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ASSESSING THE IMPACT OF MATERNAL AND CHILD HEALTH AND NUTRITION IMPROVEMENT PROJECT (MCHNP) ON SERVICE DELIVERY OUTCOMES IN GHANA

BY

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DECLARATION

I, Arif Mohammed, hereby declare that apart from specific references which have been duly acknowledged, this dissertation was conducted independently by myself under the supervision of Justice Nonvignon (PhD). I further declare that no part of this dissertation, either in the whole or part has been submitted elsewhere for the award of another degree.

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(Supervisor)	Signature	Date

DEDICATION

I would like to dedicate this research work to the Almighty Allah who has protected, guided and sustained my life in making it possible for me to reach this height on the educational ladder. Secondly my Mum and the entire family for their support.

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ABSTRACT

Background: Wide range of interventions have been introduced to improve maternal and child health services in Ghana, the most recent intervention introduced is the performance-based financing (PBF) Maternal and Child Health and Nutrition Improvement Project (MCHNP). The implementation of PBF interventions are believed to be based on weak and or very little evidence hence this study seeks to evaluate the impact of the PBF MCHNP on maternal and child health outcomes in Ghana.

Methods: A pre-test post-test study design was employed to study women of reproductive age and child within the first 28 days of life in all the 10 regions in Ghana with each region serving as its own control. The study used a retrospective longitudinal data which was obtained from the DHIMS2 database from 2014 to 2018 with the 2014 and 2015 data serving as the controls. Analysis was conducted using interrupted time series controlling for serial autocorrelation and heteroskedascity using the Cumby-Huizinga test for autocorrelation at specified lags employing Stata 15.0 as the statistical tool.

Results: The impact of MCHNP on the percentage of women who made 4 ANC visits decreased significantly by 0.011 percent points (p-value <0.01) in the Volta region with the Central, Western, Eastern, Upper East and West region seeing a positive impact however the increases in utilization was not statistically significant. Western, Upper East and Upper West regions recorded a significant increase in the neonatal mortality rate of 0.144, 0.124 and 0.082 per 1,000 LBs (p-value <0.001). The Upper East region of the Savannah belt also recorded and increased neonatal mortality rate of 0.124 per 1,000 LBs (p-value <0.001). The middle belt had no significant change in any of the outlined variables pre and post intervention.

Conclusion: The nationwide rollout of the PBF intervention MCHNP was associated with an increased use of maternal health services however these increase were not statistically significant. Maternal and childhood mortalities was a reduction in some regions following MCHNP implementation though the rate of decline were not statistically significant. It is recommended that the design of such useful interventions be tailored to the local drivers of change rather than following the broader context of the design which usually is global.

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LIST OF ABBREVIATIONS

ANC	Antenatal care
CHAG	Christian Health Association of Ghana
CHIM	Center for Health Information Management
CHO	Community Health Officer
CHPS	Community-based Health Planning and Services
CHW	Community Health Worker
CPBF	Community Performance Based Financing
DHD	District Health Directorate
DHIMS	District Health Information Management System
DHS	Demographic and Health Survey
EmONC	Emergency Obstetrics and Newborn Care
GDHS	Ghana Demographic and Health Survey
GHS	Ghana Health Service
GSS	Ghana Statistical Service
HIV/AIDS	Human Immuno-deficiency Virus/ Acquired Immune Deficiency Syndrome
ITSA	Interrupted Time Series Analysis
LB	Livebirth
LMICs	Low and Middle Income Countries
MAF	MDG5 Accelerated Framework
MCHNP	Maternal and Child Health and Nutrition Improvement Project
MCH	Maternal and Child Health

MDG	Millennium Development Goal
MEBCI	Making Every Baby Count Initiative
MICS	Multiple Indicator Cluster Survey
MOH	Ministry of Health
PBF	Performance Based Financing
PPMED	Planned Policy Monitoring and Evaluation Division
UNFPA	United Nation Population Fund
UNICEF	United Nations Children's Fund
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

At the launch of the Global Strategy for Women's, Children's and Adolescents' Health in 2015, it was indicated that maternal and child health continues to be a precedence to the international development community (Kuruvilla et al., 2016).

The World Health Organization (WHO) and United Nations Children's Emergency Fund (UNICEF) in 2014 reported that there has been an enhancement in the use maternal health services in recent times with about 86 per cent of pregnant women accessing prenatal care with a skilled provider to reaching targeted coverages globally.

Research reveals that 50% of women in sub-saharan Africa were able receive the WHO commended ANC attendance and 58% of children delivered by a skilled birth attendant (ICF International, 2012). In improving maternal health services, Ghana targeted an 85% coverage in the percentage of pregnant women who had a minimum of 4 ANC visits. Reports from the 2016 annual performance by the Family Health Division of the Ghana Health services indicated that the country recorded an estimated 76% coverage among pregnant women who received a minimum of 4 ANC attendance (Ghana Health Service, 2017). Skilled deliveries reduced in a published report by the Family Health Division of the GHS with an estimated 56% of skilled deliveries (Ghana Health Service, 2017), lower than the estimated coverage of 73% by DHS in 2014 (GHS, 2014). Poor socioeconomic status, high user fees and inaccessibility of essential health services, low motivated

providers and reduced service quality in many health sites are some of identified causes for the reduced maternal health service utilization (Steenland, Robyn, et al., 2017a).

In recent times a number of initiatives have been introduced to improve maternal and child health services, the most recent intervention implemented is the performance-based financing (PBF) Maternal and Child Health and Nutrition Improvement Project (MCHNP). Maternal and Child Health and Nutrition Improvement Project is a community performance-based financing that sought to improve the use and deliver better maternal and child health service in Ghana through financial incentive package, increase the financial independence of primary health care centers and facilities at the lower levels of the health system. The project adopted the approach of the community-based health planning services (CHPS) including visits by community health workers to clients and or community members to stimulate demand for services alongside the introduction of the financial incentives. The initiative aims to make available essential healthcare to the doorsteps of the population especially those in hard to reach areas where access to health care is a major bottleneck.

The Center for Global Development Working Group on Payment for Performance defined PBF as the allocation of resources from an organization or a body to a beneficiary, conditional on the recipient taking a measurable action or achieving a predetermined performance target (The AIDSTAR-Two Proect, 2011). The AIDSTAR-Two Project (2011) indicated that PBF focuses on either supply-side or demand-side (conditional-cash transfers, vouchers, user-fee exemptions, health insurance) interventions (financing,

targeted subsidies). According to the (World Bank Group, 2017), PBF intends to perk-up health service provision, utilization and quality through incentive packages for healthcare staff as way of increasing incentive, decreasing staff nonattendance and improving the financial freedom of service provision sites, geared towards quality service improvement. The supply-side PBF is a result-based financing that fee for service contract with the aim of improving quality (Steenland, Jacob, et al., 2017; World Bank, 2014).

Maternal and child health and nutrition improvement project introduction into the Ghanaian health system was based on the wide disparities that existed in the country with lowered use of maternal and child health services especially in remote communities of Ghana despite the progress made in the last two decades in Maternal and child health outcomes were the country recorded a 380 maternal deaths per 100000 livebirths and 60 child deaths in 1000 livebirths (OMS, 2015), with 41% of pregnant women in rural Ghana delivering at home(GHS, 2014). Maternal and child health and nutrition improvement project seeks to address the barriers rural folks encounter in utilizing maternal and child health services to raise the demand for services, increase home visits treat minor ailments and refer advanced cases for further management to increase to increase utilization and coverage through the application of a financial incentive package for health providers for better outcomes.

Specific interventions such as iron or folic acid administration for pregnant and perinatal mothers, vitamin A administration for children and post-delivery mothers, malarial chemoprophylaxis such intermittent preventive treatment in pregnancy (IPTp) as well as

the distribution of insecticide-treated nets (ITNs) and dietary supplementation for pregnant or breastfeeding mothers, have facilitated an increase in the use of maternal and child healthcare (WHO, 2014). Despite all these interventions, over a half of a million women die in the prenatal stages or during delivery or in the postnatal periods, partly of which is attributed to the lesser use of maternal healthcare services hence the introduction of MCHNP to help improve MCH service and utilization for positive outcomes (Gabrysch & Campbell, 2009).

1.2 Statement of the problem

There exist great disparities in coverage and utilization with 41% of pregnant women in rural areas receiving skilled deliveries leading to the introduction of the PBF MCHNP. Performance based financing (PBF) initiatives in recent times have received several critique following the systematic review by Cochrane in 2012, which indicate that PBF in low and middle income countries are based on too weak evidence and very little experience for a large skill implementation hence the tendency to weaken the existing health system (Paul et al., 2018). Maternal and child health and nutrition improvement project is one of such projects whose effectiveness is been criticized following its implementation. This study however seeks to determine the differential impact of MCHNP on maternal health outcomes to determine whether the intervention has improved maternal health services in Ghana.

1.3 Research questions

The study sought to answer the following research questions:

1. What is the effect of MCHNP on ANC 4 visits in Ghana?
2. What is the effect of MCHNP on skilled delivery in Ghana?
3. What is the impact of MCHNP on maternal mortality in Ghana?
4. What is the impact of MCHNP on neonatal mortality in Ghana?

1.4 General objectives

The general objective of this study was to determine the differential impact of Maternal and Child Health and Nutrition Project (MCHNP) on maternal and child health service utilization and outcomes in the ten regions of Ghana.

1.5 Specific objectives

The specific objectives were to:

1. Determine the influence of MCHNP on ANC visits in Ghana.
2. Estimate the effect of MCHNP on skilled delivery in Ghana.
3. Examine the impact of MCHNP on maternal mortality in Ghana.
4. Measure the effect of MCHNP on neonatal mortality in Ghana.

1.6 Justification

Over the years, several interventions and initiatives have been implemented to help curb the increased rate of morbidity and mortalities in women of childbearing age particularly in pregnancy and their babies. It was for this reason why MCHNP a PBF incentive scheme

was implemented to bring basic and essential health services to the doorsteps of the people especially those in the deprived and underserved localities to ensure health equity and equality to yield positive and improved health care status for women and children. Following the implementation requires the evaluation of the operations of the intervention whose effectiveness is not known hence the need for evaluate to inform stakeholders of the effectiveness of the PBF initiative in achieving better health outcomes. Findings from this study will be of much benefit to the implementing agency (MoH/GHS) to guide in the design of future PBF and or go back to the drawing board to review the implementation processes and operations of the current project to yield healthy outcomes and strengthen the health system. Again results will facilitate accountability among the donor agency, the implementing agency and other stakeholders. Information gotten from the study will help managers at all levels of the health system in undertaking their respective activities, in attaining the rationale of the project and to help improve client outcomes through delivery of adequate health care services for improved service utilization.

1.7 Conceptual framework

The below framework attempts to explain the effect of maternal and child health and nutrition improvement project of maternal and child health outcomes namely increased antenatal 4+ visits, improved access to skilled deliveries and neonatal mortalities. Children are non-autonomous and unable to make a decision concerning their health hence rely on the mother and the community to decide when and where a child should receive care. Maternal use of health is informed by ones socio-demographic characteristics such as age, marital status, level of education, occupation, parity among others as well as societal

influences such as the value systems, geographic location of the place of residence to service delivery points. A woman's decision to again seek for health care for herself and her baby despite the value systems and demographic characteristics are informed by the type of services available, how accessible the services are, the type or level of health facility in the vicinity, staffing and whether or not available services are affordable.

An intervention maternal child and nutrition improvement project (MCHNP) is said to provide improved healthcare outcomes by providing improved access to essential basic services for individuals, households and the community at large, improve service quality, improve service availability, improve access to essential logistics and equipment for basic and essential health care as well as providing incentives as a booster for community health care team to upsurge the use of basic health care to residents. The outcome of this intervention is said to improve and increase antenatal 4+ visits, reduce neonatal mortalities and increase skilled deliveries through improved access, availability of health service and delivery of quality health care services which in effect eliminate health inequities and inequality.

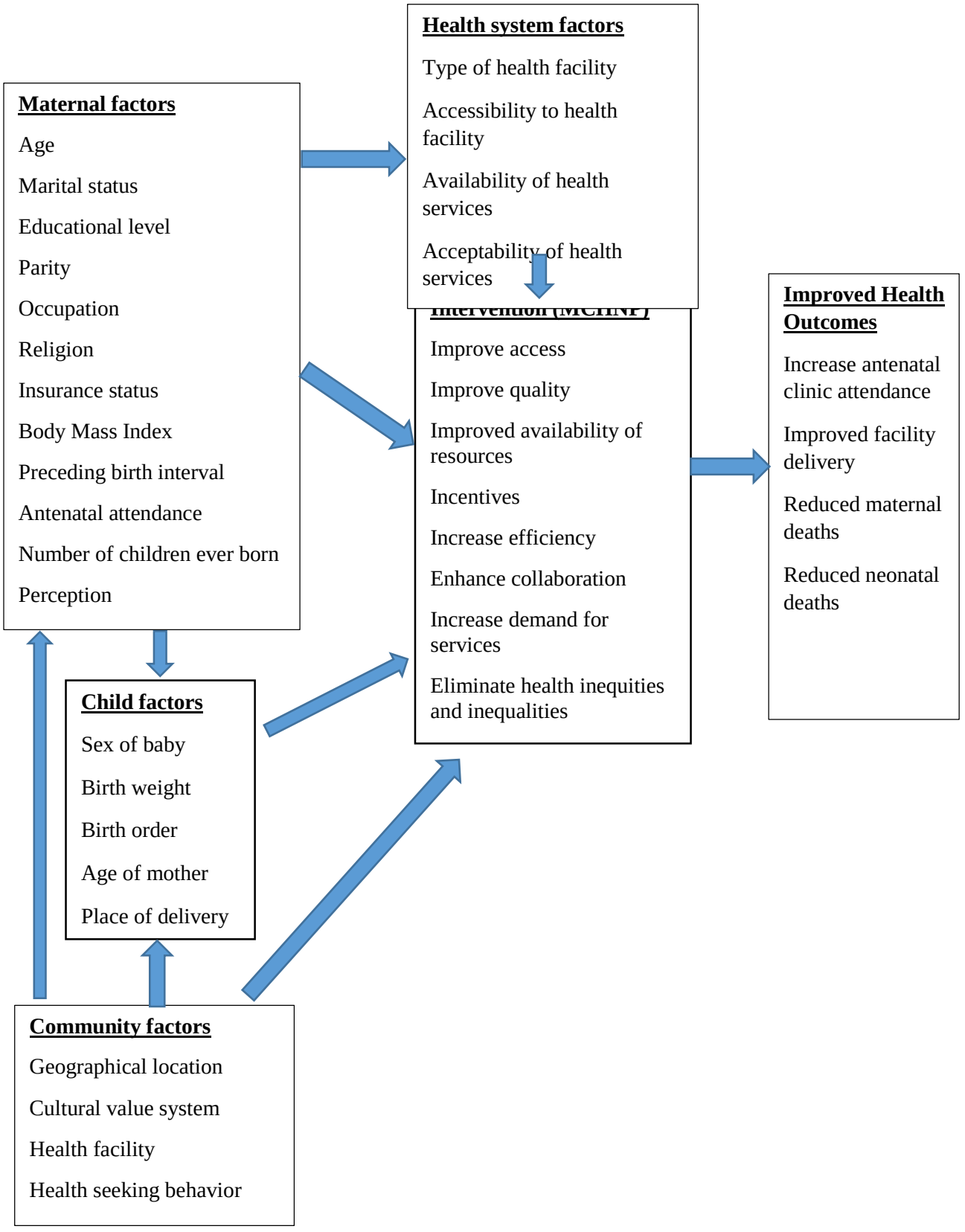

Figure 1: Conceptual Framework

1.8 Organization of the study

This study is organized in six parts, with the first chapter focusing on the study's background, problem statement, presenting the research questions and objectives, the study significance as well as the conceptual framework. The second part which is the chapter two reviews relevant literature to the study objectives. The third chapter presents with the methods employed in the study such as the design used, study site, how the data was obtained, study variables, population studied data management techniques and data analysis. The forth chapter presents the study findings and a brief interpretation of the finding in line with the rationale of the research. Chapter five of this paper presents the discussion of the study findings in relation to the works of other people. The sixth chapter is the conclusion the study gives to its findings and a number of suggested recommendation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter present relevant literature on the performance-based financing intervention, Maternal and Child Health and Nutrition Improvement Project (MCHNP) and the identified outcome of interest in relation to other related evaluation studies.

