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MASS MEDIA EXPOSURE, BIRTH LOCATION PREFERENCES AND CHILD VACCINATION IN GHANA: THE MODERATING ROLE OF MATERNAL EDUCATION

BY

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DECLARATION

This is to certify that this thesis is the result of research undertaken by Mary Darling Naa Lartele Lartey, towards the award of Master of Philosophy Degree in Economics at the Department of Economics, University of Ghana, Legon.

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ABSTRACT

Although most studies have investigated demographic and socioeconomic determinants that influence birth location preferences and child vaccination, there is limited knowledge on the role the mass media plays in awareness creation and health decision making. Notwithstanding its critical role in health decisions, it is evident that the impact of the media on health outcomes varies across education groups. As a result, the objective of this study is to examine the role of the mass media on birth location preferences and child vaccination and to determine whether this relationship is moderated by maternal education. Employing the 2014 Ghana Demographic and Health Survey data and the multinomial logit and Poisson regression models, the result shows that, although media exposure significantly and positively influenced the choice of facility delivery, it had no significant effect on the uptake of full childhood vaccination. On the other hand, while maternal education significantly influenced the choice of facility delivery and child vaccination, it reduced the effect of media exposure on facility delivery. Given the positive impact of the media on health facility delivery, the study recommends that media content and coverage be monitored to improve maternal health. Again, for the non-complementarity between the media and maternal education, the study recommends quality, routine and reliable information on institutional delivery and child vaccination from medical practitioners be provided in booklets and brochures for educated expectant mothers during ANC visits. The study also showed other significant factors such as wealth, location and region of residence, age, health insurance, religion, birth order, ANC visits, marital status and spousal education influence health facility delivery and full vaccination in Ghana.

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DEDICATION

This thesis is dedicated to my parents and siblings for their prayers, support, and encouragement.

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LIST OF ABBREVIATIONS

ANC	Antenatal Care
BCG	Bacillus Calmette-Guerin
CHPS	Community-based Health Planning and Services
DHS	Demographic and Health Survey
DPT	Diphtheria–pertussis-tetanus
EPI	Expanded Program on Immunization
GDHS	Ghana Demographic and Health Survey
GMHS	Ghana Maternal Health Survey
GAVI	Global Alliance for Vaccine and Immunization
HBV	Hepatitis B Vaccine
IIA	Independence of Irrelevant Alternative
MMR	Maternal Mortality Rate
MR	Measles-Rubella
MDGs	Millennium Development Goals
NFHS	National Family Health Survey
NHIS	National Health Insurance Scheme
OLS	Ordinary Least Square
SBAs	Skilled Birth Attendants
SNNPRS	Southern Nations, Nationalities, and People's Regional State
SSA	Sub-Saharan Africa
SDGs	Sustainable Development Goals
TV	Television

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TBAs	Traditional birth attendants
UNICEF	United Nations International Children's Emergency Fund
VIF	Variance Inflation Factor
WHO	World Health Organization

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Globally, the issue of health has become a pressing need. The World Health Organization (WHO) as cited by Callahan (1973) defined health as "the state of total, physical, mental and social well-being and not merely the absence of disease or infirmity". Although this goal has been reinforced by the SDGs goal 3 to reduce world maternal death below 70 per 100 000 live births and halt under-5 mortalities to at least 25 per 1,000 live births by 2030, the United Nation's Millennium Development Goals (MDGs) IV and V stressed on the need to improve maternal and child health to achieve universal access to healthcare (United Nation Statistics Division, 2016). As the leading cause of deaths in reproductive ages worldwide, maternal deaths continues to be the largest health disparity between developed and developing countries (Odesanya, Hassan, & Olaluwoye, 2015). According to Gayawan (2014), with a lifetime risk of 1:39 in SSA compared to 1:3800 in a developed country, high maternal mortality coupled with high fertility rates in SSA increases the lifetime risk of a woman dying from pregnancy complications (Chepkoech, 2014).

The high maternal mortality rate in developing countries according to Kamal, Hassan, and Alam (2015) and Kodom, Kodom, and Senah (2018) stem from the fact that majority of women have unsupervised deliveries which occur outside health facilities. Since maternal mortality is usually associated with limited medical attention at the time of delivery; a woman’s place of delivery – influenced by individual, household and community factors - may aid in the determination of

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survival rate (Mahama, 2019). Therefore, WHO in addition to encouraging delivery at health facilities, recommends that in the absence of complications, pregnant women make at least four antenatal care visits to a skilled birth attendant before delivery, with the most recent guideline of at least eight comprehensive contacts with midwives or health workers as a response to the complex nature of the issues surrounding the practice, organization and delivery of ANC within the health systems (Tunçalp et al., 2017).

Regardless of the positive and sustained economic growth, the rates of Ghana's maternal deaths are still high (Asamoah, 2014). With a significant improvement over the years from 760 per 100,000 live birth in 1990 to 319 per 100,000 live birth in 2015 (Awoonor-Williams & Apanga, 2018); the lifetime risk of dying from the pregnancy-related condition is 1 in 66 for women in Ghana (Adjei, 2013), with haemorrhage (30 per cent) being the leading cause of maternal death followed by hypertensive disorders (GMHS, 2017). In spite of the government's fee exemption policy for maternal care, uptake of skilled birth care remains low (Johnson, 2016). That is, despite the high proportion of expectant mothers making at least one ANC visit to a qualified health provider during pregnancy (Kodom et al., 2018); maternal mortality rates continue to be a challenge for overall health and development agenda (Mahama, 2019). Although societal norms appear to favour facility delivery such that most women belief in skilled birth attendants' ability to alleviate the dangers of delivery complications (Nesbitt et al., 2016); only 73% and 74% of women deliver at health facilities and with the help of skilled attendants, respectively (GDHS, 2014).

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Whereas child mortality has declined substantially in many undeveloped countries, Sub-Saharan African continues to experience moderate fall in mortality rates (Antai, 2009b). Out of the 14 million estimated cases of under 5 mortalities globally, 95% of death occur in developing countries; with almost 70% attributed to vaccine-preventable diseases (Antai, 2010). Abshoko (2016) explained immunization as a way of building up the body to defend itself against a particular disease. This is done by giving vaccines that are either administered orally or through injection. The likelihood of children suffering from the outbreak of preventable diseases makes child immunization a major public health intervention for the prevention of epidemic infectious diseases (Xie & Dow, 2005).

Despite the fact that immunization continues to be one of the cost-effective ways of reducing child mortality (Pegurri, Fox-Rushby, & Damian, 2005), there are 19.4 million children globally who lack basic immunization (Ozawa, Yemeke, & Thompson, 2018) even though there is an increased availability of financial and technical assistance from international organizations (Gauri & Khaleghian, 2002).In this regard, the WHO introduced the Expanded Program on Immunization (EPI) in 1974 with the attempt of ensuring worldwide availability of indispensable age-specific vaccines to children in the developing economies. Consistent with the EPI, children are considered fully vaccinated when they have received one dose of Bacillus Calmette-Guerin (BCG), three doses each of Diphtheria–Pertussis–Tetanus (DPT), polio and measles vaccines by the age of 12 months.

Notwithstanding the proven benefits of vaccination, there are still some gaps in coverage. For instance, Ghana's national vaccination coverage within the last few years has consistently dropped

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with one in eleven Ghanaian child dying largely from preventable childhood diseases before their fifth birthday (Ghana Health Service, 2014) in spite of diverse vaccination services provided by the country's EPI; thereby raising questions about the effectiveness of child vaccination in Ghana (Hagan & Phetlhu, 2016). This limitation in effectiveness may possibly be attributed to the fact that, the EPI interventions in Ghana to improve vaccination usually focuses on the health worker, health systems and logistics (Ghana Health Service, 2014); even though the decision of full vaccination usually depends on parents. For that reason, to help bridge coverage discrepancies, it is essential to examine socio-economic factors that influence parental decisions to fully vaccinate their children.

