combined GDP, representing more than \$500 million (Thomas et al., 2014). The current COVID-19 crises has not only taken a toll on human life, but it has been predicted that SSA will experience between 2.1 percent - 5.1 percent decline in 2020 economic growth, costing between \$37 billion and \$79 billion (World Bank, 2020b). Similar declines worldwide are expected to cause global economic downturn and recession which will be larger than any other previous pandemic. Households take their fair share at the end of the spectrum as they are faced with job losses and infections leading to loss in household welfare.

According to WHO Regional Office for Africa (2018), countries can have high resilience to fight disease outbreaks when they have higher income levels and high levels of health expenditure, but for many SSA countries with high fragility, low income, low health investments, weak health systems, large informal workforce and limited access to water and sanitation facilities, the overall health and wellbeing of the most vulnerable, including women and children, will significantly decline. Economic growth is expected to fall drastically for the African countries due to the pandemic, billions of dollars need to be invested in the various health systems to curb the spread of the virus. Estimates also point to an impending global economic recession that will certainly compound the negative impacts of the pandemic. Markedly, many African countries that were

expected to make progress or meet certain targets including under-five mortality (SDG 3.2), primary school enrollment (SDG 4.1) and increased access to clean drinking water (SDG 6.1) by 2030, will experience a halt in progress as the financing and implementation of the SDGs will be threatened (Min, 2021). With an impending global economic crisis, economies are expected to experience declined economic growth and recession which will pose major challenges in achieving positive maternal and child health outcomes (World Bank, 2020b).

While economic growth enables the government and private businesses to invest in the economy through the provision of financial incentives including cash transfers, employment opportunities and microfinance for the population, particularly, women, economic shocks and recessions on the other hand contract economies and this means that governments' ability to finance such investments will be impacted (Ensor et al., 2010). Resources will be channeled to areas that may need immediate attention. In the case of global recession, foreign investments, and assistance from donors which in most cases constitute a substantial portion of developing countries' health sector finance may either diminish or cease (Ensor et al., 2010). The authors show that as countries grow, the impact of economic shocks become weak and so suggesting that for many developing countries in SSA, economic shocks will have severe consequences on the economy. Remittances may decline significantly, and together with declined public spending and social safety nets, households will experience substantial economic challenges (Arieff et al., 2010).

In the case where governments are able to invest in direct and indirect sectors of the health system and in the economy in general, there is an increase in employment opportunities, cash incomes and household wealth. However, the increase in household income does not mean an automatic increase in child nutrition or maternal health outcomes. A positive association between household income and nutritional status of children will depend on how resources are apportioned to food and non-food items, level of quality of food purchased and how such foods are distributed among the individuals within the household (Vollmer et al., 2014). Also, behavioral changes that may occur due to the increase in income will have two distinct outcomes.

As mentioned earlier, it will either increase or decrease maternal and child health outcomes. On the positive side, increased household resources will enable households to provide food with more calories and nutrients for the children, greater access to water and sanitation, health-relevant goods,

social protection, and access to quality healthcare services (Harttgen et al., 2013; Lange & Vollmer, 2017). In Tanzania, Fichera & Savage (2015) found that income increase by 10 percent generally reduces the number of illnesses by 0.02 and increases vaccination of children under six by 0.1. On the other hand, households may increase risky health behaviors such as smoking, drinking and bad eating habits that have a high likelihood of increasing illnesses such as diabetes, hypertension and obesity (Lange & Vollmer, 2017).

## 2.5 Conclusion

Maternal and child mortality rates are not only among the key indicators of maternal and child health, child nutrition and overall wellbeing, but they remain a vital part of the development of countries. The reduction in maternal and child deaths is significant for human capital development and economic growth of countries, making the advancement of the health of women and children across all socio-economic statuses and geographical locations vital. For many countries in sub-Saharan Africa, maternal death, child death and child undernutrition rates are higher compared to other world regions. With such high rates, most of these countries in the region remain incapable of achieving the SDG 3 in a timely manner. Economic growth is considered a key instrument in the reduction of maternal and child deaths, but this relationship is not always positive. Countries with high growth rates may record debilitating population health outcomes. For instance, Ethiopia that was named the fastest growing economy with an accelerated growth rate of 9.5 percent in 2017, also recorded maternal mortality ratio of 401 per 100,000 live births in the same year.

Moreover, many authors have found mixed results, and such inconsistencies have been attributed to the level of investments, focus of investments and interventions in the health system and importantly, healthcare behavior of the population. Poor countries with low income will have significantly low levels of health investments which limit the essential services the population will need for positive health outcomes. Again, when economic growth boosts investments in the healthcare system, it may not increase health outcomes unless there are higher quality governance and low corruption practices. In many SSA countries, health shocks such as HIV/AIDS, Ebola and COVID-19 have threatened and reduced the health system capacity and resilience and coupled with economic shocks that come with such unpredictable illnesses, household have become more susceptible to risks and vulnerabilities. Increase in economic investment by the government can

result in positive or negative individual and household health outcomes based on their healthcare behaviors. Households can either use such increased income to purchase foods and health items that can increase their health status or resort to the consumption of unhealthy foods and items like tobacco and alcohol which can lead to illnesses like hypertension and obesity.

All these factors influence the mechanism between economic growth and maternal and child health outcomes. These factors go a long way to show that although economic growth is important, it is not enough. Understanding the overall relationship and direction between economic growth and maternal and child health outcomes in SSA countries will enable a more comprehensive and sound policies, and community acceptable programs that will strengthen the capacity of the already fragile healthcare system and improve household health behaviors, which will aid in improving maternal and child health outcomes within countries in the region.

## Chapter 3: Health and economic implications of the ongoing coronavirus disease (COVID-19) pandemic on women and children in Africa.

### 3.0 Abstract

The coronavirus disease (COVID-19) pandemic continues to pose major health and economic challenges for many countries worldwide. Particularly for countries in the African region, the existing precarious health status resulting from weak health systems have made the impact of the pandemic more dire. Although the number of the COVID-19 infections in Africa cannot be compared to that of Europe and other parts of the world, the economic and health ramifications cannot be overstated. Significant impacts of the lockdowns during the onset of the pandemic caused disruptions in the food supply chain, and significant declines in income which decreased the affordability and consumption of healthy diets among the poor and most vulnerable. Access and utilization of essential healthcare services by women and children were also limited because of diversion of resources at the onset of the pandemic, limited healthcare capacity, fear of infection and financial constraint. The rate of domestic violence against children and women also increased, which further deepened the inequalities among these groups. While all African countries are out of lockdown, the pandemic and its consequent impacts on the health and socio-economic well-being of women and children persist. This commentary discusses the health and economic impact of the ongoing pandemic on women and children in Africa, to understand the intersectional gendered implications within socio-economic and health systems and to highlight the need for a more gender-based approach in response to the consequences of the pandemic in the Africa region.

**Keywords:** COVID-19 pandemic, Maternal and Child Health Utilization, Nutrition, Domestic Violence, Africa

### 3.1 Introduction

The novel coronavirus disease (COVID-19) pandemic, which began in December 2019 has been marked as the global health crisis of today's society with more than 670 million infections and over five million related deaths across 227 countries and territories (Johns Hopkins, n.d.). As of

August 4, 2022, 55 African countries had recorded a total of more than 11.9 million infections and over 255 thousand deaths (Africa CDC, 2022). Although the aggregate COVID-19 cases in Africa are incomparable to that of Europe and other parts of the world, the economic and health ramifications cannot be overstated. About 85% of Africa's trade is with the rest of the world and therefore lockdowns in China, Europe and the United States resulted in a decline in the demand for African exports, imports of capital and consumer goods, tourism, and foreign direct investment (FDI) inflows (Geda & Yimer, 2019; Gondwe, 2020). The consequences on Africa's economies were more pronounced at the onset of the pandemic given the extent of the decline in global demand and financial inflow (Berg et. al., 2021).

While all African countries are out of lockdown and other restrictive measures, the pandemic and its consequent impacts on the health and socio-economic wellbeing of women and children persist. This commentary therefore discusses the impact of the ongoing pandemic on the health and wellbeing of women and children in Africa, particularly in the areas of reproductive health access and utilization, gender-based violence, forced/ early marriages, and food insecurity and nutrition in two time periods, the first being during the COVID-19 pandemic lockdown, and the second, after the COVID19 pandemic lockdown. This is to understand the intersectional gendered implications within socio-economic and health systems and to highlight the need for a more gender-based approach in response to the consequences of the pandemic in the Africa region.

### 3.2 COVID-19 pandemic lockdown and the health and economic impacts on women and children in Africa

In response to the spread of the pandemic, most governments instituted preventive measures including lockdowns, movement restrictions and social distancing, which resulted in the closure of certain businesses, airports, schools, and vital social services. The resulting consequences were job and income losses, as a higher percentage of people in African countries rely on informal work (UNDP, 2020). Within the first month of the COVID-19 crisis, the International Labor Organization estimated a decline in revenue of about 81% for Africa's informal workers (ILO, 2020). However, women and men experienced the pandemic and the impact of these measures differently. Evidence showed that out of the total proportion of individuals in the informal sector, approximately 70% were women, who dominated small enterprises like the sale of cooked food,

vegetables, foodstuffs and second-hand clothes at the market, which implied that such a large number of women had little to no income security, health insurance or social protection (Women, 2020b). Moreover, since they earned and saved less, they became highly susceptible to economic shocks.

### 3.3 Health implications of the pandemic on women and children

The COVID-19 pandemic and lockdown measures did put pressure on both the demand and supply of healthcare and health systems globally. Besides revealing the gaps and inadequacies in Africa's health systems, the pandemic restriction exacerbated serious societal and health problems as school closures and lockdowns disrupted access to essential health services, increased gender-based violence and early marriages, which negatively affected reproductive health and overall wellbeing.

#### 3.3.1 Health services access and utilization

At the onset of the pandemic, the fight against the spread of the virus required the mobilization of resources to acquire ventilators and personal protective equipment (PPEs) such as gloves, masks, and overalls for frontline workers. This meant that resources were diverted from critical routine health services, particularly those related to sexual and reproductive health services for women, to managing the COVID-19 pandemic. Consequently, the risks of maternal mortality and morbidity, HIV/AIDS infections and related deaths, adolescent pregnancies, and sexually transmitted diseases were heightened (UNFPA, 2020; Women, 2020b). Other factors such as constraints of resources, particularly logistical support for healthcare providers, also contributed to declines in maternal and child health service utilization including family planning, antenatal care, and immunization (Ahmed et. al., 2021). Delayed vaccination campaigns and low routine immunization coverage in many countries resulting from resource demand of the pandemic contributed to 7.7 million children in Africa missing the first dose of Diphtheria-Tetanus-Pertussis (DTP-1), representing 45% of the global figure (WHO, 2021). Consequently, in 2022, 14 out of 23 countries in Southern and Eastern Africa had experienced major measles, cholera, and poliovirus outbreaks (UNICEF, 2023).

In Uganda, facility-based deliveries declined by 3% and maternal deaths also increased by 7.6% (Atim et. al., 2021). Other affected maternal health outcomes included antenatal, sexual, and reproductive health, emergency, obstetric, and postnatal care services (Atim et. al., 2021). Significant declines in facility-based deliveries and first antenatal care attendance were recorded in Sierra Leone and Liberia (Aranda et. al., 2020). Women also avoided seeking health care due to the fear of healthcare-associated infections, which prevented them from accessing routinely required antenatal care (ANC) and post-natal health services (UNFPA, 2020; Rasmussen, et. al., 2020). Significant decrease in neonatal hospital admissions and increase in neonatal mortality as a result of combination of factors including limited healthcare capacity, financial constraint, and fear were reported in the Northern part of Ghana (Abdul-Mumin et. al., 2021). In South Africa, a study found significant decline in the number of women who utilized the services of healthcare providers, but not among men (Abdalla et. al., 2022). However, for women with no post-secondary education, the gender gap was more evident.

While many studies confirmed the above adverse impacts of the pandemic on the health of women and children, other reports showed that utilization of maternal and child health services varied across different countries, maternal health outcomes and waves of the pandemic (Thomas et. al., 2022). The level of impact of the pandemic in a particular country could be influenced by the extent of the outbreak, the influence of restrictive mitigation measures and the preparedness of the health system (Thomas et. al., 2022). Another research pointed out that as the pandemic progressed, it had to be recognized that the impact was not homogeneous among low-middle income countries or even within the same country (Banke-Thomas et. al., 2022; Banke-Thomas & Yaya, 2021). Findings were that at the onset of the pandemic, certain sub-group of the population, specifically, young women were more affected, compared to older women when it came to access to sexual reproductive health, particularly contraceptive commodities (Banke-Thomas et. al., 2022; Banke-Thomas & Yaya, 2021).

Another study revealed that in one of Ethiopia's referral hospitals, while the number of hospital deliveries was stable, family planning programs declined by 95%, antenatal care decreased by over 50% and neonatal admissions, including child emergency visits also decreased by over 70% (Abdela et. al., 2020). Findings from six referral hospitals in Guinea, Nigeria, Tanzania, and

Uganda also showed that despite few interruptions during the first wave, the provision of routine maternal care was maintained (Semaan et. al., 2022). In the Democratic Republic of Congo, even though the rates of facility-based childbirth and second post-natal care visits were not significantly impacted by the pandemic, ANC decreased by almost 45%, following the start of the pandemic in Kinshasa (Hategeka et. al., 2021). Also, in Kenya, women continued to access health facilities, although, about 40% of study respondents reported declined access because of fear of being infected (Oluoch-Aridi et. al., 2020).

### 3.3.2 Domestic violence and early marriages

Domestic violence is a multifaceted phenomenon grounded in a throng of factors including situational factors, and therefore tends to thrive in contexts where vulnerabilities persist (Heise, 1998). It is therefore not surprising that in Africa, intimate sexual violence is widespread, standing at 36%, and exceeding the global average of 30% (Ahinkorah et. al., 2018). Prior to the pandemic, data showed that in over 80 countries, one in three women experienced physical and/or sexual based violence by an intimate partner in a relationship at some point in their lives (García-Moreno et. al., 2013). Moreover, evidence had shown that in the context of crises, women endured compounding forms of violence (Campbell, 2020).

The COVID-19 pandemic nonetheless disrupted economic activities, increased unemployment, and declined incomes, resources, and access to social support and safety nets (Hategeka et. al., 2021; Campbell, 2020). This created a conducive environment for perpetrators and triggered or further compounded the risk of domestic and/or intimate partner violence. Indeed, the surge in domestic violence worldwide resulting from the pandemic earned it the term “intimate terrorism” (Taub, 2020). The increase in reports of domestic violence moreover occurred concurrently in a period where many countries were experiencing compromised healthcare services (Women, 2020a). Life-saving support, resources and care given to women who experienced domestic or intimate partner violence were totally disrupted or less accessible (Women, 2020a). In many areas in Africa, such support was not encouraging even in the pre-COVID-19 era, which meant heightened risk of violence and debilitating health impacts.

Other social problems that increased in many African countries were the rates of child, early and forced marriages and adolescent pregnancies (Phillipose & Aika, 2020). Pre-pandemic estimates showed that 30% of girls in 30 African countries experienced child or forced marriages, with as many as 15 million girls being married of before age 18 (UNFPA-UNICEF, 2018). In four Eastern and Southern African countries, Ethiopia, Mozambique, Uganda and Zambia, where the Global Programme to End Child Marriage (GPECM) was being implemented, data showed that adolescent girls were severely impacted by the pandemic as the rates of violence, child marriage, and teenage pregnancies increased (Phillipose & Aika, 2020). The rise in these numbers were partially attributed to school closures, and limited access to sexual and reproductive health services. In a household survey in Kenya, Uganda, Ethiopia and Senegal, findings showed that the COVID-19 pandemic contributed to perceived increase in child and forced marriages in Kenya because of school closures and loss of income (Esho et. al., 2022). However, the authors found that in Ethiopia and Senegal, the pandemic had limited perceived effect on child or forced marriages, and minimal perceived effect on child and forced marriages in Uganda.

### 3.4 Economic implications of the pandemic on women and children

Beyond the numerous negative health impacts, the pandemic also caused deep economic damage in many African economies. The level of global interconnection and interdependence Africa has with Europe and other parts of the world sent waves of economic shocks across many African countries (Africa Renewal, 2023). This resulted in declines in growth rates, with further estimation of a declined growth for Africa from 4.1% in 2022 to 3.8% in 2023. While the rate of poverty has been persistently and historically high in the region, COVID-19-induced outcomes such as a significant rise in price levels due to disruption in supply chains, falling growth in per capita income and high external debt, have kept many economies and vulnerable population in poverty (Africa Renewal, 2023). One of these shocks was the increase in food insecurity and undernutrition. Prior to the COVID-19 pandemic, Africa recorded the highest prevalence of undernutrition in all of its sub-regions and was home to over 250 undernourished people in 2019. This made it extremely impossible for the continent to advance the achievement of the SDG 2 which calls for an end to hunger, and achieve food security, while improving nutrition and promoting sustainable agriculture (WHO, 2019). Unfortunately, the COVID-19 pandemic posed a

significant threat to both the demand and supply sides of the global food systems. As reported in Sierra Leone during the Ebola outbreak, pandemics tend to disrupt agricultural production and food storage, processing, distribution, transport, trade, and retailing (Kodish et. al., 2019).

In Nigeria, transitory food insecurity occurred during the lockdown days, resulting from a combination of factors such as loss of household incomes and declined purchasing power, increase in post-harvest losses at both farm and market levels, increased food prices, increase in transportation costs and hoarding by marketers, and this led to significant impact on the population (Abdul, 2020). The estimation of the cost of a healthy diet in 2020 exceeded the international poverty line in Africa, with such healthy diets becoming five times more expensive than starchy staples that met only energy needs, and this made healthy food unaffordable to the poor (Erokhin & Gao, 2020). Consequently, in 2021, almost 25 million people in the region were unable to meet their food needs, representing 34% higher than in 2020 (ECOWAS et. al., 2022).

Research has shown that women and children are disproportionately impacted during economic crises, especially when it comes to food security and nutrition (Ben Hassen et. al., 2022). Often, women and girls are vulnerable on all dimensions of food security, and they suffer nutrient deficiencies. Being the main caretakers of children, the elderly and the sick, women tend to restrict their food consumption in their efforts to make more available for the rest of the household (Gromada et. al., 2020; Botreau & Cohen, 2019; FAO, 2020). With high food prices, the affordability and consumption of healthy diets among this vulnerable group became more difficult (WHO, 2020). For school children, school closures which occurred earlier on during the pandemic meant that children who relied on school meals lost such access, which contributed to poor feeding practices and micronutrient deficiencies (Akseer et. al., 2020).

### 3.5 After COVID-19 pandemic lockdowns

Although lockdowns have been lifted in all SSA countries, the negative impacts on the health and socio-economic wellbeing of women and children linger on. The disruption of the pandemic to sexual, reproductive, maternal, newborn, child and adolescent health services, gender-based violence and early marriages will persist in many African countries for a long period of time.

Moreover, research shows that while men are able to return to the pre-crisis level of living conditions within a short period, it takes much longer for women to return to pre-crisis levels of economic security and overall livelihoods (UN, 2020b).

Not only have the impacts of the pandemic further deepened persisting inequalities mainly along gender lines, but also, many women who did not access routine reproductive health services due to health system or personal resource constraint or fear, as recorded in several countries and studies, may certainly face other lasting negative effects (Raru et. al., 2022). For instance, reproductive health services such as antenatal and postnatal care are important in detecting pregnancy and after birth complications, resulting in positive birth outcomes and reduction in maternal and child mortality and malnutrition (Okedo-Alex et. al., 2019). In the same vein, children who missed immunization doses and are not able to catch up, may lose protection against vaccine-preventable diseases, including cholera, measles, rotavirus, rubella and pneumococcal diseases, which affect over 30 million children in Africa yearly, out of which half a million die annually (WHO, 2021). This translates that the obstruction of health access and utilization of these services due to the pandemic lockdown can be risk factors to complicated morbidities or mortalities in future.

Women and children who experience domestic violence encounter life-long physical, mental, psychological, or emotional traumas. Studies show that children who do not experience violence themselves, but who even witness these forms of violence in the household are highly likely to face similar negative issues as children who are victims of physical abuse, emotional abuse or neglect (Chadwick-Charuma et. al., 2022). These impacts tend to influence deviant behaviors such as substance use and abuse, antisocial behaviours towards other children, and an increased likelihood of experiencing violence in their adult lives (Chadwick-Charuma et. al., 2022). Furthermore, violence against women and girls can lead to negative economic related issues, in that, an increase in rates of violence against this group diminish economic activities and economic development of a country (Ouedraogo & Stenzel, 2021). The mental and psychological traumas they experience can induce absenteeism and presenteeism which impact productivity and GDP growth. The authors add that in countries where there are no protective laws against domestic

violence, the economic cost of violence against women is high, and this poses a threat to economic development.

Currently, all schools in African countries that went on lockdowns are reopened, which means that school feeding programs in countries where they existed during the pre-COVID period may have been resumed. However, if children are deprived of vital nutrients over time, they become malnourished, which leads to the development of chronic health issues as immune systems weaken (Owolade et. al., 2022). Similarly, with the reopening of schools, reproductive health and other vital programs that engage girls to stay in school may have resumed their operations to provide essential resources and services, however, children who were married of during the lockdown period may not have any opportunity of returning to school, which may deprive them of economic independence in their adult lives. Moreover, child marriages have significant long lasting negative impacts on the overall wellbeing of these girls. There is the high likelihood for girls who marry to experience domestic violence, face unplanned pregnancies, increase risks of pregnancy complications, and maternal and infant mortality (UNICEF, 2021b). Overall, it's been projected that lost schooling will have longer term impacts on children, with such effects being disproportionately high for children with lower socio-economic backgrounds (British Academy, 2021).

The recovery from the pandemic may vary across the African sub-regions, with some parts faring better quickly than others, however, with the fall in global demand, global inflation, and higher borrowing costs, among other factors, the continent is far from full recovery from the pandemic (Africa Renewal, 2023).

### 3.6 Conclusion

The COVID-19 pandemic has evidently had negative consequences on global health and economies, particularly, in countries in Africa persistently plagued with weak healthcare systems and deprivable maternal and child health outcomes. It is therefore fair to expect a more grievous long-term impact on the health, socioeconomic and overall wellbeing of women and children in Africa. Generally, there are still ongoing impacts of long-COVID, which will require further

mobilization of resources, and this will likely put a strain on already weak health and economic systems (British Academy, 2021).

Although lockdowns have been lifted in all African countries, the disruptive impact of the pandemic restrictions on maternal and child health outcomes will still linger on. While these impacts may be overwhelmingly innumerable and intense, it is not too late to provide comprehensive and tailored services in schools and local communities to address these complex issues through a more gendered lens by prioritizing women's safety in African countries.

As governments and policymakers in the region allocate resources to address the COVID-19 pandemic, comprehensive programs focusing on sexual and reproductive health, continuous education and awareness creation, social welfare services, and research should be part of national and institutional budgets. This will equip the most vulnerable population to deal with the negative impacts of the pandemic. In individual countries, existing policies geared at protecting the rights of women and children against domestic violence and forced marriages should be purposefully enforced, as these factors have multi-throng effects on the overall health of these individuals as well as the economy, both in the short and long run. Without the implementation of strategic interventions, these numbers will rise exponentially by 2050 (UNFPA, 2020). Significant measures should also be pursued remembering the fact that the improvement in women's health is a measure of progress and development in countries.

In learning from the ongoing COVID-19 pandemic, African countries need to remain alert and have action plans in place to effectively deal with future crises. This will help build the capacity of the health and economic systems to withstand emergencies while sustaining the provision and utilization of key services. The pandemic has had intersectional gendered implications and therefore there is a need for a more gender-based approach and response to the continuous impact on women and children in African countries.

## Chapter 4: The impact of economic growth and recessions on maternal and child health outcomes in Sub-Saharan African countries: a systematic literature review

### 4.0 Abstract

**Background:** The discourse surrounding the relationship between economic growth and maternal and child health has extended over several years. Some studies have highlighted the potential of economic growth to enhance maternal and child health, whereas other studies have challenged the conventional belief that economic growth invariably translates to improved maternal and child health. They argue that while economic growth may positively impact health, its significance as a sole determinant of mortality outcomes has declined in recent years compared to the past.

**Aim:** The objective of this systematic review is to consolidate existing literature and offer a comprehensive overview of the relationship between economic growth and maternal and child health outcomes in sub-Saharan African countries.

**Method:** A structured search of Medline, Embase, Web of Science, EconLit, and Global Health was conducted. Inclusion criteria encompassed studies published between 2000 to 2022 that examined national level economic growth and recession in conjunction with health outcomes of mothers and children in sub-Saharan African countries.

**Result:** A total of 1,167 studies were initially identified from the database searches, of which 18 met the inclusion criteria for data extraction. The review presents a range of findings. Eleven studies underscore the significant impact of economic growth in reducing child mortality and undernutrition, and maternal mortality rate. Conversely, other studies indicated insignificant or inconsistent associations, emphasizing the importance of various socio-economic factors such as female education, equitable resource distribution, effective governance, and comprehensive maternal and child health coverage and interventions. These factors are considered crucial in maximizing the benefits derived from national economic growth.