2.2 Performance –Based Financing

Performance-based financing (PBF) initiatives were implemented to supplement demand-side interventions such as home visit to stimulate the demand for service, referrals by improving community referrals by community health worker, and the removal unofficial fees at facilities for the marginalized (Steenland, Robyn, et al., 2017a). Basinga et al. (2010) indicated that results from the introduction of these interventions especially the one in Rwanda yielded positive outcomes (Paul et al., 2018) which led to the increased implementation and incorporation of PBF into the existing health systems of LMICs. A systematic review of nine studies by Cochrane (2012), concluded that "existing evidence base was too weak to draw a general conclusion" on the efficiency of PBF (Fretheim, Witter, Lindahl, & Olsen, 2012). However the Rwandan, Philippian and Tanzanian studies found PBF increased several health outcomes (Basinga, Gertler, & Binagwaho, 2009; Binyaruka et al., 2015). Impact evaluations on PBF incentives in Burundi revealed mixed findings with findings contradictory amongst studies (Steenland, Jacob, et al., 2017; Bonfrer et al., 2014). Results from two of the impact studies in Burundi found a rise in skilled deliveries and ANC coverage with one increasing contraceptive outcomes.

Evaluation findings from the Philippines, Haiti and Cambodia found significant improvement for all health services and improvement in institutional deliveries and outcomes (Gertler, Giovagnoli, & Martinez, 2014) (Zeng, Cros, Wright, & Shepard, 2013). Steenland et al. (2017), revealed that most PBF studies focus on the utilization of maternal and child health services and rarely focus its theme towards health outcomes and or improved health services.

2.3 Maternal and child mortality

An estimated number of 830 women die each day with the cause been related to pregnancy and labour, resulting in an annual estimate of 303,000 pregnancy and child related (UNFPA, 2018). Sub-saharan African and the developing worlds' for that matter are said to have recorded the largest proportion (99%) of all maternal deaths globally. In every 180 pregnant women in the developing countries it is likely that 1 die during labour, with 1 in a 4,900 pregnant women of the developed regions dying with the cause been as a result of pregnancy and childbearing (Alkema et al., 2016), hence a public health threat to the developing countries.

Massive improvement in maternal healthcare have been achieved with the reduced maternal mortality as indicated above such as increase in accessibility and availability of maternal healthcare services and emergency obstetric care (Africa Progress Panel, 2010; UNFPA, n.d.). However majority of Africa women lack access to these essential and highly effective available healthcare services (WHO, 2017).

In a maternal health report, it was indicated that countries mostly developing countries encounter various forms of obstacle in improving maternal healthcare. These challenges include; inadequate data which inhibit implementing agencies from providing cost-effective programmes. Again service fee, sociodemographic factors, cultural context are some of the identified obstacles to the utilization of essential obstetric services (Afica Progress Panel, 2010).

The global health community has been in search for efficient initiatives to reduce maternal and childhood mortalities drastically (Alvarez, Gil, Hernández, & Gil, 2009). In quest of this global menace, it is indicated that maternal health should be seen as an investment and must be seen as a governmental, collective efficient venture to improve the health of women and their babies (Africa Progress Panel, 2010). The report indicated that the health of the African woman can be improved by considering the following, maximizing services of health workers; well-organized financing mechanisms; and building political alliances. In most developing countries, it has been revealed that maternal healthcare service has been improved and has translated in the successful declination of maternal by employing community health worker programmes which ensures that essential health care and EmONC are available and accessible by the rural populace. CHWs are instrumental in providing healthcare to underserved populations, particularly in rural areas, with few healthcare facilities. “CHWs can improve maternal health more cost-effectively and reach more of the population if given the proper tools, such as mobile phones, bicycles and delivery kits” (Ibid). Alvarez, Gil, Hernández, & Gil (2009), stated that the causes of maternal deaths are categorized into two, viz; direct and indirect causes.

In 2016, WHO reported that globally approximately 75% of maternal mortality are due to direct causes, indicating that the deaths were as a result of the pregnancy. This assertion was affirmed by a study carried out by Dale et al in 2014 who stated that 73% of maternal mortality globally are due to direct causes with about 27.5% of the identified causes as indirect causes (Issah, 2017).

The direct causes to maternal mortalities include; bleeding disorders, obstructed labor, pre-eclampsia and eclampsia. Indirect causes to the maternal deaths were known to be the presence of an already existing condition such as malaria, HIV/AIDS, among others (Alvarez et al., 2009).

A systematic review by the WHO indicated that bleeding disorders, the eclampsias and puerperal sepsis were the leading causes of maternal mortality. Over 80% of these causes were found in LMICs as a result of deplorable health facilities and conditions and lack of initiatives to combat this public health menace. (Say et al., 2006).

In 2016 WHO reported that Ghana made a remarkable progress in reducing the rate maternal death of 760 per 100,000 livebirths in 1990 to 319 per 100,000 livebirths in 2015 (Bernardo, & Cesar, 2013). Even though the decline look steady to the lay man, the progress is said to be slow that is only a 2.6% reduction every year, despite the 40% reduction between the years 1990 to 2010. This insufficient reduction was why most African including Ghana was unable to achieve the MDG target of 190 per 100,000 live births due to it low pace of declination (Frempong-ainguah, Johnson, Frempong-ainguah, Matthews, & Andrew, 2015).

United Nations Population Fund (2015) indicated that most of the maternal mortalities happened in the underserved communities compared to those in the wealthier communities (Atuoye, Dixon, Rishworth, Galaa, & Boamah, 2015). It is however identified that the assertion was due the lack or low of skilled birth attendants in the remote areas. Statistics indicate that as of 2016, the proportion of pregnant women whose delivery was supervised by skilled and qualified personnel in the urban areas stood at 74% with a corresponding rural prevalence of 43% (UNFPA, 2015).

Inadequate ANC visits, societal and traditional practices, poor postnatal care attendance, lack and or shortage of logistics and equipment among others, have been some of the most important influential elements to the high maternal mortality in Ghana (Awoonor-williams, 2018). To reiterate, it is observed that causes of maternal mortality in Ghana over the period has been directly related to causes such as bleeding disorders, termination of pregnancies by an unqualified personnel and unapproved practices, pre-eclampsia and eclampsia, sepsis and obstructed labor with malaria, HIV/AIDS, and anemia as the indirect causes (Awoonor-williams, 2018).

Poverty, lack of skilled health attendant, inaccessibility to available health facility were some of the reasons to the escalated maternal mortality in the country which correlate to the findings of Thaddeus and Maine which stated that the causes of the aforementioned nature often result into one of the three identified delays to maternal mortality; “delay in making a decision to go to hospital, delay in arriving at the hospital, and a delay in getting

treatment at a health facility which often lead to maternal mortality" (Awoonor-williams, 2018).

According to Darmstadt (2014), neonatal death rate has seen a yearly decline worldwide of about a 2 per cent since 1990, lower than that of maternal mortality that stood at 2.6 percent and under-five-year mortality of 2.9 percent (WHO, 2005).

Over the past two decades, under-five death rate dwindled with an estimated proportion of about 58 per cent, that is at rate of 93 deaths per 1,000 LBs in 1990 to an estimated rate of about 39 deaths per 1,000 LBs in 2017 which corresponds to about 1 out of 11 children dying before their fifth birthday in 1990 and 1out of 26 children in 2017 (WHO, 2018).

The first 28 days of every child is described as the most crucial stage of life and this stage is what is termed the neonatal period (WHO, 2018). This stage is the most susceptible period of the life of every baby making survival of these newborns a global concern. The wellbeing and welfare of any person is determined by this phase of life, yet was the most neglected period with regards to quality service delivery until recently where neonatal health has catch the attention of many organizations and individuals leading to the implementation of several initiatives to increase the value of care and promote health of the newborn. Numerous interventions have been implemented with enormous improvements in other area, yet expected changes are not seen when it comes to neonatal health outcomes (Annan & Asiedu, 2018; Wardlaw, 2014). Neonatal mortality rates dwindled by 33 per 1,000 LBs to 21 per 1,000 LBs with an estimated proportion of only

37% from 1990 to 2013. In 2016, 2.6 million of neonatal death occurred, contributing roughly 46% of all under-five deaths translating to 7000 newborn deaths everyday (WHO, 2018).

Most regions in the world finds it very difficult to curb the high neonatal mortalities, the highest burden remains in the developing countries with West and Central Africa having the highest burden. Wardlaw (2014) indicated that the risk of a newborn dying in these unindustrialized nations is 10 times those in the industrialized countries (Bay, Miller, & Faijer, 2014).

The insignificant reduction in the neonatal mortality rate has led to the stagnation in newborns death rates as well as that of children before reaching their fifth birthday in Ghana. As of 2014, the death rate of children below 28 days stood at 29 deaths per 1000 livebirths in Ghana accounting for about 50% of under-five mortalities in the country (Ministry of Health, 2018; UNICEF, 2017). Infections (31%), preterm birth complications (29%) and Intrapartum related deaths (27%) as some of the probable factors contributing to these deaths (Ministry of Health, 2018). These measurements suggested that there are issues with the quality of care giving at the various facilities in the country since good number of the deaths can be averted with unsophisticated techniques.

2.4 Maternal and Child Health and Nutrition Improvement Project

Maternal and Child Health and Nutrition Improvement Project (MCHNP) aims at improving utilization of essential healthcare to residents in remote areas with special

attention to women of child bearing age and their wards below the ages of two. The objectives of the project includes increasing availability and utilization of basic clinical care services, public health services and resolution of the challenges associated to accessing the facilities using the pre-existing CHPS framework, intensifying home visits and improving social behavioural change communication approaches to educate opinion leaders and community members. The proposed initiative sought to tackle access challenges zooming more into the maternal and child health services foe residents of the underserved communities (Ministry of Health, 2015).

Studies have identified some prominent obstacles to essential health care services in most developing countries. Notable among these barriers include geographical access, financial constraints, sociocultural barriers, lack of knowledge and awareness among others, with associated effects of low demand or patronage for and utilization of services among the poor and marginalized segment of the society with pregnant women and child at greater risk (Jacobs, Ir, Bigdeli, Annear, & Van Damme, 2012). These factors are known to cause delay and or prevent many people in the region from accessing essential and emergency medical health services especially among the rural folks and the poor.

WHO reminded the world body at the Alma-Alta declaration of health for all where health ministers of the member state consented to provide health care services that are reachable, reasonably priced and designed to cater for local drivers or the cultural context of the people as a way to fulfil the dreams of primary health care (Phc, n.d.). These services include but not limited to supervising deliveries, antenatal care, postnatal care, treatment

of minor ailments and preventive health care services such as immunization and family planning services, health education to curb the high maternal and child mortalities in the region (Adongo et al., 2013).

In ensuring a universal health coverage, Ghana in 2005 implemented CHPS as a means of providing essential healthcare to the doorsteps of residents living in deprived areas as a result of limited structures and resource (Adongo et al., 2013). This intervention is a roll-out of the Navrongo experiment in the Upper East Region which aims at reducing barriers associated with geography, that is to say limited access to health care delivery to underprivileged populations in the region (F. Nyonator, Jones, Miller, Phillips, & Awoonor-Williams, 2005). The Ghana Health Service reiterated that activities and findings of the Navrongo Health Research Centre are what led to the birth of this life saving initiative in the country as a means to addressing the inequities in the health system by providing health facilities as well as in the community (World Vision International & Ghana Ministry of Health/Ghana Health Service, 2015).

The CHPS idea is seen as a useful approach in providing fundamental healthcare to underserved populations nationwide and widening the scope of authorities in reorienting the traditional health system by moving or delivering essential or basic health care service out of the clinical setting and achieving the anticipated objectives thereby increasing coverage, plea and use of basic services to promote health and reinforce the health system at large (World Vision International & Ghana Ministry of Health/Ghana Health Service, 2015).

The CHPS strategy aims to deliver healthcare services via partnerships with local decision and opinion leaders, civil society groups and programme itself (Nyonator, Awoonor-Williams, Phillips, Jones, & Miller, 2005). Studies have indicated about 70% Ghanaians lived over 8km to the nearest health facility, a problem aggravated by bad road network and dearth transport facilities hence the need to adopt the community-based approach of service delivery (Sulemana & Dinye, 2014).

Every year a large number (303, 000) of women of child bearing age globally are said to be confronted with obstetric and gynecological complications resulting in a rise in maternal and child mortalities (WHO, 2015). In an attempt to address the increased maternal mortality and infant deaths and devising strategies to sustain the reduction, it was noted that many women in Ghana suffer from illnesses and injuries during childbearing which are preventable to improve safe motherhood (Ibid). To avert these high mortalities in sub-Saharan Africa, it is imperative that essential and emergency health care be provided during pregnancy and childbirth to lessen the disparity between the wealthy and the destitute in fulfilling universal health coverage (Mangeni, Mwangi, Mbugua, & Mukthar, 2012). In a reproductive health strategic plan by the Ministry of Health and Ghana Heath Service in 2007, it stated that increasing skill birth attendants in the country one of the surest way to curb this menace (WHO, 2015). This led to incorporating skilled care into other public health initiatives such as CHPS as a means to increase utilization for improved health outcomes for communities especially the rural dwellers who have inadequate structures for providing fundamental healthcare (Ibid).

The Ministry of Health, Ghana Health Service and the UNDP in a mutual report indicated that skilled delivery services are not a component of the CHPS operations due to dearth of resources, albeit studies have evidenced that deliveries conducted by skilled attendants is crucial in combating the high maternal and child mortalities (Maternal Health, 2011). The strategy however is among the main prioritize to improve maternal and child healthcare by promoting skilled birth attendance via community participation, health promotion and education programmes and referral services (Johnson et al., 2015). It was for this reason why the Ghana MDG 5 Accelerated Framework (MAF) prioritize the need for expansion of CHPS zones to combat challenges such as geographical access, financial difficulties, cultural and other identified barriers to essential and EmONC to reduce the high mortalities among women of childbearing age and child mortality by encouraging communities and its members through the community leaders to use maternity facilities that are available in the area (Maternal Health, 2011).

In 2014, the World Bank in partnership with the Ministry of Health and the Ghana Health Service revamped the concept of CHPS by incorporating into it the community performance based funding as a way to motivate CHW to help bridge the gap in health service delivery to achieve the Alma –Alta declaration of "Health for All" (Ministry of Health, 2015) and this new idea was named MCHNP.

Maternal and child health and nutrition improvement project seeks to resolve the barriers to optimal maternal and child health by ensuring that pregnant women and their unborn babies as well as postpartum mothers and their children have access to essential maternal

health service and adequate nutrition with much emphasis on women who live in underprivileged communities across the country (Ministry of Health, 2015). As a PBF scheme, MCHNP is considered universal methodology directed towards the local context and a mechanism for creating an improved, a comprehensive and an accessible health delivery system (Steenland, Robyn, et al., 2017a).