In spite of socio-economic factors predominantly influencing decision-making in healthcare utilization, few studies have explicitly examined the role of media exposure (Walsh, Thomas, Mason, & Evans, 2015) although in more recent times the contribution of the mass media has been significant (Gabrysch & Campbell, 2009). For instance, the significance of the media in child immunization results from the fact that, irrespective of one’s socio-economic status, individuals who are ordinarily exposed to the media are more likely to have better knowledge and lesser negative outcome in health matters (Jung, Lin, & Viswanath, 2015). In continents with low economic power and literacy rate such as Africa, the media is used in disseminating information on health in addition to awareness creation (Chidinma, 2019). That is, access to the media considerably increase the usage of maternal health services (Tsawe et al., 2015), promote and influence reproductive health (Jahan et al., 2017), reduces health discrepancies in addition to providing pathway to reaching a mass audience (Odesanya et al., 2015) and facilitating the desire to effect behavioural change.

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1.2 Research Problem

Persons often exposed to the media have better knowledge on health issues; because the media remains an important component of individual well-being and development (Laryea, 2015). In addition to its crucial role in providing explanations in various languages for a larger audience (Kansanga et al., 2018), the media - television, radio, newspaper and quarterly publications - helps Ghana's health ministry in disseminating information on health care development (Bosompra, 1989). Despite the fact that Ghana enjoys a buoyant media environment, illiteracy tend to vary the effectiveness of the media in building a more health-literate populace (Thompson & Yeboah, 2013). For policymakers, this low levels of education remain a key reason that hinders improvement in maternal and child health (Greenaway, Leon, & Baker, 2012). As a result, to determine how to strategically communicate health information through the media, it is necessary to assess level of educational attainment since lower levels of education reduces an individual's ability to engage, communicate and understand health information (Kim, 2016).

Given that in the absence of education, media exposure remains insufficient in altering health behaviours (Kwankye & Augustt, 2007); Schillinger, Barton, Karter, Wang, and Adler (2006) proposed that, educational differences which influence health outcomes through interactions require further considerations. Although studies by Shariff and Singh (2002) and Lariscy (2020) emphasized the significance of maternal education in moderating the relationship between health outcomes and information processing and media exposure respectively; there is limited knowledge on the moderating role of maternal education on the relationship between media exposure, birth location preference and child vaccination in Ghana. It is against this backdrop that this research seeks to examine whether maternal education influences the relationship between media exposure

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and maternal health decisions concerning where a woman delivers her baby and whether or not her child receive full vaccination.

1.3 Research question

To achieve the study's objective, the following questions are set to be answered:

- What is the effect of mass media exposure on birth location preferences and child vaccination?
- Does maternal education moderate the relationship between mass media exposure and birth location preferences and child vaccination?

1.4 Research objectives

As factors in bridging the inequalities in healthcare, most studies have proved the significance of mass media and maternal education on health outcomes. For that matter, this research aims to specifically:

- Examine the effect of mass media exposure on birth location preferences and child vaccination in Ghana.
- Examine whether maternal education moderates the association between mass media and birth location preferences and child vaccination in Ghana.

1.5 Methodology and Data

The nationally representative 2014 Ghana Demographic and Health Survey (GDHS) data is employed for the analysis. This includes information on women of child-bearing age i.e 15-49years. The moderating variable is constructed by the interaction between the broadcast media

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(television and radio) and women/mothers' educational level. Estimations are carried out separately for birth location preferences using the multinomial logit regression and child vaccination using the Poisson regression.

1.6 Relevance of the Study

This study adds up to maternal health literature and presents some significance to policymakers and stakeholders regarding Ghana's aim of achieving universal maternal and child health. By this, the study provides an overview of both maternal and child health and how demographic and socioeconomic characteristics aid in bridging the maternal and child health gaps with a specific focus on how media sensitive messages induce utilization of health facility and the uptake of childhood vaccination. Also, the study provides empirical evidence on the extent to which this relationship is moderated by maternal education for policymakers to formulate appropriate strategies to improve maternal and child health in Ghana.

1.7 Structure of the Study

This study is divided into five chapters. The first chapter provides the introduction, background of the study, problem statement as well as the research objectives, significance, and organization of the study. The second chapter focuses on the overview of maternal health, media exposure and child immunization in Ghana. Relevant works of literature will be reviewed in chapter three. Chapter four provides data sources, research design or methodology and theoretical framework used for the study as well as discuss the major findings from the study. Chapter five focuses on data presentation and discussion of results. Finally, chapter six provides summary, conclusion and recommendations based on the study.

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CHAPTER TWO

OVERVIEW OF MATERNAL HEALTH, MASS MEDIA EXPOSURE AND CHILD HEALTH IN GHANA

2.0 Introduction

This chapter presents an overview of maternal health, mass media exposure and child health in Ghana. The overview consists of the trend and governmental interventions that are aimed at increasing child vaccination rates as well as supervised and health facility delivery in Ghana.

2.1 Overview of Maternal Health in Ghana

Chepkoech (2014) and Kodom et al. (2018) indicated that most maternal deaths can be avoided if appropriate treatment is provided by health professionals at delivery. Therefore, the WHO in 1994 recommended that expectant mothers in the absence of complications make at least four antenatal care (ANC) visits, with the first visit during the first three months of pregnancy. Antenatal care helps prevent adverse outcomes during pregnancy and delivery as well as provides proper care for both mother and child. It provides an opportunity to inform and address maternal issues and also provides advice on birth preparedness, referrals and delivery location in addition to administering tetanus toxoid injection and iron tablets, measuring blood pressure and taking urine and blood samples of pregnant women (GDHS, 2014).

Notwithstanding the benefits of receiving antenatal care, there are still some variations in antenatal care visits and supervised deliveries in Ghana. For this reason, various interventions to increase

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coverage and quality of maternal health services following the Millennium Development Goal (MDG) have been introduced (Adjei, 2013). For instance, to encourage attendance and accessibility to ANC and supervised deliveries, four free ANC visits were introduced in 1998 (McGlynn, Wilk, Luginaah, Ryan, & Thind, 2014) and in 2003, the fee-free delivery exemption policy on maternal services was introduced (Kodom et al., 2018).

Prior to the fee-free delivery exemption, Community-based Health Planning, and Services (CHPS) was established in 2002 to improve geographic access to health services nationally (Boah, Mahama, & Ayamga, 2018). This was followed by a declaration of national emergency in July 2008 aimed at bridging the inequality gaps in other to provide free maternal health care (ANC, delivery and postnatal care) for all pregnant women who have registered with the National Health Insurance Scheme (NHIS) in other to hasten the attainment of MDGs 4 and 5 (Adjei, 2013; Nketiah-Amponsah & Arthur, 2014). More recently, to ensure women have safe pregnancy and childbirth, the WHO and many safe motherhood advocates redirected focus to the training of skilled birth attendants to conduct safe delivery. Because of this, Ghana's health ministry in conjunction with WHO released a communiqué in 2010 relieving all TBAs of their role in communities with existing health facilities (Kodom et al., 2018).