**Conclusion:** Given the scope of this study and the limitations associated with economic growth and health measures, future research might benefit from exploring alternative economic growth indicators that account for several socio-economic factors. These could include the inequality-adjusted Human Development Index and Genuine Progress Indicator. Additionally, a broader timeframe could offer a more comprehensive perspective on the impact of economic growth and recession on maternal and child health in SSA.

The authors declare no competing interests and no funding was received for this work.

**Keywords:** Economic Growth, Recessions, Maternal and Child Health, Sub-Saharan African

## 4.1 Background

### 4.1.1 Economic Growth and recession and Maternal and Child Health

The promotion of macroeconomic growth continues to be advocated in low-income countries, driven by the observation that countries with higher per capita incomes tend to exhibit longer life expectancy and lower infant mortality rates while the poorest countries tend to have the poorest health status (Ogunleye, 2014). The benefits of such economic growth are channelled into investments in the health system, including primary health services and medical advancements aimed to enhance the health and wellbeing of the population, leading to lower mortality rates, and extension of life expectancy. Numerous studies have indeed a strong positive association between economic growth and population health outcomes, within and across countries (O'Hare et. al., 2013; Cole, 2019). In a meta-analysis conducted by O'Hare and colleagues, the relationship between national income and infant and under-five mortality in developing countries was quantified. The findings indicated that with 10% increase in national income, a country with existing infant mortality of 50 per 1000 live births is expected to see this rate reduced to 45 per 1000 live births (Kolbl, 2018). Furthermore, in analysis of data from 187 countries, excluding countries that massively export oil or mining products, a study identified a strong relationship between GDP growth and infant mortality, suggesting that higher GDP corresponds to lower infant mortality (Baird et. al., 2011).

The declines in economic growth (i.e., economic downturns or recessions) have also been shown to have a significant impact on the health and overall wellbeing of the most vulnerable population, with women and children in low-middle income countries (LMICs) bearing disproportionately burden of these consequences (Baird et. al., 2011; Stavropoulou & Jones, 2013; Maruthappu et. al., 2017). The global financial recession in 2008, considered as one of the most substantial economic slowdowns since the Great Depression, had adverse effects on the health of women and children. It as result contributed to an estimated 28,000–50,000 additional infant deaths in sub-Saharan Africa and erased progress which has been made toward achieving the Millennium Development Goals (MDGs) (Friedman & Schady, 2013). Similar to the 2008 recession which posed major threats to the health and living conditions among global population through its impact on food, fuel, and finance, the recent COVID-19 pandemic has had profound negative impact on

global economies and health systems (Stavropoulou & Jones, 2013; Samuels et. al., 2011; UN, 2020a). During the height of the pandemic, many key sectors were severely affected, leading to job and income losses, cuts in household spending on food and health care utilization (Akseer et. al., 2020; Arande et. al., 2022). The adverse consequences and risks this posed on the health and well-being of women and children have been extensively documented (Ahmed et. al., 2021; Atim et. al., 2021; Phillipose and Aika, 2020; Esho et. al., 2022).

However, the conventional view that economic growth invariably translates to improved maternal and child health has been challenged. Several studies have revealed range of impacts of economic growth on maternal and child outcomes, including positive associations, mixed effects, and in some cases, or limited or no associations (Nzayirambaho et. al., 2022; Lange & Vollmer, 2017; Heltberg, 2009). Contrary to the widespread belief that economic growth is the primary driver of improved health and wellbeing is the fact that several sub-Saharan African countries have experienced relatively strong economic growth but remains the region with the worst health outcome globally, while grappling with high poverty levels, and disease prevalence (Ogunleye, 2014; Abidemi, 2023). For instance, a 2004 Human Development Report underscored the disparity between Georgia and Angola, both having similar GDP per capita (US\$2,200 PPP). Georgia exhibited high health levels as those of OECD countries, whereas Angola's health outcomes were among the world's poorest, ranking 166 out of 177 countries (UNDP, 2004). Other studies also argue that while economic growth may positively influence health, its role as a determinant of mortality outcomes has diminished in recent years compared to the past, emphasizing the necessity of equitable income distribution and healthcare investments (Ensor et. al., 2010; Heaton et. al., 2016). For instance, Haddad and colleagues explored household survey data from 12 countries and aggregate data from 61 countries and found that while income can play an important role in reducing malnutrition, it is insufficient as a sole factor (Smith & Haddad, 2002).

In their commitment to reducing mortality and morbidity rates among women and children, numerous Sub-Saharan African countries are actively exploring diverse solutions. Given the ongoing lack of consensus concerning the impact of national-level economic growth and recessions on maternal and child health outcomes, the main objective of this systematic review is to provide a comprehensive synthesis of existing literature. This synthesis provides a current

overview of the relationship between economic growth, recessions, and the health of mothers and children in Sub-Saharan African countries. The primary focus is on examining how economic growth and recessions influence maternal and child health outcomes according to relevant literature. Furthermore, this study highlights additional socioeconomic factors, as revealed by the reviewed studies. These factors are instrumental in maximising the impact of economic growth on maternal and child health outcomes. Findings can also provide policymakers with a nuanced understanding that can inform the formulation of targeted policies aimed at advancing maternal and child health in Sub-Saharan Africa.

## 4.2 Methods

### 4.2.1 Search strategy and selection criteria

A structured search of relevant publications selected from Medline, Embase, Web of Science, EconLit, and Global Health was conducted in September 2020. In collaboration with a departmental librarian, search terms and criteria were created, followed by an initial search on Medline. Subsequently, the query was adapted to the remaining databases. Combination of search terms used were: "Economic Development" OR "Economic growth" OR "Gross Domestic Product" OR "Gross National Income" OR "Gross National Product" Economic downturn" OR "Economic recession" OR "Economic crisis" AND "Maternal Health" OR "Child Health" OR "maternal mortality" OR "child mortality" OR "infant mortality" OR "child nutrition" AND "Africa South of the Sahara" OR "East Africa" OR "West Africa" OR "Southern Africa" OR "Central Africa" OR "Sub-Saharan Africa". The protocol for this review was registered on PROSPERO international register for systematic reviews in September 2022 (CRD42022352086). The search strategy used in each of the database is included in Appendix D.

Results were imported into Covidence software, an online tool designed for managing scoping and systematic reviews. This tool facilitates efficient screening of a large volume of articles, allowing multiple reviewers to assess them simultaneously. Additionally, it enables the export of the titles of included articles to Excel for further analysis (Covidence, 2023). Covidence automatically detected and removed duplicates. Afterwards, the first two authors, HY and OO independently

assessed the titles and abstracts of remaining studies for inclusion. Studies were deemed eligible if they examined the impact of economic growth or recessions on maternal or child health in sub-Saharan African countries. Specifically, studies had to meet the following criteria: (i) health outcomes of mothers and children in SSA; (ii) economic growth and recession variables; (iii) peer reviewed studies published in English between January 2000 to August 2022. This timeframe encompasses periods of economic growth, the 2008/9 global economic recession, and the COVID-19 pandemic induced economic downturn. It also encapsulates the era of the Millennium Development Goals (MDGs - 2000) and the initiation of the Sustainable Development Goals (SDGs - 2015). Both initiatives aimed to reduce maternal and child mortality rates and enhance universal access to reproductive health (WHO, 2018; UNDP, n.d.). By focusing on this timeframe, it offers an opportunity to capture a wider range of literature to comprehend the connections between economic growth, recession, and maternal and child health in sub-Saharan Africa.

The comprehensive review of full articles was conducted by HY and OO, who excluded any study that did not meet the specified criteria. This included those focused on: (i) general population health outcomes; (ii) countries outside of SSA; (iii) household or individual income variables; (iv) studies in other languages before January 2000 and after August 2022; (v) literature review, systematic reviews and meta-analysis. In addition to this, eligible articles were identified through a cross-referencing process and subsequently incorporated into the review.

#### 4.2.2 Data Extraction

HY and OO independently extracted and tabulated the data using a spreadsheet to create a custom extraction form. From each relevant article, data extracted included: title, author, setting (country, region), period of study; study design/source of data (longitudinal, cross-section, time series, Demographic Health Survey, World Bank Data, etc.), objectives of the study, population description, outcome variables (child mortality, child undernutrition, maternal mortality, etc.), explanatory variables (Economic growth, GDP per capita, economic crises, economic downturn, etc.), and the main results in terms of impact on maternal and child health. The third author (SY) was consulted to resolve disagreements between the reviewers.

*Table 4.1: Definitions of measures of income and maternal and child health.*

|                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gross domestic product (GDP) is the standard measure of the value added created through the production of goods and services in a country during a certain period.                                                                                                             |
| GDP growth is the annual average rate of change of the gross domestic product (GDP) at market prices based on constant local currency, for a given national economy, during a specified period of time.                                                                        |
| GDP per capita is the GDP divided by the midyear population and considered as a measure of the standard of living in a country or the level of economic development.                                                                                                           |
| Real GDP per capita a measurement of the total economic output of a country divided by the number of people and adjusted for inflation. It's used to compare the standard of living between countries and over time.                                                           |
| Per capita GNP comprises the gross domestic product (GDP), plus net factor income from abroad, which is the income residents receive from abroad for factor services (labour and capital) less similar payments made to non-residents who contributed to the domestic economy. |
| Gross National Income (GNI) is defined as gross domestic product, plus net receipts from abroad of compensation of employees, property income and net taxes less subsidies on production.                                                                                      |
| Economic recession refers to two consecutive quarters of decline in a country's real gross domestic product (GDP)                                                                                                                                                              |
| Economic downturn refers to a significant decline in economic activity spread across the economy, lasting more than a few months                                                                                                                                               |
| Under 5 mortality rate refers to the probability a newborn would die before reaching exactly 5 years of age. The under-five mortality rate includes neonatal (28 days) and infant (one year) deaths per 1000 live births.                                                      |
| Maternal mortality refers to the death of a woman during pregnancy, at delivery, or soon after delivery                                                                                                                                                                        |

#### 4.2.3 Study Appraisal

The risk of bias of included studies was assessed independently by HY and OO, using the Effective Public Health Practice Project Quality Assessment Tool (EPHPP) (EPHPP, 2019). Since only

national level economic growth variables were considered, only quantitative studies were included. The tool assesses eight domains: (1) selection bias; (2) study design; (3) confounders; (4) blinding; (5) data collection method; (6) withdrawals/ dropouts; (7) intervention integrity; and (8) analyses. Each domain was allocated one of three possible categories for each of the included studies: ‘strong’ (no weak ratings), ‘moderate’ (one weak rating), and ‘weak’ (two or more weak ratings). Given the scarcity of data on the study subject, studies were not excluded based on the quality of the reporting assessment. Differences in quality assessment were resolved through discussion among the authors. All studies show low risk of bias. Also, the Prisma 2020 checklist can be found in Appendix E

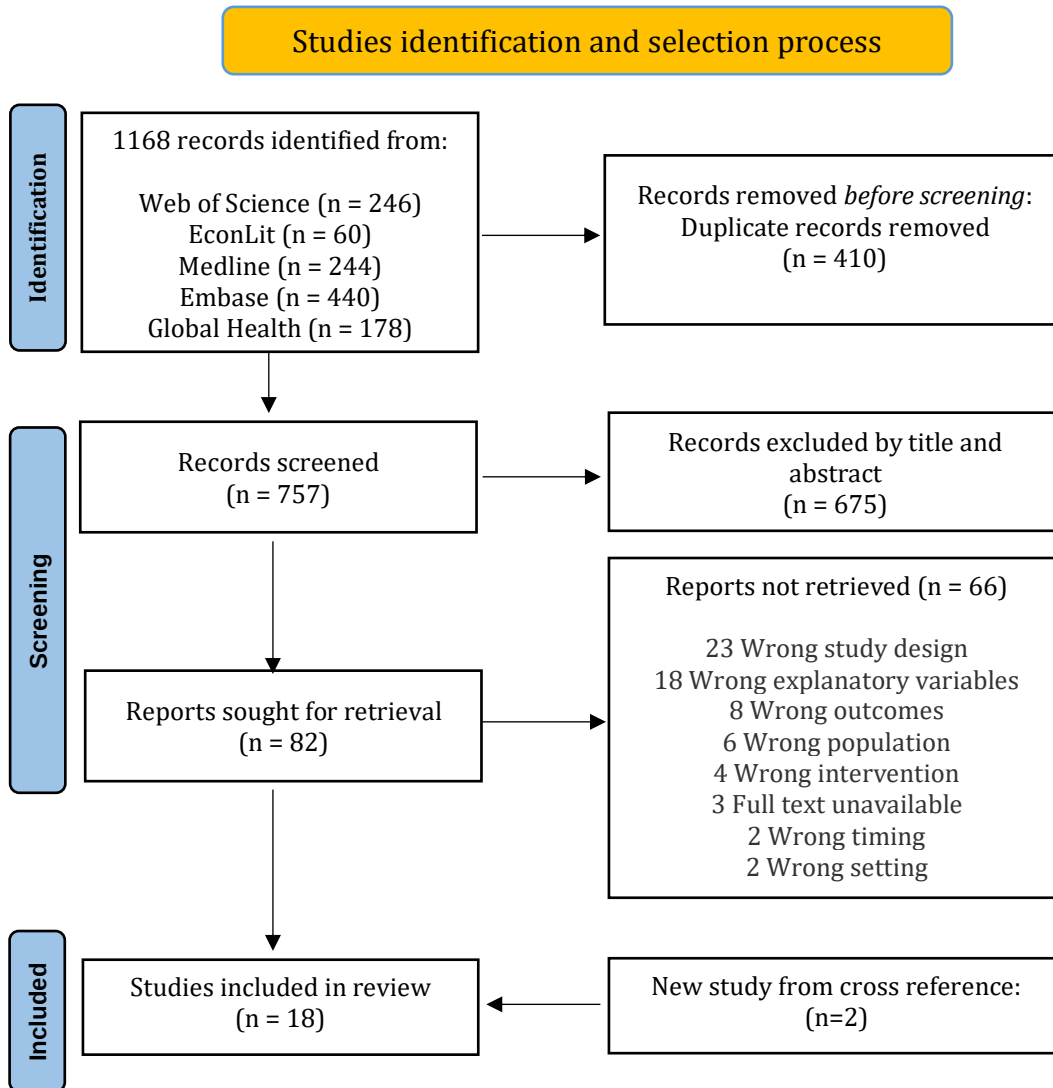
#### 4.2.4 Data analysis and synthesis

The publications were heterogenous in terms of the measures of economic growth and maternal and child health outcomes. In addition, due to the diversity in study designs, methodologies, participant characteristics, and study objectives, a narrative synthesis approach was employed to effectively present the findings of this systematic review. The data was organized based on the primary outcomes investigated in the studies, focusing on the presence or absence of a relationship and the specific health outcomes under consideration, which included child mortality, childhood nutrition, and maternal mortality.

#### 4.3 Results

In total 1,168 documents were initially obtained for review. Following the removal of duplicate records, the number of studies was 757, out of which 675 were excluded after titles and abstracts were screened. Many of the studies excluded primarily addressed general health outcomes, cost effectiveness of health interventions, and issues relating to poverty and inequality. Out of the 82 full texts screened, 18 studies met the inclusion criteria for the review (two studies from cross reference included). Many of the studies were excluded at this stage because national level economic growth variables were not reported. The Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) flowchart was used to document the selection process.

Figure 4.1: PRISMA flow diagram



#### 4.3.1 Study characteristics

All the studies included in the review employed a quantitative research approach. Half (50%) of the included articles, constituting nine studies, were based on time series data. Longitudinal studies accounted for 22% of the total, while cross-sectional studies made up 28%. These studies were published between 2004 and 2022 and covered diverse geographical regions, including aggregate data from the sub-Saharan Africa region, as well as from specific countries such as Ghana, Nigeria,

Ethiopia, South Africa, and Rwanda. Of the studies included, sixteen focused on child health variables, with twelve of them concentrating on different aspects of child mortality, including neonatal, infant, and under-5 mortality. Three studies explored child nutrition outcomes, encompassing undernutrition, stunting, underweight, wasting, and chronic malnutrition, while one study delved into child morbidity, specifically pediatric surgery. Two studies had specific focus on maternal health, specifically the maternal mortality rate. The studies centered on a range of outcome variables, which included economic growth (3 studies), GDP per capita (6 studies), real per capita GDP (2 studies), GDP growth rate (3 studies), per capita gross national product (1 study), gross national income (1 study), economic downturn (1 study), and economic recession (1 study). These studies made use of secondary data sources, such as the World Development Indicators (WDI), Demographic and Health Surveys (DHS), and government data, to analyze the relationships between these various concepts.

*Table 4.2: Study Characteristics*

| Author(s)                 | Year      | Study setting                                    | Study design/source of data                                      | Maternal and Child Health variables                        | Economic growth and recession variable |
|---------------------------|-----------|--------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------|
| Akhmat et. al. (2014)     | 1975-2011 | Major world regions including Sub-Saharan Africa | Time series / IISP (2013) and World Bank (2010a)                 | Infant mortality                                           | GDP per capita                         |
| Akinlo & Sulola (2019)    | 2000-2008 | Sub-Saharan Africa                               | Time series                                                      | Under-five mortality rates Infant mortality                | GDP per capita                         |
| Biadgilign et. al. (2016) | 2000-2010 | Ethiopia                                         | Pooled cross-sectional data / DHS and World Bank data            | Childhood (0-59 months) undernutrition (wasting, stunting) | Real per capita income                 |
| Cardona et. al. (2022)    | 1990-2020 | Sub-Saharan Africa                               | Time series, WDI Database and the UN World Populations Prospects | Under-5 mortality                                          | Economic downturn (GDP per capita)     |

|                               |             |                                                       |                                                                             |                                                                     |                                             |
|-------------------------------|-------------|-------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------|
| Chireshe & Ocran (2020)       | 1995-2014   | Sub-Saharan Africa                                    | Longitudinal / WDI (2017)                                                   | Child health / under 5 mortality                                    | GDP per capita                              |
| Cornia et. al. (2013)         | 1995-2007   | Sub-Saharan Africa                                    | Time series data                                                            | Under-5 mortality                                                   | Economic recession                          |
| Corsi & Subramanian (2017)    | 1990-2009   | sub-Saharan Africa                                    | Repeated cross-sectional data / DHS                                         | Under five mortality                                                | Per capita gross domestic product (pcGDP)   |
| Harttgen et. al. (2013)       | 1991-2009   | Sub-Saharan Africa                                    | Cross sectional data / DHS                                                  | Child (under 5) undernutrition (Stunting, underweight, and wasting) | GDP per capita                              |
| Jemiluyi (2021)               | 1970-2018   | Nigeria                                               | Time series data analysis / WDI database (2019)                             | Infant, neonatal and under-5 mortality                              | Gross Domestic Product (GDP) growth rate    |
| Kofi Boachie et. al. (2018)   | 1980-2014   | Ghana                                                 | Time series / WDI database, World Bank and Government of Ghana publications | Infant mortality rate (IMR), under-five mortality rate (UMR)        | Real per capita income (RGDPC) (US\$ 2005)  |
| Mogford (2004)                | 1970-1997   | Sub-Saharan Africa                                    | Longitudinal analysis                                                       | Under 5 mortality                                                   | Per Capita Gross National Product           |
| Namahoro & Mugabushaka (2020) | 2009 - 2018 | Rwanda                                                | Time series / Central Hospital of the University of Kigali and WHO Data     | Maternal mortality                                                  | Gross National Income (GNI)                 |
| Nyamuranga & Shin (2019)      | 2000-2013   | Sub-Saharan Africa, SADC region, developing countries | Balanced longitudinal data                                                  | Child mortality / Infant and under-five                             | real GDP per capita                         |
| Ogujiuba & Omoju (2013)       | 2000-2010   | Nigeria                                               | Central Intelligence Agency (CIA) World Factbook (2011)                     | Infant mortality                                                    | Economic Growth measured by GDP growth rate |

|                               |               |                       |                                                                                                        |                                                                        |                                                |
|-------------------------------|---------------|-----------------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------|
| Okoye et. al.<br>(2016)       | 2013          | Nigeria               | Pediatric Personnel,<br>Infrastructure,<br>Procedures, Equipment<br>and Supplies<br>(PediPIPES) survey | Pediatric surgical<br>capacity / Children                              | GDP per capita                                 |
| Salahuddin et.<br>al., (2020) | 1985-<br>2016 | South Africa          | Annual time series data                                                                                | Infant and Child Under 5<br>mortality                                  | GDP per capita                                 |
| Sede & Izilien<br>(2014)      | 1980-<br>2011 | Nigeria               | Time series data                                                                                       | Maternal mortality rate                                                | GDP growth rate                                |
| Yaya et al.<br>(2020)         | 1987-<br>2016 | Sub-Saharan<br>Africa | Cross- sectional data /<br>DHS                                                                         | Childhood stunting<br>(stunting and chronic<br>childhood malnutrition) | GDP per capita and<br>GDP growth per<br>capita |

Table 4.3 shows six studies (Akhmat et. al., 2014; Akinlo & Sulola, 2019; Chireshe & Ocran, 2020; Kofi Boachie et. al., 2018; Ogujiuba & Omoju, 2013; Salahuddin et. al., 2020) that investigated the impact of economic growth, measured by GDP growth and GDP per capita, on child mortality. The results indicated that economic growth had significant negative correlation with child health, in that when economic growth increased, infant and under-5 mortality declined. For instance, a time series study conducted in Ghana showed that a 10% increase in real per capita income was associated with a 4.34% to 5.25% decline in childhood mortality (Kofi Boachie et. al., 2018). Similarly, an annual time series study in South Africa indicated that both in the short-term and long-term, economic growth led to a decrease in infant and under 5 mortalities (Salahuddin et. al., 2020).

*Table 1.3: Positive impact of economic growth on child mortality*

| Author(s)                | Main findings                                                           | Study setting                                    |
|--------------------------|-------------------------------------------------------------------------|--------------------------------------------------|
| Akhmat et. al.<br>(2014) | Economic growth has significant and negative impact on infant mortality | Major world regions including Sub-Saharan Africa |

|                             |                                                                                                                                                                   |                    |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Akinlo & Sulola (2019)      | GDP per capita is negative and significant at the 1% level in both pooled OLS and fixed-effects models - for under-five mortality and infant mortality variables. | Sub-Saharan Africa |
| Chireshe & Ocran (2020)     | Real GDP per capita is significantly and negatively related to under 5 mortality                                                                                  | Sub-Saharan Africa |
| Kofi Boachie et. al. (2018) | Real per capita income is significance at 1%. A 10% increase in real per capita income causes 4.34% to 5.25% decline in childhood mortality                       | Ghana              |
| Ogujiuba & Omoju (2013)     | Economic growth exhibits a significant negative long run relationship with infant mortality.                                                                      | Nigeria            |
| Salahuddin et. al., (2020)  | GDP per capita has negative significant effects on indicators of child health outcomes (infant and under 5 mortality) in both the short run and the long run.     | South Africa       |

Regarding insignificant and inconsistent relationship between these variables, a time series study conducted in Nigeria revealed that economic growth, as measured by GDP growth rate, had an insignificant effect on all the measures of child health outcomes considered in the study, including infant, neonatal and under-5 mortality rates) (Jemiluyi, 2021). A longitudinal study conducted in sub-Saharan Africa between 1970 and 1997 also found no association between economic growth and declines in child mortality (Mogford, 2004). Another study in sub-Saharan Africa, which utilized balanced longitudinal data, provided limited evidence to support the notion that higher GDP per capita had a positive impact on infant and under-five mortality (Nyamuranga & Shin, 2019). In a repeated cross-sectional study across sub-Saharan Africa, it was observed that changes in country-level per capita GDP (pcGDP) was not consistently associated with a reduction in under-5 mortality across different model specifications (Corsi & Subramanian, 2017). For instance, the ecological time series models demonstrated that a unit increase in pcGDP was

associated with an 11.6 decrease in under-5 mortality per 1000 live births (95% CI: 29.1, 5.9), while the composite index of maternal, newborn, and child health (MNCH) interventions, calculated as a weighted average of the coverage of eight MNCH interventions, was linked to a more substantial reduction in under-5 mortality (31.9 deaths per 1000 live births; 95% CI: -48.6, -15.3). Additionally, a study conducted in Nigeria failed to identify any evidence indicating that better economic indicators enhanced the capacity to deliver essential and emergency surgical care to children (Okoye et. al., 2016).