Maternal and child health and nutrition improvement project as a PBF intervention is "a system reform approach that provides responses to the 'how' of achieving Universal Health Coverage and the Sustainable Development Goals" (Steenland, Robyn, et al., 2017a).

Increased health information, financial motivation and efficient human resource management has the tendency to promote system-wide restructurings to improve better health outcome (Ibid).

Like any other system or policy there is bound to be gaps in between planned activities and the actually operations which are likely to hinder the achievement of the overall goals of the initiative (Paul et al., 2018). According to Paul et al. (2018), the design of PBF schemes were designed by consultants, academics and experts in the developed countries to perk-up the functioning of the health system, however these schemes lacks sufficient experience and or evidence from the developed countries on the effective of the scheme before its wide implementation in the LMICs.

The Ministry of Health (2015), indicated that the introduction of MCHNP is perceived to increase utilization of essential services and improve its quality by motivating staff (CHW) with financial incentive package. It is evidenced that these packages will encourage the community health team to increase coverage of essential health services which are the WHO recommended ANC4+ visits, supervised deliveries attended to by skilled professionals and perinatal services as a way to lessen maternal and child mortalities in the region.

Rudasingwa, Soeters, & Bossuyt (2014), indicated that PBF implemented in Burundi showed a raise in service utilization such as outpatient services, maternity services, antenatal care services and management of minor ailment with improved referral system, enhancing positive health outcomes following the introduction of the PBF incentive. An evaluation of a similar intervention in the Democratic Republic of Congo revealed an improvement in service coverages (World Bank, 2014) and these results found to be similar to a controlled study in Haiti (Zeng et al., 2013). Studies have indicated that PBF has accounted significantly to the improvement in the quality and quantity in healthcare service utilization LMICs as mentioned by (Rudasingwa et al., 2014). Research have shown that PBF has to potential enhance all-inclusive reforms to redress structural challenges of public health service delivery leading to transformation of the current public sector of LMICs, however it is about time to question the effectiveness, the performance and the design of PBF in the region (Fretheim et al., 2012).

An evidence synthesis of nine PBF interventions revealed that large scale implementation of PBF in LMICs is based on too weak evidence to draw a general conclusion that the scheme is efficiently potent (Fretheim et al., 2012) this has led to the introduction of robust methods, designs and evaluation techniques to increase the quality of available evidence (Steenland, Robyn, et al., 2017). Results from the studies was what led to the conclusion by Paul et al. (2018) in a paper "Performance-based financing in low income and middle-income countries: isn't it time for a rethink?", that the implementation of PBF was done in a rush as the initiative is said to lack sufficient evidence from practice especially in developed countries. Paul et al. (2018), reiterated that the much effectiveness and efficiency have not been demonstrated especially in developed nations (Van Herck et al., 2010; Emmert, Eijkenaar, Kemter, Esslinger, & Schoffski, 2012) hence particular caveat must be instituted in the implementation new developments and change ideas, especially the health sector (de Savingy & Taghreed, 2009).

2.5 Empirical studies on Impact of Antenatal care and Skilled Delivery

Utilization of maternal health services was one of the surest ways of achieving the Millennium Development Goal 4 and 5. Prenatal care, supervised deliveries and perinatal care are the key maternal health services available to curb the high maternal and childhood mortalities (Ahmad, Zhu, Lebcir, & Atun, 2019; Lassi, Majeed, Rashid, Yakoob, & Bhutta, 2013).

WHO defined ANC "as the care provided by skilled health-care professionals to pregnant women in order to ensure the best health conditions for both mother and baby during

pregnancy. The components of ANC include: risk identification; prevention and management of pregnancy-related or concurrent diseases; and health education and health promotion" (WHO, 2016).

Among the factors of ensuring safe delivery is receiving essential medical services from highly skilled, qualified and well-motivated personnel's whose main activities are to help prevent, detect, and treat pregnant women from any pregnancy complication such as foetal loss among others. These services are said to promote safe motherhood and avert the high mortalities among pregnant women and their children. To reiterate, it is evidenced that a worth prenatal care is a determinant to the reduced maternal and perinatal morbidity and mortality (Anwar, Kalim, & Koblinsky, 2009).

Tuladhar & Dhakal (2011), indicated that the services provided during antenatal help in identifying at risk women from low hemoglobin, pre-eclampsia, pre-term labour among other identified complication which can lead to deteriorating the health of the mother and or the foetus. Prenatal care is therefore said to be a protective garment to safe pregnancy and positive delivery outcomes as it help in reducing the risk associated with the condition (Tuladhar & Dhakal, 2011; Yakoob et al., 2009).

Abou-Zahr & Wardlaw (2003) posited that the information provided to gravid women through health education during prenatal sessions aid them in identifying some warning and danger signs and symptoms associated with the pregnancy and to report quickly for care in times of these dangers (Olayinka, Joel, & Bukola, 2012). A study on healthcare

utilization and strategize to improve it indicated that improved antenatal care visit increases the increases supervised deliveries and postnatal care attendance (Belemsaga et al., 2015).

A study conducted by Mumu, Afroz, Chowdhury, Kabir, & Ahmed (2013), identified some of the identified health system and user related barriers that hinders the use of prenatal care. Unavailability and inaccessibility to essential maternal health care services, unofficial fees and reduced feature of ANC in several communities, family's status, background characteristics, educational status, supposed understanding, ethnic principles and earlier pregnancy history remained some of the known challenges that hinders utilization of the service.

The AIDSTAR-Two Project (2011), indicated that in addressing these identified challenges required the introduction of an initiative geared towards maintaining and refining maternal and child health care services, some of which includes focused ANC as well as initiatives directed towards changing the demand for services such as "user fee exemptions, health insurance, free maternal health packages, conditional cash transfers and use of vouchers for accessing essential services as well as interventions that focuses on changing the supply-side such as financing targeted subsidies"(Steenland, Jacob, et al., 2017) hence the implementation of performance-based financing (PBF) schemes. Performance-based financing initiatives in maternal and child health service provision is said to foster health service utilization for improved health outcomes (The AIDSTAR-Two Project, 2011) and also "aims to improve health service provision and quality by increasing staff motivation, reducing provider absenteeism as well as increasing financial

independence of facilities and service delivery points to improve service quality and potentially minimize user fees"(World Bank, 2014). Steenland, Jacob, et al., (2017) stated that PBF has led to the introduction of several differentiated modules such as home visits among other modules of care in leading to improvements in the demand for health services and utilization resulting in positive health seeking behaviors and outcomes. As cited by Soeters & Griffiths (2014), improved referrals are integral part of the demand-side intervention of the PBF schemes. In this module, community healthcare team or workers refer illness beyond their scope and expertise for advance care to positive outcomes (Bossert, Chitah, & Bowser, 2003). Fritsche et al. (2014) in his study revealed that PBF resulted in positive outcomes in several LMICs such as the Cambodia, Zambia and the Republic of Rwanda through decentralization and performance contracts providing attractive intervention modules of supply-side and demand-side interventions (Basinga et al., 2009).

Antenatal care has three identified dimensions in measuring its quality. As cited by Rahman et al. (2017), the dimensions of ANC service includes; period of initiation, amount of visit and an addition of a complete commended care (Joshi, Torvaldsen, Hodgson, & Hayen, 2014); Lincetto, Mothebesoane-anoh, Gomez, & Munjanja, n.d.). Studies have indicated that the number of ANC visits has a substantial bearing on the pregnancy outcomes (Mpembeni et al., 2007).

Women with low antenatal care visits (one or no ANC visit) tend to be two times probable to record a postnatal mortality related to those that received four and above prenatal visits (Pervin, 2012). It is for this reason why the WHO recommended a least of four focus

prenatal visits for every pregnant woman for positive outcomes (Rahman et al., 2017). The proportion of expectanat mothers having four quality antenatal care sections whiles pregnant seems low and unsatisfactory as recent estimates indicate that 64% (2007 – 2014) of pregnant women attended the WHO recommended four or more prenatal visits globally (Lincetto et al., n.d.) which affirms the proportion of 37% in low-resource settings between 2005 – 2012 (Rahman et al., 2017). This suggest that much is expected to be done to achieve optimal sexual reproductive health and rights and the dignity of life as stated in the international human right law as having a state to permit adult females and teenage girls outlive pregnancy and childbirth (Lincetto et al., n.d.). Therefore the WHO is said to foresee a world where "every pregnant woman and newborn receives quality care throughout the pregnancy, childbirth and the postnatal period" (Ibid).

Prior to achieving MDG 5, WHO proposed a recommend antenatal care visit of at least four (4) for an effective prenatal care (WHO, 2008). Several studies have indicated that positive maternal and child health are vastly associated or correlated with the use of antenatal care services (Ameyaw, 2011). Antenatal care gives women the direction to plan for safe delivery and as well help in the identification of potential risk and complications associated with the pregnancy (WHO, 2003). As cited by (Ameyaw, 2011), the main impact of antenatal care has been the decrease in obstructed labour, severe anaemia and other medical complications through the administration of supplements as such iron folic acid, high risk mother's identification, treatment and nutrition improvement. Studies indicated that there is a significant correlation between maternal mortality as maternal death decreases with increase antenatal care utilization. Antenatal care was found to drop

maternal mortalities by seventeen fold in Zaire (Ameyaw, 2011). The probability of a woman with inadequate ANC visit and the intrauterine growth retardation is 63% (WHO, 2003) which affect foetal development and the general health of the child. Prevention of obstetric emergencies cannot be achieved by only prenatal care, but the data and information generated during antenatal care services go as farther as supporting successful management of pregnancies and subsequent wellbeing of the child (Ameyaw, 2011). As posited by United Nations Economic and Social Commission for Asia and the Pacific (2008) the main essence of prenatal care visits is not only limited to the pregnancy period but also period beyond pregnancy as there is a high probability of seeking a supervised or an assisted delivery from health professionals among those who frequently seek antenatal care.

As cited by Ameyaw (2011), site of delivery is associated with improved maternal and child health outcomes by reducing obstetric complications, foetal malformations, maternal and child mortalities. Acquisition of infections and associated complications during childbirth can be decreased with appropriate hygienic condition during delivery to produce better and improved health outcomes (United Nations Economic and Social Commission for Asia and the Pacific, 2008). Improved hygienic environment for delivery is one of the major riders to better health outcomes in children and women of reproductive age, with several studies asserting to the claim with a significant reduction in maternal and child mortality rates. For effective conditions, childbirth much be assisted by trained and skilled health professionals who are capable of detecting danger signs and intervening as early as possible. This demand a robust and fully functional referral system where complicated

obstetric cases will be referred immediately for further management to increase survival among expectant mothers and their babies (Ameyaw, 2011); Thaddeus & Maine, 1994). In 2009, Sari asserted that unexpected obstetric complications coupled with poor referral system are key to maternal mortality. The availability of trained health attendants during delivery and the accessibility of health facilities led to an estimated dwindling in maternal deaths from obstructed labour, puerperium sepsis, pre-eclampsia, eclampsia, antepartum and postpartum heamorrhage (UNFPA, 2006). An estimated 56% of women in developing countries are assisted by trained and skilled attendants which means a significant proportion of these deliveries occur in the communities (UNFPA, 2006). In Ghana traditional birth attendants are substitute to professional birth attendants, increasing the risk of infections, obstetric complications and poor health outcomes leading to high maternal and child deaths (Senah, 2003)(UNFPA, 2006). It is indicated that economic status plays an essential role in a woman's place of childbirth. Women in the low wealth quintile are 13 times less likely to deliver in the health facility than among their counterparts with higher wealth index. (ibid).

2.6 Theoretical Framework

The Andersen theory of healthcare utilization model was used as the theoretical basis for assessing the differential impacts of MCHNP on maternal and child health service utilization outcome in the country as conceptualized in the section 1.7 of this study. This framework aims at ascertaining settings that either expedite or hamper the utilization of health services. The utilization of healthcare services is a function of the policies, political system as well as ones' interaction with others in the society and other societal forces,

which shapes the health seeking behavior of the population or an individual on the usage of available healthcare services leading to the achievement of ultimate outcomes.

To reiterate the model conceptualizes that one's access and usage of health services is a function three fundamental features possessed by an individual or the population namely; predisposing characteristics, enabling characteristics and need characteristics.

Predisposing characteristics are factors that render the utilization of health services apt. They include the demographic characteristics of an individual such as age, gender, religion, ethnicity, belief, culture, knowledge about the illness.

Enabling characteristics are factors that engender the utilization of health services. They them are costs, availability of service, proximity, motivational benefits, health insurance, social network support, family support.

Need factors are imperative and requires immediate usage of the available health services. These includes; perception of severity, disability days, disease, symptoms, health status.

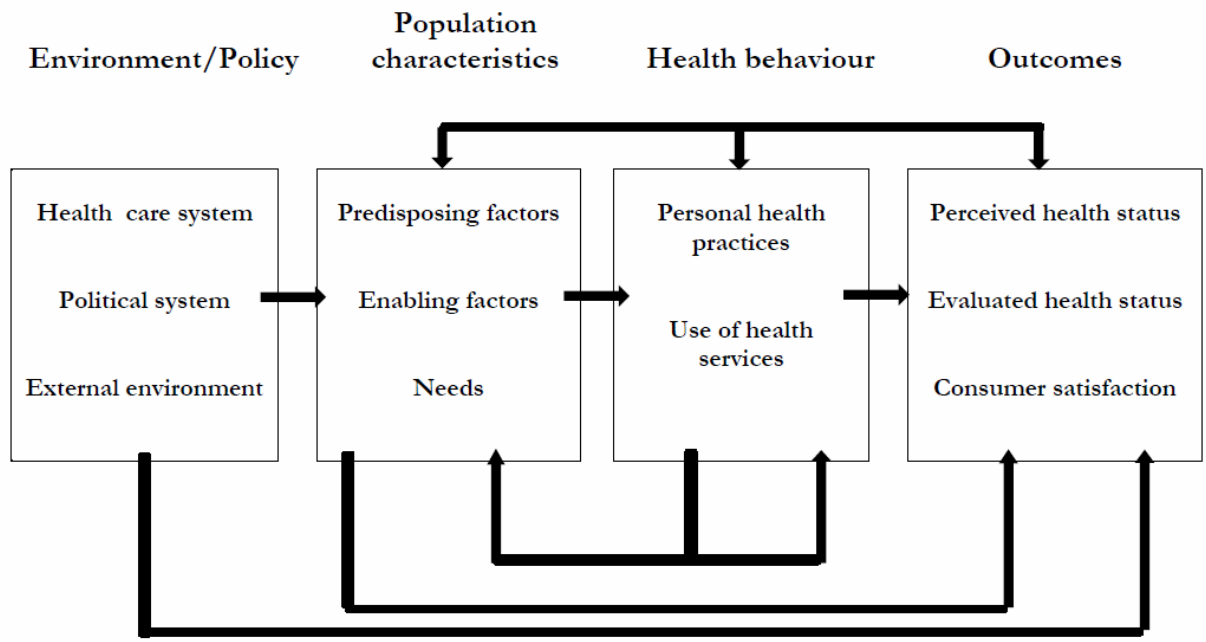

Figure 2: Andersen and Newman Framework of Health Services Utilization Model

CHAPTER THREE

METHOD

3.1 Introduction

This chapter outlines the methods that were employed in the evaluation study ranging from the evaluation design, the study variables, how data were obtained and managed as well as the techniques for analyzing the data and how results were presented and limitations of the study.