Although these interventions have increased ANC visit over time, it did not match up to the proportions of delivery by skilled providers in health facilities. The low coverage as indicated by Manyeh et al. (2017) is due to cost of service, quality of care and proximity of health facility. According to the 2017 Ghana Maternal and Health Survey (GMHS), almost all (98%) of expectant mothers made at least one ANC visit to a skilled provider (nurses, midwives and doctors) 5 year

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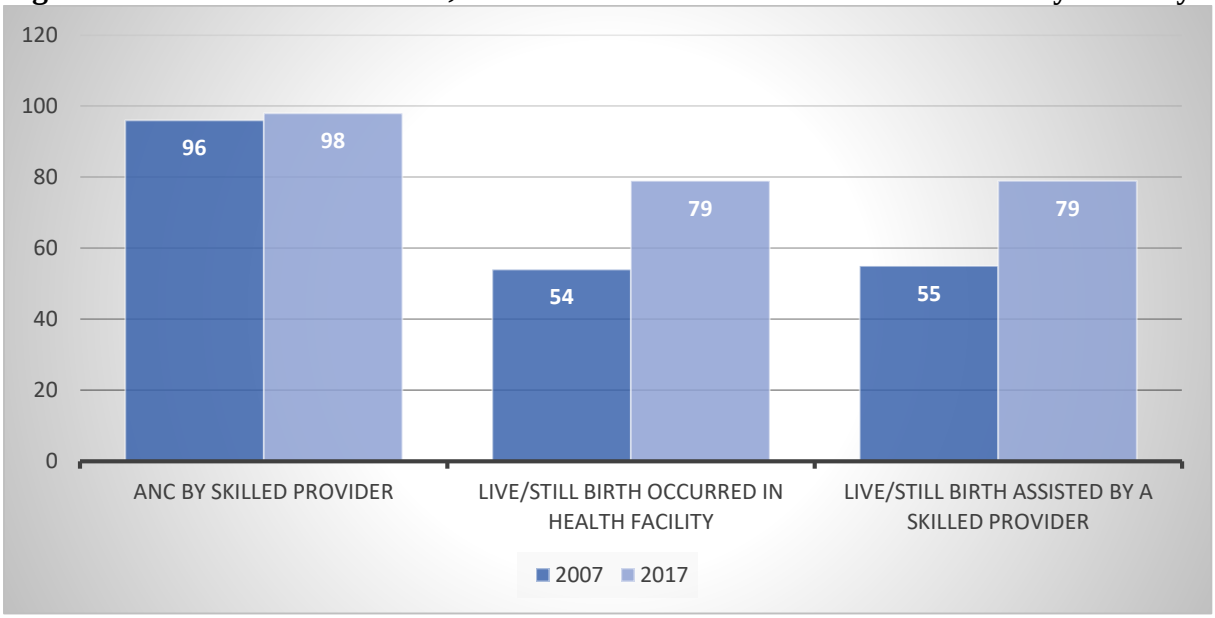
preceding the survey for their most recent birth (still or live birth) which represents a 2 percentage points increase (from 96 per cent in 2007 to 98% in 2017). Health facility delivery increased from 54 per cent from 2007 to 79 per cent in 2017. For supervised deliveries, the proportions increased from 55 per cent in 2007 to 79 per cent in 2017 as depicted in figure 2.1.

Figure 2.1: Trends in ANC visits, Skilled Birth Attendants and Health Facility Delivery



Source: GMHS report 2007 and 2017

2.1.1 Maternal Health and Educational levels

The proportions of ANC received from skilled providers and delivery at private health care for a still/live birth increased with higher levels of education. For women with no education, ANC increased from 94 per cent in 2007 to 99 per cent in 2017 compared to at least secondary educated women (99.5 per cent in 2007 to 100 per cent in 2017). Similarly, the percentage of women with no education who delivered at a private health facility delivery decreased from 6 per cent in 2007

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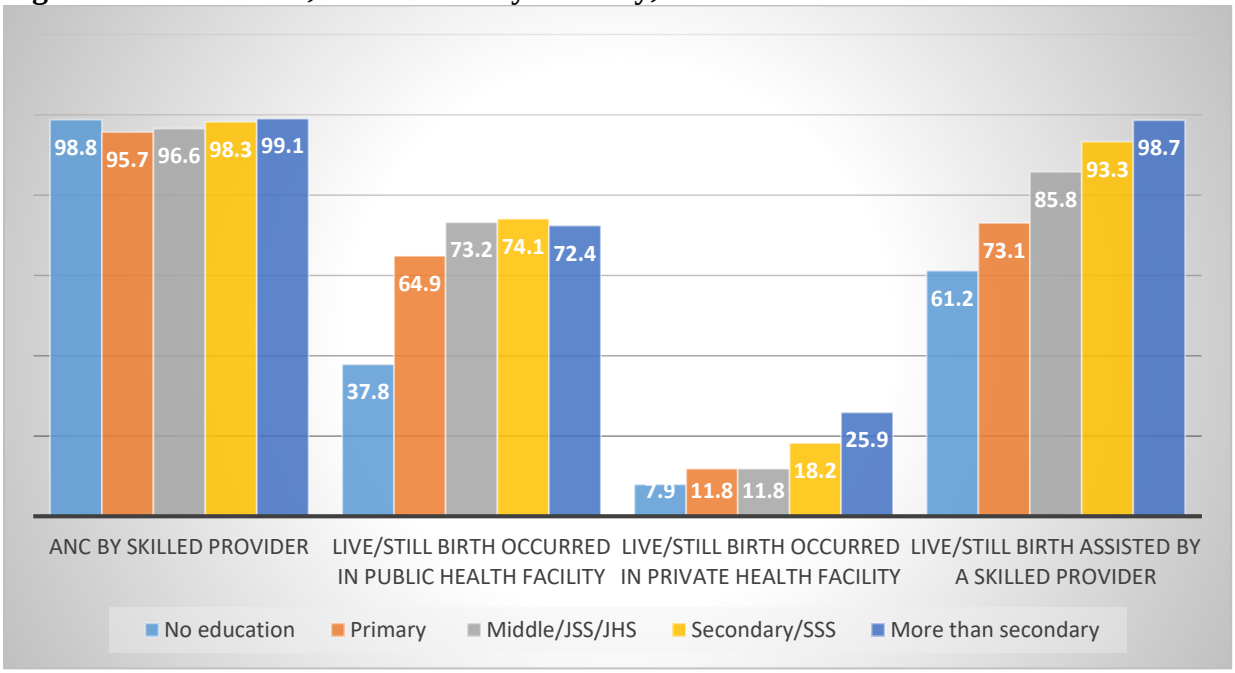
to 5 per cent in 2017 relative to an increase from 24 per cent in 2007 to 26 per cent in 2017 for women with higher levels of education. With regards to public health facility delivery, the highest coverage was recorded for women with secondary education (from 64 per cent in 2007 to 74 per cent in 2017) and lowest among women with no education (from 26 per cent in 2007 to 38 per cent in 2017). For assistance received at birth, while the percentages increased for uneducated women (32 per cent in 2007 to 61 per cent in 2017), the proportion for primary educated women remained unchanged (73 per cent for 2007 and 2017 respectively) as depicted in Figure 2.2.