*Table 4.4: Insignificant/Inconsistent impact of economic growth on child health.*

| Author(s)                  | Main findings                                                                                                                  | Study setting      |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Corsi & Subramanian (2017) | Changes in country-level per capita GDP (pcGDP) are not consistently associated with a reduction in U5MR                       | Sub-Saharan Africa |
| Jemiluyi (2021)            | Economic growth had an insignificant effect on all measures of child health outcomes.                                          | Nigeria            |
| Mogford (2004)             | National levels of income are not significantly related to levels of child mortality.                                          | Sub-Saharan Africa |
| Nyamuranga & Shin (2019)   | Little evidence to support the positive impact of higher GDP per capita on infant and under-five mortality.                    | Sub-Saharan Africa |
| Okoye et. al. (2016)       | No evidence that better economic indicators increase the ability to deliver essential and emergency surgical care to children. | Nigeria            |

Two studies which examined the impact of economic recession or downturn on child health outcomes, revealed varying findings. One research examined the economic repercussions of the COVID-19 pandemic in sub-Saharan Africa, by employing time series analysis to estimate the indirect economic effects (Cardona et. al., 2022). This analysis assessed the impact of various economic downturn scenarios on under-5 mortality and found that a 15% reduction in GDP

resulted in a significant increase in the total number of under-5 lives lost, surpassing 470,000 (Cardona et. al., 2022). Additionally, a study based on time series data from sub-Saharan Africa found no statistically significant impact of the 2008-2009 economic recession on child mortality (Cornia et. al., 2013).

*Table 4.5: Impact of economic recession on child health*

| Author(s)              | Main findings                                                                     | Study setting                     |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------|
| Cardona et. al. (2022) | 15% downturn increased the total number of under-5 lives lost up to over 470,000. | 129 LMICs including SSA countries |
| Cornia et. al. (2013)  | No statistically significant impact of economic recession on child mortality      | Sub-Saharan Africa                |

In terms of the impact of economic growth on child nutrition, a cross-sectional study conducted in sub-Saharan Africa showed that a 10 percent increase in GDP per capita is associated with 1.5-1.7 percent decrease in the likelihood of being stunted, 2.8-3.0 percent in the likelihood of being underweight, and 3.5-4.0 percent in the likelihood of being wasted (Harttgen et. al., 2013). Another cross-sectional study conducted in sub-Saharan Africa found that an increase in GDP per capita decreased the prevalence of stunting, but no significant association was observed between GDP growth rate and child nutritional status (Yaya et. al., 2020). Furthermore, a pooled cross-sectional study conducted in Ethiopia indicated that economic growth had a significant effect in reducing child undernutrition issues (Biadgilign et. al., 2016).

*Table 4.6: Impact of GDP per capita on childhood nutrition*

| Author(s)                 | Main findings                                         | Study setting |
|---------------------------|-------------------------------------------------------|---------------|
| Biadgilign et. al. (2016) | Economic growth reduces child undernutrition problems | Ethiopia      |

|                         |                                                                                                                                                                                                    |                    |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Harttgen et. al. (2013) | A 10 percent increase in GDP per capita is associated 1.5-1.7 percent lower odds of being stunted, 2.8-3.0 percent lower odds of being underweight, and 3.5-4.0 percent lower odds of being wasted | Sub-Saharan Africa |
| Yaya et. al. (2020)     | Increase in GDP per capita decreases the prevalence of stunting, but there is no significant association between GDP growth per capita and child nutritional status.                               | Sub-Saharan Africa |

A study conducted in Rwanda forecast three years of maternal mortalities based on the influence of gross national income (GNI) in Rwanda and found that although maternal mortality were not statistically different in several years, there was a significant correlation between maternal mortality and GNI (Namahoro & Mugabushaka, 2020). Another study conducted in Nigeria evaluated the impact of economic growth on maternal health and found that a one-unit increase in GDP growth results in a mere 0.008-unit reduction in maternal mortality, indicating a very weak impact. (Sede & Izilien, 2014).

*Table 4.7: Impact of GDP growth rate on maternal mortality*

| First author                  | Main findings                                                                             | Study setting |
|-------------------------------|-------------------------------------------------------------------------------------------|---------------|
| Namahoro & Mugabushaka (2020) | GNI had positive impact in maternal mortality reduction (-0.610, P value $0.012 < 0.05$ ) | Rwanda        |
| Sede & Izilien (2014)         | GDP growth rate had a meager and insignificant impact of 0.008 on maternal mortality rate | Nigeria       |

#### 4.4 Discussion

In summary, most of the studies utilized aggregated secondary data from various regions within sub-Saharan Africa. Many of the researchers employed different data types, such as time series,

longitudinal or pooled cross-sectional data, to examine the relationship between economic growth, recessions, and maternal and child health. The principal findings of this study are that out of the 18 studies analyzed, eleven of them suggested that economic growth and recessions indeed had an impact on maternal and child health outcomes. Specifically, an increase in economic growth was associated with improved child health outcomes such as reduction in child mortality and childhood undernutrition, while economic downturn was found to increase child mortality. However, the seven remaining studies revealed inconsistent or insignificant relationships between economic growth and maternal and child health outcomes, such as child morbidity and maternal mortality rate.

When it comes to the question of whether economic growth can influence maternal and child health outcomes, the answer is not straightforward. While economic growth can potentially lead to improvements in maternal and child health, it is not a guaranteed outcome, as there are many intervening factors that can influence the relationship. To begin with, evidence suggests that economic growth may lead to increased resource allocation for enhancing public healthcare infrastructure, improving capacity of the healthcare workforce, and strengthening social safety nets. These investments can strengthen social and healthcare systems, ensuring improved access to nutrition, clean water, sanitation, and better housing (Corsi & Subramanian, 2017). However, the positive effects of economic growth on maternal and child health can be influenced by a variety of socio-economic factors at the national, community, household, and individual levels (Harttgen et. al., 2013). For instance, enhancements in Maternal, Neonatal, and Child Health (MNCH) coverage and interventions such as antenatal care, vaccination, family planning, and improved sanitation have been strongly associated with reductions in child mortality and play a critical role in lowering the under-5 mortality rate (Corsi & Subramanian, 2017). Female education also plays a crucial role in improving maternal and child health as educated women often have better access to economic opportunities, which can lead to improved living conditions for their households (Chireshe & Ocran, 2020; Corsi & Subramanian, 2017; Harttgen et. al., 2013). Furthermore, education empowers women to make informed decisions regarding reproductive and child healthcare, including family planning, pregnancy-related healthcare, and nutrition (Sede & Izilien, 2014). However, the inequitable allocation of resources, as well as issues such as inequality, corruption, and deficiencies in governance structure, can negatively impact maternal and child

health (Chireshe & Ocran, 2020; Ogujiuba & Omoju, 2013; Salahuddin et. al., 2020). Unless these determinants are addressed and purposefully incorporated into health policies and goals, simply increasing healthcare expenditure may not improve health disparities among the most vulnerable (Heaton et. al., 2016; Sede & Izilien, 2014).

The literature also brought to light that different measures for both the economic growth and maternal and child indicators yielded different relationships and impacts. For instance, one study observed that two distinct economic growth measures, namely GDP per capita and GDP growth per capita, led to differing associations with childhood nutrition. An increase in GDP per capita was linked to a decrease in the prevalence of stunting, while GDP growth rate showed no significant connection with child nutritional status (Yaya et. al., 2020). One possible explanation for this divergence was that the benefits of economic growth tend to be skewed, favoring households in the highest quintile, thus enhancing the well-being of children in these households, while failing to prevent stunting among children in the lowest quintile.

Furthermore, two studies conducted in Nigeria arrived at different conclusions when examining the impact of economic growth on child health (Jemiluyi, 2021; Ogujiuba & Omoju 2013). It's important to note that one of these studies, like a few others in this review, was not specifically designed to investigate the impact of economic growth on maternal and child health (Jemiluyi, 2021). Its primary objective was to explore the long-run relationships between the degree of urbanization and various child health outcomes, but it also included Gross Domestic Product (GDP) growth rate and level of education in its analysis. The study found that economic growth had no significant effect on any of the child health outcomes measures (Jemiluyi, 2021). The authors pointed out that although they did identify positive impact of urbanization on child health, the relationship between urbanization, level of education and child health may have influenced the results. In contrast, the second study investigated the long-term relationship between economic growth and various socio-economic indicators such as poverty, life expectancy, infant mortality, and unemployment rates in Nigeria (Ogujiuba & Omoju 2013). The study revealed that while economic growth displayed a significant negative long-term correlation with infant mortality, it did not effectively reduce poverty or unemployment. This finding suggests that while economic growth may be a necessary factor, it alone is insufficient to consistently bring about a reduction in

infant mortality, alleviate poverty, and advance overall human development (Ogujiuba & Omoju 2013).

These distinct findings, though divergent, point to the importance of focusing on and prioritizing socio-economic determinants that have the potential to enhance maternal and child health in sub-Saharan African countries. They emphasize that these determinants may hold greater significance in promoting positive maternal and child health outcomes than only aiming for higher average income levels in a country marked by high income inequality.

A notable observation from the reviewed studies was the predominant focus on child health outcomes, with 16 out of 18 studies primarily concentrating on child mortality, as opposed to maternal health outcomes, which were represented by only two studies. Again, only one study focused on child morbidity. Nevertheless, it is essential to recognize that relying solely on infant mortality rates, for example, might provide an incomplete picture of a country's overall health trajectory. This is because it is possible that a country's infant mortality rate may decrease while morbidity rates among children or the entire population are on the rise, potentially masking health challenges (Spence & Lewis, 2009). Estimates show that non-communicable diseases (NCDs) such as cancer, hypertension, and diabetes are anticipated to become the primary causes of morbidity and mortality in sub-Saharan Africa post-2050 (Wamai & Shirley, 2022). Given the changing disease patterns in the region, it is imperative for governments to refashion their health policies and invest in surgical care as it has the potential to address surgically treatable diseases, including NCDs (Wamai & Shirley, 2022). Conducting additional studies on the impacts of national economic growth on NCDs and surgical capacities could facilitate governments in understanding this relationship better and making informed resource allocation decisions to enhance the well-being of the most vulnerable populations.

The quality of the data analysed also poses another limitation for this study. The data analyzed in the included studies spanned from 8 years to 48 years, primarily sources from national level surveys and World Bank data, which are also reliant on statistical data provided by member countries (World Bank Data, n.d.). While data collection and quality may have improved in recent years, earlier data from numerous sub-Saharan African countries may have suffered from issues

related to reliability and validity. Consequently, the interpretation of longitudinal data may pose risks, further compounded by pooled cross-country analyses due to variations in the definitions of variables and differences in data quality. Given the diversity of studies in terms of data sources, economic growth measures, and data years, it was not feasible to employ quantitative meta-analytic methods to discern statistical patterns. Moreover, due to the variance in findings and the varying directions of relationships between these concepts, generalizing the findings is not feasible.

Specific to this study, there are some few limitations to consider. Firstly, the chosen timeframe and language criteria of the included literature might have resulted in the exclusion of relevant studies that could have provided diverse contributions into the discussion of the relationship between the concepts of economic growth, recessions, and maternal and child health. Furthermore, while literature emphasizes the importance of other socio-economic variables in explaining positive maternal and child health outcomes alongside economic growth, the study's focus on economic growth variables omitted studies that assessed household or individual level income its influence on these health outcomes. Nonetheless, by systematically compiling relevant literature, this study aims to provide insights and lessons for countries in SSA regarding the diverse multilevel factors that could promote and/or act as a catalyst for a positive impact of economic growth on maternal and child health in SSA region.

#### 4.5 Policy implication

The study's outcome revealed a range of findings regarding the impact of economic growth and recessions on maternal and child health. While some studies identified relationships between these concepts, others reported either inconsistent or insignificant relationships. Nonetheless, this review underscores that while economic growth holds potential for enhancing maternal and child health, it may not be sufficient on its own. Factors such as the coverage and interventions in Maternal, Newborn, and Child Health (MNCH), female education, resource allocation, governance structure, and inequality have been emphasized as important in influencing maternal and health outcomes.

These findings suggest that while the impact of economic growth on maternal and child health is significant and context specific, it is crucial for countries to address various multi-level socio-economic factors that could aid in understanding the unique health needs, allocating appropriate resources, and formulating policies and interventions to improve maternal and child health. This approach acknowledges the contextual disparities, as policies effective in one setting may not necessarily work in another. It allows for maximizing the benefits from economic growth while mitigating potential adverse effects. Failure to address these factors could limit the impact of economic growth on maternal and child health.

There are other alternative measures of economic growth such as inequality-adjusted Human Development Index (IHDI) which measures achievements in health, education and living standards while considering inequality (Klugman, 2010). Another indicator, which has been proposed as either substitute or supplement to GDP as a measure of economic welfare is the Genuine Progress Indicator (GPI). The GPI initially measures GDP and then account for positive non-monetary factors such as volunteer work and household work (mostly borne by women) while subtracting negative factors such as pollution, resource depletion and crime and adjust for inequality (Talbarth & Webb, 2014). These measures are quite complex in their computation; for instance, GPI comprises seven major aggregations derived from 26 underlying indicators. Additionally, these measures might not be universally available across countries, leading to limited not use by many researchers. Nevertheless, due to their incorporation of significant socio-economic factors, they could yield different impacts on maternal and child health. Further research could benefit from employing broader economic growth measures and a more extensive timeframe to gain a comprehensive understanding of the effects of economic growth and recession on maternal and child health in SSA.

#### 4.6 Conclusion

The debate regarding the relationship between economic growth, recessions and maternal and child health has spanned several years. This systematic review examined the literature exploring the relationships between economic growth and health, with a primary focus on child mortality as the

outcome variable. The studies included in this review employed various measures of economic growth, leading to diverse findings. While some studies suggest that economic growth plays a significant role in promoting maternal and child health outcomes, others failed to establish consistent or significant relationships. Considering these diverse findings, the overarching consensus emphasizes the significance of other crucial multi-level socio-economic factors. Factors such as female education, the utilization of maternal, neonatal, and child health (MNCH) coverage and interventions (including antenatal care, vaccination, and family planning), as well as the reduction of inequalities and the improvement of governance structures, all play significant roles. It is therefore evident that economic growth should not be viewed in isolation as the sole determinant of good health. Instead, it is best understood as a fundamental element that maximises its full potential when complemented by other essential socio-economic and health determinants operating at various levels.

## Chapter 5: The impact of the COVID-19 pandemic on the utilization of maternal and child health services in Ghana: a quantitative analysis

### 5.0 Abstract

**Introduction:** The COVID-19 pandemic has had significant effects on healthcare services worldwide. In many sub-Saharan African countries, the repercussions have been severe, with women and children facing significant challenges in their access to and use of essential services. Using the social ecological model which encompasses the interrelation between demand and supply-side barriers, this study examined the impact of the COVID-19 pandemic on the utilization of maternal and child healthcare services in six regions in Ghana.

**Method:** The study used regional level routine and aggregated monthly data from the Ghana Health Services from January 2019 to February 2021. Using interrupted time series model, the data was segregated into two time periods (pre-COVID-19 and during COVID-19) to estimate the changes in utilization of maternal and child healthcare services (first and fourth antenatal care, first and third doses of pentavalent and total deliveries) in the Greater Accra, Ashanti, Bono, North East, Savannah, and Western North regions. Sensitivity analyses were also conducted to understand the distinct impact of the lockdown in Ghana.

**Results:** The impact of the pandemic varied across health services and regions, with the Greater Accra Region experiencing the most significant disruptions in utilization during the COVID-19 pandemic. Antenatal care (ANC) 1 dropped by about 8,600 visits per month ( $p=0.04$ ) and Children's third dose of the pentavalent vaccination declined by 2,000 monthly visits during the pandemic ( $p=0.1$ ). The Western North Region also recorded a decline of about 290 pentavalent 3 vaccinations per month ( $p=0.03$ ). When the lockdown period was excluded, ANC 1 visits decreased by about 1,700 monthly ( $p=0.04$ ) and children's pentavalent 1 vaccination increased by about 2,800 per month ( $p=0.02$ ) in the Greater Accra Region. Four of the six regions experienced no substantial changes in health service utilization.

**Conclusion:** The overall finding reveals that the pandemic disrupted essential health services in Ghana. However, further analysis to understand the contribution of the extra restrictions imposed by lockdowns on access and utilization of MCH suggest that the lockdown period did not contribute significant declines, as anticipated, in the rates of first and forth antenatal attendance in the Greater Accra region. The implementation of strategies at the institutional level mitigated the fear of individuals and improved trust in healthcare professionals while ensuring continuous access to routine maternal and child health services. It is of utmost importance to derive lessons from the many challenges and best practices, ensuring that maternal and child health services remain unaffected as governments implement safety measures. Understanding the pandemic's impact, particularly while considering region-specific factors, and other social ecological factors, is crucial

for formulating effective policy responses to address the persistent repercussions and to prepare for future pandemics.

**Keywords:** COVID-19 pandemic, Maternal and Child Health, Antenatal care, Vaccination, Ghana

## 5.1 Introduction

Enhancing women's access to and utilization of sexual and reproductive healthcare and child health services is not only a fundamental right but also a pivotal priority for global health and national development (Shatilwe et. al., 2021). Nevertheless, in numerous impoverished nations, women in need of pregnancy-related healthcare confront high obstetrical risks including poverty, malnutrition, and inadequate access to medications, healthcare professionals, and facilities (Dansereau et. al., 2016). These obstacles impede their ability to access and utilize healthcare services. Such limited utilization further compounds the challenges associated with maternal and child mortality, ultimately yielding abysmal health outcomes.

Many countries have invested in health services including antenatal care, routine child immunization and nutrition, to improve maternal and child health (MCH) outcomes and have limited preventable deaths especially in sub-Saharan African countries. Studies have shown for instance, that visiting antenatal care at least once can reduce the risk of neonatal mortality by 39% (Tekelab, et. al., 2019). Since 1990, several sub-Saharan African countries have halved maternal mortality levels, representing a decline of 2.3% annually between 1990-2015 (WHO Africa Region, 2020). Global strategies have also been implemented to accelerate the declines in MCH. These strategies include the implementation of Sustainable Development Goals (SDGs) to reduce maternal mortality to less than 70 per 100 000 live births, while calling for the end of preventable deaths of newborns and children under 5 years (WHO, 2023). Achieving these goals require continuous care in MCH, timely interventions during birth complication, and a wholistic approach that identifies and addresses barriers that limit the access to and utilization of quality MCH services at all levels of the health system.

Particularly in Ghana, the government and the Ministry of Health have made several efforts to improve overall population health but particularly MCH outcomes. This includes the

implementation of the Community-based Health Planning and Services (CHPS) initiative which became a part of the national health program in 1999, after a successful piloting in the early 1990s (Awoonor-Williams et. al., 2013). The CHPS has been a strategy to reduce geographical barriers to health access and to achieve universal health coverage, specifically essential primary preventive, curative and promotional health services led by trained nurses known as the Community Health Officer (CHO) and supported by community volunteers, which enhances ownership and involvement in primary healthcare interventions (Awoonor-Williams et. al., 2013). The National Health Insurance Scheme (NHIS) was also introduced in 2003, guaranteeing free maternal health and an increase in the number of skilled birth attendants which increased from 58.7 percent in 2008 to almost 74 percent in 2014 (Wang et. al., 2017). In 2016, the Ministry of Health in consultation with stakeholders within the Northern, Middle, and Southern belts of the country developed a five-year strategy (2017-2021) under the National Healthcare Quality Strategy (NHQS) which particularly focused on areas such as MCH, epidemic-prone diseases, mental health and non-communicable diseases (Ministry of Health, 2017). Consequently, Ghana's maternal mortality ratio declined by about 9 percent from 339 per 100,000 live births in 2010 to 308 per 100,000 live births in 2017, and a decline in under-5 mortality rate from 73 live births per 1000 in 2008 to 45 live births per 1000 in 2020 (WHO African Regions, 2020; UNICEF, 2021a).

Despite such successes, the maternal and child mortality rates are still unacceptably high in many sub-Saharan African countries, as the sub-region accounts for half of all maternal deaths and 41% of global newborn deaths. Moreover, utilization rates of health services and improvements are neither equally distributed across income groups nor geographic location. In Ghana, the share of births attended to by skilled health personnel in the lowest quintile in 2014 was less than half (46.9 percent) of the coverage rate of women in the highest quintile (96.7 percent) (Wang et. al., 2017).

The emergence of the COVID-19 pandemic in 2019 posed a significant challenge to global health systems, making it impossible for poor countries to achieve these targets. Declared as a global pandemic by the World Health Organization on March 11, 2020, COVID-19 affected over 676 million people, with more than 6.8 million deaths as of April 2023 (WHO, 2020a; Hopkins, 2020). While the rate of infections in many African countries are comparably lower than the numbers recorded in Europe and other world regions, the COVID-19 pandemic has challenged the already weak health systems as it has impacted investments in health programs, and healthcare delivery.

It has also exposed persisting deficits and lapses in health service utilization, health inequalities faced by the most vulnerable population, and inadequate health human resources within the healthcare systems (Amu et. al., 2022).

Many governments instituted several response measures at the peak of the pandemic to curb the spread of the virus, and this included lockdowns and restricted mobility, focusing of resources on managing the pandemic, such as the acquisition of personal protective equipment (PPEs) and ventilators, and the provision of care for affected persons (WHO, 2020b). In Ghana, the government embarked on temporary closure of airports and national borders, social distancing measures, ban on public gathering, and closure of schools and non-essential businesses. A three-week partial lockdown in the form of stay-at-home orders was in effect in the Greater Accra and Ashanti regions, the two major regions and COVID-19 hotspots in Ghana (Assan et. al., 2022). For many countries, these measures did put pressure on both the demand for and supply of healthcare services. The provision of healthcare services during this period became strained and vital health services such as maternal sexual and reproductive health services and child health services such as immunization were overlooked as financial investments and staff were diverted from these critical routine health services (Rasmussen et. al., 2020). Many women also avoided seeking health care due to the fear of infections, and there was also an increase in unemployment and poverty rates as a result of lockdowns and movement restrictions (Hailemariam et. al., 2021).

Currently, lockdowns have been lifted in all sub-Saharan African countries; however, the negative effects on the health access and utilization for women and children are far from being fully restored. Moreover, the multiple waves of the pandemic continue to pose severe threat to health systems and MCH outcomes. A recent WHO African Region report found that partly due to the disruption of the pandemic, an estimated number of 390 women will die in childbirth for every 100 000 live births in sub-Saharan African countries by 2030, which is five times higher than the set SDG target of 70 (WHO, 2022a). Several studies show that the impacts of the COVID-19 pandemic may rollback a huge part of the improvement that has been made in MCH outcomes particularly in most low- and middle-income countries (Ahmed et. al., 2021; Estifanos et. al., 2021).

Several research findings show that the COVID-19 pandemic has contributed to significant declines in the utilization of MCH services, including antenatal care, sexual, and reproductive health, emergency, obstetric, postnatal care services, and vaccinations/immunization (Shapira et. al., 2021; Atim et. al., 2021; Aranda et. al., 2022). Numerous authors specifically emphasize that the implementation of lockdowns and stringent rules regarding movement had notable adverse effects on the access to and utilization of Maternal and Child Health (MCH) services. In South Africa, significant declines were reported among women in their ability to utilize the services of health care providers (Abdalla et. al., 2022). An interrupted-times series study design in eight sub-Saharan countries found that although the level of disruptions to MCH varied in these countries, child vaccinations were most affected in all countries, with a short fall of over 320,000 pentavalent three vaccinations (Shapira et. al., 2021). An issue brief by UNICEF also outlined some primary and secondary consequences of the COVID-19 pandemic and its mitigative measures on children and women in Ghana (Least, 2020). The report pointed to the limited use of healthcare services particularly among children between 5-14 years as households were more likely to obtain medical treatment when children are younger than 5 years. Furthermore, antenatal care (ANC) declined and about 14% of households with children 2 years or younger could not obtain their scheduled vaccination because of lack of vaccines, fear of infection, and movement restrictions (Least, 2020).

However, some studies found varied MCH service utilization across various countries, health outcomes and waves of the COVID-19 pandemic (Banke-Thomas et. al., 2022; Ahmed et. al., 2022). These studies suggest that the impact of the pandemic even within a country has not been homogeneous, as the outcome was contingent on factors such as the severity of the outbreak, the stringency of mitigation measures, and the preparedness of the healthcare system to shoulder the pandemic infections (Banke-Thomas et. al., 2022; Banke-Thomas & Yaya, 2021). A study conducted in Ghana employed a household survey to assess the pandemic's impact on the maternal health behavior by comparing pre-pandemic maternal health behavior with post-pandemic information among the same women using data from 2018 to 2020 (Kawakatsu, 2023). In their findings, the authors noted that while COVID-19 had a statistically significant adverse effect on facility deliveries and antenatal care visits, there was no statistically significant impact observed on skilled deliveries. In Kenya, a qualitative study found that while some of the respondents continue to access health facilities despite the fear of contracting the COVID-19 virus, some (less

than half) reported declined access to due to factors such as fear, new hospital policies which restricted entry, economic constraints, and lockdown and curfew induced psychosocial effects (Oluoch-Aridi et. al., 2020). Another study in the Democratic Republic of Congo found varying results regarding maternal health utilization at the onset of the Covid-19 pandemic (Hategeka et. al., 2021). The authors in examining the rate of changes in the use of the maternal health services concluded that overall, while the rates of facility-based deliveries and visit for second post-natal care were not largely affected by the pandemic and its consequent lockdown, antenatal care declined by approximately 45% during the same period.