3.2 Study design

The study used a retrospective longitudinal design precisely the pre-test posttest design. Data for the study was obtained over a period on repetitive and regular interval on the variables of interest to the researcher. The selection of this design helped to measure effects of the intervention over time on the outcomes of interest. Aggregated measurements were obtained for the outcome variables on monthly basis for the target population across the 10 regions of Ghana without a baseline data collection. The introduction of the performance-based intervention (MCHNP) was fully scaled up throughout the country to increase maternal and child health service utilization and outcomes therefore monthly data on attendance of women who; made 4 prenatal attendance, who received skilled deliveries, maternal mortalities and neonatal mortalities were recorded from January 2014 to December 2018, hence the adoption of the pretest posttest design, time series design to be specific due to its ease for description of change over a period, observing track of trends and predicting of upcoming trends. Again data produced provided 60 data points or

observations providing an accurate estimate hence the use of the time series pretest posttest design.

The strengths of this longitudinal pretest posttest design allow for comparison of scores before and after the intervention on the same variables. The design minimizes problems related to having no control group to measure the same dependent variables.

Limitations of applying this study design are that the design does not include a control group hence prone to many threats to internal validity. Again participants to the study are not randomly assigned hence increases the study's susceptibility to the threat of internal validity.

3.3 Study setting

Ghana is centrally located on the West African coast that lies between latitude 5°33'North and 0°12'West and longitude 5.550° North and 0.200° West with a total land size of 238,537 square kilometers. Ghana share borders with Burkina Faso on the North and Northwest, Togo on the East, Ivory Coast on West and with Gulf of Guinea lying to the South which stretches across the 560-kilometer coastline.

The nation has an estimated population of 29,463,643 according to the 2018 projected population with a 2.18% annual change rate. The country has a ten administrative regions viz; Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong Ahafo, Northern, Upper East, and Upper West regions.

The Ministry of Health is the government ministry accountable for the health care need of the population. It provides public health services, manages the Ghanaian Healthcare industry as the regulator and constructing service delivery points and training of qualified health professionals for the healthcare delivery to the people of Ghana. Among its agencies are the Ghana Health Service (GHS), Christian Health Association of Ghana (CHAG), Teaching Hospitals, Faith-based service providers and the Private health practitioners, with GHS as its main health service agency which implement approved national policies for health delivery in the country, increase access to high quality health services and manage resources available for the provision of health services (GHS, 2017). According to GHS (2017), the service provides comprehensive health services at all directly. GHS performs relevant functions to promotion, prevention and restoration of health, provides in-service training and continuing education as well as establishing effective mechanisms for disease surveillance, prevention and control. Administratively the GHS has three (3) levels namely the National, Regional and District levels. The highest level of the health service provider is the Teaching hospital also known as Tertiary hospitals which provide specialized healthcare and the last point of referral in the Ghana health delivery system. Each of the regions in the country Regional Hospitals which serve as the referral (secondary referral) sites for all the district hospitals in the region. The district hospitals in across the country acts as the primary referral sites for the primary health care centres which are the health centers, polyclinics and community-based health promotion service (CHPS).

3.4 Study population

The study population were pregnant women, post-partum women and children aged 0 – 28 days of life under the review periods in the 10 regions of Ghana.

3.4.1 Inclusion criteria

The inclusion criteria for the study was all the pregnant women who had 4 ANC attendance during their pregnancy, women who received skilled deliveries by a doctor, midwife or a nurse, women who died whiles pregnant or during their postpartum period or death by a woman resulting from termination of a pregnancy and also death of children aged 0-28 days deaths recorded across Ghana.

3.4.2 Exclusion criteria

The exclusion criteria for this study was all the pregnant women who received less than four and more than ANC visits whiles pregnant. Deliveries conducted outside a health facility and or supervised by a TBA. Again women who died whiles pregnant or in their postpartum period whose underlying cause was not related to the pregnancy or childbirth after review by a medical doctor and babies who were born alive and died within the day of birth and their 28th birthday with a gestation period of less than 28 weeks.

3.5 **Variables**

The variables for the study included the PBF intervention; Maternal and child health and nutrition improvement project (MCHNP) as the independent variable which was measured on a categorical scale with the outcome being a binary outcome. Again millennium development goal accelerated framework (MAF) and Making Every Baby Count Initiative

(MEBCI) by PATH international were some of the explanatory variables of the study and were also measured on a categorical scale as binary outcomes. These two identified interventions (MAF and MEBCI) were controlled for to prevent any confounding effects or endogeneity that might mask the full effect of MCHNP on the measured outcomes.

The dependent variables were maternal mortalities, antenatal attendance, antenatal 4+ visits, skilled deliveries, neonatal deaths, monthly health facility attendance of women in reproductive age, livebirths and stillbirths which were all measured on a continuous scale. Age groups of; antenatal registrants, women who delivered and maternal mortalities recorded, parity, site of deliveries, mode of deliveries and uptake if intermittent preventive treatment for pregnant women (IPTp) were the other identified variables measured on a categorical scale. Table 1 shows all the variables used in the study.

Table 1: Indicator reference sheet

Characteristics	Type of Variable	Description	Scale of Measurement	Measurement
Maternal mortality	Outcome	Number of women who died while pregnant or in their postpartum period or termination of pregnancy, its management	Discrete	Count
Neonatal mortality	Outcome	Number of infant mortalities recorded before their 28th day of life	Discrete	Count
Skilled delivery	Outcome	Number of pregnant women who received supervised delivery by a qualified professional.	Discrete	Count
ANC 4+ visit	Outcome	Number of pregnant women who received 4 prenatal visits whiles pregnant	Discrete	Count
MCHNP	Explanatory	Period when the intervention was introduced	Binary	Yes, No
Age group	Explanatory	Age group of study population	Categorical	<15, 15-19, 20-34, 35+
Trimester	Explanatory	Period of pregnancy duration	Categorical	1st, 2nd, 3rd
Parity	Explanatory	Number of times a woman has given birth	Categorical	0, 1-2, 3-4, 5+
IPT	Explanatory	Number of sulphadoxine pyrimethamine (SP) prophylaxis taken during pregnancy	Categorical	1, 2, 3, 4, 5
Type of delivery	Explanatory	Specific procedure employed during childbearing	Binary	Normal, Caesarean section
Site of delivery	Explanatory	Place or type of facility for childbirth	Nominal	GHS, CHAG, TTH, Quasi, Private, TBA
Outcome of delivery	Explanatory	Children born alive and those born dead	Binary	Livebirth, Stillbirth

3.6 **Data collection**

The study used a secondary data from the national health database called District Health Information Management System 2 (DHIMS2) managed by the largest agency of the Ministry of Health, Ghana Health Service (GHS) but includes data from the other agencies (Teaching hospitals, CHAG and private facilities) of the ministry. DHIMS2 is the main data repository of the Ghanaian heath system hence the source of information for managers at all levels of the health system in decision making and policy formulation. It collect both aggregated data and individual level data (line listing) on a set of indicators on daily, weekly, monthly and quarterly basis. Data on maternal and child health services are collected and collated at the facility level and reported to the District Health Directorate (DHD) by the close of the reporting period usually the end of the month for validation. Completed datasets are entered into the national database for each reporting facility within the district which makes the district total. The district level data are validated at the regional level ensuring data timeliness, completeness and validity. Regional data forms the national data which are stored in a server located at the Center for Health Information Management (CHIM) under the Policy Planning Monitoring and Evaluation Division of the GHS.

Data for the study were retrieved on the identified outcome indicators and or variables as outline in section 3.6 of this chapter. Data from were extracted from various dataset in the form of a query for the said reporting period (January, 2014 – December, 2018) and the 10 administrative regions in the country as of 2018 using pivot table application in the DHIMS2 database. Results from the queries were downloaded in to an excel template for

management and cleaning. Find attached in appendix 2.0 the data extraction template for the retrieval of the data for this study.

3.7 **Data management**

Data retrieved or extracted were validated to identify any inconsistencies, incompleteness and inaccuracies. Any identified error was flagged and was validated by comparing there indicator and the data with other datasets in the system as the data elements are interconnected and appear on several datasets to obtain the correct measure of the particular indicator. This was done to enhance reliability in the data as well as producing a credible study result.

The data extracted were saved into my hard disk drive and was kept in a password protected file to prevent authorized personnel's from accessing the data and making changes to the data which might affect consistency in the study results. Again a copy of the data was drafted into my cloud storage space to enable access to the data in case of any catastrophe.

3.8 **Data analysis**

Data analysis for this study which sought to examine the differential impact of MCHNP on maternal and child health outcomes was conducted at the regional level. Background information on maternal and child health service coverage, utilization and outcomes were summarized and further segregated into pre-intervention summary (January, 2014-December, 2015) and post-intervention summary (January, 2016 – December, 2018) as shown in Table 2 of this paper.

Normality tests such histogram was carried out prior to the impact analysis to indicate whether or not the data is normally distributed. The result from the normality test indicated that the distribution is skewed hence not normally distributed. Basic inferential statistical analysis were conducted to determine the statistical significance among the independent variable (MCHNP) and the outlined dependent variables to ascertain the effectiveness of the intervention on service delivery. Mean comparison pre and post intervention periods was estimated using unequal welch t-test for each of the dependent variable. Means and significance level (p-values) were estimated at a 95% confidence interval.

The evaluated intervention is said to target population-level health outcomes because the intervention (MCHNP) was implemented at the population level with data collected at regular time intervals (monthly) over a specified period of time indicating clearly the pre and post intervention periods with outcomes analyzed at the regional level to achieve the study objectives. An interrupted time series analysis (ITSA) regression model was fixed to determine the differential impact of MCHNP on the observed health outcomes variables using the underlying trends determined over the study period.

Outcome variables were converted to proportions and rates followed by a log transformation for each of the estimated proportions of the dependent variables. In determining the ANC4+ and skilled delivery proportions, the number of women of childbearing age who utilized the facility were determined and used to divide the number of women receiving 4 ANC visits to determine the percentage of women who received 4 prenatal visits. The proportion of women who received supervised deliveries were also

determined by dividing the number of women who were assisted by qualified personnel during deliveries by the number of women of childbearing age who visited the health facilities for healthcare under the reporting period. Maternal mortality rates was calculated by determining dividing the number of maternal death reported by the livebirths recorded in the period under review. Neonatal mortality rate was estimated by diving the recorded neonatal deaths by the total livebirths for the period.

Time series data are said to encounter serial correlation or autocorrelation (due to similarity between observations at different time) as well as heteroscedacity (due to differences in variability among the various sub populations) in the models error term. Cumby-Huizinga test for autocorrelation was employed to overcome serial correlation and heteroscedacity at specified lags.

According to Shadish, Cook, Campbell, Shadish, & Cook (2004), an interrupted time series analysis is applicable when taking into account the effect of an intervention at a population level and the available data are reported at an aggregated level and when several measurements on the outcome variables are obtainable pre and post intervention period as it offers a hypothetically high level of internal validity.

The strengths in the application of ITSA are the use of administratively collected data, population been studied acts as its own control, employs modern regression modelling tools and techniques (Gasparrini, 2018).

Among the limitations of the use of ITSA is that ITSA are sensitive to the choice of the model choose for evaluating the impact and trend of the intervention, solely depends on aggregated data for population level studies as well as diffusion effects in situation were the lags of events are too long (Gasparrini, 2018).

3.9 Estimation technique

Interrupted time series analysis (ITSA) relies on ordinary least square (OLS) regression due to its flexibility in the context of ITSA and its ability to account for autocorrelated errors (Linden, 2017).

According to Mckean et al. (2014) and Linden (2017), a single-group ITSA must be employed when the study has no comparison group that is use only one group hence the adoption of the single-group ITSA with the regression equation presented as below;

$$\gamma = \beta_0 + \beta_1 T + \beta_2 \chi + \beta_3 T\chi + \mathcal{E}$$

Equation 1: Standard Interrupted Time Series Regression Model for Single Group Analysis

Where; "γ is the outcome variable of interest measured, *T* is the time periods specified for the study, χ is a dummy variable representing the intervention (pre-intervention periods 0, post-intervention 1), $T\chi$ is an interaction term and represent the impact of the intervention and $\mathcal{E}$ been the error term.

In the case of a single-group study, β_0 represents the intercept or starting level of the outcome variable. β_1 is the slope or trajectory of the outcome variable until the introduction of the intervention. β_2 represents the change in the level of the outcome that occurs in the

period immediately following the introduction of the intervention (compared with the counterfactual).

β_3 represents the difference between pre-intervention and post-intervention slopes of the outcome variables" (Linden, 2017).

Statistical analysis and presentations were conducted using Stata IC 15.0 (Statacorp, College Station, USA) and MS Excel.

The statistical analysis were followed by a plausibility argument in discussing the variations if any in the performances of the measured indicators across all the ten (10) regions of Ghana.

3.10 **Ethical considerations**

Permission was sought from CHIM through the Director PPMED of the GHS to use the data from DHIMS2 for my study.

3.11 Limitations

The study made use of available administrative data (secondary data) which limited the researcher's ability to determine the individuals who were actually reached by the intervention to determine the actual treatment effect rather the average treatment effect.

Being a pretest posttest study, there was a lack of randomization which is said to reduce internal validity of study findings, limiting the researcher to generalize the findings of the

study to the larger context hence statistical analysis may not be meaningful due to the validity threats resulting from the lack of randomization. Pretest posttest designs are unable to control for other pre-existing factors that might have influence the outcome of interest hence a limitation to the study. Another limitation to the study is the use of an interrupted time series analysis as there is the nonexistence of a suitable control or a perfect counterfactual for evaluating the impact of a program. Using an interrupted time series also limited the researcher in making inferences about individual level outcomes as the series was set at the population level.

CHAPTER FOUR

RESULTS

4.1 Introduction

This section present the study findings from the impact evaluation analysis conducted. Results are presented in tables with a graphical display from the impact analysis, followed by interpretation of the outputs from the analysis.

Table 2 presents the background information on maternal and child health service coverages, utilization and outcomes before and after the introduction of the intervention MCHNP.