Figure 2.2: ANC visits, Health Facility Delivery, and Skilled Assistance at birth



Source: GMHS Report, 2017

2.1.2 Maternal Health and Place of Residence

For locational differences, an individual living in an urban area is more likely to receive appropriate care and treatments during pregnancy for both survey years. This is as a result of the

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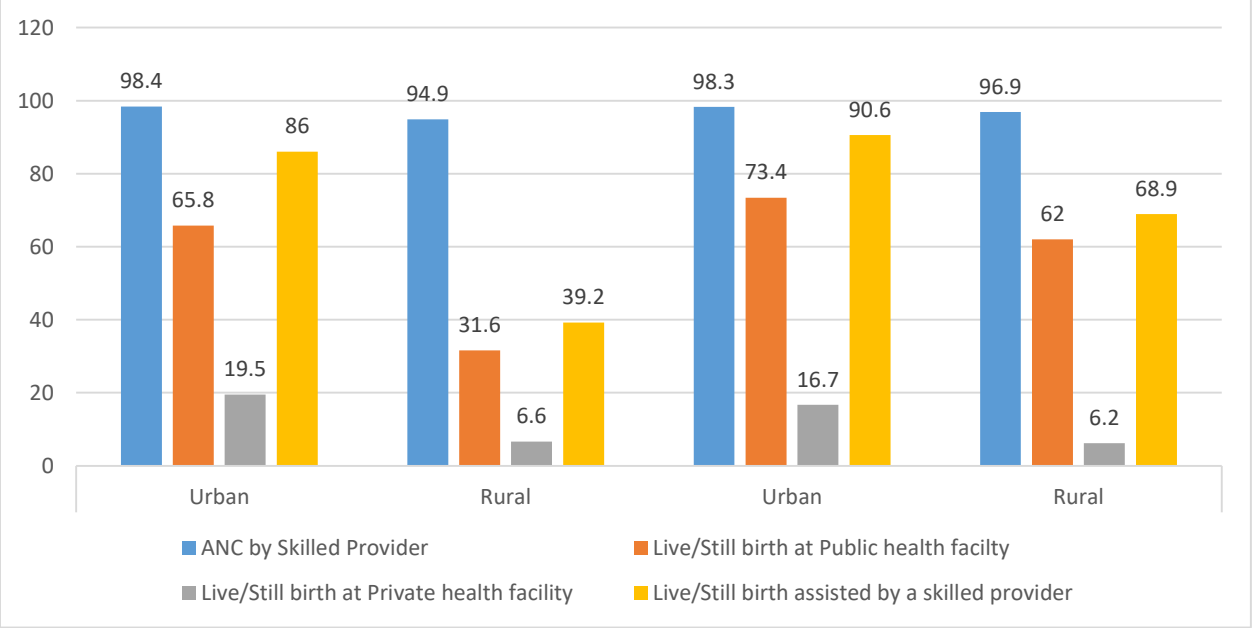
high prevalence of SBAs in urban areas relative to rural areas (Awoonor-Williams & Apanga, 2018). The percentage of women who receive skilled assistance at delivery were higher in an urban area (from 86 per cent in 2007 to 91 per cent in 2017) than rural areas (from 39 per cent in 2007 to 69 per cent in 2017). From Figure 2.3, though there are no major disparities between urban and rural dweller in ANC visits, 98 per cent of women in urban areas received ANC from skilled providers as compared to 97 per cent in rural areas in 2017. There was an improvement in institutional delivery for women who reside in both rural and urban areas even though the percentages were higher for public health facility than for a private health facility. Between 2007 and 2017, the proportion of deliveries at a public health facility increased by 8 percentage points and 30 percentage points for urban and rural, respectively. On the other hand, the percentage of urban and rural women who delivered at a private health facility decreased by 2.3 percentage points and 0.4 percentage points, respectively.

Figure 2.3: Trends in ANC visits, Institutional and Supervised Delivery by Place of Residence



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Source: GMHS Reports (2007 and 2017)

With regards to regional locations, improvements in the utilization of maternal health services in the three northern regions results from the recent increase in the number of hospitals in these regions to encourage the use of institutional delivery (Cilbastone, 2018). The Upper West region (from 98 per cent in 2007 to 99.6 per cent in 2017) recorded the highest percentage of women who received ANC from skilled providers while the Volta region (96.4 per cent in 2007 to 96 per cent in 2017) recorded the least coverage for ANC visits. The Upper East (46 per cent in 2007 to 86 per cent in 2017) and Greater Accra (from 24 per cent in 2007 to 21 per cent in 2017) regions recorded highest percent for public and private health facility with the least proportions recorded for the Volta (35 per cent in 2007 to 55 per cent in 2017) and Upper East (from 1 per cent in 2007 to 0.3 per cent in 2017) regions, respectively. For skilled assistance at birth, the Greater Accra (from 79 per cent in 2007 to 92 per cent in 2017) and the Northern (from 4 per cent in 2007 to 59 per cent in 2017) regions recorded the highest and the lowest percentages, respectively.

2.2 Overview of Mass Media Exposure among Women in Reproductive ages in Ghana

The media is one of the popular and cost-effective sources of health information in many parts of the world (Zamawe, Banda, & Dube, 2016). Some studies (Jahan et al., 2017; Kwankye & Augustt, 2007; Lashuay et al., 2000; Moynihan et al., 2000) provide evidence to show the media impacts public health knowledge and behaviours. This is because it offers broad coverage by which a larger audience may be reached (Sokey, 2016). The GDHS reports evaluated the media employing how effective it disseminates health-related information. This is done by assessing respondents' frequent use of the radio, television and/or newspaper. The broadcast media (radio and television) recorded higher rates for media exposure as compared to the print media in the 2008 and 2014

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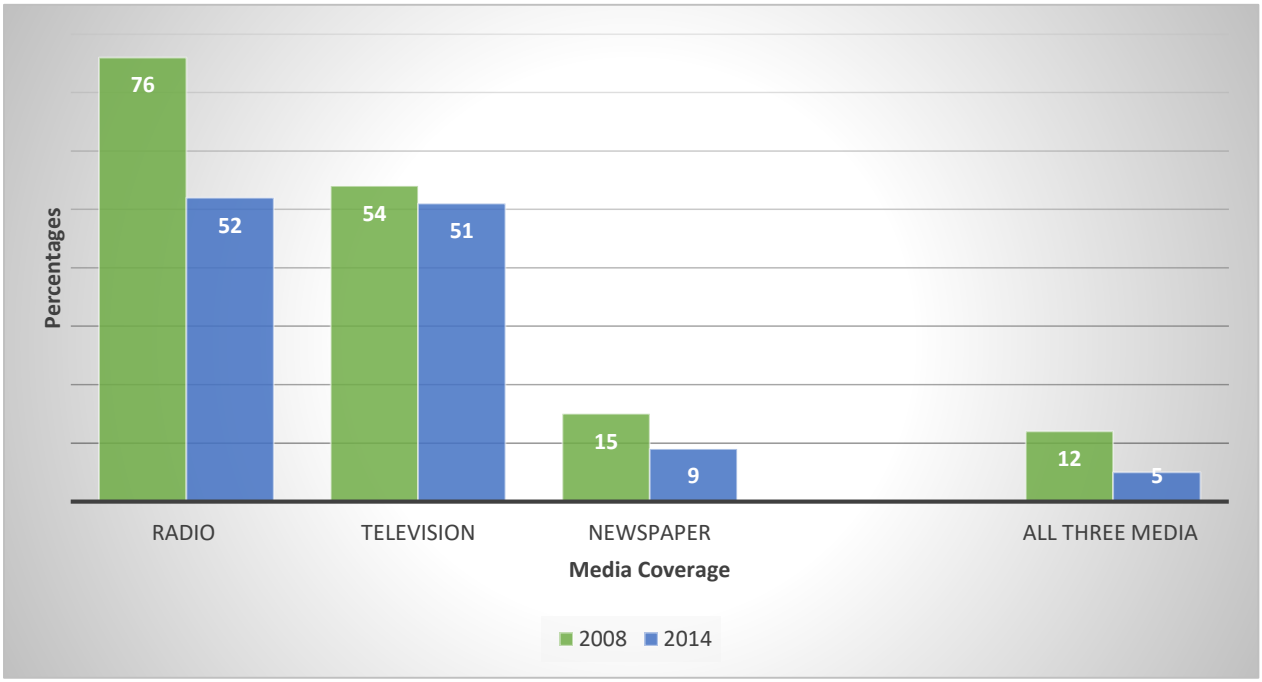
survey years. In 2008, 12 per cent of women were exposed to all three media with the highest rate of media coverage recorded among women who listen to the radio (76 per cent) and the least coverage among women who read the newspaper (15%) at least once a week. Nonetheless, in 2014, exposure to all three media declined by 7 percentage points (from 12 per cent in 2008 to 5 per cent in 2014) with the most and least common media been the radio (51%) and the print media (9%), respectively as depicted in figure 2.4.