No matter the magnitude of the disruption in maternal and child health outcomes indirectly brought about by the pandemic, the long-term consequences on women and children are profound. Furthermore, it not only erases several accomplishments made by countries in improving the overall welfare of this vulnerable group, but also exacerbates mortality and morbidity rates, posing significant challenges for many nations to attain the Sustainable Development Goals (SDGs).

#### 5.1.1 Research Objective and questions

This study therefore assesses the impact of the COVID-19 pandemic on maternal reproductive health services and child health services in Ghana: (1) Deliveries per month; (2) ANC 1 per month; (3) ANC 4 per month; (4) receipt of five infant vaccines. Specifically, it examines the differential impact of the COVID-19 pandemic on the utilization of MCH services in six of Ghana's regions.

#### 5.1.2 Significance of the research

This study is significant because even though a majority of women in Ghana utilized ANC (93.2%) and skilled birth attendance (76.9%) as of 2014, the country still recorded high maternal mortality ratio in 2017 (Ameyaw et. al., 2021). As the COVID-19 pandemic continues to affect health care access and utilization, it is important to examine the effect of the pandemic on MCH service utilization. By comparing pre-COVID-19 and COVID-19 trends in the MCH outcomes, the study aid in comprehending the immediate and medium-term repercussions of the COVID-19 pandemic on sub-national levels in Ghana. Moreover, the analysis offers insights specifically into the effects of the lockdown measures on the utilization of maternal and child health services. Consequently,

this study's findings contribute to the existing body of knowledge as it quantifies the pandemic's impact and the extent of disruption, considering various factors that can influence maternal and child health.

### 5.1.3 Theoretical framework

This research is informed by the economic framework of demand and supply side barriers of healthcare utilization (Ensor & Cooper, 2004). According to the framework, the demand side barriers are those that influence the ability to use health services at individual, household, or community levels. Supply side factors relate to those that influence the provision of effective healthcare services. The demand barriers include indirect costs to households, information on health care services/providers, education, community, and cultural preferences as some, while price and quality drugs, technology, efficiency of management/staff are listed as supply barriers. Although the COVID-19 pandemic has undoubtedly fueled both the demand and supply barriers to maternal and child health service access and utilization in many countries, it has also presented different forms of factors which has interacted and influenced maternal and child health service utilization with impacts at various levels of severity. This study is therefore underpinned by the social-ecological model. This model was chosen because it provides a framework for understanding the dynamic interrelations between different multilevel factors, while providing an opportunity to explore the demand and supply side barriers and factors at the individual, interpersonal, community, institutional, and national levels that influence health behaviours (Jang, 2022; Bah & Russo, 2022). In the era of the COVID-19 pandemic these factors encompassed (i) individual factors including some demand side factors such as knowledge, fear, employment status and income that limit the demand and utilization of maternal and child health services; (ii) interpersonal factors: the combination of demand and supply factors such as trust in the family and healthcare professionals; (iii) community factors (e.g., community perception and mistrust, cultural and social norms); (iv) institutional factors are the supply side factors including lack of staff, reduction of routine health services, and the closure of some health facilities; and (v) national policy factors were the COVID-19 policies lockdowns and stay at home orders which influenced other demand barriers like transportation costs (Alabi et. al., 2023; Bekele et. al., 2022). Discrepancies in research results concerning the effects of the COVID-19 pandemic on maternal

and child health underscore the significance of comprehending the interrelation and mutual influence of these elements in a particular area. This understanding could enable a more tailored intervention, directing attention to the most critical factor, thereby optimizing limited resources while enhancing health and overall well-being.

## 5.2 Methodology

### 5.2.1 Study design

This quantitative research used retrospective observational study, which reviewed and used existing secondary data to assess the impact of the COVID-19 pandemic on MCH services. Two time periods were considered: pre-Covid-19 (January 2019 – February 2020) and Covid-19 period (March 2020 – February 2021). A notable disadvantage of using retrospective observational study is that existing data may be incomplete, inconsistent or inaccurate as they may be collected for other intended purposes; however, data for this study were obtained from the Policy, Planning, Monitoring and Evaluation Division (PPMED), a focal unit of the Ghana Health Services (GHS) that is responsible for collecting and collating routine health data from all levels of the health care system, including primary and referral hospitals. The division leads the technical process for strategizing plans and using relevant sources of information to conduct trend assessment, analyze the overall health service performance and monitor progress in key policy implementations. Although data quality cannot be compared to that of many developed nations, such data flaws are minimized.

### 5.2.2 Study setting and population

The research took place in six of Ghana's regions, namely, Greater Accra, Ashanti, Western North, Bono, Savannah, and North East regions, with the population of interest being women and children who attended public facilities for institutional deliveries, antenatal care, and vaccination services before and during the COVID-19 pandemic. The country recorded its first two confirmed cases in the Greater Accra Region on March 12, 2020, and by April 20, 2023, over 170,000 confirmed cases had been recorded with over 1,400 deaths. While the government placed country-wide ban on public gathering and enforced social distancing and movement restrictions, the Greater Accra

and Ashanti regions, being COVID-19 hotspots, experienced a three-week partial lockdown in the form of stay-at-home order (Assan et. al., 2022). The six regions were selected based on the regional distribution of cumulative COVID-19 cases between March 2020 and December 2020. Two regions each were selected from the highest (Greater Accra and Ashanti regions), middle (Western North and Bono regions) and lower (Savannah and North-East regions) values.

*Table 5.1: Demographic characteristics*

| Regions       | Total Population in 2021 (%) | Female population by locality | Total fertility rate* | Residential proximity to health facilities (%)** | COVID-19 cases (as of Dec 2020) |
|---------------|------------------------------|-------------------------------|-----------------------|--------------------------------------------------|---------------------------------|
| Ghana         | 30,832,019                   | 15,631,579                    | 3.1                   | 60.9                                             | 52,962                          |
| Ashanti       | 5,440,463 (17.6)             | 2,760,549                     | 3.0                   | 54.5                                             | 11,170                          |
| Bono          | 1,208,649 (3.9)              | 611,973                       | 3.0                   | 62.4                                             | 635                             |
| Greater Accra | 5,455,692 (17.7)             | 2,776,629                     | 2.2                   | 67.7                                             | 30,140                          |
| North-East    | 658,946 (2.2)                | 336,797                       | 4.5                   | 49.2                                             | 22                              |
| Savannah      | 653,266 (2.1)                | 325,579                       | 3.7                   | 51                                               | 62                              |
| Western North | 880,921 (2.9)                | 428,973                       | 3.0                   | 61.8                                             | 665                             |

\* The average number of children that would be born to a woman by the end of her reproductive lifespan (15-49 years) \*\* The presence of at least one type of health facility (hospitals, clinics, health centres, health posts, CHPS compounds) in a residential cluster.

Sources: Ghana Statistical Service (GSS) – 2021 (Population census)/ Ghana Health Service - COVID-19 updates

Considering table 1, these regions have different demographic characteristics such as population size, fertility rates, and residential proximity to health facilities. The Greater Accra region holds the highest proportion of the population, 17.7%, followed by the Ashanti region, 17.6%. Comparably, the Savannah region is home to only 2.1% of Ghana's total population. While the share of female population follows the same trend, the fertility rate tends to be higher in rural areas than in the urban centers (Ghana Statistical Services, 2021). The Greater Accra Region has about 90% of its population living in urban areas, followed by the Ashanti and Bono regions. These regions have lower total fertility rates, with the Greater Accra Region recording the lowest of 2.2%. In comparison, the share of population living in urban areas in the North East (32.6%), Western North (29.8%) and Savannah (29.6%) regions is quite low. The North East has the highest total

fertility rate (4.5) in the country. The Western North Region however defies this trend and recorded a comparatively lower fertility rate (3.0) (Ghana Statistical Services, 2021).

With regards to residential proximity to health facilities, almost seven in ten residential clusters in the Greater Accra Region have access to at least one health facility, compared to about five in ten in the North-East region. While rural and urban access differ across all regions, Community-based Health Planning and Services (CHPS) compounds are more widely spread but concentrated in the rural parts of the country compared to other types of healthcare facilities such as hospitals, clinics, and maternity homes, which are more widely available in the urban areas (Ghana Statistical Services, 2021). Additionally, 39% residential structures in the Savannah region are underserved; located beyond five kilometers. This rate makes the Savannah region the lead among three others with more than 20% of their residential structures underserved, compared to about 1% in the Greater Accra region.

#### 5.2.3 Data source

Aggregate monthly data on the number of women who were delivered by skilled personnel in a health facility (total delivery), first antenatal care (ANC1) attendance, mothers making 4th ANC visits (ANC4), children vaccinated for the first dose of the pentavalent vaccination (Penta1), and children completing the pentavalent schedule (Penta3), were obtained from the Greater Accra, Ashanti, Bono, North East, Savannah and Western North regions in Ghana. Data on these essential MCH services were obtained from 4,042 health facilities within the 6 regions, including teaching hospitals (3), regional hospitals (3), university hospitals (2), psychiatric hospitals (31), district hospitals (46), polyclinics (31), maternity homes (201), health centers (316), hospitals (290), clinics (528) and Community-based Health Planning and Services (CHPS) (2619).

#### 5.2.4 Ethical approval

The study utilized publicly available data from GHS which were not linked to any personal identifying information such as names or addresses. No ethical approval was therefore obtained. However, permission to acquire and use the data was obtained from the Director General of the GHS.

### 5.2.5 Outcome variables and measures

The MCH indicators used are key performance indicators of primary healthcare. Nearly 75% of all maternal deaths are the result of major complications which are preventable or could be managed when women access ANC services and are attended by skilled health professionals (WHO, 2020). Similarly, 4.4 million children die yearly in SSA from preventable communicable diseases such as Hib diseases along with DPT and Hepatitis B, which could have been curbed through administration of pentavalent vaccines (Gebeyehu et. al., 2022).

The outcome variables employed in the study are as follows:

- Total delivery: the total number of facility-based births attended by skilled health personnel.
- Antenatal care (ANC): health care access and use during pregnancy (WHO, 2021).
  - ANC 1: first contact a pregnant woman makes with a skilled health service provider.
  - ANC 4: the utilization of four antenatal visits, which is the minimum recommended by WHO.
- Pentavalent vaccine (Penta): a five-in-one vaccine that protect children against diphtheria, pertussis, tetanus, hepatitis B and Hemophilus influenza type B (Hib).
  - Penta 1: first dose of the pentavalent vaccination
  - Penta 3: third dose of the pentavalent vaccination

### 5.2.6 Statistical analysis

This study was a secondary analysis of aggregate regional data using a before/after design.

An interrupted-times series analysis, also called piecewise regression approach, was used to compare the levels and trends in each outcome before and after the onset of the COVID-19 Pandemic. Also known as segmented OLS regression, the interrupted-times series analysis allows multiple linear models to be fit to the data for different ranges of the explanatory variables. The health shock of the COVID-19 pandemic made it a significant breakpoint, and therefore, it was necessary to model the regression function in “pieces”, that is pre-Covid-19 pandemic (January 2019 - February 2020) and during the Covid-19 pandemic (March 2020 - February 2021). This was achieved by fitting segmented linear regression models to the pre-COVID and during COVID

data. The models were compared using likelihood ratio tests. The general model form used is as follows:

$$Y_i = \alpha_0 + \alpha_1 + \beta_0 T_{pre} + \beta_1 T_{during} + \epsilon_i$$

where

$\alpha_0$  = model intercepts for pre – covid pandemic

$\alpha_1$  = model intercept for during covid pandemic

$\beta_0$  = coefficient of pre – covid indicators

$\beta_1$  = coefficient of indicators during covid

$T_{pre}$  = indicator of being in the pre – covid period

$T_{post}$  = indicator of being in the covid period

$\epsilon_i$  = error term

The models were fit using the regress function in STATA 17 (©Statacorp) with the `_hascons` option. The differences in intercepts and slopes between the pre- and during covid periods were calculated and tested using STATA's `lincom` command. Differences were considered statically significant if  $p < 0.05$ . The data were aggregated in two ways and the models fit to them separately. For each outcome, the model was first fit to the data from each region separately. This was done to account for the expected heterogeneity between regions. Secondly, the Greater Accra and Ashanti regions were compared (together) to all the four remaining regions for the regional estimates. This was done as they showed similar pre-COVID levels and trends in the outcomes compared to the other regions. These regions are also known to be similar in their levels of economic development, urbanization, and baseline access to healthcare. They were also the regions which saw the imposition of lockdowns in some of their cities.

A second analysis was conducted as sensitivity analysis by repeating each model fit by eliminating the period that lockdowns were in effect. This was done to exclude the contribution of the extra restrictions imposed by these lockdowns on access and utilization of MCH care due to the inability of people to move around freely.

## 5.3 Results

### 5.3.1 Descriptive Statistics

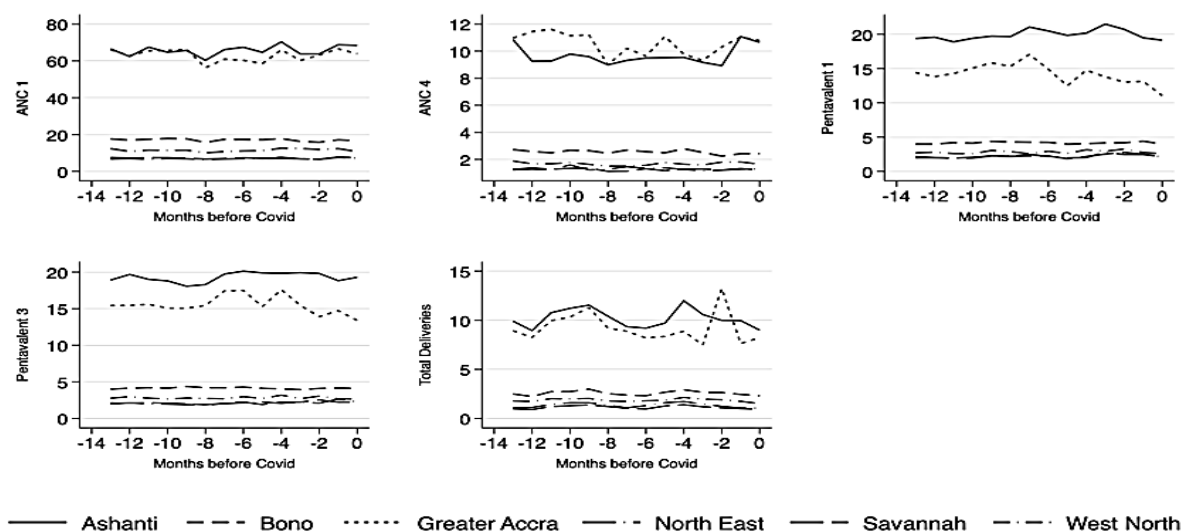
*Table 5.2: Baseline (Pre-COVID-19) distribution of outcomes*

| Region        | Total Deliveries   |                 | 1st ANC             |                   | 4th ANC            |                   | Pentavalent 1       |                   | Pentavalent 3       |                   |
|---------------|--------------------|-----------------|---------------------|-------------------|--------------------|-------------------|---------------------|-------------------|---------------------|-------------------|
|               | Mean<br>(SD)       | Median<br>(IQR) | Mean<br>(SD)        | Median<br>(IQR)   | Mean<br>(SD)       | Median<br>(IQR)   | Mean<br>(SD)        | Median<br>(IQR)   | Mean<br>(SD)        | Median<br>(IQR)   |
| Ashanti       | 10180.2<br>(951.6) | 9976<br>(1421)  | 65759.5<br>(2691.2) | 65946<br>(3671)   | 9673.7<br>(686.4)  | 9504.5<br>(524)   | 19920.3<br>(752.8)  | 19682.5<br>(1071) | 19308<br>(653.1)    | 19492.5<br>(1006) |
| Bono          | 2573.4<br>(228.3)  | 2577<br>(350)   | 17109.9<br>(694.8)  | 17298.5<br>(946)  | 2554.2<br>(146)    | 2544<br>(214)     | 4163.7<br>(149.4)   | 4170<br>(275)     | 4144.6<br>(110.9)   | 4139<br>(102)     |
| Greater Accra | 9200.8<br>(1561.5) | 8874<br>(1735)  | 63057.1<br>(3284.1) | 63537<br>(5718)   | 10537.2<br>(835.1) | 10875.5<br>(1365) | 14209.9<br>(1501.1) | 14339<br>(1941)   | 15534.7<br>(1241.4) | 15447.5<br>(531)  |
| North East    | 1336.2<br>(235.3)  | 1329.5<br>(511) | 6941.9<br>(315.8)   | 6966<br>(405)     | 1294.1<br>(113.7)  | 1263.5<br>(110)   | 2208.9<br>(260.3)   | 2167<br>(471)     | 2103.6<br>(210.1)   | 2079<br>(264)     |
| Savanna       | 1133.9<br>(165.4)  | 1136.5<br>(285) | 7286.6<br>(370.1)   | 7423<br>(468)     | 1256.1<br>(82.3)   | 1268.5<br>(123)   | 2229.3<br>(244.4)   | 2197.5<br>(211)   | 2148.4<br>(164.6)   | 2138<br>(158)     |
| Western North | 1856.6<br>(163.2)  | 1826<br>(244)   | 11532.1<br>(769.7)  | 11500.5<br>(1520) | 1669.7<br>(116.6)  | 1654.5<br>(184)   | 2820.3<br>(227.7)   | 2784.5<br>(334)   | 2813.6<br>(165.3)   | 2751.5<br>(277)   |

Source: elaborated by author

Table 5.2 describes the pre-COVID distribution (mean, standard deviation, median and interquartile range) of the health outcomes by region. Overall, the Greater Accra and Ashanti Regions had the highest rates of ANC attendance averaging more than 60,000 monthly first ANC visits and about 10,000 monthly 4th ANC visits (table 5.2). The North East and Savanna Regions had the lowest average ANC attendance rates with around 7000 monthly first ANC visits and around 1,200 4th ANC visits each. A similar pattern was observed for the total deliveries, first and third doses of the pentavalent vaccinations. The Ashanti region again had about 20,000 pentavalent 1 and about 19,000 pentavalent 3 vaccination visits monthly. The Greater Accra region recorded around 14,000 pentavalent 1 and 15,000 pentavalent 3 vaccination visits monthly. The North East and Savanna Regions had the lowest rates of antenatal care with about 2,300 pentavalent 1 and 3 monthly visits each. The total number of deliveries registered per month closely tracked the number of pentavalent 1 vaccination. Given the demographic characteristics of the selected regions, it is not surprising that the North-East, Savanna and Western North regions reported lower MCH outcomes. For all the outcomes, Greater Accra measures the largest average distance of the data points from the means (SD).

Figure 5.1: Pre-pandemic Trends in Outcomes (x1000)



Source: elaborated by author

Figure 5.1 gives a clearer picture of the pre-pandemic trends in outcomes. For all outcomes, the Bono, North-East, Savannah and Western North regions show steady trends and lower values for MCH outcomes. For the Ashanti Region, Pentavalent 1 and 3 show steady trend compared to the Greater Accra Region that record decreasing trend 6 months before the first COVID-19 confirmed case in Ghana. The Greater Accra Region also recorded a sharp increase in total deliveries (13,227) about 3 months before COVID-19 confirmed cases, followed by a sharp decline a month later.

### 5.3.2 Association between COVID-19 pandemic and maternal and child health

*Table 2.3: Main Regression Analysis Results*

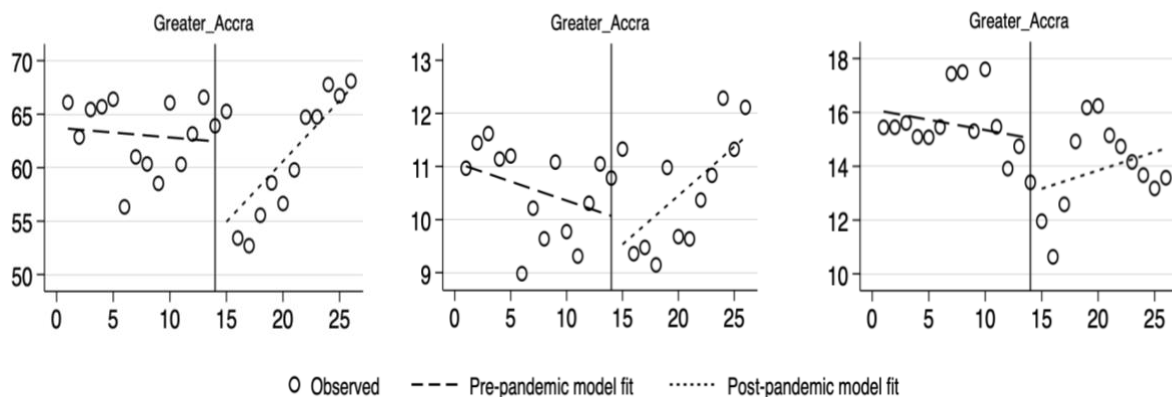
| Location                | Baseline intercept          | Change in Intercept         | p-value     | Baseline slope         | Change in slope         | p-value     |
|-------------------------|-----------------------------|-----------------------------|-------------|------------------------|-------------------------|-------------|
| <b>ANC 1</b>            |                             |                             |             |                        |                         |             |
| All Regions             | 10644.7 (8589.2 - 12700.3)  | -1487 (-4605.1 - 1631.1)    | 0.35        | 17.7 (-241.6 - 276.9)  | 326.2 (-91.1 - 743.5)   | 0.12        |
| Ashanti                 | 67085.6 (60999.9 - 73171.3) | -1535.7 (-11106.1 - 8034.6) | 0.74        | 204 (-591.7 - 999.7)   | 634.1 (-646.6 - 1914.9) | 0.32        |
| Bono                    | 16661.3 (15864 - 17458.6)   | 853.1 (-400.7 - 2106.9)     | 0.17        | -69 (-173.3 - 35.2)    | -21.3 (-189.1 - 146.5)  | 0.79        |
| Greater Accra           | 62463.6 (58503.4 - 66423.8) | -8661 (-14888.7 - -2433.2)  | <b>0.01</b> | -91.3 (-609.1 - 426.5) | 1224.9 (391.5 - 2058.3) | <b>0.01</b> |
| North East              | 7189.4 (6778.4 - 7600.4)    | 466.3 (-180.1 - 1112.6)     | 0.15        | 38.1 (-15.6 - 91.8)    | 4.5 (-82 - 91)          | 0.91        |
| Savanna                 | 7222.9 (6766.5 - 7679.3)    | 340.4 (-377.4 - 1058.1)     | 0.34        | -9.8 (-69.5 - 49.9)    | 29.9 (-66.1 - 126)      | 0.52        |
| Western North           | 11752.9 (10986.9 - 12519)   | -385 (-1589.7 - 819.7)      | 0.51        | 34 (-66.2 - 134.1)     | 85 (-76.2 - 246.2)      | 0.29        |
| <b>ANC 4</b>            |                             |                             |             |                        |                         |             |
| All Regions             | 1579.9 (1306.5 - 1853.3)    | -162.1 (-576.9 - 252.6)     | 0.44        | -12.7 (-47.2 - 21.8)   | 57.4 (1.9 - 112.9)      | <b>0.04</b> |
| Ashanti                 | 9840.3 (9209.5 - 10471.2)   | -146.5 (-1138.6 - 845.6)    | 0.76        | 25.6 (-56.8 - 108.1)   | 26.1 (-106.7 - 158.9)   | 0.69        |
| Bono                    | 2434.1 (2297.5 - 2570.7)    | -13.8 (-228.6 - 201)        | 0.9         | -18.5 (-36.3 - -0.6)   | 16 (-12.8 - 44.7)       | 0.26        |
| Greater Accra           | 10068.9 (9167.7 - 10970.2)  | -719.5 (-2136.8 - 697.8)    | 0.3         | -72 (-189.9 - 45.8)    | 255.9 (66.2 - 445.6)    | <b>0.01</b> |
| North East              | 1263.8 (1117.6 - 1410)      | 121.5 (-108.4 - 351.5)      | 0.28        | -4.7 (-23.8 - 14.4)    | 0.6 (-30.2 - 31.3)      | 0.97        |
| Savanna                 | 1223.8 (1129.2 - 1318.5)    | -80.2 (-229 - 68.7)         | 0.28        | -5 (-17.3 - 7.4)       | 15 (-4.9 - 35)          | 0.13        |
| Western North           | 1659.7 (1551.4 - 1768)      | -134.3 (-304.6 - 36.1)      | 0.12        | -1.5 (-15.7 - 12.6)    | 31 (8.2 - 53.8)         | <b>0.01</b> |
| <b>Pentavalent 1</b>    |                             |                             |             |                        |                         |             |
| All Regions             | 2879.1 (1955.4 - 3802.8)    | -152.9 (-1554.1 - 1248.3)   | 0.83        | -7.6 (-124.1 - 108.9)  | 9.2 (-178.3 - 196.7)    | 0.92        |
| Ashanti                 | 20333.8 (19461.3 - 21206.3) | -546.1 (-1918.2 - 825.9)    | 0.42        | 63.6 (-50.5 - 177.7)   | 31.4 (-152.2 - 215)     | 0.73        |
| Bono                    | 4194.5 (4024.5 - 4364.4)    | -186.4 (-453.7 - 80.9)      | 0.16        | 4.7 (-17.5 - 27)       | -12 (-47.8 - 23.7)      | 0.49        |
| Greater Accra           | 12961.9 (11515 - 14408.9)   | 423.3 (-1852.2 - 2698.8)    | 0.7         | -192 (-381.2 - -2.8)   | 88.2 (-216.3 - 392.8)   | 0.55        |
| North East              | 2428 (2119.2 - 2736.9)      | -318.5 (-804.2 - 167.2)     | 0.19        | 33.7 (-6.7 - 74.1)     | 1.2 (-63.8 - 66.2)      | 0.97        |
| Savanna                 | 2425 (2174.7 - 2675.3)      | -120.6 (-514.2 - 273.1)     | 0.53        | 30.1 (-2.6 - 62.8)     | -21.4 (-74.1 - 31.2)    | 0.41        |
| Western North           | 2913.7 (2681.1 - 3146.3)    | -168.8 (-534.6 - 197)       | 0.35        | 14.4 (-16 - 44.8)      | -32.2 (-81.1 - 16.8)    | 0.19        |
| <b>Pentavalent 3</b>    |                             |                             |             |                        |                         |             |
| All Regions             | 2899 (2169 - 3629)          | -547.6 (-1654.9 - 559.7)    | 0.33        | 4.2 (-87.9 - 96.2)     | 47.6 (-100.6 - 195.7)   | 0.53        |
| Ashanti                 | 19659 (18918.9 - 20399)     | -520.7 (-1684.5 - 643.1)    | 0.36        | 54 (-42.8 - 150.8)     | 72.2 (-83.6 - 227.9)    | 0.35        |
| Bono                    | 4105.6 (3991.4 - 4219.7)    | -126.6 (-306.2 - 52.9)      | 0.16        | -6 (-20.9 - 8.9)       | 3.3 (-20.7 - 27.3)      | 0.78        |
| Greater Accra           | 15038.2 (13502.1 - 16574.3) | -2009.3 (-4425 - 406.4)     | <b>0.1</b>  | -76.4 (-277.2 - 124.5) | 212.7 (-110.6 - 535.9)  | 0.19        |
| North East              | 2317.3 (2107.9 - 2526.6)    | -252.9 (-582.1 - 76.4)      | 0.13        | 32.9 (5.5 - 60.2)      | -9.5 (-53.5 - 34.6)     | 0.66        |
| Savanna                 | 2271.7 (2108.5 - 2434.8)    | -84.5 (-341.1 - 172)        | 0.5         | 19 (-2.4 - 40.3)       | -1.4 (-35.8 - 32.9)     | 0.93        |
| Western North           | 2823.7 (2654.2 - 2993.3)    | -291.7 (-558.2 - -25.1)     | <b>0.03</b> | 1.6 (-20.6 - 23.7)     | 8.1 (-27.6 - 43.8)      | 0.64        |
| <b>Total Deliveries</b> |                             |                             |             |                        |                         |             |
| All Regions             | 2879.1 (1955.4 - 3802.8)    | -152.9 (-1554.1 - 1248.3)   | 0.83        | -7.6 (-124.1 - 108.9)  | 9.2 (-178.3 - 196.7)    | 0.92        |
| Ashanti                 | 20333.8 (19461.3 - 21206.3) | -546.1 (-1918.2 - 825.9)    | 0.42        | 63.6 (-50.5 - 177.7)   | 31.4 (-152.2 - 215)     | 0.73        |
| Bono                    | 4194.5 (4024.5 - 4364.4)    | -186.4 (-453.7 - 80.9)      | 0.16        | 4.7 (-17.5 - 27)       | -12 (-47.8 - 23.7)      | 0.49        |
| Greater Accra           | 12961.9 (11515 - 14408.9)   | 423.3 (-1852.2 - 2698.8)    | 0.7         | -192 (-381.2 - -2.8)   | 88.2 (-216.3 - 392.8)   | 0.55        |
| North East              | 2428 (2119.2 - 2736.9)      | -318.5 (-804.2 - 167.2)     | 0.19        | 33.7 (-6.7 - 74.1)     | 1.2 (-63.8 - 66.2)      | 0.97        |
| Savanna                 | 2425 (2174.7 - 2675.3)      | -120.6 (-514.2 - 273.1)     | 0.53        | 30.1 (-2.6 - 62.8)     | -21.4 (-74.1 - 31.2)    | 0.41        |
| Western North           | 2913.7 (2681.1 - 3146.3)    | -168.8 (-534.6 - 197)       | 0.35        | 14.4 (-16 - 44.8)      | -32.2 (-81.1 - 16.8)    | 0.19        |