Table 2: Background characteristics of maternal and child health services and outcomes

Characteristics	Pre-intervention (n)	Percentage (%)	Post-intervention (n)	Percentage (%)
Age group of registrants				
10 _ 14	5,987	0.31	7,611	0.27
15 _ 19	225,109	11.82	327,791	11.67
20 _ 24	487,548	25.60	682,292	24.29
25 _ 29	540,034	28.36	786,080	27.99
30 _ 34	400,264	21.02	613,506	21.84
35+	245,401	12.89	391,428	13.94
Trimester				
1st trimester	862,623	45.75	1,328,024	47.55
2nd trimester	784,834	41.62	1,144,749	40.99
3rd trimester	238,087	12.63	319,901	11.46
Parity				
0	525,081	27.69	775,416	27.72
1 _ 2	751,488	39.63	1,126,637	40.27
3 _ 4	433,342	22.85	635,121	22.70
5+	186,290	9.82	260,532	9.31
Intermittent Preventive Treatment				
IPT 1	1.171,653	39.41	1,907,234	34.33
IPT 2	920,356	30.96	1,599,566	28.79
IPT 3	626,629	21.08	1,193,778	21.49
IPT 4	188,553	6.34	606,141	10.91
IPT 5	65,801	2.21	248,724	4.48
Delivery				
Age Groups at Delivery				
10 _ 14	3,387	0.27	4,899	0.25
15 _ 19	140,902	11.33	223,142	11.23
20 _ 24	305,370	24.55	461,535	23.23
25 _ 29	354,105	28.47	561,651	28.27
30 _ 34	270,404	21.74	446,691	22.49
35+	169,601	13.64	288,515	14.52
Type of Delivery				
Normal	1,056,691	84.95	1635,241	82.77
Caesarean section	187,252	15.05	340,380	17.23
Site of Delivery				
GHS Facilities	833,384	55.24	1,366,701	59.18
CHAG	241,331	16.00	373,227	16.16
Teaching Hospital	48,146	3.19	81,502	3.53
Quasi Facilities	31,162	2.07	42,385	1.84
Private Facilities	201,891	13.38	288,025	12.47

TBA deliveries	152,866	10.13	157,412	6.82
Outcome of Delivery				
Live births	1,306,441	98.27	1,963,564	98.49
Stillbirths	23,012	1.73	30,197	1.51
Mortalities				
Age Group of Maternal deaths				
10 _ 14	11	0.59	5	0.18
15 _ 19	149	7.98	178	6.41
20 _ 24	304	16.28	409	14.72
25 _ 29	462	24.75	692	24.90
30 _ 34	483	25.87	761	27.38
35+	458	24.53	734	26.41
Neonatal Deaths		**Rate(/1,000 0LBs)**		**Rate(/1,000 0LBs)**
Neonatal deaths	4,823	3.7	13,101	6.6

Table 2 above represent the background information of maternal and child health services, coverage and outcomes over the years. ANC registrant saw an increase post-intervention of about 47% with majority of the registrants between the age bracket of 25-29 with representation of 28.36 at pre-intervention and 27.99% post-intervention and with majority reporting in their first trimester, 45.75% and 47.55% pre and post-intervention respectively. The results indicated that majority of the pregnant women that reported were those within the parity category 1-2, of 39.63% and 40.27% pre and post-intervention respectively. Intermittent preventive treatment for malaria uptake was a percentage increase of about 87% following the implementation of MCHNP with IPT1 having the highest uptake of 39.41% pre-intervention and 34.33% post-intervention, whereas IPT5 recorded the least uptake of 2.21% and 4.48% pre and post-intervention respectively. Just as the ANC registrants, women of the 25-29 age bracket dominated the women who delivered in the review period with a 28.47% and 28.27% pre-intervention and post-intervention respectively, having seen a percentage increase in deliveries with a percentage increase of 59.7%. Normal deliveries was recorded as the highest mode of delivery pre and post-

intervention with percentages of 84.95% and 82.77% respectively. TBA deliveries decreased following the introduction of the intervention by registering a percentage of 6.82% post-intervention with a pre-intervention representation of 10.13%. Maternal mortality increased post-intervention by 48.85% with majority of the mortality occurring among the 30-34 age brackets.

4.2 Impact Analysis

Table 3: Nationwide comparison of pre and post intervention means of the outcome variables using T-test

Variables	Mean	Standard Deviation	P-value	95% CI
Percentage of women who had 4 ANC visits				
Pre-intervention	1.290	0.349	0.490	[1.246, 1.335]
Post intervention	1.310	0.355		[1.274, 1.347]
Percentage of women who had skilled delivery				
Pre-intervention	1.175	0.282	<0.001***	[1.139, 1.210]
Post intervention	1.263	0.291		[1.232, 1.293]
Maternal Mortality rate (per 100,000 LBs)				
Pre-intervention	4.855	0.509	0.543	[4.790, 4.920]
Post intervention	4.829	0.498		[4.777, 4.882]
Neonatal Mortality Rate (per 1,000 LBs)				
Pre-intervention	0.984	0.934	<0.001***	[0.864, 1.103]
Post intervention	1.600	0.759		[1.521, 1.679]

Significance level: *** p< 0.001, **p< 0.01, *p< 0.05

The mean ANC4+ visit pre and post intervention was estimated at 1.290 percent (95% CI [1.246, 1.335]) and 1.310 percent (SD= 0.355, 95% CI [1.274, 1.347]) respectively with a significance level of 0.490 nationwide. There was a statistical significant difference in the mean skilled delivery pre and post-intervention with a significance level p<0.001. The mean skilled deliveries pre-intervention was estimated at 1.175 percent (95% CI [1.139,

1.210]) and a post-intervention mean of 1.263 percent (95% CI [1.232, 1.293]). Mean maternal mortality rate pre-intervention was estimated at 4.855 per 100,000 livebirths (95% CI [4.790, 4.920]) and a post intervention mean of 4.829 per 100,000 livebirths (95% CI [4.777, 4.882]) with a significance level of p= 0.543. Pre and post-intervention neonatal mortality rate mean was estimated at 0.984 per 1,000 livebirths (95% CI [0.864, 1.103]) and 1.600 per 1, 000 livebirths (95% CI [1.521, 1.679]) respectively, with a statistical significance level of $p<0.001$.

Table 4: T-test comparing Pre and Post intervention means of outcome variables by regions

Variables	ANC4+ visit		Delivery		Maternal Mortality rate		Neonatal Mortality Rate	
	Pre-intervention	Post intervention	Pre-intervention	Post intervention	Pre-intervention	Post intervention	Pre-intervention	Post intervention
Central								
Mean [95% CI]	1.397 [1.355, 1.438]	1.311 [1.275, 1.346]	1.272 [1.224, 1.320]	1.291 [1.249, 1.332]	4.566 [4.311, 4.821]	4.866 [4.725, 5.007]	0.351 [-0.123, 0.824]	1.371 [1.173, 1.570]
P-value	0.002		0.552		0.041		<0.001	
Greater Accra								
Mean [95% CI]	1.744 [1.670, 1.819]	1.765 [1.723, 1.808]	1.576 [1.489, 1.664]	1.545 [1.499, 1.591]	5.176 [5.057, 5.295]	5.107 [5.003, 5.210]	1.701 [1.486, 1.915]	2.067 [1.933, 2.201]
P-value	0.619		0.514		0.373		0.005	
Volta								
Mean [95% CI]	1.067 [1.004, 1.130]	1.124 [1.090, 1.158]	0.933 [0.860, 1.005]	1.091 [1.047, 1.134]	4.984 [4.833, 5.136]	4.681 [4.469, 4.894]	1.157 [0.991, 1.323]	1.633 [1.506, 1.760]
P-value	0.114		<0.001		0.021		<0.001	
Western								
Mean [95% CI]	1.190 [1.147, 1.234]	1.137 [1.107, 1.166]	0.997 [0.962, 1.033]	1.099 [1.060, 1.138]	4.819 [4.623, 5.015]	4.824 [4.701, 4.947]	0.995 [0.587, 1.402]	1.306 [1.070, 1.541]
P-value	0.042		<0.001		0.966		0.181	
Ashanti								
Mean [95% CI]	1.530 [1.473, 1.586]	1.291 [1.249, 1.332]	1.331 [1.296, 1.365]	1.301 [1.269, 1.333]	4.704 [4.483, 4.924]	4.878 [4.707, 5.049]	0.173[-0.294, 0.639]	1.824 [1.446, 2.203]
P-value	<0.001		0.202		0.205		<0.001	
Brong-Ahafo								

Mean [95% CI]	0.932 [0.861, 1.003]	1.080 [1.035, 1.126]	0.878 [0.846, 0.911]	0.980 [0.944, 1.016]	4.822 [4.646, 4.997]	4.546 [4.385, 4.707]	1.678 [1.544, 1.812]	1.970 [1.893, 2.048]
P-value	0.001		<0.001		0.021		<0.001	
Eastern								
Mean [95% CI]	0.961 [0.922, 1.001]	0.961 [0.926, 0.997]	0.986 [0.941, 1.031]	1.018 [0.983, 1.054]	5.056 [4.812, 5.300]	4.960 [4.827, 5.093]	1.169 [0.944, 1.394]	1.754 [1.603, 1.905]
P-value	0.993		0.254		0.482		<0.001	
Northern								
Mean [95% CI]	1.860 [1.789, 1.931]	2.009 [1.947, 2.070]	1.534 [1.456, 1.612]	1.799[1.731, 1.868]	4.732 [4.515, 4.948]	4.987 [4.815, 5.160]	0.367 [0.009, 0.726]	1.199 [0.811, 1.587]
P-value	0.002		<0.001		0.064		0.002	
Upper East								
Mean [95% CI]	1.008 [0.926, 1.090]	0.981 [0.926, 1.037]	0.981 [0.907, 1.055]	1.078[1.013, 1.143]	4.731 [4.528, 4.934]	4.714 [4.511, 4.917]	0.908 [0.467, 1.349]	1.440 [1.178, 1.703]
P-value	0.581		0.048		0.902		0.039	
Upper West								
Mean [95% CI]	1.212 [1.119, 1.305]	1.446 [1.369, 1.523]	1.258 [1.177, 1.338]	1.423[1.348, 1.498]	4.944 [4.687, 5.201]	4.695 [4.497, 4.892]	1.319 [1.045, 1.593]	1.435 [1.181, 1.690]
P-value	<0.001		0.003		0.120		0.526	

The Central and Western regions recorded a significant difference in the mean percentage of women who had 4 ANC visits with a pre intervention mean of 1.397% (95% CI [1.355, 1.438]) and a post intervention mean of 1.311% (95% CI [1.275, 1.346]) p-value = 0.002 for Central region and a pre intervention mean of 1.190% (95% CI [1.147, 1.234]) and a post intervention mean of 1.137% (95% CI [1.107, 1.166]), p-value = 0.042 for the Western region. The mean percentage difference among women who received skilled deliveries was significant at p-value <0.001 with a pre and post intervention means of 0.933% (95% CI [0.860, 1.005]) and 1.091% (95% CI [1.047, 1.134]) respectively for the Volta region and a pre and post intervention mean 0.997% (95% CI [0.962, 1.033]) and 1.099% (95% CI [1.060, 1.138]) at <0.001 level of significance for the Western region. Central and Volta region saw a significant mean difference in maternal mortality rate at a significance level of 0.041 and 0.021 respectively. Pre and post intervention mean for the Central region was estimated at 4566 (95% CI [4.311, 4.821]) and 4.866 (95% CI [4.725, 5.007]) per 100,000 LBs respectively with the Volta region recording an estimated mean maternal mortality rate of 4.984 (95% CI [4.833, 5.136]) and 4.681 (95% CI [4.469, 4.894]) per 100,000 LBs respectively. Central region recorded a pre and post intervention mean neonatal mortality rate of 0.351 and 1.371 per 1,000 LBs respectively at a significance level (p-value) <0.001, with the Greater Accra region recording an estimated pre and post intervention mean neonatal mortality rate of 1.701 (95% CI [1.486, 1.915]) and 2.067 (95% CI [1.933, 2.201]) per 1,000 LBs respectively with a level of significance of 0.005 and with the Volta region also recording an estimated pre and post intervention neonatal mortality rate 1.1571.157 (95% CI [0.991, 1.323]) and 1.633 (95% CI [1.506, 1.760]) per 1,000 LBs respectively, p-value <0.001.

The mean percentage of women who had 4 ANC visits pre and post intervention was 1.530% (95% CI [1.473, 1.586]) and 1.291% (95% CI [1.249, 1.332]) respectively with a significance level of <0.01 in the Ashanti region and 0.932% (95% CI [0.861, 1.003]) and 1.080% (95% CI [1.035, 1.126]) respectively with a significance level of 0.001 in the Brong-Ahafo region. The mean difference in the percentage of women who had skilled deliveries pre and post intervention in the Brong-Ahafo region was 0.878% (95% CI [0.846, 0.911]) and 0.980% (95% CI [0.944, 1.016]) respectively with a p-value <0.001. There was a significant difference (p-value = 0.021) in the pre and post intervention of the mean maternal mortality rate of 4.822 per 100,000LBs (95% CI [4.646, 4.997]) and 4.546 per 100,000 LBs (95% CI [4.385, 4.707]) respectively in the Brong-Ahafo region. Ashanti, Brong-Ahafo and Eastern regions recorded a significant mean difference in neonatal mortality rate pre and post intervention with a mean rate of 0.173 per 1,000 LBs (95% CI [-0.294, 0.639]) and 1.824 per 1,000 LBs (95% CI [1.446, 2.203]) respectively, p-value <0.001 for the Ashanti region, a pre and post intervention mean of 1.678 per 1,000 LBs (95% CI [1.544, 1.812]) and 1.970 per 1,000 LBs (95% CI [1.893, 2.048]) respectively and a significance level of <0.001 in the Brong-Ahafo region. The mean neonatal mortality rate pre and post intervention in the Eastern region was 1.169 per 1,000 LBs (95% CI [0.944, 1.394]) and 1.754 per 1,000 LBs (95% CI [1.603, 1.905]) respectively with a p-value <0.001.

The pre and post intervention mean percentage of women who had 4 ANC visits in the Northern region was 1.860% (95% CI [1.789, 1.931]) and 2.009% (95% CI [1.947, 2.070]) respectively and the Upper West recording pre and post intervention mean of 1.212% (95%

CI [1.119, 1.305]) and 1.446% (95% CI [1.369, 1.523]) respectively. The percentage of women who had skilled deliveries recorded a pre intervention mean of 1.534% (95% CI [1.456, 1.612]) and a post intervention mean of 1.799% (95% CI [1.731, 1.868]) and a p-value <0.001 for the Northern region. Upper East recorded a mean skilled delivery of 0.981% (95% CI [0.907, 1.055]) pre intervention and 1.078% (95% CI [1.013, 1.143]), p-value =0.048 with the Upper West region recording a pre intervention mean of 1.258% (95% CI [1.177, 1.338]) and a post intervention mean of 1.423% (95% CI [1.348, 1.498]) and a p-value of 0.003. The pre and post neonatal mortality rate mean was 0.367 per 1,000 LBs (95% CI [0.009, 0.726]) and 1.199 per 1,000 LBs (95% CI [0.811, 1.587]) respectively, p-value = 0.002 for the Northern region, a 0.908 [0.467, 1.349] and 1.440 [1.178, 1.703] respectively, p-value = 0.039 for Upper East.