Figure 2.4: Trends in Media Coverage



Source: Ghana Demographic and Health Surveys (2008 and 2014)

2.2.1 Media Exposure and Educational levels

Per the 2014 GDHS report, all the forms of media showed a direct relationship with educational levels though the proportions of media exposure in 2008 were higher compared to 2014. Following

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Figure 2.5, women with no education were less likely to access the media as compared to women with at least secondary educational levels. For the specific forms of media, listening to the radio was most preferred by all educational levels in 2008 and 2014, respectively with newspaper reading the least preferred media. All educational levels preferred to listen to the radio followed by watching television and newspaper reading, respectively. Women with no education showed no significant exposure to all three media. For at least secondary educational level, listening to radio declined from 89 per cent in 2008 to 64 per cent in 2014 as compared to 60 per cent to 41 per cent for women with no education, respectively. Likewise, the percentages of watching TV were higher for women with secondary education (from 85 per cent in 2008 to 71 per cent in 2014) than uneducated women (from 24 per cent in 2008 to 30 per cent in 2014). Lastly, women with higher education recorded the highest proportion of reading newspaper (from 13 per cent in 2008 to 27 per cent in 2014) and the lowest among uneducated women (from 0.4 per cent in 2008 to 0 per cent in 2014).

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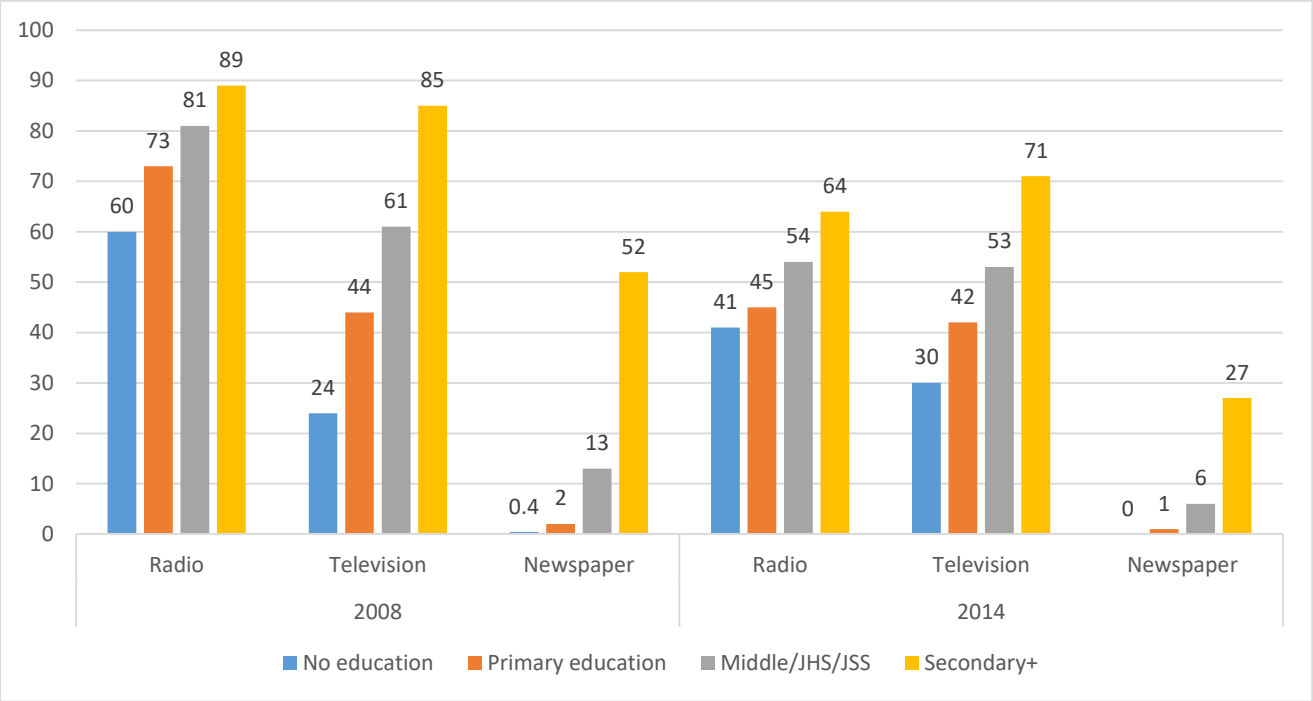
Figure 2.5: Educational levels and Mass Media Exposure



Source: GDHS Reports 2008 and 2014

2.2.2 Media Exposure and Place of Residence

Urban women tend to have greater exposure to all three forms of media than their rural counterparts though media exposure rates declined between 2008 and 2014. The percentage of weekly exposure to all three media was 5 times higher for urban women than rural women in 2014 (20 per cent for urban women compared to 4 per cent for rural women) possibly because of the availability of social amenities such as electricity, higher levels of education and others resources in urban areas compared to rural areas. Although exposure to newspaper declined from 23 per cent to 12 per cent for urban women and from 7 per cent to 4 per cent for rural women for 2008 and 2014, respectively, exposure to radio remain the most preferred media (81 and 72 percent for urban and rural

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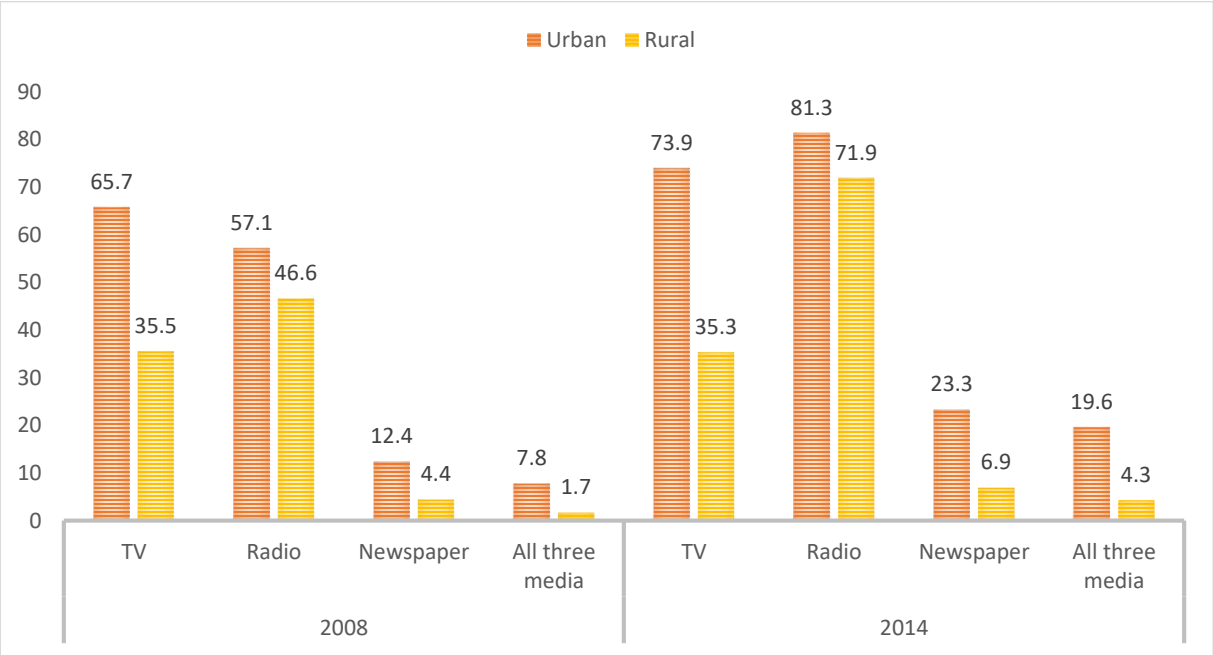
respectively in 2008 and in 2014, 57 and 47 per cent for urban and rural, respectively) as depicted in figure 2.6.