Source: elaborated by author

During the pre-pandemic period (January 2019 - February 2020), over 62,000 women accessed first antenatal care in the Greater Accra Region, but during the COVID-19 pandemic (March 2020 - February 2021), the region recorded a statistically significant decrease ( $p=0.01$ ) in the level of first antenatal attendance as shown in Table 5.3 and Figure 5.2. Compared to the pre-pandemic levels (baseline), the level of ANC 1 visits dropped by about 8,600 visits per month. This effect persisted and increased in magnitude to a drop of about 14,000 monthly visits ( $p=0.04$ ) when the

contribution of the lockdown period was accounted for in the sensitivity analysis (Table 5.4). There was also a drop of about 700 visits a month for the fourth antenatal care visits for the Greater Accra Region in the main findings, but this was not statistically significant. However, when the lockdown period was excluded from the analysis, the effect became statistically significant with a decrease of about 1,700 monthly visits ( $p=0.04$ ). Children's third dose of the pentavalent vaccination recorded over 15,000 monthly visits pre-pandemic, however, the level declined by 2,000 monthly visits during the pandemic ( $p=0.1$ ). No other significant changes in levels were observed for Greater Accra in the main analysis, however, when the lockdown period was excluded, Children's pentavalent 1 vaccination were found to have increased by about 2,800 per month ( $p=0.02$ ) from baseline (Table 5.4). The Western North Region also saw a drop of about 290 pentavalent 3 vaccinations per month ( $p=0.03$ ) during the COVID period compared with the pre-pandemic trend. This drop remained the same in the sensitivity analysis as no lockdown occurred in the Western North Region.

*Figure 5.2: Selected results for the Greater Accra Region (x1000)*



Before the outbreak, the Greater Accra Region recorded declining trends in first and fourth antenatal care attendance every month (Figure 5.2). Similar declining trend was recorded for ANC 4 attendance in the Western North region. Following the COVID-19 outbreak, ANC 1 attendance was found to be increasing in the Greater Accra Region at a rate of about 1,200 additional visits per month each month compared to baseline ( $p=0.01$ ). This effect remained after excluding the lockdown period, increasing to 1,800 additional visits per month each month during the pandemic ( $p<0.001$ ). Similarly, ANC 4 attendance was found to increase by 250 additional monthly visits

each month ( $p=0.01$ ), persisting and increasing to about 370 additional visits per month during the COVID period excluding lockdowns ( $p<0.001$ ). The Western North Region also experienced increase in ANC 4 attendance by 30 additional visits per month each month during the pandemic ( $p=0.01$ ), which remained consistent in the sensitivity analysis. The all regions result which compared ANC 4 attendance of the Greater Accra and Ashanti regions (together) to the other regions also showed an increase of about 50 additional visits per month each month ( $p=0.04$ ), increasing to about 60 visits per month excluding lockdowns ( $p=0.02$ ).

*Table 5.4: Sensitivity Analysis Results*

| Location                | Baseline intercept          | Change in Intercept           | p-value     | Baseline slope         | Change in slope          | p-value     |
|-------------------------|-----------------------------|-------------------------------|-------------|------------------------|--------------------------|-------------|
| <b>ANC 1</b>            |                             |                               |             |                        |                          |             |
| All Regions             | 10644.5 (8614.5 - 12674.5)  | -1565.3 (-4832.6 - 1702)      | 0.35        | 17.7 (-237.8 - 273.1)  | 338.3 (-91.5 - 768.2)    | 0.12        |
| Ashanti                 | 67085.6 (60922 - 73249.2)   | -3987.4 (-16376.8 - 8401.9)   | 0.51        | 204 (-601.8 - 1009.9)  | 919.3 (-642.8 - 2481.4)  | 0.23        |
| Bono                    | 16661.3 (15864 - 17458.6)   | 853.1 (-400.7 - 2106.9)       | 0.17        | -69 (-173.3 - 35.2)    | -21.3 (-189.1 - 146.5)   | 0.79        |
| Greater Accra           | 62463.6 (59482.6 - 65444.6) | -14208.7 (-20200.8 - -8216.6) | <b>0</b>    | -91.3 (-481.1 - 298.4) | 1862.2 (1106.6 - 2617.7) | <b>0</b>    |
| North East              | 7189.4 (6778.4 - 7600.4)    | 466.3 (-180.1 - 1112.6)       | 0.15        | 38.1 (-15.6 - 91.8)    | 4.5 (-82 - 91)           | 0.91        |
| Savanna                 | 7222.9 (6766.5 - 7679.3)    | 340.4 (-377.4 - 1058.1)       | 0.34        | -9.8 (-69.5 - 49.9)    | 29.9 (-66.1 - 126)       | 0.52        |
| Western North           | 11752.9 (10986.9 - 12519)   | -385 (-1589.7 - 819.7)        | 0.51        | 34 (-66.2 - 134.1)     | 85 (-76.2 - 246.2)       | 0.29        |
| <b>ANC 4</b>            |                             |                               |             |                        |                          |             |
| All Regions             | 1588.9 (1317.7 - 1860)      | -246.1 (-682.6 - 190.3)       | 0.27        | -12.7 (-46.8 - 21.4)   | 67.4 (10 - 124.8)        | <b>0.02</b> |
| Ashanti                 | 9840.3 (9228.9 - 10451.8)   | -699.6 (-1928.7 - 529.6)      | 0.25        | 25.6 (-54.3 - 105.6)   | 89.4 (-65.6 - 244.4)     | 0.24        |
| Bono                    | 2434.1 (2297.5 - 2570.7)    | -13.8 (-228.6 - 201)          | 0.9         | -18.5 (-36.3 - -0.6)   | 16 (-12.8 - 44.7)        | 0.26        |
| Greater Accra           | 10068.9 (9268.1 - 10869.8)  | -1744 (-3353.7 - -134.3)      | <b>0.04</b> | -72 (-176.7 - 32.7)    | 373.4 (170.4 - 576.3)    | <b>0</b>    |
| North East              | 1263.8 (1117.6 - 1410)      | 121.5 (-108.4 - 351.5)        | 0.28        | -4.7 (-23.8 - 14.4)    | 0.6 (-30.2 - 31.3)       | 0.97        |
| Savanna                 | 1223.8 (1129.2 - 1318.5)    | -80.2 (-229 - 68.7)           | 0.28        | -5 (-17.3 - 7.4)       | 15 (-4.9 - 35)           | 0.13        |
| Western North           | 1659.7 (1551.4 - 1768)      | -134.3 (-304.6 - 36.1)        | 0.12        | -1.5 (-15.7 - 12.6)    | 31 (8.2 - 53.8)          | <b>0.01</b> |
| <b>Pentavalent 1</b>    |                             |                               |             |                        |                          |             |
| All Regions             | 2826.3 (1934.7 - 3717.9)    | 276.8 (-1158.2 - 1711.8)      | 0.7         | -7.6 (-119.8 - 104.6)  | -39.3 (-228.1 - 149.5)   | 0.68        |
| Ashanti                 | 20333.8 (19569.4 - 21098.2) | 803.9 (-732.7 - 2340.5)       | 0.29        | 63.6 (-36.3 - 163.6)   | -120.3 (-314 - 73.4)     | 0.21        |
| Bono                    | 4194.5 (4024.5 - 4364.4)    | -186.4 (-453.7 - 80.9)        | 0.16        | 4.7 (-17.5 - 27)       | -12 (-47.8 - 23.7)       | 0.49        |
| Greater Accra           | 12961.9 (11747.6 - 14176.3) | 2869.7 (428.7 - 5310.8)       | <b>0.02</b> | -192 (-350.8 - -33.2)  | -188.5 (-496.3 - 119.2)  | 0.22        |
| North East              | 2428 (2119.2 - 2736.9)      | -318.5 (-804.2 - 167.2)       | 0.19        | 33.7 (-6.7 - 74.1)     | 1.2 (-63.8 - 66.2)       | 0.97        |
| Savanna                 | 2425 (2174.7 - 2675.3)      | -120.6 (-514.2 - 273.1)       | 0.53        | 30.1 (-2.6 - 62.8)     | -21.4 (-74.1 - 31.2)     | 0.41        |
| Western North           | 2913.7 (2681.1 - 3146.3)    | -168.8 (-534.6 - 197)         | 0.35        | 14.4 (-16 - 44.8)      | -32.2 (-81.1 - 16.8)     | 0.19        |
| <b>Pentavalent 3</b>    |                             |                               |             |                        |                          |             |
| All Regions             | 2839.9 (2163.1 - 3516.6)    | -81.3 (-1170.5 - 1007.9)      | 0.88        | 4.2 (-81 - 89.3)       | -4.5 (-147.8 - 138.8)    | 0.95        |
| Ashanti                 | 19659 (18979.8 - 20338.1)   | 100.8 (-1264.3 - 1465.9)      | 0.88        | 54 (-34.8 - 142.8)     | 3.8 (-168.3 - 175.9)     | 0.96        |
| Bono                    | 4105.6 (3991.4 - 4219.7)    | -126.6 (-306.2 - 52.9)        | 0.16        | -6 (-20.9 - 8.9)       | 3.3 (-20.7 - 27.3)       | 0.78        |
| Greater Accra           | 15038.2 (13727.1 - 16349.3) | 424.7 (-2210.7 - 3060.1)      | 0.74        | -76.4 (-247.8 - 95)    | -60.2 (-392.5 - 272.1)   | 0.71        |
| North East              | 2317.3 (2107.9 - 2526.6)    | -252.9 (-582.1 - 76.4)        | 0.13        | 32.9 (5.5 - 60.2)      | -9.5 (-53.5 - 34.6)      | 0.66        |
| Savanna                 | 2271.7 (2108.5 - 2434.8)    | -84.5 (-341.1 - 172)          | 0.5         | 19 (-2.4 - 40.3)       | -1.4 (-35.8 - 32.9)      | 0.93        |
| Western North           | 2823.7 (2654.2 - 2993.3)    | -291.7 (-558.2 - -25.1)       | <b>0.03</b> | 1.6 (-20.6 - 23.7)     | 8.1 (-27.6 - 43.8)       | 0.64        |
| <b>Total Deliveries</b> |                             |                               |             |                        |                          |             |
| All Regions             | 2879.1 (1955.4 - 3802.8)    | -152.9 (-1554.1 - 1248.3)     | 0.83        | -7.6 (-124.1 - 108.9)  | 9.2 (-178.3 - 196.7)     | 0.92        |
| Ashanti                 | 20333.8 (19461.3 - 21206.3) | -546.1 (-1918.2 - 825.9)      | 0.42        | 63.6 (-50.5 - 177.7)   | 31.4 (-152.2 - 215)      | 0.73        |
| Bono                    | 4194.5 (4024.5 - 4364.4)    | -186.4 (-453.7 - 80.9)        | 0.16        | 4.7 (-17.5 - 27)       | -12 (-47.8 - 23.7)       | 0.49        |
| Greater Accra           | 12961.9 (11515 - 14408.9)   | 423.3 (-1852.2 - 2698.8)      | 0.7         | -192 (-381.2 - -2.8)   | 88.2 (-216.3 - 392.8)    | 0.55        |
| North East              | 2428 (2119.2 - 2736.9)      | -318.5 (-804.2 - 167.2)       | 0.19        | 33.7 (-6.7 - 74.1)     | 1.2 (-63.8 - 66.2)       | 0.97        |
| Savanna                 | 2425 (2174.7 - 2675.3)      | -120.6 (-514.2 - 273.1)       | 0.53        | 30.1 (-2.6 - 62.8)     | -21.4 (-74.1 - 31.2)     | 0.41        |
| Western North           | 2913.7 (2681.1 - 3146.3)    | -168.8 (-534.6 - 197)         | 0.35        | 14.4 (-16 - 44.8)      | -32.2 (-81.1 - 16.8)     | 0.19        |

Source: elaborated by author

In both the main analysis and sensitivity analysis, no statistically significant changes were observed in the levels or trends for total deliveries or in any MCH outcomes for the Bono, North East, and Savannah regions.

## 5.4 Discussion

This study examined the impact of the COVID-19 pandemic on maternal and child health service utilization in six of Ghana's regions. Segmented OLS models were used to analyse facility based regional aggregate data from January 2019 to February 2021, to compare the levels and trends in each MCH outcome before and after the onset of the COVID-19 Pandemic. To the best of our knowledge, this study represents the first attempt to quantify the changes in maternal and child health services utilized at public facilities across different regions of Ghana and explore the distinct impact of the COVID-19 pandemic at the sub-national level. The findings revealed substantial declines in MCH service utilization during the COVID-19 pandemic, however, no statistical difference was found for the number of facility-based births attended by skilled health personnel before and during the COVID-19 pandemic. Like earlier studies, the findings show that the impact of the pandemic varied across MCH service type and regions (Banke-Thomas et. al., 2022; Ahmed et. al., 2022; Banke-Thomas & Yaya, 2021).

The main findings show that women's first and fourth antenatal care visits and children's third dose of the pentavalent vaccination experienced significant disruptions. With the antenatal care visits, an earlier study from Ghana and several sub-Saharan African countries found that pregnant women deferred or canceled initial antenatal care visits as well as attendance of the fourth antenatal care during the pandemic (Least, 2020; Shapira et. al., 2021). Studies from multiple countries such as Nigeria, South Africa, Kenya, and Sierra Leone also found substantial reduction in the number of women attending antenatal care clinics during the COVID-19 pandemic (Aranda et. al., 2022; Assefa et. al., 2021; Temesgen et. al., 2021). Concerning child healthcare services, the results indicate reductions in the pentavalent 3 vaccination for children, aligning with a prior study that measured the disruption in maternal and child health across eight Sub-Saharan African nations (Shapira et. al., 2021). The study observed that the administration of the third dose of pentavalent vaccine declined for a minimum of one month in seven of the eight countries examined. These declines were attributed to a combination of various social-ecological factors, both on the demand

and supply sides, that collectively impacted critical maternal and child health services. Previous reports have suggested that concerns about contracting the virus, healthcare worker exhaustion, the closure of health facilities, service interruptions, and a lack of protective equipment during the height of the pandemic might have deterred women from seeking this essential service, which plays a crucial role in early detection and prevention of pregnancy complications (Least, 2020; Banke-Thomas et. al., 2022; Abdalla et. al., 2022; Asuming et. al., 2022).

Additionally, the study revealed that the Greater Accra Region encountered the most pronounced service utilization interruptions throughout the COVID-19 pandemic. One potential reason for this trend is that the Greater Accra Region was a COVID-19 hotspot, with the highest count of confirmed cases recorded between March 2020 and December 2020. This presented significant challenges to maternal and child health access and utilization. A separate study that accessed the influence of the COVID-19 pandemic on access to health services and utilization in three Sub-Saharan African nations presented results indicating that the effects of the pandemic on health access escalates as the burden of COVID-19 cases became more substantial (Assefa et. al., 2021). Although the Western North Region reported a relatively lower COVID-19 confirmed cases during the same period, the findings indicate declines in the number of the third dose of the pentavalent vaccine for children. Notably, the Western North Region shares its borders with five other regions, three of which reported higher confirmed cases, including the Ashanti Region, which was identified as a COVID-19 hotspot and underwent lockdown measures. Concerns about contracting COVID-19 may have had a substantial impact on the decrease in accessibility, and utilization of this child health service.

While there was a fairly rapid recovery of MCH outcomes after the initial drop in the maternal and child health indicators that experienced significant declines, there was not enough data in this study to analyze a post-COVID-19 impact which could have helped determine if these health outcomes recovered and caught up to its pre-pandemic levels. However, several studies have found that the disruptions of reproductive, maternal, newborn, and child health services resulting from the pandemic will persist and shape health outcomes for years to come (Abdalla et. al., 2022; Adu et. al., 2022). Insights from the West African Ebola outbreak demonstrated that interruptions in healthcare utilization, particularly regarding measles vaccinations, led to a persistently high incidence of measles for a period of two years following the outbreak (Delamou et. al., 2017;

Masresha et. al., 2020; Wesseh et. al., 2017). This underscores that postponing or discontinuing these essential healthcare services can lead to substantial, long-term health issues or loss of life.

Further analysis to understand the contribution of the extra restrictions imposed by lockdowns on access and utilization of MCH suggest that the lockdown period did not contribute significant declines, as anticipated, in the rates of first and forth antenatal attendance in the Greater Accra region. This is in contrast to numerous studies conducted across sub-Saharan African countries and globally which has shown that the lockdown restriction impeded women's access and utilization of health services. These positive health outcomes reflect the interrelation of health interventions at various levels which impacted health behaviors. In applying the social ecological theory and demand and supply side barriers of healthcare utilization to Ghana's case, the potential explanation for these observations is that on the level of national policy in Ghana, partial lockdowns in the form of stay-at-home orders were implemented only in two hotspot regions (Assan et. al., 2022). Moreover, the partial lockdown lasted only three weeks. At the institutional level, health institutions and officials adopted new strategies during this period to ensure uninterrupted access to essential and routine healthcare services. Rather than closing healthcare facilities, officials opted for an extensive COVID-19 screening process at all facility entrances to mitigate the risk of patient infections (Dwomoh et. al., 2023). Community health workers also delivered basic and regular vital healthcare services, such as antenatal care to patients in their homes, which improved trust in healthcare professionals. Health facilities adopted appointment systems where healthcare professionals scheduled meeting times with patients. These approaches ensured that essential maternal and child health services were accessible to patients without exposing them to the risk of infection in healthcare facilities, which mitigated the fear of contracting the disease. In general, factors on the supply side were enhanced to address health issues stemming from a combination of individual's fear, closure of healthcare facilities, movement restrictions, decreased employment, income loss, and the consequent shift in priorities.

A previous study, which examined healthcare utilization patterns before and during COVID-19 in three Sub-Saharan African countries, indicated that South Africa's more rigorous nationwide lockdown, as opposed to Nigeria and Kenya, which initially focused on COVID-19 hotspots and then extended restrictions gradually, may have led to a more significant pandemic impact in South

Africa (Abdalla et. al., 2022). In Uganda, alongside broad population-level lockdowns, local antenatal care, and childhood immunization clinics were closed, resulting in substantial reductions in maternal and child health indicators (Burt et. al., 2021). Variations in how the pandemic was managed, the severity of lockdown measures and institutional initiatives led to varying consequences on maternal and child health. Considering the lockdown strategies employed in Ghana, countries should approach public health crises carefully by considering multilevel factors beyond the national policy level, as institutional level policies across each geographical area can enhance health seeking behaviors of individuals. As such, it is crucial to enhance the resilience of healthcare systems while ensuring that essential maternal and child health services are not compromised.

## 5.5 Limitations

There are several limitations worth considering. First, the study did not focus on establishing causality but to identify the relationships between the COVID-19 pandemic on a number of MCH access and utilization. Caution should be taken when results are being interpreted. Secondly, the study would have greatly benefitted from including other MCH variables, such as family planning and postpartum care that help protect women from health risks before, during, or after pregnancy. Family planning data for example, is often obtained through maternal health surveys or demographic health surveys, typically conducted approximately every five years, making it difficult to analyze monthly impact of the pandemic. Nonetheless, the study variables provided valuable insights into the pandemic's impact on MCH outcomes. Hospital deliveries, ANC visits, and child immunizations have been shown to reduce complications that result in maternal and child deaths and morbidities. Again, due to the use of aggregate regional data, the study did not account for individual level confounding variables such as age, income, education, and other factors that could have influenced access and utilization of MCH services within the regions. Including these possible confounders could have added more depth to the study. Moreover, the use of sub-national data means that results from this study cannot be generalized at the national level but should be interpreted for each geographical region. Finally, a broader dataset spanning from 2019 to 2022 would have offered a comprehensive grasp of the pandemic's effects in the periods preceding, during, and following the COVID-19 era. Nonetheless, employing combined regional data from

both pre-pandemic and during-pandemic periods offers a valuable opportunity to assess how the pandemic affected each region, considering their distinct population and geographic attributes as well as other social ecological factors. This understanding is crucial for addressing the persisting impacts of the pandemic and prepare for future outbreaks, beginning with the development of effective, region-specific policy responses and decisions at various levels.