Table 5: Impact of MCHNP on the outcome variables in the Coastal belt

Variables	Central Region Coefficient [95% CI]	Greater Accra Region Coefficient [95% CI]	Volta Region Coefficient [95% CI]	Western Region Coefficient [95% CI]
Percentage of women who had 4 ANC visits				
Time	-0.007*[-0.013,-0.001]	0.005 [-0.002, 0.012]	0.006 [-0.002, 0.015]	-0.006* [-0.010, -0.001]
Intervention	0.057 [-0.064, 0.178]	0.089 [-0.029, 0.208]	0.061 [-0.080, 0.202]	0.076 [-0.032, 0.185]
Interaction/Impact	0.004 [-0.003, 0.011]	-0.012 [-0.021, -0.004]	-0.011** [-0.020, -0.002]	0.003 [-0.003, 0.008]
Lincom estimate	-0.003 [-0.007, 0.001]	-0.008 [-0.011, -0.004]	-0.005** [-0.008, -0.002]	-0.003* [-0.007, <-0.001]
Percentage of women who had skilled delivery				
Time	-0.003 [-0.011, 0.006]	0.004 [-0.008, 0.015]	0.009 [-0.001, 0.019]	0.002 [-0.005, 0.008]
Intervention	0.046 [-0.088, 0.181]	-0.041 [-0.238, 0.155]	-0.019 [-0.179, 0.142]	0.039 [-0.064, 0.141]
Interaction/Impact	0.003 [-0.006, 0.013]	-0.006 [-0.019, 0.007]	-0.005 [-0.015, 0.006]	0.001 [-0.006, 0.008]
Lincom estimate	0.0004 [-0.004, 0.005]	-0.002 [-0.008, 0.004]	0.004* [<0.001, 0.007]	0.003 [-0.001, 0.006]
Maternal Mortality rate (per 100,000LBs)				
Time	-0.018 [-0.080, 0.044]	-0.008 [-0.022, 0.007]	-0.021* [-0.042, -0.001]	-0.004 [-0.023, 0.015]
Intervention	0.846 [-0.338, 2.029]	0.170 [-0.159, 0.498]	0.503* [0.081, 0.925]	0.285 [-0.090, 0.659]
Interaction/Impact	0.010 [-0.053, 0.074]	-0.001 [-0.018, 0.017]	-0.010 [-0.035, 0.016]	-0.009 [-0.031, 0.013]
Lincom estimate	-0.008 [-0.020, 0.005]	-0.008 [-0.018, 0.001]	-0.031*** [-0.046, -0.016]	-0.013* [-0.024, -0.002]
Neonatal Mortality Rate (per 1,000 LBs)				
Time	0.025 [-0.050, 0.101]	-0.005 [-0.041, 0.032]	-0.002 [-0.028, 0.025]	-0.093*** [-0.134,-0.052]
Intervention	0.007 [-0.907, 0.920]	0.002 [-0.548, 0.552]	0.328 [-0.213, 0.869]	0.578 [-0.215, 1.372]
Interaction/Impact	0.015 [-0.062, 0.092]	0.029 [-0.010, 0.067]	0.011 [-0.019, 0.041]	0.144*** [0.100, 0.188]
Lincom estimate	0.040***[0.026,0.054]	0.024***[0.012, 0.036]	0.01 [-0.004, 0.023]	0.051*** [0.035, 0.067]

Significance level: *** p< 0.001, **p< 0.01, *p< 0.05

Volta region recorded a significant reduction in the post trend change of the percentage of women who had 4 ANC visits after the introduction of the intervention of 0.011 percentage points (p-value <0.01, 95% CI [-0.020, -0.002]). The Central and Western regions however recorded an increase of 0.004 and 0.003 percentage points respectively.

The Coastal belt saw no significant change in the post trend change in the percentage of women who received skilled deliveries with the Central and Western regions recording an insignificant increase of 0.0003 (p-value >0.05, 95% CI [-0.006, 0.013]) and 0.001 (95% CI [-0.006, 0.008]) respectively and with the Greater Accra and Volta regions recording a reduction of 0.006 (p-value >0.05, 95% CI [-0.019, 0.007]) and 0.005 (p-value >0.05, 95% CI [-0.015, 0.006]) percentage points respectively.

Regarding maternal mortality rates, the Greater Accra, Volta and Western regions recorded a post trend change reduction of 0.001 (p-value >0.05, 95% CI [-0.018, 0.017]), 0.01(p-value >0.05, 95% CI [-0.035, 0.016]) and 0.009 (p-value >0.05, 95% CI [-0.031, 0.013]) per every 100,000 LBs respectively.

All the regions in the Coastal belt saw an increase in the post level change in neonatal mortality rates but these increase was only significant in the Western region with a rate of 0.144 (p-value <0.001, 95% CI [0.100, 0.188]) per every 1,000 LBs.

Table 6: Impact of MCHNP on the outcome variables in the Middle belt

Variables	Ashanti Region Coefficient [95% CI]	Brong- Ahafo Region Coefficient [95% CI]	Eastern Region Coefficient [95% CI]
Percentage of women who had 4 ANC visits			
Time	-0.007 [-0.015, 0.001]	-0.003 [-0.014, 0.008]	-0.007** [-0.012, -0.002]
Intervention	0.005 [-0.139, 0.149]	0.287*** [0.132, 0.443]	0.175** [0.068, 0.283]
Interaction/ Impact	-0.002 [-0.011, 0.007]	-0.003 [-0.015, 0.010]	0.002 [-0.004, 0.008]
Lincom estimate	-0.009*** [-0.012, -0.006]	-0.006* [-0.010, -0.001]	-0.005** [-0.009, -0.002]
Percentage of women who had skilled delivery			
Time	0.002 [-0.004, 0.008]	0.004 [-0.001, 0.009]	-0.005 [-0.013, 0.002]
Intervention	-0.01 [-0.121, 0.102]	0.042 [-0.056, 0.139]	0.077 [-0.023, 0.178]
Interaction/ Impact	0.002 [-0.004, 0.008]	-0.004 [-0.010, 0.002]	0.006 [-0.002, 0.014]
Lincom estimate	-0.003 [-0.006, 0.001]	<0.001 [-0.003, 0.004]	0.001 [-0.002, 0.004]
Maternal Mortality rate (per 100,000 LBs)			
Time	0.011 [-0.021, 0.043]	-0.001 [-0.019, 0.017]	0.016 [-0.020, 0.052]
Intervention	-0.319 [-0.900, 0.262]	-0.061 [-0.585, 0.463]	-0.127 [-0.606, 0.352]
Interaction/Impact	0.009 [-0.029, 0.046]	-0.018 [-0.052, 0.017]	-0.025 [-0.064, 0.013]
Lincom estimate	0.020* [0.001, 0.039]	-0.019 [-0.047, 0.010]	-0.01 [-0.021, 0.002]
Neonatal Mortality Rate (per 1,000 LBs)			
Time	0.064* [0.004, 0.124]	0.008 [-0.015, 0.030]	-0.001 [-0.030, 0.029]
Intervention	0.191 [-1.140, 1.522]	0.143 [-0.204, 0.490]	0.230 [-0.279, 0.738]
Interaction/ Impact	-0.026 [-0.103, 0.052]	-0.005 [-0.028, 0.019]	0.022 [-0.011, 0.055]
Lincom estimate	0.038 [-0.006, 0.083]	0.003* [-0.003, 0.009]	0.021** [0.007, 0.034]

Significance level: *** p< 0.001, **p< 0.01, *p< 0.05

The percentage of pregnant women who had 4 ANC visits in the Middle belt of the country saw reduction of 0.002 (p-value >0.05, 95% CI [-0.011, 0.007]) and 0.004 (p-value >0.05, 95% CI [-0.010, 0.002]) percentage points in the post trend change in the Ashanti and Brong-Ahafo regions respectively and an increase in the Eastern region of 0.002 (p-value >0.05, 95% CI [-0.004, 0.008]) percentage points in the post trend change.

There was an insignificant post trend change in the percentage of women who received skilled deliveries with the Ashanti and Brong Ahafo regions recording a reduction of 0.002 (p-value >0.05, 95% CI [-0.004, 0.008] and 0.004 (p-value >0.05, 95% CI [-0.010, 0.002]) percentage points respectively and an increase of 0.006 (p-value >0.05, 95% CI [-0.002, 0.014]) percentage points.

The Brong-Ahafo and Eastern regions of the middle belt recorded a post trend change reduction in in maternal mortality rates of 0.018 (p-value >0.05, 95% CI [-0.052, 0.017]) and 0.025 (p-value >0.05, 95% CI [-0.064, 0.013]) per 100,000 LBs respectively.

Neonatal mortality rate recorded a reduction of 0.026 (p-value > 0.05, 95% CI [-0.103, 0.052]) and 0.005 (p-value >0.05, 95% CI [-0.028, 0.019]) per 1,000 LBs in the post trend change in the Ashanti and Brong-Ahafo regions and a post trend increase of 0.022 (p-value > 0.05, 95% CI [-0.011, 0.055]) per every 1,000 LBs in the Eastern region.

Table 7: Impact of MCHNP on the outcome variables in the Savannah belt

Variables	Northern Region Coefficient [95% CI]	Upper East Region Coefficient [95% CI]	Upper West Region Coefficient [95% CI]
Percentage of women who had 4 ANC visits			
Time	0.001 [-0.011, 0.014]	-0.01 [-0.023, 0.003]	-0.005 [-0.021, 0.010]
Intervention	0.192 [-0.050, 0.434]	0.08 [-0.188, 0.347]	0.276 [-0.035, 0.586]
Interaction/Impact	-0.005 [-0.019, 0.009]	0.011 [-0.004, 0.026]	0.007 [-0.012, 0.026]
Lincom estimate	-0.003 [-0.001, 0.003]	0.001 [-0.005, 0.008]	0.002 [-0.009, 0.012]
Percentage of women who had skilled delivery			
Time	0.004 [-0.009, 0.018]	0.001 [-0.012, 0.013]	0.001 [-0.012, 0.014]
Intervention	0.096 [-0.146, 0.337]	-0.058 [-0.306, 0.191]	0.059 [-0.203, 0.321]
Interaction/Impact	0.002 [-0.013, 0.018]	0.007 [-0.007, 0.021]	0.005 [-0.011, 0.021]
Lincom estimate	0.007 [<0.001, 0.013]	0.008* [0.002, 0.015]	0.006 [-0.003, 0.014]
Maternal Mortality rate (per 100,000LBs)			
Time	0.003 [-0.028, 0.035]	-0.078* [-0.157, -0.001]	0.008 [-0.026, 0.042]
Intervention	0.582 [-0.027, 1.191]	0.480 [-1.405, 2.365]	-1.083 [-2.538, 0.372]
Interaction/Impact	-0.024 [-0.060, 0.011]	0.099 [-0.020, 0.218]	0.016 [-0.042, 0.074]
Lincom estimate	-0.021 [-0.036, -0.006]	0.020 [-0.054, 0.094]	0.024 [-0.023, 0.071]
Neonatal Mortality Rate (per 1,000 LBs)			
Time	-0.065*** [-0.097, -0.032]	-0.076** [-0.12, -0.032]	-0.051*** [-0.077, -0.026]
Intervention	0.163 [-0.711, 1.037]	0.643 [-0.240, 1.527]	0.188 [-0.508, 0.884]
Interaction/Impact	0.149 [0.108, 0.191]	0.124*** [0.076, 0.172]	0.082*** [0.048, 0.117]
Lincom estimate	0.085 [0.057, 0.112]	0.048*** [0.028, 0.068]	0.031* [0.008, 0.055]

Significance level: *** p< 0.001, **p< 0.01, *p< 0.05

The Savannah zone recorded an insignificant post trend change in the percentage of pregnant women who had 4 ANC visits, with the Upper regions (Upper East and Upper West) recording a post level change increase of 0.011 (p-value >0.05, 95% CI [-0.004, 0.026]) and 0.007 (p-value >0.05, 95% CI [-0.012, 0.026]) percentage points respectively and the Northern region seeing a decrease of 0.005 (p-value, 95% CI [-0.019, 0.009]) percentage points.

Percentage of women who received skilled deliveries was increased after the implementation of the intervention in the Savannah zone of the country with a post trend increase of 0.002 (p-value >0.05, 95% CI [-0.013, 0.018]), 0.007 (p-value >0.05, 95% CI [-0.007, 0.021]) and 0.005 p-value >0.05, 95% CI [-0.011, 0.021]) percentage points in the Northern, Upper East and Upper West regions respectively.

Northern region recorded a reduction in the post trend change of maternal mortality rate of 0.021 (p-value >0.05, 95% CI [-0.036, -0.006]) per 100,000 LBs) and increase in the post trend rate of 0.099 (p-value >0.05, 95% CI [-0.020, 0.218]) and 0.016 (p-value >0.05, 95% CI [-0.042, 0.074]) per 100,000 LBs in the Upper East and Upper West regions respectively.

There was a significant increase in the post trend change in neonatal mortality rate of 0.124 (p-value <0.001, 95% CI [0.076, 0.172]) and 0.082 (p-value <0.001, 95% CI [0.048, 0.117]) per 1,000 LBs in Upper East and Upper West regions respectively.

Table 8: Autocorrelation Test for ITSA using Cumby-Huizinga Test

Region	Outcome	Lag	Chi square (χ^2)	P-value
Central	Percentage of women who had 4 ANC visits	1	5.117	0.024
	Percentage of women who had skilled delivery	1	14.230	<0.001
	Maternal Mortality rate	1	14.365	<0.001
	Neonatal Mortality Rate	2	4.479	0.034
	Neonatal Mortality Rate	8	4.831	0.028
Greater Accra	Percentage of women who had 4 ANC visits	8	6.898	0.009
	Percentage of women who had skilled delivery	1	8.180	0.004
	Maternal Mortality rate	na	na	na
	Neonatal Mortality Rate	na	na	na
Volta	Percentage of women who had 4 ANC visits	1	5.302	0.021
	Percentage of women who had 4 ANC visits	6	7.980	0.005
	Percentage of women who had skilled delivery	1	17.083	<0.001
	Maternal Mortality rate	na	na	na
	Neonatal Mortality Rate	1	6.838	0.009
Western	Percentage of women who had 4 ANC visits	1	10.301	0.001
	Percentage of women who had skilled delivery	1	11.266	0.001
	Percentage of women who had skilled delivery	3	6.411	0.011
	Maternal Mortality rate	na	na	na
	Neonatal Mortality Rate	1	7.735	0.005
Ashanti	Percentage of women who had 4 ANC visits	1	9.196	0.002
	Percentage of women who had skilled delivery	1	7.407	0.007
	Maternal Mortality rate	1	7.363	0.007
	Neonatal Mortality Rate	1	7.478	0.006
Brong-Ahafo	Percentage of women who had 4 ANC visits	1	16.221	<0.001
	Percentage of women who had skilled delivery	1	6.852	0.009
	Maternal Mortality rate	1	6.298	0.012
	Neonatal Mortality Rate	na	na	na
Eastern	Percentage of women who had 4 ANC visits	1	6.885	0.009
	Percentage of women who had skilled delivery	1	8.579	0.003
	Maternal Mortality rate	1	0.774	0.379
	Neonatal Mortality Rate	1	1.324	0.250
Northern	Percentage of women who had 4 ANC visits	1	27.804	<0.001
	Percentage of women who had 4 ANC visits	5	7.569	0.006
	Percentage of women who had 4 ANC visits	6	10.006	0.002
	Percentage of women who had 4 ANC visits	7	6.045	0.014
	Percentage of women who had skilled delivery	1	24.126	<0.001

	Percentage of women who had skilled delivery	4	4.775	0.029
	Maternal Mortality rate	7	4.065	0.044
	Neonatal Mortality Rate	8	4.781	0.029
Upper East	Percentage of women who had 4 ANC visits	1	20.610	<0.001
	Percentage of women who had 4 ANC visits	5	8.577	0.003
	Percentage of women who had 4 ANC visits	6	9.896	0.002
	Percentage of women who had skilled delivery	1	19.610	<0.001
	Maternal Mortality rate	1	19.610	<0.001
	Neonatal Mortality Rate	na	na	na
Upper West	Percentage of women who had 4 ANC visits	1	24.864	<0.001
	Percentage of women who had 4 ANC visits	6	6.978	0.008
	Percentage of women who had 4 ANC visits	7	3.963	0.047
	Percentage of women who had skilled delivery	1	20.488	<0.001
	Maternal Mortality rate	1	19.751	<0.001
	Neonatal Mortality Rate	na	na	na

Note: na – No Autocorrelation at any specified lag

In the Central region, autocorrelation was present at lag 1 for the percentage of women who had 4 ANC visits, percentage of women who had skilled delivery and maternal mortality rate ($\chi^2 = 5.117$, p-value = 0.024), ($\chi^2 = 14.230$, p-value <0.001) and ($\chi^2 = 14.365$, p <0.001) respectively. Autocorrelation was present a lag 2 ($\chi^2 = 4.479$, p-value = 0.034) and lag 8 ($\chi^2 = 4.831$, p-value = 0.028) for neonatal mortality rate.