Figure 2.6: Mass Media Exposure and Place of Residence



Source: GDHS Reports 2008 and 2014

For regional locations, newspaper reading (28%) and watching TV (81%) were highest in Greater Accra while listening to the radio was highest in the Western region (90%) in 2008. However, least exposure to the newspaper was recorded for Brong Ahafo (5%) while Upper West (27%) and Northern regions (56%) had the least exposure to television and radio respectively. For 2014, Greater Accra recorded the highest percentage for exposure to all three media (11% for all three media, 18% for exposure to the newspaper, 72% for exposure to television and 59% for exposure to radio). However, the least exposure to the newspaper (2%), exposure to the radio (37%) and

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exposure to all three media form (1%) were recorded for the Northern region while the Upper East region recorded the least exposure to television (26%).

2.3 Overview of Childhood Vaccination in Ghana

The Expanded Immunization Program (EPI) was initiated in 1974 to reduce child mortality by enhancing full vaccination for children under age one throughout the world. Vaccinations against tuberculosis, diphtheria-pertussis-tetanus (DPT), measles, and polio have intensely reduced the death and disease burden of infectious diseases (Muula, Polycarpe, Job, Siziya, & Rudatsikira, 2009). The EPI has prevented more than 2 million child deaths in low and middle-income countries (Antai, 2009b; Kawakatsu & Honda, 2012). In response to the national health policy to reduce vaccine-preventable morbidity and mortality, Ghana adopted the EPI program in 1978 and it became operational in all 10 regions in 1985 (Ansong et al., 2018). Fully funded by the government with support from donor partners such as Global Alliance for Vaccine and Immunization (GAVI), WHO and UNICEF. The routine schedule of the EPI program in Ghana requires that each child should receive one dose of BCG at birth, three doses of DPT, (at 6, 10 and 14 weeks), four doses of OPV (at birth, 6, 10 and 14 weeks) and one dose of measles (at 9 months).

With the initial six vaccines, Ghana's immunization program has periodically been reviewed to include the yellow fever vaccine (at 9 months) which was introduced in 1992 and the pentavalent vaccine (DPT-Hib-HeB) which replaced the DPT vaccine in 2002. Starting from 2012, the pneumococcal (at 6, 10 and 14 weeks) and rotavirus vaccines (at 6 and 10 weeks) which protects a child from pneumonia and diarrhoea, respectively and the measles second-dose vaccine (at 18 months) have been added to the major vaccines. More recently in 2013, the measles-only vaccine was replaced by the Measles-Rubella (MR) vaccine (GDHS, 2014).

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Vaccinations in Ghana are organized along hierarchical organization structure - national, regional, district, sub-district and community levels (Yawson et al., 2017). At the regional and operational levels (district and sub-district), there are trained health promotion officers and health staff that carry out health education and interventions. Vaccines are administered through static services (at healthcare facilities), outreach services (for a cluster of communities without access to health facilities) and mass immunization campaigns to reach out to the high-risk population. Though vaccination rates are higher, the dropout rates (reduction in the proportion of coverage for subsequent doses) increased for vaccines with multiple-dose. Coverage declined for the first dose of the pentavalent vaccine (from 98 per cent in 2008 to 97 per cent in 2014), the third dose of the polio vaccine (from 86 per cent in 2008 to 84 per cent in 2014) and measles (from 90 per cent in 2008 to 89 per cent in 2014). However, it increased marginally for BCG (from 96 per cent in 2008 to 97 per cent in 2014). For the five years preceding both surveys, there was a two percentage point decrease in basic vaccination coverage from 79 per cent in 2008 to 77 per cent in 2014. Figure 2.7 indicates the trends in basic vaccination coverage in Ghana at any time (not necessarily age 12 months) for children between 12-23 months.

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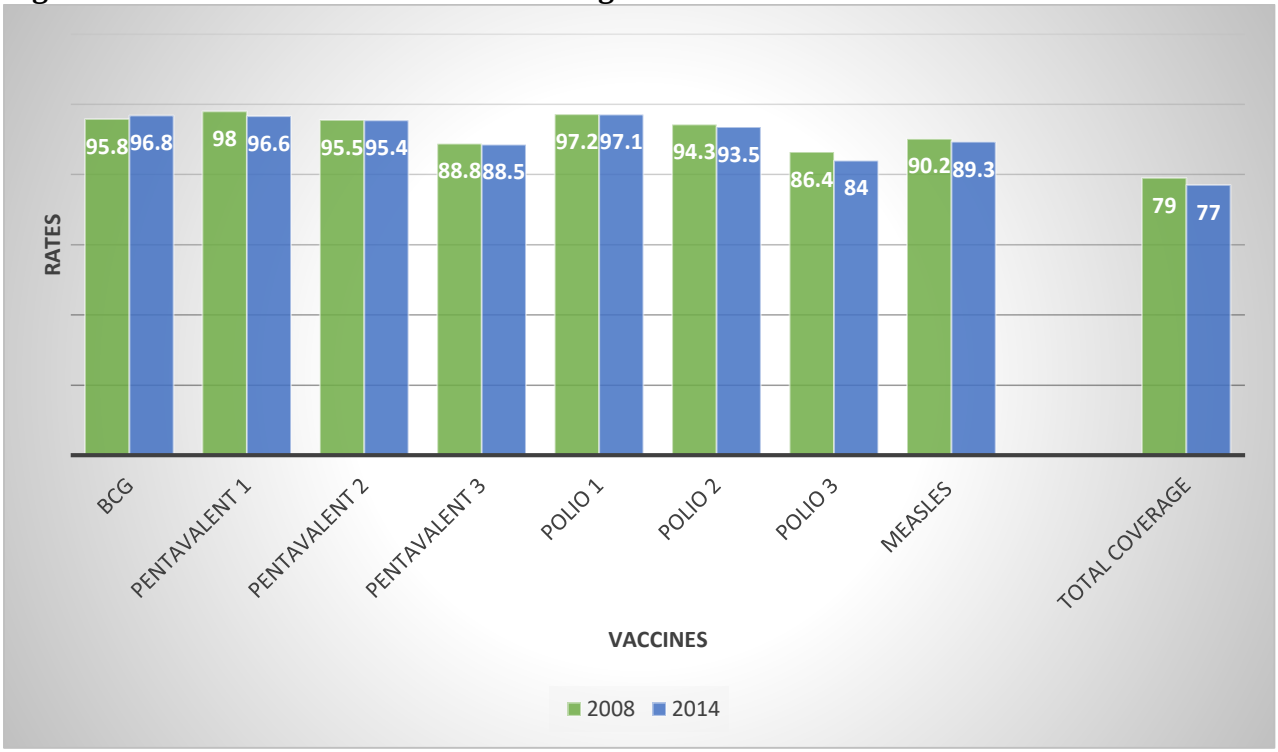
Figure 2.7: Trends in Basic Vaccine Coverage



Source: Ghana Demographic and Health Surveys (2008 and 2014)