## 5.6 Conclusion

The global healthcare systems are continually challenged by the ongoing COVID-19 pandemic as the result of multilevel and multifaceted social ecological factors as well as the interrelation between demand and supply-side barriers of healthcare utilization. Overall, the findings show that women's first and fourth antenatal care visits and children's third dose of the pentavalent vaccination experienced significant disruptions. When the lockdown period was excluded from the analysis, the results show that the lockdown did not contribute significant declines in the rates of first and forth antenatal attendance in the Greater Accra region, due to implementation of strategies at the institutional level. The initiatives mitigated the fear of individuals and improved trust in healthcare professionals while ensuring continuous access to routine maternal and child health services. It is of utmost importance to derive lessons from the many challenges and best practices in many countries, ensuring that maternal and child health services remain unaffected as governments implement safety measures. In this study which focused on six regions in Ghana, it was observed that the pandemic did have an impact on the utilization of maternal and child health services. However, the extent of this impact varied across different types of maternal and child health services and regions. Notably, the Greater Accra Region experienced the most significant disruptions in utilization during the COVID-19 pandemic, particularly affecting three out of the six essential MCH services. In contrast, four of the six regions saw no substantial changes.

Understanding the impact of the pandemic, while considering region-specific factors, as well as other social ecological factors, is crucial for formulating effective policy responses to address the persistent repercussions and to prepare for future pandemics. Further research could benefit from a broader dataset to provide a more comprehensive understanding of the pandemic's effects during the periods preceding, during, and following the COVID-19 era.

## 5.7 Competing interests and funding

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## Chapter 6: The impact of the COVID-19 pandemic on the nutritional wellbeing and food security of women and children in Ghana: A qualitative research.

### 6.0 Abstract

**Background:** The COVID-19 pandemic and its restrictive measures have had significant impact on the health and economic conditions of the global population, threatening its sustenance. Ghana's food insecurity prior to the COVID-19 pandemic has made its impact on women and children's nutrition severe. This research therefore examined the influence of the COVID-19 pandemic on the nutritional wellbeing and food security of women and children in Ghana.

**Methods:** This study adopted a qualitative research design and used semi-structured interview guides to obtain information from key informants and community informants including government officials, heads of local NGOs, gatekeepers/local leaders, front-line workers, and COVID-19 survivors and their partners within the Greater Accra and Bono regions. Codes and themes were obtained and analysed. Vital quotes were integrated to add depth to the results.

**Results:** The study confirmed that the COVID-19 pandemic and its mitigative measures had significant disproportionate impact on food security and the socio-economic wellbeing of women and children in both the Greater Accra and Bono regions. The pandemic did influence lifestyle changes which impacted food demand and consumption. Notably, while some people cut down on food waste and included fruits and vegetables to their daily meals, others consumed unhealthy foods or resorted to concoctions to prevent infections or boost their immune systems.

**Conclusion:** Policy response to future pandemics and its subsequent mitigation and economic recovery packages should be more targeted by considering the interrelation between the pandemic and other socio-economic factors, and circumstances of women, children, and other vulnerable groups in different geographic areas.

**Keywords:**

COVID-19 Pandemic, Food Insecurity, Ghana, Maternal and Child Nutrition

## 6.1 Introduction

The impact of the COVID-19 pandemic on health and economic wellbeing has threatened global sustenance (Naseer et. al., 2023). While over 676 million confirmed cases and over 6.8 million deaths have been reported, the overall impact goes beyond the loss of lives (Das et. al., 2022). Many economies implemented virus-prevention measures to curb the spread at the peak of the pandemic. These measures included quarantines, public gathering bans, border closures, social distancing, and cleanliness (Deepa et. al., 2022). These measures may have limited the community-wide spread of COVID-19 infections, but associated consequences included hampered market access, disruption of the food value chain, and high levels of poverty (WHO, 2022). These factors, in turn, significantly altered the dietary and lifestyle patterns of individuals and resulted in undernutrition and food insecurity (Mekanna et. al., 2023). The number of people who experienced extreme levels of food insecurity globally increased from 9.3% in 2019 to 11.7% in 2021, representing an additional 207 million people (WHO, 2022). These effects were attributed to factors such as loss of employment opportunities, low incomes, reduced food availability and accessibility, and heightened nutritional challenges (Hammad et. al., 2023). For many poor nations, this is a retrogression to delivering results on global hunger, achieving food security, improving nutrition, and promoting sustainable agriculture (Kubatko et. al., 2023).

In Africa, although the COVID-19 infection rates were incomparable to those of Europe and some parts of the globe, the health and economic repercussions cannot be overstated (Ataguba, 2020; Ozili, 2020). Years of lack of a robust health care system, persistently poor maternal and child health outcomes, financial and economic vulnerabilities, and corruption have made the impact of the COVID-19 pandemic in African countries more devastating (Yeboah & Yaya, 2023; Alabi et. al., 2023). Specifically to nutrition, the devastating effects stem from the fact that prior to the COVID-19 pandemic, 27.4% of the African population were extremely food insecure in 2016, about four times the global average, as well as being home to about 20–22% of the world's undernourished population of 821 million in 2017 (Wambogo et. al., 2018). Estimates from 2021 show that hunger affected 278 million people on the continent, representing a 0.6 percentage point increase from 2020 (WHO, 2022c). Further projections indicate that by 2030, the global goal of eradicating hunger will remain unattained as almost 600 million people are anticipated to continue

living in extreme poverty, with a larger proportion of these individuals located in Africa (World Bank, 2022). Progress towards achieving the second goal of the Sustainable Development Goals (SDG), which calls for an end to hunger, was already lagging in many African countries (Otekunrin et. al., 2020). The COVID pandemic will therefore make it significantly unfeasible to achieve this goal while contributing to food security, improving nutrition, and promoting sustainable agriculture (Daum et. al., 2023).

Evidence shows that when households experience economic shocks and expenditure declines, women tend to absorb the food shocks by reducing their nutrient intake in favor of the rest of the household (Kalbarczyk, 2022; De Paz et. al., 2020). When women lose their incomes, their decision-making power over resource allocation within the household can be limited, which could decrease investments in household nutrition (Taukobong, et. al., 2016). Specifically, the closure of schools for several months exacerbated the risk of malnutrition most children faced, as many families depended on Ghana's school feeding program to provide food for their children (Owusu & Frimpong-Manso, 2020). The short-term impacts were declined access to essential nutrition goods and services and increased food insecurities, and the long-term impacts were intensified negative impacts on child health, nutrition, learning outcomes, and overall wellbeing (Konlan & Abiwu, 2022).

Ghana recorded its first COVID-19 case on March 12, 2020, and as of June 21, 2023, a total of 171,653 cases had been confirmed, with 1,462 deaths (WHO Ghana, n.d.). Like many African countries, studies show that Ghana had severe food insecurity prior to the COVID-19 pandemic (Atuoye et. al., 2019). Evidence shows that each year, 12,000 children die due to low weight, resulting partly from inadequate feeding, micronutrient deficiency, and food insecurity, among other factors (UNICEF Ghana, 2021). Particularly for infants, only 12% of those aged 6 to 23 months eat nutritious meals on a regular basis (Aurino, 2020). Children consuming insufficient nutrition experience stunted growth and wasting, with long-term impacts on their cognitive and overall development, which further results in increased illnesses and the risk of mortality (Drammeh, 2019).

At the onset of the COVID-19 pandemic, response measures by the government of Ghana included the temporary closure of airports and national borders, schools, non-essential businesses, and a

ban on public gathering and travel (Kenu et. al., 2020). There was also a three-week partial lockdown in two regions of the country: the Greater Accra Region, which is the capital of Ghana, and the Ashanti Region. On one hand, these restrictions impacted agricultural productivity, food production, and distribution, which affected the food supply chain, food availability, and consequently food prices (Bukari et. al., 2022). On the other hand, restricted mobility and business closures led to job losses and reduced disposable incomes, which severely impacted many poor households and limited both quality and quantity of their food consumption (Tibiru et. al., 2022). A study pointed out that the COVID-19 pandemic affected nutrition service utilization in Ghana to the extent that Vitamin A supplementation failed to recover to pre-pandemic levels as of November 2020 after decreasing in April 2020 (Kawakatsu et. al., 2023).

The government of Ghana and various private institutions, including local NGOs, churches, and businesses, implemented several nutrition-related interventions specifically within the regions that experienced lockdowns. Cooked food and raw food items were distributed to the most vulnerable people, such as street hawkers, popularly known as "kayayei" (Salifu & James, 2020). However, these mitigation measures could not alleviate the nutritional deficiencies faced by thousands of the urban poor who lived in these "hotspot" regions (Sarkodie et. al., 2021). Additionally, many poor and vulnerable individuals in non-lockdown regions did not receive any form of nutritional support from these stakeholders (Bukari et. al., 2022).

Most studies have been undertaken in Ghana to explore the impact of the COVID-19 pandemic on women and children; but a significant proportion are quantitative in nature. However, to understand the extent of the impact of the pandemic on several individuals within a sub-group or geographic space, it is vital to obtain information through their own lived experiences and personal opinions to inform a more tailored and effective implementation of nutrition response strategies to mitigate the ongoing food insecurity. By contributing to the growing literature on the COVID-19 pandemic, nutritional wellbeing and food security on women and children, findings from this research could help improve healthy eating habits and readiness for future pandemics by providing a variety of nutritional response options. Through firsthand accounts of key and community informants in rural and urban communities in the Greater Accra and Bono regions of Ghana, this

research examined the impacts of the COVID-19 pandemic on the nutritional wellbeing and food security on women and children in Ghana.

## 6.2 Theoretical framework

This research is premised on the assumption that maternal and child health outcomes are shaped by a range of interconnected factors that operate at varying levels of influence. The study is influenced by a multi-level framework of action developed by Naja and Hamadeh to maintain optimal nutrition during the COVID-19 pandemic (Naja & Hamadeh, 2020). This multi-level framework adapts the socio-ecological model and posits that the nutritional health of an individual is the interrelation between: (i) individual levels - the individual's own choices which include food utilization, changes in eating patterns, physical inactivity; (ii) community levels - structured and reliable support system to ensure food accessibility and availability especially among vulnerable groups; (iii) national levels - preparedness of the government such as food and agriculture policies, food security, food assistance; and (iv) global levels - global engagements such as food distribution and shipping, food trade agreement, commodity pricing (Naja & Hamadeh, 2020). Since the study is to understand the impact of the ongoing pandemic on women and children, the study was also informed by a gender based analytical framework which was built on various gender, nutrition, and conceptual frameworks including Naja and Hamadeh's multi-level framework (Kalbarczyk et. al., 2022). The framework examines how gender power relations manifest as inequalities, including through inequitable access to resources, assets, income, education, and employment opportunities – with women more likely to have informal employment and limited access to resources; roles, norms, and household division of labor – with women often bearing sole responsibility for domestic work and serving as the primary caretakers of the household; and decision-making power, institutions, and policies. Kalbarczyk and colleagues systematically present an evidence-informed pathway of how the interaction of the pandemic interventions and underlying gender norms, roles and relations affect the nutrition outcomes of women, girls, and children. Employing both frameworks, this study identified the impact of the COVID-19 pandemic on nutrition of women and children, and recommendations to mitigate such impacts on this vulnerable population.

## 6.3 Methodological approach

### 6.3.1 Study design

This study adopted a qualitative research design to examine how the COVID-19 pandemic have impacted women and children's nutrition in Ghana using Key Informant Interviews (KII) and community informant interviews (CII). This approach gathers the experiences, perceptions, and opinions of individuals to answer the whys and hows for deeper understanding into complex societal issues (Tenny et. al., 2017). The study used deductive approach, where research questions and interview guides were informed by existing relevant literature and framework. However, asking open-ended questions minimized the researcher's preconception and allowed the researcher to explore participants' perspective. New themes were inductively identified for a deeper and more extensive understanding and interpretation. Again, the use of different frameworks and data sources enhanced the validity of the research process (Fusch & Ness, 2015).

### 6.3.2 Research setting

The study was conducted in Ghana, a low-middle income country in the western part of Africa, with 16 regions and a population of over 30 million. The country prior to the pandemic recorded high prevalence of malnutrition but was also hailed as one of the best among African countries regarding COVID-19 response measures (Quakyi et. al., 2021). This presented an interesting case as this study sought to understand the impact of the pandemic and its response measures on the nutritional health of women and children in the country.

For the purpose of this study, we considered 2 regions, the Greater Accra region and the Bono region. The Greater Accra region, which is the capital of Ghana was one of the COVID-19 hotspots and one of the regions that experienced the three-week lockdown. The Bono region on the other hand recorded relatively lower COVID-19 cases than the capital, but it is about 120 kilometres from the Ashanti region, which was one of the COVID-19 hotspots and lockdown areas. Many individuals in the Bono region however travel and trade at regular basis in the Ashanti Region. Therefore, the lockdowns and other mitigative measures might have impacted the population in similar ways. Choosing these regions aided in a rural-urban comparative analysis and provided the

opportunity to assess the extent to which the pandemic impacted women and children in these areas differently.

### 6.3.3 Participant sampling and recruitment

The study used purposive snowball sampling with the focus of engaging key and community informants in both the Greater Accra and the Bono regions for interviews. Research assistants purposely targeted and recruited government officials, heads of local NGOs, gate keepers and COVID-19 survivors within the communities. The criteria for inclusion for KIIs was determined by being in current position a year prior to the pandemic. Women who have lived in the communities and were between 18 to 65 years were recruited using snowballing sampling, where recruited participants referred others for recruitment.

### 6.3.4 Ethics approval and consent

Ethical clearance was obtained from the University of Ottawa Research Ethics Board (File number S-03-21-6577) in May 2021. All participants provided formal consent during recruitment, which was verbally confirmed before interviews took place. All activities were in conformity with all ethical requirements and protocols as stipulated in the ethics application, including but not limited to anonymity, confidentiality, voluntary participation, and beneficence. Any personal identifying information was removed.

### 6.3.5 Research instruments

Separate interview guides were designed for KII and CII participants to elicit detailed information regarding their personal experiences and perceptions relating to the impact of the Covid-19 pandemic on maternal and child nutrition. Questions were devoid of bias and were specific to obtain responses that were directly related to the questions asked. The questions were also modified to suit cultural inferences, language, and literacy levels. Basic questions centered around:

- 1) The overall impacts of the COVID-19 pandemic on Ghana's health system.
- 2) Personal and general impressions of the impact of the pandemic on food security, food prices, and changes in demand for food.
- 3) Impacts of the pandemic on maternal and child malnutrition.
- 4) Government support for COVID-19 survivors and affected communities.

## 5) Lessons learned and nutritional recommendations for the future.

### 6.3.6 Data collection

Between May and October 2021, semi-structured interview guides were used to collect data via WhatsApp voice calls primarily in English and Akan. Different interview guides were developed in English and carefully reviewed for the KII and CII participants (Appendix A-C). These guides were influenced by the various frameworks and literature. A field officer and local research assistants, who were trained in qualitative research and ethics, recruited participants by contacting them via emails and by phone. The field officer recruited and coordinated all the research assistants responsible for recruiting participants in various communities. Additionally, the officer handled the payment of remuneration for both the research assistants and participants. In both the Greater Accra and Bono regions, participants were selected from communities severely affected by the COVID-19 pandemic to assess the impact. Additionally, individuals in communities situated away from the hotspot were chosen to explore diverse impacts. Government officials, heads of local NGOs, gatekeepers and local leaders within the selected communities were specifically targeted. During participant recruitment, research assistants read the interview consent form to each participant to obtain their verbal consent. The consent form was verbally translated into the Akan language. The field officer coordinated the dates and times participants were available for the interviews. A total of 31 participants (21 women and 10 men), including government officials, heads of local NGOs, gatekeepers and local leaders, front-line workers, and COVID-19 survivors and their partners, were recruited from communities in the Greater Accra and Bono regions. At the start of each interview, consent was confirmed, and study objectives were briefly described and confidentiality reassured. The principal researcher (interviewer) is fluent in the local language (Akan) and therefore questions were translated verbally in real-time for participants who preferred the local language. All interviews were audio recorded with the permission of participants and lasted between 40 to 60 minutes, except for two participants who chose self-administered questionnaires for personal reasons and time considerations. The study excluded one distorted interview which could not be clearly analyzed.

Three KII participants and twenty-five CII participants received a token of appreciation to cover airtime costs and as a compensation for their time. Two participants who completed self-administered questionnaire and one KII did not receive any incentive.

Due to the different types of KII and CII participants in the study, data saturation was determined at 31 interviews. At this point, incoming data produced little to no new information to address the research questions.

#### 6.3.7 Data analysis

All KII and CIIs were audio recorded. Six CIIs in Akan language were manually translated into English in a word document. The English recordings were also transcribed verbatim using OTTER.AI software. Due to the differences in accent and background noises, each transcript was spot checked by listening to the original audio recordings for accuracy and to fill in inaudible words or words the software might have missed. Transcripts were carefully reviewed and comprehended to familiarize with the data. Major ideas were identified in each transcript and were coded. These codes were then grouped under identifiable themes/sub themes based on both inductive and deductive approaches. With the deductive approach, themes were driven by study objectives, theoretical frameworks, and existing literature, and for the inductive approach, themes were directed by the content of the data and not based on researchers' preconception (Braun and Clarke, 2006). Vital individual quotes were extracted and integrated to add depth to the themes being discussed.

#### 6.3.8 Trustworthiness

To promote trustworthiness, the researcher's preconception and bias were bracketed by being self-aware and allowing participants share their unique experiences using semi structured open-ended questions and probes. The research employed theory and data source triangulation by using different theoretical frameworks and collecting data from multiple key informant and community informant for a broader and deeper understanding and ensure validity, credibility, and dependability (Triangulation, 2014). In qualitative research, researchers' social identities: class, ability, gender, location, employment status, and political affiliation etc. can influence the way they interact with participants, and this may either pose challenges or become an asset in the

research process (Jacobson & Mustafa, 2019). The principal researcher lived in Ghana most of her life, and while she understood the vulnerabilities and lived experiences of some participants, she did not share other social identities with them, and this required open mindedness, respect and probing further for them to share their own unique experiences. The data was then carefully analyzed both deductively (based on existing frameworks) and inductively (new knowledge), coded and themes identified.

#### 6.3.9 Ethical clearance

Ethical clearance was obtained from the University of Ottawa Research Ethics Board (File number S-03-21-6577) in May 2021. All participants provided formal consent during recruitment, which was verbally confirmed before interviews took place. All activities were in conformity with all ethical requirements and protocols as stipulated in the ethics application, including but not limited to anonymity, confidentiality, voluntary participation, and beneficence. Any personal identifying information was removed. All data collected, including audio tapes, was stored on a hard drive, and securely kept by the primary researcher. Data will be stored for 5 years and destroyed afterwards (May 2026).

### 6.4 Results

Of the 31 study participants, 21 were women (68%) and 10 were men (32%). The 5 KIIs included 2 government officials and 3 local NGO leaders, and the 26 CII participants consisted of 12 women community members (WCM), 3 gatekeepers or local leaders, 5 frontline workers, 5 COVID-19 survivors (CS), and 1 partner of a survivor (PS). Twenty-one (21) participants from the Greater Accra region and ten (10) individuals from the Bono region were selected to ensure a representative data.

#### 6.4.1 General impacts of the Covid-19 pandemic

All participants indicated that the COVID-19 pandemic significantly challenged both the supply and demand side of Ghana's healthcare system. Healthcare personnel were afraid to treat patients since they did not have personal protective equipment (PPEs) at the start of the pandemic. Health

experts who perished from the infection fueled the dread. Due to the rising incidence of illnesses, many health personnel worked under stressful circumstances, risking their lives. An airport worker in the Dansoman, a suburban town in Accra, mentioned that, because of the increased number of health personnel losing their lives, a lot of people who presented other illnesses but had COVID-19 symptoms lost their lives.

*“We did not have enough PPEs. The PPEs we would wear to attend to patients in the wards we didn’t have so one felt reluctant attending to patients but now it appears we have a lot for now.”*  
(Senior Staff Nurse-CS, Berekum)

*“Another difficult situation was getting frontline staff to manage the isolation centre. The nurses were not willing to work at the isolation centre. It took a long time and persuasion before getting.”*  
(Government official, Sunyani)

Many public health programs were halted, non-emergency surgeries and elective surgeries were postponed, and patient admissions were reduced to create more space for isolation.

*“We had to cut down outpatients’ admissions to do more of emergencies. But then the issue with that was that most people can’t really tell if what you’re having is an emergency ... for example, those with chronic conditions, like hypertension, diabetes, we had clinic days for them, or we had to stretch this period instead of coming every month, every two months, we had to give them more medications”* (Medical Doctor, Mallam)

*“Almost all the attention was given to COVID, neglecting the other programs expected to run. Other public health programs and interventions which were supposed to be rolled out got delayed owing to the pandemic.”* (Technical officer-PS, Berekum)

People who were ill or required regular general check-ups did not visit health facilities. One reason was the fear of being infected with the virus, and the other was the fear of police and security men who harassed people on the street.

*“One of my sons had had an operation so the doctor asked us to come over, but it was in the following week that the lockdown was declared so we couldn’t go. We resorted to the local pharmacy if we needed any medication rather than board a car to be harassed at the hospital. I*

*used to go to Korle Bu but during the lockdown, I couldn't. The police would be asking you lots of questions on why you need to be at the hospital, where your card is and other intimidating questions. It was really frustrating. So, our health was impacted.” (Trader-WCM, Ablekuma)*

#### 6.4.2 Economic challenges and income inequality

The pandemic brought many challenges to most Ghanaians. Particularly during the period of lockdown and movement restrictions, many individuals were laid off and non-essential businesses were closed. On the part of the government, this meant fewer taxes. On the part of citizens, participants mentioned that this meant job losses, low incomes, financial and mental stress, and hunger. For instance, one participant in Sunyani indicated that because of the restrictions on funerals, church, and mass gatherings, she lost income as a seamstress and her husband's taxi driver business was also adversely impacted. For most of these informal workers, the last resort was to dip into their savings to survive the price shocks.

*“The assembly [local government] depends greatly on the revenue from the people within the municipality. Because of the pandemic, most businesses collapsed, people were not doing anything to warrant taxing. Therefore, the activities of the assembly almost collapsed. ... we suspended capital intensive projects like schools, boreholes, clinic etc.” (Government official, Sunyani)*

*“You spend the little savings you've made on daily expenses. We had to plead with our wholesalers and creditors to give us more time to pay our debts. We'd spent the money on daily expenses. Most of the shoes got spoilt and faded owing to the heat and that did not motivate any customer to buy them. We had to dispose off most of the footwears.” (Trader-WCM, Accra)*

*“We had to depend on whatever we have saved. Yes, because you don't have any source of income, the only source of income you have now is saving. So, we need to dip our hands into our savings and whatever projects we had to do was put on hold.” (Administrator-WCM, Ablekuma)*

In comparison to individuals in the informal sector who were barely surviving, people who work in the government sector or big private companies did not experience such difficulties. For most of the participants in this category, the issue they faced was their inability to retrieve their monies

from the bank to buy things for themselves or the loss of other extra allowances they used to receive from their job places. While it is true that the poor will be poorer in the long run, it is quite evident that the pandemic increased income inequality and worsened poverty and nutrition.

*“Honestly, no, it didn’t affect me... because Ghana Airports, the pay is quite good. Even though our salary bonuses and allowances were not coming, expenses were low during Covid” (Airport worker-WCM, Dansoman)*

#### 6.4.3 Food security challenges

During outbreaks, lockdowns and movement restrictions result in disruptions in the food value chain. In Ghana, travel between regions, especially from the "hotspots" to other parts of the country, was disrupted, which made it difficult for poultry farmers to obtain raw products or for farmers to get their produce to the market. A nurse in Accra mentioned that imported foods became very expensive, and those already available (e.g., rice) as well as local non-perishable foods were sold at inflated prices as food available for the population became limited. This meant that individuals with inadequate funds could not afford to feed themselves.

*“Normal planting season starts in April each year. During that time in 2020, then people were tense and afraid to farm. So, people did not plant as expected. The negative impact of not being able to plant as expected is high cost of food. For instance, maize prices has never been high as we are experiencing. Maize of 50kg is at the moment GH¢400.00 It has never been GH¢250.00 before. This has resulted in the collapse of the poultry industry. Besides the maize prices, every food commodity has increased.” (Traditional leader, Nsoatre)*

*“The biggest challenges are price hike ... especially food prices ... the supplies were not actually coming in as it was expected, and demand was high. So, the traders decided to increase prices abnormally. So, it was only a handful of the population that could afford the basic foodstuffs.” (Administrator-WCM, Ablekuma)*

#### 6.4.4 Impact on women and children’s nutrition

Most of the participants highlighted the disproportionate impact of the pandemic on women's and children's nutrition. Purchasing power, access, and consumption of adequate nutritious foods

declined because of the collapse of businesses, food price hikes, and extensive school closures. Participants also shared their views on the increased risk of malnutrition. Many asserted that while they may not have the numbers to back their claims, they do believe that the child malnutrition rate increased in the country. Participants who work in the health sector also confirmed that since the beginning of the pandemic, a higher number of children have reported to the hospital with anemia.