Serial correlation was present at lag 8 ($\chi^2 = 6.898$, p-value = 0.009) for the percentage of women with 4 ANC visit and at lag 1 ($\chi^2 = 8.180$, p-value = 0.004) for the percentage of women who received skilled deliveries. Autocorrelation was no present at any specified lag for maternal and neonatal mortality rates in the Greater Accra region.

Autocorrelation was present at lag 1 (χ^2 = 5.302, p-value = 0.021) and lag 6 (χ^2 = 7.980, p-value = 0.005) for the percentage of women with 4 ANC visits in the Volta region. The region recorded a presence of autocorrelation for the percentage of women with skilled birth attendants during delivery at lag 1 (χ^2 = 17.083, p-value <0.001) and at lag 1 (χ^2 = 6.838, p-value = 0.009) for neonatal mortality rate with maternal mortality rate recording no serial correlation.

At specified lags, the Western region recorded a autocorrelation at lag1 (χ^2 = 10.301, p-value = 0.001) for the percentage of women who had 4 ANC visits, at lag 1 (χ^2 = 11.266, p-value = 0.001) and lag 3 (χ^2 = 6.411, p-value = 0.011) for the percentage of women who received skilled deliveries, and at lag 1 (χ^2 = 7.735, p-value = 0.005) for neonatal mortality rate with no autocorrelation at any specified lag for maternal mortality rate.

Autocorrelation was present at lag 1 for the percentage of women who had 4 ANC visits, percentage of women who had skilled deliveries, maternal and neonatal mortality rates (χ^2 = 7.735, p-value = 0.002; χ^2 = 9.196, p-value = 0.007; χ^2 = 7.363, p-value = 0.007 and χ^2 = 7.478, p-value = 0.006) respectively in the Ashanti region.

Autocorrelation was seen at lag 1 for the percentage of women who had 4 ANC visits (χ^2 = 16.221, p-value = <0.001), percentage of women who had skilled deliveries (χ^2 = 6.852, p-value = 0.009) and maternal mortality rates (χ^2 = 6.298, p-value = 0.012) with no autocorrelation for neonatal mortality rate in the Brong-Ahafo region.

The Eastern region recorded autocorrelation at lag 1 for both the percentage of women who had 4 ANC visits (χ^2 = 6.885, p-value = 0.009) and the percentage of women who had skilled deliveries (χ^2 = 8.579, p-value = 0.003) with maternal and neonatal mortality rates recording no autocorrelation at specified lags.

Autocorrelation was present at lags 1, 5, 6 and 7 for the percentage of women who had 4 ANC visits (χ^2 = 27.804, p-value <0.001; χ^2 = 7.569, p-value = 0.006; χ^2 = 10.006, p-value = 0.002; χ^2 = 6.045, p-value = 0.014) respectively in the Northern region. Again autocorrelation was present for in the percentage of women who had skilled deliveries at a specified lag of 1 and 4 (χ^2 = 24.126, p-value <0.001, χ^2 = 4.775, p-value = 0.029). Maternal mortality rate and neonatal mortality rate saw autocorrelation presence at lag 7 and 8 (χ^2 = 4.065, p-value = 0.044; χ^2 = 4.781, p-value = 0.029) respectively.

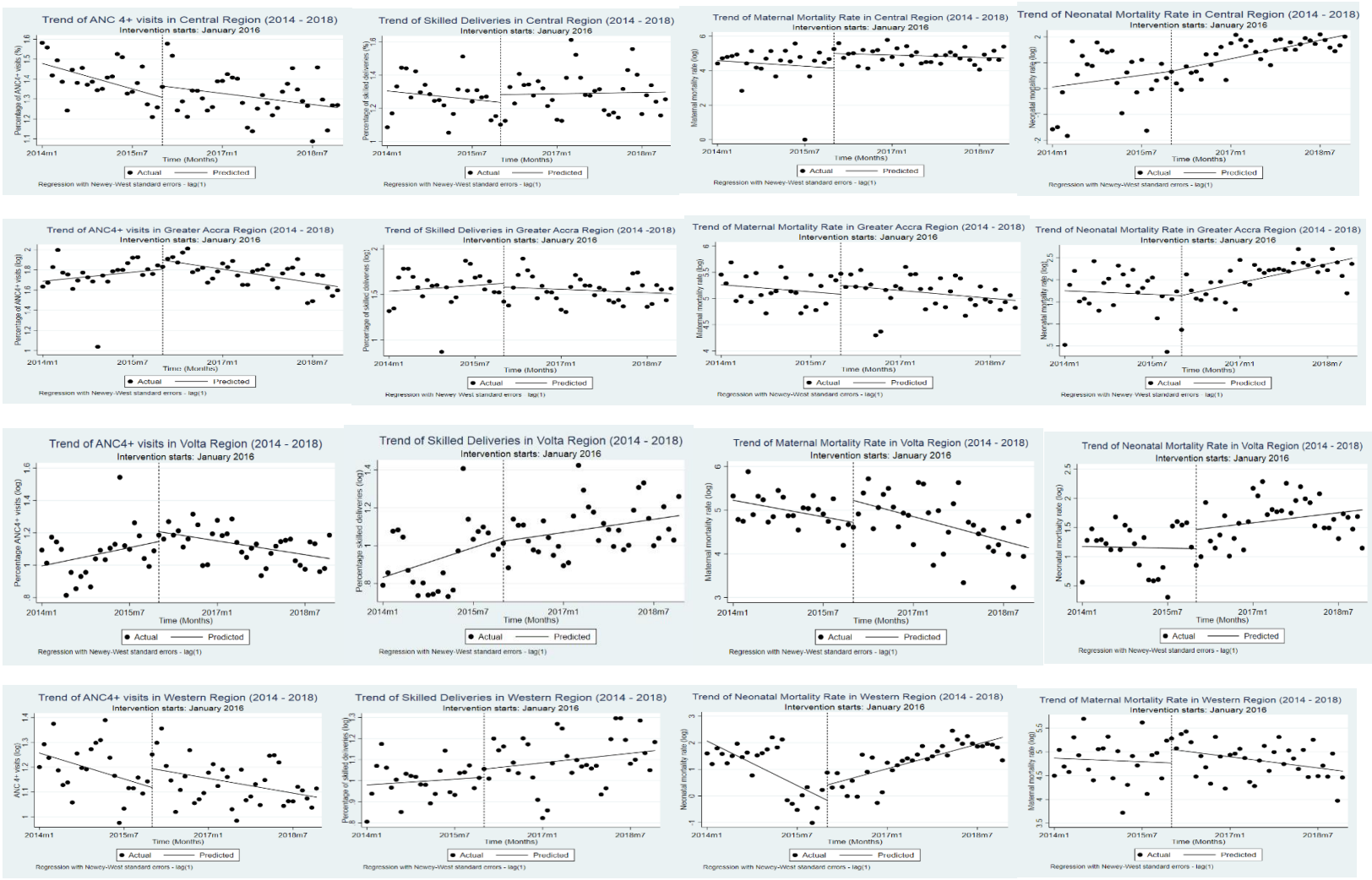

Figure 3: Trend Analysis the outcome variables for the Coastal Belt

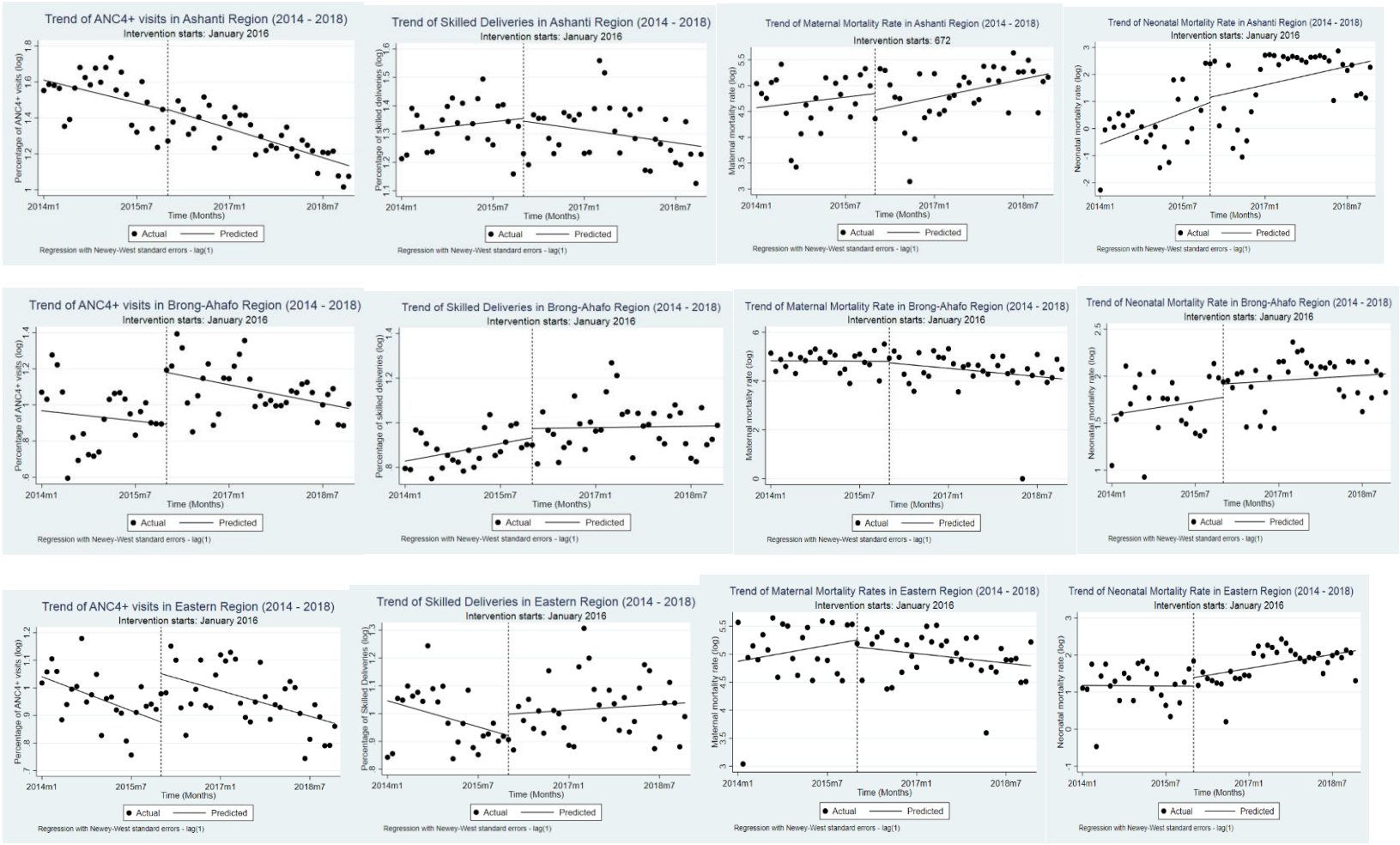

Figure 4: Trend Analysis the outcome variables for the Middle Belt

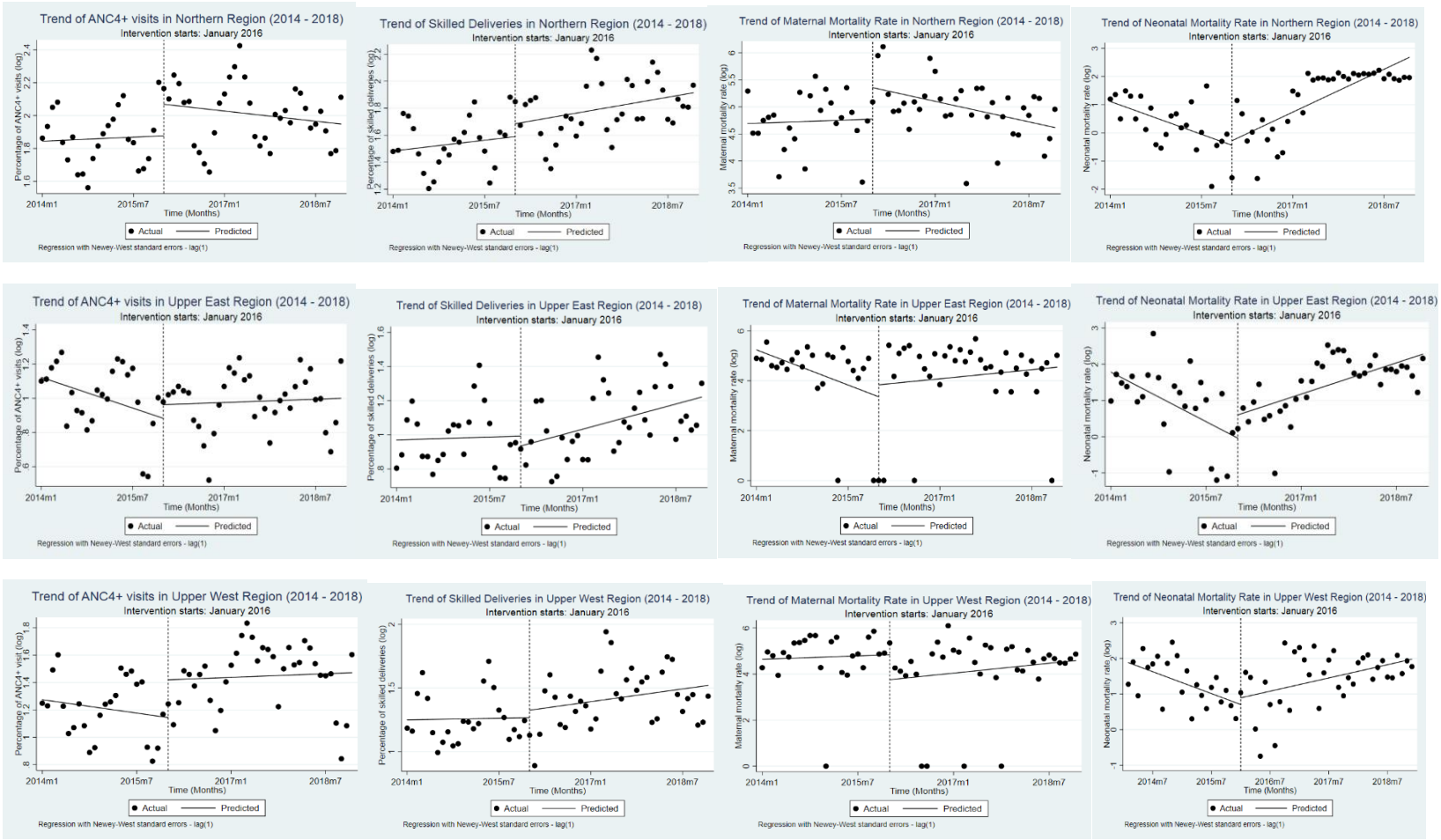

Figure 5: Trend Analysis the outcome variables for the Savannah Belt

CHAPTER FIVE

DISCUSSION

5.1 Introduction

Finding from the study showed a statistically significant impact on the percentage women who received ANC 4 visits in the Volta region, this impact was however a reduction in ANC 4 visit coverage. Antenatal 4 visits increased in the Central, Western, Eastern Upper East and Upper West regions but the increased in coverage was not significant statistically.

Central, Western, Eastern, Northern, Ashanti Upper East and Upper West regions recorded an escalation in deliveries although the impact was not significant statistically.

Maternal mortality rates reduced in the Greater Accra, Volta, Western, Brong-Ahafo, Eastern and Northern regions in the post level trend estimation but these impacts were not statistically significant.

Neonatal mortality rates increased in the Western, Upper East and Upper West region and the impact was statistically significant. The Ashanti and Brong-Ahafo regions were the only two regions which saw a reduction in neonatal mortality rates.