2.3.1 Maternal Education and Childhood Vaccination

Mothers are mostly entrusted with the responsibility of childhood vaccination because they are considered the most appropriate persons in terms of child health. Therefore, to demonstrate the effect of educational attainments on childhood vaccination, the educational levels of mothers are considered. From Figure 2.8, the rates of childhood vaccination for maternal education (except for with a minimum of secondary education) were higher in 2008 than in 2014. For the 2008 and 2014 survey years, the percentage of fully vaccinated children (for all basic vaccines) was highest for mothers with middle/JHS/JSS and at least secondary, education respectively. In 2014, mothers with at least secondary level of education recorded the highest rate of child vaccination (from 74 per cent in 2008 to 83 per cent in 2014) with the lowest rate recorded by mothers with primary

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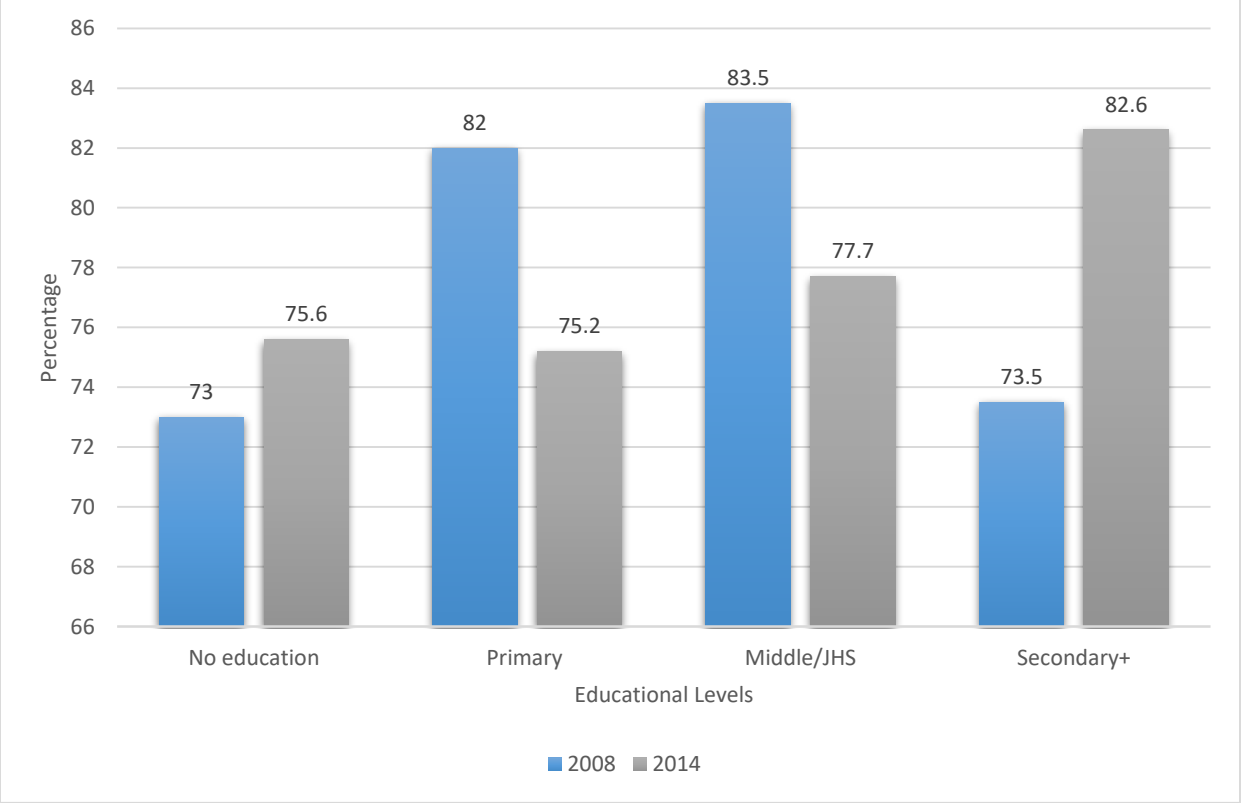
education (from 82 per cent in 2008 to 75 per cent in 2014). Similarly, for mothers with middle/JSS/JHS education, the percentage of vaccination declined from 84 per cent in 2008 to 78 per cent in 2014; implying that, though maternal education is an important determinant of child immunization, a higher level of education does not necessarily guarantee a higher rate of child immunization in Ghana. Though mothers with no education recorded the lowest rate of vaccination coverage in 2008 (73%), in 2014, the rates increased to 76 per cent.

Figure 2.8: Childhood vaccination and Maternal Education



Source: Ghana Demographic and Health Surveys (2008 and 2014)

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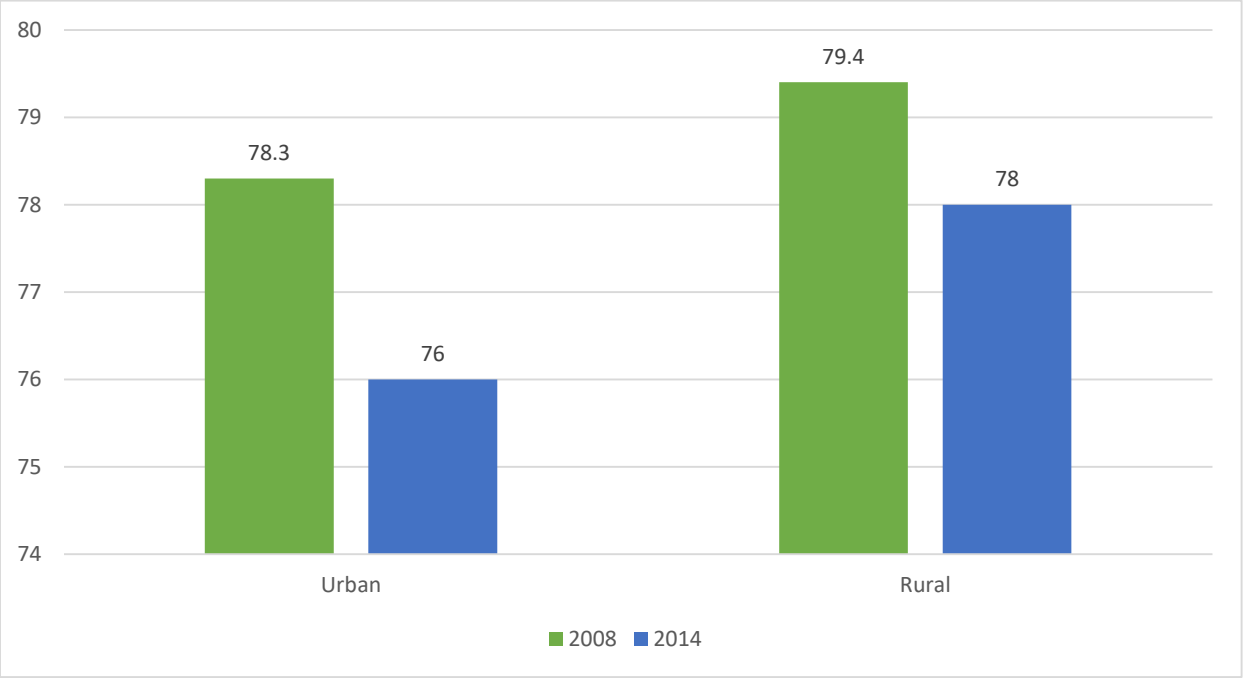
2.3.2 Childhood Vaccination and Place of Residence

The 2014 GDHS reported locational differences in vaccination coverage with the proportions of children who received all basic vaccine were higher in the rural community. However, the coverage rates for 2014 were lower as compared to the 2008 levels. In 2014, 78 per cent of rural children between age 12-23 months were fully vaccinated compared to 79 per cent in 2008. For urban communities, the proportions decreased from 78 per cent in 2008 to 76 per cent in 2014 as depicted in figure 2.9.