*“So, in Ghana, we have a lot of single mothers, and most single mothers are not people that are working in corporate environments. They are traders and so those that were affected, those that had shops that are not essential, found it very tough.” (Airport worker-WCM, Dansoman)*

*“If you come to my hospital, a lot of children have become anaemic since the covid started. This is mainly because their mothers couldn’t afford to give them balanced diets.” (Nurse, Berekum)*

*“I haven’t read on that or heard anything, but I know when I was in Gynae, the rate of teenage pregnancy was high since COVID came, and then when I came to paediatrics, I have realized there are lots of anaemias, but when you check, their mothers are really young, they don’t know what to give them.” (Medical Doctor, Weija)*

In response to the rising numbers of COVID-19 cases, the government closed down schools from March 2020 to January 2021. This meant that most of the school-going children who obtained daily meals from school under the school feeding program were likely to experience a decline in nutritional intake. Participants with dependents of school-going age lamented the challenges that they had to go through to feed the children while school closed for almost a year. Furthermore, insights from community and key informants revealed that women, particularly single mothers, were disproportionately affected by the pandemic.

*“Feeding was difficult for us, sometimes. Sometimes, we ate porridge as brunch, at about 11am - since we bought corn dough in large quantities - then we skip lunch and then eat dinner, sometimes we make banku or kokonte from the dough, so we have something to eat. So feeding was challenging and as I said it wasn’t satisfying the children. So, we need to assure them that there are brighter days ahead so they should manage the portions given them.” (Trader-WCM, Ablekuma)*

*“There was one house next to me who went through worse experiences than we did. They sometimes slept without any food or at other times took porridge the whole day. It was very sad for them, and I became comforted when I saw them because they were going through worse than I was. The woman will sometimes go house-to-house asking to wash clothes for people so she can get something to feed her family. She had little kids, and it was difficult getting food to feed them. The children are seen loitering about, drinking lots and lots of water and then in the evening, they take their porridge for dinner as a family.” (Trader-WCM, Accra)*

*“in this vicinity of ours, which definitely translates into the bigger picture of the whole nation, a lot of them are single mothers .... the man is not around or the man is not taking ownership of the pregnancy and all that so most often, you would find them in the churches; they are struggling ... Some of them were doing businesses or working as support system for certain businesses, but since it went down...” (Reverend Minister, Tema)*

#### 6.4.5 Nutritional changes

To cope during the lockdowns, some of the participants made nutritional changes. This included the consumption of foods like vegetables, fruits, and vitamins, which they believed boosted their immune systems. Many of the women reported that they had fewer nutritional choices and had to reduce their intake of expensive foods, practice food preservation, and avoid food waste. However, some participants indicated that they ate what they could afford, even though that might not be healthy or nutritious enough. Another aspect was the intake of mixtures and concoctions, which sometimes proved dangerous to their health. A senior health regulatory officer indicated that their organization had to educate people regarding the use of concoctions and the fact that vitamins C and D did not have any value for fighting the COVID-19 pandemic.

##### Addition of vegetables and fruits to daily meal

*“Yea, I made a lot of changes. I am not the type who loves veggies and greens but during the pandemic, we were educated to change our way of eating - to take in more greens like lettuce, cucumber carrot, cocoyam leaves and more fruits to boost their immune system.” (Civil servant-WCM, Sunyani)*

##### Changes in nutritional choices

*“It’s a challenge because, you know, previously, when you have so little, a small amount, they are buying things you need. But now, things are quite expensive. So, people are just eating anything at all. You understand whether is healthy enough or not healthy enough, just so we can survive and live and move on.” (Caterer-WCM, New Achimota)*

*“Yes, for us, we had to cut down on rice because it became expensive on the market. We also hitherto didn’t like to eat banku<sup>1</sup> but we were forced to eat it since the price of corn dough was relatively cheaper on the market.” (Trader-WCM, Accra)*

### Cutting down food waste

*“We didn’t make any nutritional changes, but I think we had to reduce wastage ... because there was price hike. It was really serious. So, we had to cut down on how we waste food.” (Administrator-WCM, Ablekuma)*

*“We cut down on a lot of unnecessary food items that we didn’t need” (Pharmacist-WCM, Accra)*

### Introduction of mixtures and concoctions

*“I think during the COVID the only thing I introduced in food was the concoction. They said we should peel the pineapple, the husk, then you add ginger, sometimes you add prekese<sup>2</sup> to it. Then you cook it. So, you take it to warm” (Airport worker- WCM, Dansoman)*

*“People were taking mixtures that were not good because if there is a rumour that this thing helps everybody wants to move and get some of it” (Medical Scientist- WCM, Spintex)*

#### 6.4.6 Response to food crises

The government of Ghana, together with faith-based organizations provided dry food packages and hot meals for up to 400,000 vulnerable individuals within some of the lockdown areas, specifically, communities in Accra, Tema, Kumasi and Kasoa (Sarkodie et. al., 2021). Only one participant indicated that she received some food items, but food items were not enough for her

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<sup>1</sup> Local meal made out of maize.

<sup>2</sup> Aidan fruit

and her family.

*“Sometimes, the MPs come around with small bags of rice and oil to give us too .... Yes. That’s all.... the sachet of rice they brought won’t be enough for one of my boys. It is just about two cups of rice. And you know how much boys eat.” (Trader- WCM, Ablekuma)*

Within some communities, some local leaders and religious leaders also organized and provided food for the community members.

*“Yes, I invited resource person from the District Health Directorate to educate the people on the need to eat good, nutritious food to boost the immune system... Few people who were not afraid were mobilized to go to farm to get food stuffs for those who were afraid.” (Traditional leader, Nsoatre)*

*“I think we’re able to reach about 50 families who were under very, very, you know, severe situations. This is what the church did as an organization, but individuals of the church were also encouraged to do other things for other individuals.” (Reverend Minister, Tema)*

This notwithstanding participants indicated that although most of them did not receive these forms of assistance, news from traditional and social media revealed that most of the recipients of the government food support complained about the quality and quantity of the food. Some of the recipients preferred raw foodstuffs to cooked food packages. A pharmacist in Accra mentioned that some individuals in the chain of supply took extra bags of food for themselves and this limited the quantity available for the people most in need.

*“Yes Generally, ... reports indicate that a few percentages about 20% were ok with the food; for the remaining 80%, from what we heard, they were complaining about the poor quality of the food and less quantity. For those we saw from the news, it was chaotic. People had to be in the queue with less social distancing, more like a survival-of-the-fittest challenge.” (Technical Officer, Kato)*

*“Was that really nutritional support? In my opinion, with all the funds that we received all the donations that we received, ... I believe they should put the food items and give it to the people. And then the person can cook enough for the family or whatever.” (Public servant- WCM, Tema)*

Most of the participants outside of these hotspots, like communities in the Bono Region, mentioned that such governmental support would have benefitted them greatly. These individuals operate non-essential businesses and therefore lost their incomes which made it difficult to afford nutrient balanced food items.

#### 6.4.7 Recommendations by participants

The study asked participants to identify the most significant recommendations and optimal strategies for leveraging the country's resources to enhance nutritional responses to similar outbreaks. Overall, participants acknowledged that the ongoing pandemic has imparted numerous valuable lessons to government and citizens. It is believed that despite the financial burden imposed on both the populace and the government, the pandemic has presented an opening for the nation to reconsider and restructure its food supply chain by fostering domestic food production and leveraging indigenous resources through meaningful partnerships. These measures have the potential to facilitate the development of a food production, distribution and storage systems that are both sustainable and resilient in the long run.

##### Financial and nutritional resources

*“I suggest that the government should be able to provide financial resources to almost all the districts to ensure malnourishment is reduced and give them the necessary educational and nutritional packages such malnourished people will need.” (Biologist- WCM, Ashtown)*

##### Partnership with food producers

*“The government should reduce taxes and import duties on all kinds of meat and fish imported into the country for it to be affordable. Seeds of vegetables, fertilizers etc. should be provided to farmers for free.” (Government official, Sunyani)*

*“We grow rice here. So, all is left is transportation and distribution. Even if the government cannot import, it can negotiate with the rice producing companies here, so they produce in large quantities and distribute to all of us.” (Trader- WCM, Ablekuma)*

##### Partnership with the young population

*“I think we should go into farming more. I encourage the youth to go into farming, that's what is going to help us produce our food. No matter how long we close down our borders, we will not have issues with food because we can feed ourselves. The government should help finance people that are going into farming, you know, they should make it easy for them to get access to land. Maybe they can give it out for leasing for number of years and all that ...encourage more people make it more lucrative so people want to go into farming.” (Microbiologist, Tema)*

## 6.5 Discussion and policy implications

The study involved soliciting insights from respondents regarding the nutritional implications of the COVID-19 pandemic on women and children, including key takeaways, optimal strategies, and resource allocation for enhancing nutritional outcomes during similar outbreaks. The findings of this study contribute to the growing literature on the impact of the COVID-19 pandemic on maternal and child nutrition. Additionally, the qualitative approach to this study was vital in understanding the extent of the impact of the COVID-19 pandemic on maternal and child nutrition through the lived experiences and personal opinions of participants. The results complement and extend the findings of previous studies from Ghana where the researchers relied on quantitative methods. By focusing on the effects of COVID-19 on household food insecurity and poverty, they found that over 50% of the sampled households did not get enough food to eat due to the pandemic (Bukari et. al., 2022). Findings from this qualitative research could help inform a more tailored and effective implementation of nutrition response strategies to mitigate the ongoing food insecurity issues.

Overall, participants confirmed the challenges faced by Ghana's health care system and the general economic wellbeing of the population due to the COVID-19 pandemic. Specifically, the implementation of mitigation measures reduced economic accessibility and purchasing power as activities that fuel livelihoods came to a halt. This had a notable effect on various aspects of food systems, including the supply-value chain and price levels. Evidence shows that in Benin, Ghana, Kenya, Uganda, and Zambia, the COVID-19 lockdown measures, which included shutting down businesses and limiting mobility, increased poverty, and inequality (Daum et. al., 2023).

Through the lens of the multi-level framework and the gender based analytical framework, findings show that the pandemic had a significant and disproportionate impact on food security and the socio-economic status of women and children. Within the first week of the lockdown, the employment rate of women dropped by 36 percentage points as compared to 13 percentage points for men (Dzansi et. al., 2021). This is particularly due to the disproportionate number of women employed in the informal sector. During the lockdown period, non-essential businesses were forced to close, resulting in limited income. This, coupled with high cost of food and other essential items, created significant challenges. Most of these women resorted to consuming meals that were primarily carbohydrate-based as a means of coping during the lockdown period. This finding is consistent with one study from Ghana which found that while the pandemic affected both sexes, the impact on women was greater, in that food insecurity in female-headed households increased by about 12% compared to male-headed households (Bukari et. al., 2022).

The study clearly highlights the disproportionate impact of the pandemic on women, particularly single mothers. Community and key informant perspectives revealed that due to the traditional division of labor within households, women often shouldered the primary responsibility for caregiving including feeding the children in addition to household work, and in many cases, had to take on additional jobs to support their families. One participant cited an instance where her female neighbor had to go from house to house to wash peoples' clothing in order to provide food for the children in the household. In some instances, men left their families, leaving women to care for the children alone. also, societal norms, beliefs and perceptions favor men, encouraging them to attain higher education levels which means better employment opportunities, more resources and assets, and greater decision-making power. Compared to many single mothers, most men had safety nets to rely on during the pandemic.

Specifically for children, school closure for a period of almost a year meant that those who relied on school feeding could not obtain their daily meals. Evidently, participants in this study lamented that the prolonged school closure brought difficulties as they could not provide adequate food for their children. Similar findings were confirmed in India, stating that the nutritional safety of children who relied on school meals and other nutrition programs suffered due to pandemic lockdowns (Alvi & Gupta, 2020). At the individual and household level, eating pattern changed.

Some participants indicated that they had to ration the little nutrient deficient food available to the household, complementing with water. For many children, the consequences are stunting, underweight, and anemia, which have long-term impacts on both their physical and cognitive health outcomes (Bukari et. al., 2022). Children are highly vulnerable to the indirect impact of the pandemic due to household income shocks, disruptions in essential health service utilization, and educational progress (UNICEF Ghana, 2021). Global estimates reveal that over 368 million children missed out on school meals as result of COVID-19-induced school closures (Kalbarczyk et. al., 2022). Pairing this with high food prices, job and income losses and gendered food allocation practices that favor adult males, the impact on girls in particular have been disproportionate.

Additionally, while women and children in both the Greater Accra and Bono regions experienced significant negative impacts of the pandemic on their nutrition, the extent of the impact varied. Firstly, prices of food items did not rise as high in the Bono region compared to the Greater Accra region. This was because the partial lockdown measures that were implemented in the Greater Accra region at the peak of the pandemic caused panic buying and food hoarding which did influence the price hikes. It has been shown that at the community level, the pandemic indirectly impacted food supply chain, food access and availability as it changed consumer behavior towards hoarding, which created extreme market shortages (Naja & Hamadeh, 2020). One study found that while COVID-19 impacted the poverty levels of households in rural areas more than urban households, the food insecurity status of urban households was higher compared to rural households (Tibiru et. al., 2022). To address food security in the lockdown areas, the government and other agencies implemented food assistance programs by providing cooked food and raw food items. Reports however indicate that many recipients did not them sufficient in terms of quality and quantity. Nonetheless, several participants in the Bono region mentioned that while they did not experience any lockdown, food support from the government would have cushioned many of them who lost their jobs and incomes and could not provide adequate food for themselves and their families.

Although women were evidently more impacted than men, the extent of the impact was also influenced by the individuals' education and employment status. Findings show that women who

had higher levels of education, for instance, post-secondary and above, and worked in the government or big private companies fared better economically than those who had less than post-secondary education and worked in certain trades, except for food selling, which was deemed essential during the myriad of restrictions throughout the country. For these disadvantaged women, the last resort was to dip into their savings to survive the price shocks and feed their families. Thus, leading to depletion of wealth and assets. A review has shown that gender-related levers, including education, decision-making power, and control over resources, have been associated with improvements in health outcomes, including nutrition (Kalbarczyk et. al., 2022; Taukobong et. al., 2016). As has been seen, the impact of the pandemic is not gender-neutral; therefore, addressing the consequences of the pandemic and its mitigation measures should take a multidimensional approach.

The study also confirmed that indeed the COVID-19 pandemic influenced lifestyle changes that impacted food demand and consumption, thereby posing challenges for individuals to maintain healthy diets. Notably, most people cut down on food waste and substituted expensive food items by purchasing relatively cheaper ones. A study showed that the pandemic influenced the consumption of unhealthy foods either for survival or to cope with conditions of stress, emotional disturbance, or fear (Naja & Hamadeh, 2020). In Ethiopia, similar nutritional changes were adopted as coping mechanisms for households that faced income losses and their related food shocks. These strategies included declining expenditures on agricultural inputs and food consumption, which have a high probability of adversely impacting livelihoods (Abay et. al., 2023). This study also confirmed that many people resorted to the consumption of herbal concoctions or certain vitamins to boost their immune systems or prevent the infections. However, on the positive side, many people added vegetables and fruits to their daily meals as they believed these boosted their immune systems.

The COVID-19 pandemic has taught both the government and the citizens of the country some valuable lessons. The prevailing belief is that, despite the financial burden imposed on both the populace and the government, the pandemic has presented a chance for the nation to reassess its food supply chain by cultivating domestic produce and leveraging domestic resources. The participants recommended that the government should assume responsibility for enhancing the

healthcare system, allocating resources effectively, conducting research, and taking proactive measures to address pandemics of similar nature. The findings revealed that while individuals made personal nutritional choices to survive, food access and consumption were dependent on the community, the nation, and the global community (Naja & Hamadeh, 2020). At the community level, a more structured support system needs to be created to ensure food availability, access, and affordability, particularly for the most vulnerable (Naja & Hamadeh, 2020). The government needs to prioritize investments in agriculture and food production industries by developing meaningful partnerships with the youth and food producers, while monitoring markets and food prices. Doing so will have the potential of enhancing food supply and food security. The implementation of this approach is expected to contribute towards the development of a food production, distribution, and storage system that is characterized by sustainability and resilience, thereby enhancing its capacity to meet the needs of future generations.

## 6.6 Conclusions

This study sought to examine the nutritional implications of the ongoing COVID-19 pandemic for women and children in Ghana. Using sub-national data collected through interviews with key and community informants in the Greater Accra and Bono regions, the results show that the COVID-19 pandemic had a significant disproportionate impact on food security and the socio-economic wellbeing of women and children in both regions. Specifically, several women employed in the informal sector lost their incomes and had to dip into their savings to provide food for their families. Moreover, the lockdown of schools added a layer of difficulties for households, eliminating the ability for these children to obtain their daily meals from Ghana's school feeding programme. The findings of this study have several policy implications that could help inform a more tailored and effective implementation of nutrition response strategies to mitigate ongoing food insecurity. The impact of the pandemic is not gender-neutral; therefore, addressing the consequences of the pandemic and its mitigation measures should take a multidimensional approach. While pandemic mitigation measures were different across several regions, the provision of nutritional support by the government should not have been restricted to those residing within the confines of the lockdown zones as the impact of the pandemic was felt even in places where low positive cases were recorded. The interrelation between the pandemic and other socio-

economic factors such as education, employment and income resulted in significant negative consequences within some non-lockdown regions. Overall, policy response to future pandemics and its subsequent mitigation and economic recovery packages should be more targeted by considering socio-economic circumstances of women and other vulnerable groups in different geographic areas.

## 6.7 Strength and limitations

The use of semi-structured, in-depth interviews to obtain information from key informants and community informants allowed for open-ended questioning and probing, which generated rich descriptions of lived experiences and personal opinions regarding the impact of the pandemic on their health and economic wellbeing. The inclusion of multiple and diverse key and community actors within these two regions enriched the breadth of the data and allowed for exploration of themes that emerged across the regions. Some possible study limitations to be considered are that the use of the purposive snowball sampling method of participant recruitment may have led to the selection of participants with similar views and opinions. To minimise potential bias, research assistants from different areas and backgrounds were involved in the recruitment process, which brought in different participants to aid in obtaining a wide range of views and experiences. Participants were also assured anonymity and confidentiality and were encouraged to speak freely as interviews were conducted in the local language for individuals not fluent in the English language.

## 6.8 Competing interests and funding

The authors declare that they have no competing interests. This work was carried out with grant from Canada's International Development Research Centre (IDRC). The views expressed herein do not necessarily represent those of IDRC or its Board of Governors.

## Chapter 7: Conclusion

This thesis explores the impact of economic growth, recessions, and the COVID-19 pandemic on maternal and child health outcomes in sub-Saharan African countries, with a case study on Ghana. Employing a socio-economic interdisciplinary study based on the social ecological model, demand supply side health utilization framework and gender-based multi-level framework, this study investigates how these multilevel factors interact to enhance maternal and child health.

### 7.1 Summary of research findings

This thesis has been guided by three overarching research questions which were aimed at exploring the linkages between the concepts of economic growth, recession, COVID-19 pandemic, and maternal and child health. However, the findings are interconnected and offer a comprehensive picture on enhancing maternal and child health outcomes. Overall, the findings indicate that to enhance maternal and child health, it is vital to consider specific multi-level factors that interact to ensure that the health system is designed to balance economic circumstances with health objectives and social values.

Specific to the individual chapters, Chapter 2 provides an overview and empirical evidence of how economic growth affects maternal and child health in sub-Saharan African (SSA) countries. By analyzing the maternal and child health trends in SSA and developing a conceptual framework, the paper reveals the need to consider macro and micro level factors including evidenced-based health investments, level of corruption, household, and individual health behaviors, as these factors influence the mechanism between economic growth and maternal and child health outcomes. The paper also highlights that while economic growth is important, it is not enough. Chapter 3 provides an extensive background information on the COVID-19 pandemic and how its mitigative measures have impacted women and children in Africa. The review outlines both the health and economic implications of the pandemic and forms the basis for the analysis presented in Chapters 5 and 6.

Chapter 4 consolidates and synthesizes existing literature and offers a comprehensive overview of the relationship between economic growth and recessions, and maternal and child health outcomes in sub-Saharan African countries. In general, results show that economic growth could potentially

lead to improvements in maternal and child health, through investments to enhance public healthcare infrastructure, the capacity of the healthcare workforce, and strengthen social safety nets. However, the positive effect of economic growth on maternal and child health is not a guaranteed outcome as it depends on a variety of intervening and socio-economic factors at the national, community, household, and individual levels (Harttgen, 2021). Findings highlight that equitable allocation of resources, improvement in efficiencies in governance structure, lower inequalities and corruption, investments in female education, and enhancement in Maternal, Neonatal, and Child Health (MNCH) coverage and interventions such as antenatal care, vaccination, family planning, and improved sanitation are significant factors that could ensure positive maternal and child health outcomes (Corsi et. al., 2014; Chireshe & Ocrean, 2020; Harttgen, 2021; Heaton et al., 2016; Ogujiuba & Omoju, 2013; Sede & Izilien, 2014; Salahuddin et. al., 2020). If these determinants are not addressed and purposefully incorporated into health policies and goals, a country by simply having higher economic growth may not experience positive maternal and child health outcomes.

In Chapter 5, subnational routine health data were analyzed to examine the impacts of the COVID-19 pandemic on the utilization of maternal and child health services in Ghana. Using aggregated regional level data, this quantitative study revealed substantial declines in MCH service utilization during the COVID-19 pandemic, which were more pronounced in the Greater Accra region where COVID-19 confirmed cases were higher. Specifically, women's first and fourth antenatal care visits and children's third dose of the pentavalent vaccination experienced the most decline during the pandemic. Further analysis to understand the contribution of the extra restrictions imposed by lockdowns on access and utilization of MCH suggest that the lockdown period did not contribute significant declines, as anticipated, in the rates of first and forth antenatal attendance in the Greater Accra region. Innovative strategies such as community health worker visits, telehealth and appointment system, ensured uninterrupted access to essential and routine maternal and child healthcare services during the lockdown period. The results highlight the significance of considering region-specific factors as they are crucial for formulating effective policy responses to address the persistent repercussions of the pandemic and enhance maternal and child health outcomes.

Chapter 6 presents the results of interviews with local key and community informants on the impacts of the pandemic and its induced recession on the nutritional wellbeing and food security of women and children in Ghana. The qualitative analysis revealed that the pandemic did impact businesses and incomes. Lockdowns, movement restrictions and food value chain disruptions increased food prices significantly which heightened nutrition and food security challenges particularly among poor households within COVID-19 hotspots. In addition, prolonged school closures exacerbated the nutritional intake of children. While the government and other organizations provided food for individuals in the lockdown regions, many people indicated there were deficiencies in the quality and quantity of the food. Findings also show that women, especially single women, experienced disproportionate impacts. However, women who had higher levels of education, for instance, post-secondary and above, and worked in the government or big private companies fared better economically than those who had less than post-secondary education and worked in certain trades. Overall, the findings highlighted the need for a more targeted policy response to future pandemics by considering the socio-economic circumstances of women and other vulnerable groups in the different geographic areas.

## 7.2 Policy implications and future research

This thesis describes and demonstrates the importance of considering the role and impact of multi-level socio-economic factors in maternal and child health policies and outcomes. This allows policy makers and institutions to plan and implement the right policy-mix focused on specific characteristics of the community, region, or nation to enhance maternal and child health outcomes. Through this process, policy makers need to understand the unique impacts of each socio-economic factor at each level and estimate to what extent a modification can impact these health outcomes considering the country's specific circumstances, and then implement policies that leave room for adjustments, as the circumstances of the country and population change over time. To enhance and sustain population health, these health policies should be designed with careful consideration to the values and priorities of communities, since what people place value on can serve as a standard for decision making. A limitation of such multi-level and multi-sectoral approach to enhancing maternal and child health outcomes could be the myriad of factors that need to be considered in health and economic policy making. Adding to such

complexities is the consideration of other underlying factors such as culture, social norms, and persisting health behaviors when analysing the interaction and linkages among the factors. This is to ensure that the best set of health policies are chosen and implemented. However, these determinants to understand how they interrelate, and impact health outcomes can be proven more effective, as in the long run, maternal and child health can be maintained at optimal level.

Consolidating the evidence regarding the impact of economic growth and recession on maternal and child health provides important information for policy makers as the focus on economic growth alone cannot guarantee positive maternal and child health. Additionally, policies focused exclusively on economic growth pose a threat to population health (Patterson, 2023). Given the established bi-directional relationship between these concepts, it is fair to say that future economic growth could also be harmed. Analyzing multi-prong variables could provide an understanding of how economic growth relates to health within the context of the country (Patterson, 2023). Specifically, the findings suggest that without the proper mindfulness of factors such as levels inequality, quality of governance, and gender norms that disproportionately disadvantage women, maternal and child health outcomes will decline even in times of high economic growth (Makuta and O'Hare, 2015; Kalbarczyk et al, 2022). To ensure more consistent findings between economic growth and maternal and child health, governments need to develop and adopt a growth outcome that considers socio-economic factors such as health, education, inequality and living standards as is the case of the Inequality-adjusted Human Development Index (IHDI) and the Genuine Progress Indicator (GPI) (Klugnan, 2010; Talbarth and Webb, 2014).