5.2 Antenatal 4 visits

Following the introduction of the PBF intervention the percentage of women who attended ANC for 4 times was anticipated to rise significantly to improve maternal and child health. Women who had 4 ANC visits increased slightly in the Eastern region and percentage

increase in skilled deliveries as well increased in the Ashanti and Eastern regions of the middle belt but then these increases were not significant as expected. A slight increase was seen in the percentage of women who had 4 prenatal visits during the course of their pregnancy with the Upper East and West regions recording an insignificant inclination indicating that maternal health service increased though the increase was not significant following the implementation of the intervention.

The findings from the study is inconsistent with a PBF scheme in the Burkina Faso which asserted that the introduction of PBF incentives increased the utilization and coverage of maternal health services chief of it been increased ANC visits as reported by Steenland et al. (2017). The statistically insignificant increase in the ANC 4 visits may be as a result of some challenges in the design of the intervention which as cited by Paul et al. (2017) in a study, PBF in LMICs, time to rethink, which stated that the introduction of PBF incentives were rushed in the regions as much experiences or evidence is not known in the developed countries hence the mixed results. The coverage in the indicator was though not as expected following the intervention, this could be due to the late registration or reporting of pregnant women to the facilities for ANC services, hence will have very few attendances since they do not report to the facility early enough.

5.3 Skilled Deliveries

The impact of MCHNP on the skilled deliveries saw an increase in about seven regions of the country but these increase in the percentage of women who received skilled deliveries were not statistically significant. The findings of this impact study is inconsistent with a

study by Basinga et al. (2011), which evaluated a PBF incentive following its implementation that PBF had a significant impact on maternal health service use precisely on institutional deliveries as supervised deliveries improved. These impact could be due to the education and durbar organized in the communities especially in places that have some myths on facility deliveries and that home delivery is a sign of how strong and tough a woman is. A study on PBF incentives in Rwanda reported a significant improvement in institutional deliveries following the implementation of the intervention hence recommended that PBF interventions are the best approaches to improving institutional deliveries in LMICs as cited by Basinga et al. (2011). This study report following its findings that particular caveat should be taken when initiating alteration in a system as intricate as the health sector (de Savigny & Adam, 2009) especially in looking at the PBF incentives to ensure maximum or expected impacts and to ensure sustainability in the sector.

Regions with low skilled delivery coverage could be due to lack of collaboration and engagement with the community and its members hence the non-adherence to the all-important PBF intervention. It is believed that education of the populace on facility deliveries was not adequate and in cases where they were done, the education could not go down well with the community members since professionals couldn't demystify the myths surrounding the facility deliveries in the various communities. It is again believed that pregnant women are made to pay unauthorized or unofficial fees to skilled birth attendants hence the inability of the intervention to achieve the anticipated impact, as these fees deter women from receiving skilled services especially in families or communities where there

is lack of support for the pregnant woman in terms of finances. They then sought to home deliveries as that's the only available and presented option for her. Talking about financial constraints, distance from communities to the nearest health facility that has a skilled professional is a major toll on utilization of deliveries services. Also the bad road network to these facilities is a contributory factor to the discrepancies in utilization of the service.

It was observed that some facilities mainly health centers and primary health care centers only provides ANC and PNC services without conducting deliveries when these facilities have a range of staff to provide that service but due to lack of basic equipment such an important service is not provided hence pregnant women who are due for delivery are to visit the next service delivery site for delivery services making most rural women tend to resort to home deliveries although the importance of facility delivery is known and they are willing to receive it but the lack of equipment for skilled attendants to provide the service becomes the barrier.

5.4 Maternal mortality rate

The introduction of PBF led to a decline in maternal mortality in the intervention group compared to the controls according to Basinga et al. (2011). The institution of the PBF intervention, MCHNP was to increase the availability of logistics, provide improved and well-motivated staff to administer essential health care services especially maternal and child health services to residents in remote settlements to increase coverage and use of essential care and reduce maternal mortalities in the region as revealed by the Africa Progress Panel (2010), that increased availability and accessibility of essential maternal health and obstetric services to women of reproductive age leads to a massive improvement

in curbing the increased rate of maternal mortality. Maternal mortality rates reduced in six of the regions although the impact was not statistically significant, the intervention can help produce expected impacts which might be statistically significant if the design of the intervention is directed to the local context rather than the broader and nonspecific ideas which does not support the local setting. The weak referral system in Ghana can be said to have led to the inability of the intervention to produce optimum impacts.

The discrepancies in the impact of maternal mortality rate could be associated with the lack of critical staff or maldistribution of available critical staff across the country making some regions and or zones lack the services of these professionals. Again some facilities lack monitors and other lifesaving equipment leading to the discrepancies in the impacts of the PBF scheme MCHNP in improving maternal health outcomes with maternal mortality rate as the main measuring indicator.

Poor labour progression and the inability of staff to implement a lifesaving intervention when needed can also be due to the reason why the discrepancies in the impact following the intervention. This can be as a result of limited in-service training midwives usually have to advance themselves with improved skills to save the life of women from conception to the end of their postpartum days. By limited trainings it is said that most of these staff are not abreast with the new and upcoming knowledge and techniques in critical situations aside their usual practices hence the insignificant reduction in maternal mortality rates in the regions.

5.5 Neonatal mortality rate

Maternal and child health improvement project is and intervention that is said to help improve both maternal and child health outcomes such as reduced maternal and childhood mortalities. Following its implementation, neonatal mortality rate was anticipated to reduce significantly in every 1,000 LBs cross the country. Findings from this study rather indicated an increase in neonatal mortality rate in the Coastal (Western region) and Savannah (Upper East and Upper West regions) recording increased neonatal mortality rate which are statistically significant. Apart from the Ashanti and Brong-Ahafo regions which recorded a reduction in the rates, the remaining regions recorded an increase in the post level neonatal mortality rates trends. These findings are consistent with the impact evaluation conducted in the Philippines following the implementation of PBF which reported that the intervention group reported more morbidities and mortalities than the control group (DeSalvo et al., 2009; Peabody et al., 2013). An evaluation in Mexico which reported an increased improvement in child health outcomes following the implementation of PBF where the intervention reduced significantly the occurrence of arrested growth among nursery children (Gertler 2004; Rivera et al., 2004) indicating an improvement in child outcomes whereas the impact evaluation on MCHNP was unable to reduce childhood mortality. Following trends, neonatal mortalities might have been appalling had the intervention not been implemented although the impact seen was not as expected, hence the design of the intervention have to be looked and skills of staff must be revamped though they are motivated but then skills training on newborn survival techniques such as neonatal resuscitation among others be done. This insignificant impact recorded could be due to poor monitoring during labour as most midwives particularly in the remote regions do not

adhere to the use of partographs claiming that the workload is so much on them, hence end up delivering baby through spontaneous vaginal delivery leading to the delivery of more asphyxiated babies increasing neonatal mortality because they do not have the requisite skill to resuscitate the baby. Again the referral system in the country is poor and most of these deaths have been attributed to the weak referral system. Addressing these issues will go a long way to produce high impacts following the implementation of this PBF intervention.

Facilities across the countries lack essential equipment such as incubators and phototherapies to care for preterm babies and those with jaundice among others supplies. The lack of these equipment leads to the increased rate of neonatal mortalities in most of the regions in the countries hence the discrepancies in the impact following the implementation of the intervention. Again the inability of the most staff to monitor the progress of labour is believed have also lead to the increased neonatal mortality rates. It is also known that most staff working in the newborn area and in the maternity sections of our facilities lack lifesaving techniques such as helping the baby to breathe (HBB), cord care and neonatal resuscitation among others hence the increase in the neonatal mortality rate. Although the intervention of has a component of home visiting in it, this component is not properly looked at by managers which if properly done will lead to the early detection of danger signs in the newborn for early referral and for early management of whichever condition.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The findings from the study revealed a significant impact in the Volta region with a significant reduction in the percentage of women who had 4 ANC visits. Following the implementation of the intervention, Western, Upper East and Upper West regions reported a significant increase in the neonatal mortality rate.

The study again indicated that the impact of MCHNP on the percentage of pregnant women who made 4 ANC visit increased in the Western, Central, Eastern, Upper East and Upper West regions of the country although there was some positive impact, the increase was not statistically significant as was expected by the intervention. Skilled deliveries was said to have increased following the introduction of the intervention in the Central, Western, Eastern Ashanti, Northern, Upper East and Upper West region however these impacts no statistically significant. Maternal mortality rates also saw a decline in the Volta, Western, Greater, Eastern, Brong-Ahafo and Northeern regions, though mortalities declined, the impact was not statistically significant. The Ashanti and Brong Ahafo regions were the two regions who recorded a reduction in the neonatal mortality rates but the impact was not statistically significant.

6.2 Recommendation

1. The study recommends that monitoring and evaluation activities must be built in programme planning to determine the impact of interventions and to re-strategize

its delivery mechanism if the need arises so as to ensure improved health outcomes and strengthen accountability.

2. Community Health Teams and the Health administrations who are the recipients of the funds must identify the challenges encountered in the implementation of the intervention for amends to ensure accountability and improve population health.
3. Independent evaluators focus on how models in the design are transformed into practice to improve on behaviour and motivation of service providers as well as how stakeholders intern to retain the gains.
4. Enhance social behavioural change communication (SBCC) and durbars to demystify misconceptions about ANC service and facility deliveries which most communities have by that home deliveries is a sign that the woman is strong. These SBCC activities should include local opinion leaders to act as agent of change.
5. Mobile outreaches must be instituted in hard to reach communities to increase ANC coverages and utilization as well as encourage facility deliveries leading to significant decline in maternal and neonatal death.
6. Service providers must improve interpersonal relationship with their clients to act as a motivation factor for the clients to utilize the essential ANC services to enrich maternal and child health outcomes.
7. It is again recommended that staff at the peripheries must be trained in life-saving techniques for the newborn babies to help curb the neonatal mortalities as well as training of for midwives on partographs and on its adherence.
8. The referral systems in the rural areas must to tackled and improved to help reduce maternal and neonatal mortalities in the country.

9. This study recommends that further studies be carried out to ascertain why intervention seem not to be working in some regions.

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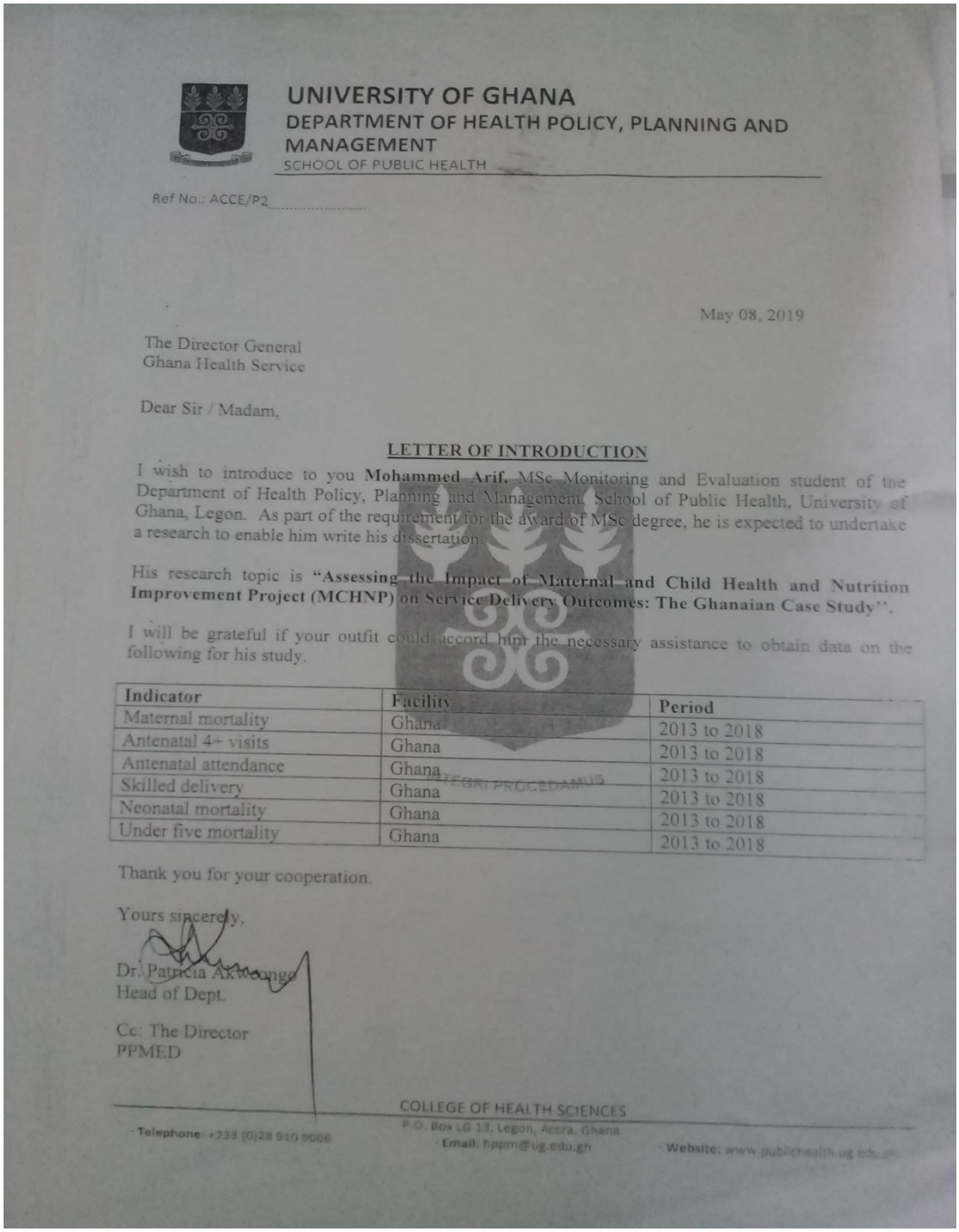
APPENDICES

1.0 Letter of Introduction



UNIVERSITY OF GHANA
DEPARTMENT OF HEALTH POLICY, PLANNING AND MANAGEMENT
SCHOOL OF PUBLIC HEALTH

Ref No.: ACCE/P2

May 08, 2019

The Director General
Ghana Health Service

Dear Sir / Madam,

LETTER OF INTRODUCTION

I wish to introduce to you **Mohammed Arif**, MSc Monitoring and Evaluation student of the Department of Health Policy, Planning and Management, School of Public Health, University of Ghana, Legon. As part of the requirement for the award of MSc degree, he is expected to undertake a research to enable him write his dissertation.

His research topic is **"Assessing the Impact of Maternal and Child Health and Nutrition Improvement Project (MCHNP) on Service Delivery Outcomes: The Ghanaian Case Study''.**

I will be grateful if your outfit could accord him the necessary assistance to obtain data on the following for his study.

Indicator	Facility	Period
Maternal mortality	Ghana	2013 to 2018
Antenatal 4+ visits	Ghana	2013 to 2018
Antenatal attendance	Ghana	2013 to 2018
Skilled delivery	Ghana	2013 to 2018
Neonatal mortality	Ghana	2013 to 2018
Under five mortality	Ghana	2013 to 2018

Thank you for your cooperation.

Yours sincerely,

Dr. Patricia Akweongo
Head of Dept.

Cc: The Director
PPMED

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2.0 Data extraction Form

Region	Period of reporting (Monthly)	Intervention (MCHNP)	ANC attendance	ANC4 visit	Deliveries	Maternal mortality	Neonatal Mortality	Number of women of women who used the health facility	Live birth	Other interventions