Finally, the study emphasizes the need for government and institutions to develop robust response mechanisms to public health emergencies that negatively affect maternal and child health issues and devise health policies to mitigate adverse effects of lockdown. In times of pandemic, there is need to maintain continuous access for both maternal and child health services, as factors such as fear, job and income losses may shift resources from health access and utilization. For SSA governments, this could be achieved by focusing on what works, considering the characteristics of the country and population. It was evident in many studies that SSA countries that embarked on strict lockdowns and movement restrictions, as was seen

in various advanced economies, recorded significant declines in these health outcomes, as there was inadequate allocation of resources to ensure that women and children receive routine health care (Burt, 2021).

Overall, this thesis contributes to body of knowledge in the field of global health and health economics by building on the evidence about the impact of economic growth, recession and the COVID-19 pandemic on women and children. The health of women and children is an important contributor to a nation's economic growth and so practically, the research findings help to inform healthcare policy and practice, ensuring efficient resource allocation, and promoting better maternal and child health outcomes.

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## APPENDICES

### Appendix A: Key informant interview guide – government officials and NGOs

Date of interview ..... Start time: .....

Good morning/afternoon/evening. Thank you for taking time to talk to me today. I am Helena Yeboah, and I will like to talk to you today about the impact of the Covid-19 pandemic on women's living conditions (nutrition) in Ghana. I am conducting this research as part of my PhD thesis at the University of Ottawa. The duration of this interview will be between 1-1.5 hours.

Before we begin, I would like to confirm that you have given your consent for this interview. I would also like to ask your permission to record this interview in order to capture details that I may not be able to capture in my notes. I want to assure you that all information discussed in this interview will be kept confidential.

Can I have your permission to record the interview? (Yes/No)

Please do you have any question for me before we begin?

#### Questions:

##### Part 1: Introduction

##### Demographics:

- 1) Gender: Female/Male/Other
- 2) Geographic region in Ghana
- 3) Can you please give me a brief introduction about yourself?
- 4) What is the nature of your organization?
- 5) What specific services and programs does your organization provide?
- 6) Please describe your role and responsibilities in the organization

##### Part 2: Covid-19 impact (General impact)

- 7) Please tell me about the Covid-19 outbreak in your area
- 8) How do you perceive the country's overall response to the pandemic?

##### Part 3: Covid-19 impact (on organization)

- 9) What has been the specific impacts of the outbreak on your organization?

##### Part 4: Covid-19 impact (on health system)

- 10) Please could you describe the impact of the Covid-19 pandemic on the health system?

##### Part 5: Covid-19 and nutritional health

- 11) What would be your general impression on the impact of the Covid-19 pandemic on any of these aspects: food security, food prices, harvest, access to markets, changes in demand for food
- 12) What do you think has been the impact of Covid-19 on malnutrition rates in Ghana?
- 13) Specifically, what has been the impact on maternal and child nutrition?

14) The government and some private groups provided nutritional support to some individuals in the country, please discuss for me your perception of the quality of the nutritional support given to individuals in Ghana during the outbreak

15) Did your organization provide any nutritional support (food, nutritional health information) to members of the community? (YES/NO)

a) If yes, please explain the services that were provided

b) What were the primary challenges faced during service provision?

Part 6: recommendation and lessons learned

16) Overall, what are your key lessons learned from this outbreak (health system, nutrition)?

17) How best can country-level resources be utilized for better nutritional respond to such an outbreak?

18) Considering everything, what are your top recommendations for improving the overall response to such an outbreak like this in the future?

Thank you so much. This information is really helpful. Do you have any questions for me?

Interview end time: .....

Appendix B: Community informant interview guide (A) – local leaders, women in the community, Covid-19 women survivors and their partners.

Date of interview ..... Start time: .....

Good morning/afternoon/evening. Thank you for taking time to talk to me today. I am Helena Yeboah, and I will like to talk to you today about the impact of the Covid-19 pandemic on women's living conditions (nutrition) in Ghana. I am conducting this research as part of my PhD thesis at the University of Ottawa. The duration of this interview will be between 1-1.5 hours.

Before we begin, I would like to confirm that you have given your consent for this interview. I would also like to ask your permission to record this interview in order to capture details that I may not be able to capture in my notes. I want to assure you that all information discussed in this interview will be kept confidential.

Can I have your permission to record the interview? (Yes/No)

Please do you have any question for me before we begin?

Questions:

Part 1: Introduction

Demographics:

- 1) Gender: Male/Female/Other
- 2) Marital status: Single/Married/Widowed/Divorced
- 3) Level of education
- 4) Occupation:
- 5) Geographic region in Ghana:
- 5) Please tell me about your community
- 6) Please tell me a bit about your family
- 7) From the time you get up in the morning, until when you go to bed, I would like you to describe your typical day to me

Part 2: Covid-19 impact (general)

- 8) Please tell me about the Covid-19 outbreak in your area
- 9) What were some of the biggest challenges your community dealt with during the outbreak?
- 10) What are some of the specific ways Covid-19 affected you and your family?
- 11) What services/activities did you start, continue or discontinue due to the Covid-19 pandemic?
- 12) Please explain to me how well you feel the government and the global health communities responded to the outbreak in Ghana/area?

Part 3: Covid-19 impact (health system and services)

- 13) Please could you describe the impact of the Covid-19 pandemic on the health system?
- 14) What has been some challenges faced by you or your family members in assessing health services?

Part 4: Perception of nutrition care to communities

- 15) The government provided food and nutrition support to many communities in Ghana. Did your community receive such support? (Yes/No)

If yes,

- i) Could you explain the quality of that nutritional support? (effectiveness and acceptability)
- ii) Were there other organizations (private/NGOs) providing nutritional care in the community?

If no,

- iii) Was such support needed in your community? (YES/NO)
- iv) If yes, why?
- v) What stories/issues did beneficiaries raise?

Part 5: perception of nutrition support to Covid-19 patients/survivors

- 16) Did you or anyone you know contract Covid-19? (YES/NO)

If yes,

- a) Please tell me about the experience
- b) Could you tell me about the types of nutrition care and support that were provided to patients?
- c) Please explain the quality of that nutritional care
- d) Could you explain to me the level of nutritional support you or Covid-19 survivors you know were given after they recovered from the Covid-19 infection?

Part 6: Covid-19 impact on women nutrition

- 17) What would be your general impression on the impact of the Covid-19 pandemic on any of these aspects: food security, food prices, harvest, access to markets, changes in demand for food
- 18) What do you think has been the impact of Covid-19 on malnutrition rates in Ghana?
- 19) Specifically, what has been the impact on maternal and child nutrition?
- 20) What are some of the nutritional changes that were made in your household in order to cope during the pandemic?

Part 7: recommendation and lessons learned

- 21) Thank you for sharing your experiences. What will you do differently in order to improve your nutritional health in an event as this?
- 22) Could you describe specific recommendations that you think will help ensure that responses during pandemics are more effective and appropriate for your community in the future?

Thank you very much for your time and information. Do you have any final comments or questions?

Interview end time: .....

## Appendix C: Community informant interview guide (B) – health/front-line workers

Date of interview ..... Start time: .....

Good morning/afternoon/evening. Thank you for taking time to talk to me today. I am Helena Yeboah, and I will like to talk to you today about the impact of the Covid-19 pandemic on women's living conditions (nutrition) in Ghana. I am conducting this research as part of my PhD thesis at the University of Ottawa. The duration of this interview will be between 1-1.5 hours.

Before we begin, I would like to confirm that you have given your consent for this interview. I would also like to ask your permission to record this interview in order to capture details that I may not be able to capture in my notes. I want to assure you that all information discussed in this interview will be kept confidential.

Can I have your permission to record the interview? (Yes/No)

Please do you have any question for me before we begin?

### Questions:

#### Part 1: Introduction

- 1) Gender: Female/Male/Other
- 2) Geographic region in Ghana
- 3) Please describe your role and responsibilities in the health sector

#### Part 2: Covid-19 impact (health system)

- 4) Please tell me about the Covid-19 outbreak in your area
- 5) Please could you describe the impact of the Covid-19 pandemic on Ghana's health system?
- 6) What were some of the biggest challenges your clinic/hospital dealt with during the outbreak?
- 7) What services/activities did you start, continue or discontinue due to the Covid-19 pandemic?
- 8) Please explain to me how well you feel the government and the global health communities responded to the outbreak in Ghana/area?

#### Part 3: perception of nutrition support to Covid-19 patients/survivors

- 9) Did you record any Covid-19 case? (YES/NO)  
If yes,
  - a) Could you tell me about the types of nutrition care and support that were provided to Covid-19 patients?
  - b) Could you explain the quality of that nutritional care?
  - c) Could you explain to me the level of nutritional support that was provided for Covid-19 survivors after they recovered from the Covid-19 infection?

#### Part 4: Perception of nutrition care to communities

- 10) What would be your general impression on the impact of the Covid-19 pandemic on any of these aspects: food security, food prices, harvest, access to markets, changes in demand of food
- 11) What do you think has been the impact of Covid-19 on malnutrition rates in Ghana?
- 12) Specifically, what has been the impact on maternal and child nutrition?
- 13) The government and some private groups provided nutritional support to some individuals in the country, please discuss for me your perception of the quality of the nutritional support given to individuals in Ghana during the outbreak
- 14) Did your clinic/hospital provide any nutritional support (food, information on nutritional health) to members of the community? (YES/NO)
  - a) If yes, please explain the services that were provided
  - b) What were the primary challenges faced during service provision?

Part 5: recommendation and lessons learned

- 15) What will your clinic/hospital do differently in order to improve nutritional health of women/community members in an event as this?
- 16) Could you describe specific recommendations that will help ensure that responses during pandemics are more effective and appropriate for your community in the future?

Thank you very much for your time and information. Do you have any final comments or questions?

Interview end time: .....

## Appendix D: Search strategies

### Medline

1. exp economic development/ or economic recession/ or gross domestic product/
2. (economic adj3 (development or growth or recession or crisis or downturn)).ti,ab.
3. ((Gross adj1 (domestic or National) adj1 (income or product)) or GNI or GNP or GDP).ti,ab.
4. 1 or 2 or 3
5. child health/ or infant health/ or women's health/ or maternal health/
6. child mortality/ or exp infant mortality/ or maternal mortality/ or maternal death/
7. ((mother? or maternal) adj3 (health or maternity or mortality or death or care)).ti,ab.
8. (maternal health or mother health or maternal maternity or maternal death or mother death).ti,ab.
9. ((child\* or infant\* or baby) adj4 (health or death or care or development or nutrition)).ti,ab.
10. exp child health services/ or exp maternal-child health services/ or exp maternal health services/ or Maternal-Child Health Centers/
11. 5 or 6 or 7 or 8 or 9 or 10
12. ((east or west or sub-sahara\* or central or south) adj1 africa).ti,ab.
13. (cameroon or central african republic or chad or congo or "democratic republic of the congo" or equatorial guinea or gabon or "sao tome and principe" or burundi or djibouti or eritrea or ethiopia or kenya or rwanda or somalia or south sudan or sudan or tanzania or uganda or angola or botswana or eswatini or lesotho or malawi or mozambique or namibia or south africa or zambia or zimbabwe or benin or burkina faso or cabo verde or cote d'ivoire or gambia or ghana or guinea or guinea-bissau or liberia or mali or mauritania or niger or nigeria or senegal or sierra leone or togo).ti,ab.
14. exp africa/ or exp "africa south of the sahara"/ or exp africa, central/ or cameroon/ or central african republic/ or chad/ or congo/ or "democratic republic of the congo"/ or equatorial guinea/ or gabon/ or "sao tome and principe"/ or exp africa, eastern/ or burundi/ or djibouti/ or eritrea/ or ethiopia/ or kenya/ or rwanda/ or somalia/ or south sudan/ or sudan/ or tanzania/ or uganda/ or exp africa, southern/ or angola/ or botswana/ or eswatini/ or lesotho/ or malawi/ or mozambique/ or namibia/ or south africa/ or zambia/ or zimbabwe/ or exp africa, western/ or benin/ or burkina faso/ or cabo verde/ or cote d'ivoire/ or gambia/ or ghana/ or guinea/ or guinea-bissau/ or liberia/ or mali/ or mauritania/ or niger/ or nigeria/ or senegal/ or sierra leone/ or togo/
15. 12 or 13 or 14
16. 4 and 11 and 15
17. limit 16 to (english language and yr="2000 -Current")

## Embase

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | exp economic crisis/ or economic development/ or economic instability/ or economic recession/ or economic stability/ or gross national income/ or gross national product/                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2.  | (economic adj3 (development or growth or recession or crisis or downturn)).ti,ab.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3.  | ((Gross adj1 (domestic or National) adj1 (income or product)) or GNI or GNP or GDP).ti,ab.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 4.  | 1 or 2 or 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 5.  | Exp maternal care/ or maternal child health care/ or maternal health service/ or child health/ or exp child health care/ or exp child nutrition/                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 6.  | Exp maternal death/ or childhood mortality/ or infant mortality/ or maternal mortality/ or fetus mortality/ or perinatal mortality/ or premature mortality/ or prenatal mortality/ or perinatal mortality/ or newborn mortality/                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 7.  | ((mother or maternal) adj3 (health or mortality or death or care)).ti,ab.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 8.  | ((child* or infant* or baby) adj4 (health or death or care or development or nutrition)).ti,ab.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 9.  | 5 or 6 or 7 or 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 10. | (cameroon or central african republic or chad or congo or "democratic republic of the congo" or equatorial guinea or gabon or "sao tome and principe" or burundi or djibouti or eritrea or ethiopia or kenya or rwanda or somalia or south sudan or sudan or tanzania or uganda or angola or botswana or eswatini or lesotho or malawi or mozambique or namibia or south africa or zambia or zimbabwe or benin or burkina faso or cabo verde or cote d'ivoire or gambia or ghana or guinea or guinea-bissau or liberia or mali or mauritania or niger or nigeria or senegal or sierra leone or togo).ti,ab.                                                                                                                                                                                          |
| 11. | exp africa/ or exp "africa south of the sahara"/ or exp africa, central/ or cameroon/ or central african republic/ or chad/ or congo/ or "democratic republic of the congo"/ or equatorial guinea/ or gabon/ or "sao tome and principe"/ or exp africa, eastern/ or burundi/ or djibouti/ or eritrea/ or ethiopia/ or kenya/ or rwanda/ or somalia/ or south sudan/ or sudan/ or tanzania/ or uganda/ or exp africa, southern/ or angola/ or botswana/ or eswatini/ or lesotho/ or malawi/ or mozambique/ or namibia/ or south africa/ or zambia/ or zimbabwe/ or exp africa, western/ or benin/ or burkina faso/ or cabo verde/ or cote d'ivoire/ or gambia/ or ghana/ or guinea/ or guinea-bissau/ or liberia/ or mali/ or mauritania/ or niger/ or nigeria/ or senegal/ or sierra leone/ or togo/ |
| 12. | ((east or west or sub-sahara* or central or south) adj1 africa).ti,ab.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 13. | 10 or 11 or 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 14. | 4 and 9 and 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 15. | limit 14 to (english language and yr="2000 -Current")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Web of Science

((ALL= ("Economic Development" OR "Economic growth" OR "GDP per capita" OR "GDP growth rate" OR "GNI per capita" OR "Economic downturn" OR "Economic recession" OR "Economic crisis") or economic NEAR/3 (growth or development or crisis or depression) AND ALL= ("maternal death" OR "skilled birth attendance" OR "antenatal care" OR "infant mortality" OR "child nutrition") or (child\* or infant\* or baby or babies or mother or maternal or mom or mothers) NEAR/2 (mortality or health or care or service\*) AND ALL= ("Africa South of the Sahara" OR "East Africa" OR "West Africa" OR "Southern Africa" OR "Central Africa" OR "Sub-Saharan Africa" OR "Cameroon" OR "Central African Republic" OR "Chad" OR "Congo" OR "Democratic Republic of the Congo" OR "Equatorial Guinea" OR "Gabon" OR "Burundi" OR "Djibouti" OR "Eritrea" OR "Ethiopia" OR "Kenya OR Rwanda" OR "Somalia" OR "Sudan" OR "Tanzania" OR "Uganda" OR "Angola" OR "Botswana" OR "Lesotho" OR "Malawi" OR "Mozambique" OR "Namibia" OR "South Africa" OR "Swaziland" OR "Zambia" OR "Zimbabwe" OR "Benin" OR "Burkina Faso" OR "Cape Verde" OR "Cote d'Ivoire" OR "Gambia" OR "Ghana" OR "Guinea" OR "Guinea-Bissau" OR "Liberia" OR "Mali" OR "Mauritania" OR "Niger" OR "Nigeria" OR "Senegal" OR "Sierra Leone" OR "Togo"))

## Global Health / EconLit

|      |                                                                                                                                                                                                                          |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| S1.  | DE "economic development"                                                                                                                                                                                                |
| S2.  | DE "economic growth"                                                                                                                                                                                                     |
| S3.  | DE "gross national product"                                                                                                                                                                                              |
| S4.  | economic depression                                                                                                                                                                                                      |
| S5.  | DE "economic depression" OR DE "economic crises"                                                                                                                                                                         |
| S6.  | TI (economic N3 (growth or crisis or depression or development or recession or downturn) ) OR AB ( economic N3 (growth or crisis or depression or development or recession or downturn) )                                |
| S7.  | S1 OR S2 OR S3 OR S4 OR S5 OR S6                                                                                                                                                                                         |
| S8.  | DE "maternal mortality"                                                                                                                                                                                                  |
| S9.  | DE "child nutrition" OR DE "infant nutrition" OR DE "child feeding"                                                                                                                                                      |
| S10. | DE "infant mortality"                                                                                                                                                                                                    |
| S11. | maternal health                                                                                                                                                                                                          |
| S12. | TI ( (mother or maternal or mom or mum or mothers) N2 (mortality or death or health or care or service*) ) OR AB ( (mother or maternal or mom or mum or mothers) N2 (mortality or death or health or care or service*) ) |

|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| S13. | TI ( (child* or infant or newborn or baby) N2 (mortality or development or death or health or nutrition or care or service*) ) OR AB ( (child* or infant or newborn or baby) N2 (mortality or development or death or health or nutrition or care or service*) )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| S14. | S8 OR S9 OR S10 OR S11 OR S12 OR S13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| S15. | DE "Africa South of Sahara" OR DE "Central Africa" OR DE "East Africa" OR DE "Sahel" OR DE "Southern Africa" OR DE "West Africa"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| S16. | TI ( (Cameroon or Central African Republic or Chad or Congo or "Democratic Republic of the Congo" or Equatorial Guinea or Gabon or "Sao Tome and Principe" or Burundi or Djibouti or Eritrea or Ethiopia or Kenya or Rwanda or Somalia or South Sudan or Sudan or Tanzania or Uganda or Angola or Botswana or Eswatini or Lesotho or Malawi or Mozambique or Namibia or South Africa or Zambia or Zimbabwe or Benin or Burkina Faso or Cabo Verde or Cote d'Ivoire or Gambia or Ghana or Guinea or Guinea-Bissau or Liberia or Mali or Mauritania or Niger or Nigeria or Senegal or Sierra Leone or Togo) ) OR AB ( (Cameroon or Central African Republic or Chad or Congo or "Democratic Republic of the Congo" or Equatorial Guinea or Gabon or "Sao Tome and Principe" or Burundi or Djibouti or Eritrea or Ethiopia or Kenya or Rwanda or Somalia or South Sudan or Sudan or Tanzania or Uganda or Angola or Botswana or Eswatini or Lesotho or Malawi or Mozambique or Namibia or South Africa or Zambia or Zimbabwe or Benin or Burkina Faso or Cabo Verde or Cote d'Ivoire or Gambia or Ghana or Guinea or Guinea-Bissau or Liberia or Mali or Mauritania or Niger or Nigeria or Senegal or Sierra Leone or Togo) ) |
| S17  | S15 OR S16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| S18. | S7 AND S14 AND S17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| S19. | Year of pub                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| S20. | language                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## Appendix E: PRISMA Checklist

| Section and Topic             | Item # | Checklist item                                                                                                                                                                                                                                                                                       | Location where item is reported |
|-------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>TITLE</b>                  |        |                                                                                                                                                                                                                                                                                                      |                                 |
| Title                         | 1      | Identify the report as a systematic review.                                                                                                                                                                                                                                                          | 45                              |
| <b>ABSTRACT</b>               |        |                                                                                                                                                                                                                                                                                                      |                                 |
| Abstract                      | 2      | See the PRISMA 2020 for Abstracts checklist.                                                                                                                                                                                                                                                         | 45                              |
| <b>INTRODUCTION</b>           |        |                                                                                                                                                                                                                                                                                                      |                                 |
| Rationale                     | 3      | Describe the rationale for the review in the context of existing knowledge.                                                                                                                                                                                                                          | 48                              |
| Objectives                    | 4      | Provide an explicit statement of the objective(s) or question(s) the review addresses.                                                                                                                                                                                                               | 48                              |
| <b>METHODS</b>                |        |                                                                                                                                                                                                                                                                                                      |                                 |
| Eligibility criteria          | 5      | Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.                                                                                                                                                                                          | 49                              |
| Information sources           | 6      | Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.                                                                                            | 48                              |
| Search strategy               | 7      | Present the full search strategies for all databases, registers and websites, including any filters and limits used.                                                                                                                                                                                 | 45, 48                          |
| Selection process             | 8      | Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.                     | 48-49                           |
| Data collection process       | 9      | Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process. | 48                              |
| Data items                    | 10a    | List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.                        | 49                              |
|                               | 10b    | List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.                                                                                         | 49                              |
| Study risk of bias assessment | 11     | Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.                                    | 51                              |
| Effect measures               | 12     | Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.                                                                                                                                                                  | 53                              |
| Synthesis methods             | 13a    | Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).                                                                                 | 50                              |
|                               | 13b    | Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.                                                                                                                                                | 51                              |
|                               | 13c    | Describe any methods used to tabulate or visually display results of individual studies and syntheses.                                                                                                                                                                                               | 52                              |
|                               | 13d    | Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.                                          | 51                              |
|                               | 13e    | Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).                                                                                                                                                                 | N/A                             |
|                               | 13f    | Describe any sensitivity analyses conducted to assess robustness of the synthesized results.                                                                                                                                                                                                         | 51                              |
| Reporting bias assessment     | 14     | Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).                                                                                                                                                                              | N/A                             |
| Certainty assessment          | 15     | Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.                                                                                                                                                                                                | 51                              |

| Section and Topic                              | Item # | Checklist item                                                                                                                                                                                                                                                                       | Location where item is reported |
|------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>RESULTS</b>                                 |        |                                                                                                                                                                                                                                                                                      |                                 |
| Study selection                                | 16a    | Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.                                                                                         | 51                              |
|                                                | 16b    | Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.                                                                                                                                                          | N/A                             |
| Study characteristics                          | 17     | Cite each included study and present its characteristics.                                                                                                                                                                                                                            | 53                              |
| Risk of bias in studies                        | 18     | Present assessments of risk of bias for each included study.                                                                                                                                                                                                                         | N/A                             |
| Results of individual studies                  | 19     | For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.                                                     | 55-59                           |
| Results of syntheses                           | 20a    | For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.                                                                                                                                                                               | 55-59                           |
|                                                | 20b    | Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect. | 55-59                           |
|                                                | 20c    | Present results of all investigations of possible causes of heterogeneity among study results.                                                                                                                                                                                       | N/A                             |
|                                                | 20d    | Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.                                                                                                                                                                           | N/A                             |
| Reporting biases                               | 21     | Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.                                                                                                                                                              | N/A                             |
| Certainty of evidence                          | 22     | Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.                                                                                                                                                                                  | N/A                             |
| <b>DISCUSSION</b>                              |        |                                                                                                                                                                                                                                                                                      |                                 |
| Discussion                                     | 23a    | Provide a general interpretation of the results in the context of other evidence.                                                                                                                                                                                                    | 59                              |
|                                                | 23b    | Discuss any limitations of the evidence included in the review.                                                                                                                                                                                                                      | 61                              |
|                                                | 23c    | Discuss any limitations of the review processes used.                                                                                                                                                                                                                                | 62                              |
|                                                | 23d    | Discuss implications of the results for practice, policy, and future research.                                                                                                                                                                                                       | 63                              |
| <b>OTHER INFORMATION</b>                       |        |                                                                                                                                                                                                                                                                                      |                                 |
| Registration and protocol                      | 24a    | Provide registration information for the review, including register name and registration number, or state that the review was not registered.                                                                                                                                       | 49                              |
|                                                | 24b    | Indicate where the review protocol can be accessed, or state that a protocol was not prepared.                                                                                                                                                                                       | 49                              |
|                                                | 24c    | Describe and explain any amendments to information provided at registration or in the protocol.                                                                                                                                                                                      | N/A                             |
| Support                                        | 25     | Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.                                                                                                                                                        | 46                              |
| Competing interests                            | 26     | Declare any competing interests of review authors.                                                                                                                                                                                                                                   | 46                              |
| Availability of data, code and other materials | 27     | Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.                                           | N/A                             |

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: <http://www.prisma-statement.org/>