Figure 2.9: Childhood vaccination and Place of Residence



Source: Ghana Demographic and Health Surveys (2008 and 2014)

All the same, there were inequalities in basic vaccine coverage across regional levels. The highest rate was recorded in the Upper West region (from 89 per cent in 2008 to 91 per cent in 2014) and the lowest rate recorded in the Northern region (from 59 per cent in 2008 to 69 per cent in 2014).

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However, there was a notable decline in the proportion of full vaccination in the Western region (from 82 per cent in 2008 to 69 per cent in 2014). Recording the lowest rates, Yawson et al. (2017) indicated that both the Northern and Western regions are among geographical inaccessible areas for immunization services. Communities in such regions are hardly accessed due to poor road networks, especially the Western region which is characterized by the prolonged rainy season and the least number of community outreach/static points.

2.4 Conclusion

From the above discussions, whereas ANC visits improved over time, the rates did not match up health facility delivery. Similarly, childhood vaccination coverage declined by 2 percentage points. Even though media exposure to all forms of media declined by 7 percentage points between 2008 and 2014, more than 50 per cent of women were exposed to television and radio in 2014. Also, the proportion of women with higher education increased with media exposure, full vaccination uptake, ANC visits and health facility delivery. Lastly, the percentages of media exposure, ANC visits and health facility delivery increased with urban residence while the rates of basic vaccines uptake increased with a rural residence.

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CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

The main focus of this chapter is to provide past shreds of evidence on the effects of media exposure on child vaccination and birth location preferences. This chapter focus on two main sections. The first section presents the theoretical review while the second section reports on empirical reviews.

3.1 Theoretical Review

3.1.1 Behavioural Model of Healthcare Utilization

Andersen and Newman (1973) Behavioural Model of Health Services Utilization as a conceptual framework has been used extensively in both developing and developed countries to understand the utilization of health services (Thind, Mohani, Banerjee, & Hagigi, 2008). It provides a framework to empirically address societal inequality in healthcare provision and utilization by allowing choices of independent variables that fit a specific hypothesis. The model considers individual behaviour of primary importance in explaining healthcare use which is constrained by societal factors and the availability of health care services. It is formulated by considering factors that affect healthcare services as a function of three characteristics: predisposing factors, enabling factors and need factors.

Predisposing factors refer to factors that prompt an individual's propensity to use healthcare. They are the demographic features that exist before the onset of any illness. They include demography (age, marital status, sex), social structure (race, education, religion, family size) and health beliefs.

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Enabling factors refers to family and community resources that facilitates or hinder the use of health services. They include income, media exposure, health insurance, urban-rural characteristics and the region of residence. Lastly, the need factors are subjective to the level of one's illness. This can either be perceived (disability and general state) or evaluated (system and diagnosis).

Nonetheless, considering birth location preferences on the assumption that an expectant mother in the absence of any complications chooses her birth location before her delivery and child vaccination as a preventive healthcare and derived demand, this study limits the determinants of birth location preference and the full uptake of vaccination to predisposing and enabling factors.

3.2 Empirical Review

According to Sokey (2016), the media is an important social institution in any contemporary society. The media development has enabled women to participate in healthcare utilization (Sohn, Lin, & Jung, 2018) because it provides information to handle women reproductive health problems (Arthur, Dukper, & Sakibu, 2019). The strategic use of the media can promote awareness, increase knowledge and change health-related behaviours. Reviewing the effect of media exposure on birth location preferences and childhood vaccination, the empirical literature is largely on developing countries because most developing countries have weaker health systems and usually resort to demanding factors in maximizing healthcare decisions (Jung et al., 2015).

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3.2.1 Media Exposure, Education and Birth Location Preferences

Shariff and Singh (2002) used the probit regression and the National Council of Applied Economic Research's 1994 rural cross-sectional household survey dataset on 7,635 women who delivered a year before the survey. They aimed to analyze the impact of education, information processing (mass media) and economic factors on some measures of maternity healthcare (ANC, blood pressure check-up, place of delivery, SBA at delivery and postnatal care). Assuming the homogeneity of health facility delivery, the study reported information processing and higher education as a negative significant determinant in a woman's choice of home delivery. Further, the study interacted information processing and maternal education to determine how variations in education influence information processing. The results showed that though the interaction did not affect the significance of maternal education, the magnitude of its direct effects declined for women with at least middle education. Despite the reduction in the direct effects of mass media, its interaction with education level reported that the women who were exposed to the media and had at least middle level of education were less likely to choose home delivery.

Navaneetham and Dharmalingam (2002) conducted a study that comprises of four southern states in India to investigate determinants and patterns in the use of maternal health services across different social settings in south India – Kerala, Karnataka, Andhra Pradesh and Tamil Nadu. India's 1992-93 National Family Health Survey (NFHS) data was used to identify factors that influence maternal health with the focus on ANC visits, health facility delivery, skilled attendants at birth and tetanus toxoid vaccination. With respect to institutional delivery, the effect of media exposure - determined by scoring media exposure high if, within a week, a mother is exposed to both radio and television, medium if the mother listened to radio but had not watched television

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and low if there was no exposure to either radio or television – increased a woman's chances of delivering at health facilities in three out of four states. Also, compared to uneducated women, higher education significantly increased the odds of having institutional delivery.

In an attempt to investigate the level of institutional delivery and its associated factors, Amano, Gebeyehu, and Birhanu (2012) used a cross-sectional community survey conducted from April 1–20, 2011 on 855 sampled women in Munesa Woreda, Ethiopia who delivered 12months before the study. Though nationally unrepresentative, the descriptive statistic reported only 12.3 per cent of deliveries took place at a health facility. The ownership of radio or television as a proxy for media exposure increased the chances of institutional delivery in the bivariate analysis though it remained insignificant in the backward stepwise logistic regression. On the contrary, higher levels of education influenced a woman's decision for institutional delivery in both bivariate and adjusted multivariate analysis.

In a community based cross-sectional analysis, Ravi and Kulasekaran (2014) examined data on 605 Indian women of reproductive age (15-24 years) in 28 villages between July 2010-April 2011. Assuming homogeneity of institutional facilities, media exposure significantly influenced a woman's choice of institutional delivery in the bivariate analysis; with a decline in the proportion of home delivery for women exposed to the media (1.6%) compared to those who are less exposed (7.1%). For educational differences, women with at least secondary education were less likely to choose home delivery. Also, other covariates such as age, spousal education, residence and ANC visits were found to influence the choice of place of delivery.

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Kamal et al. (2015) in their objective to identify factors that influence delivery at health facilities, broadly categorized classified delivery choices into either home or medically facilitated setting. Employing Bangladesh's 2007 DHS for analysis, the study reported 85 per cent of women delivering at home. Media exposure and maternal education were significantly associated with the choice of place of delivery in the bivariate analysis. The estimations from the adjusted multivariate binary logistic regression showed that compared to women with no media access, the likelihood of institutional delivery increased by 24 per cent for women with media access. Also, higher educated women were more likely to choose health facilities for delivery. Other factors such as birth order, spousal education, wealth, ANC visits and location/residence significantly influence institutional delivery.

Using more recent data, Chowdhury et al. (2013) employed Bangladesh's 2011 DHS to access socio-demographic determinants of home delivery assisted by untrained traditional attendants among rural expectant mothers. Measuring media exposure as a composite variable which comprises of access to TV, radio and newspaper, the results from the multivariate logistic model reported that because the media promotes awareness on health facility services and the potential risk of home delivery, women with media access were less likely to have untrained traditional birth attendant's assisted delivery at home. For educational levels, compared to uneducated women, women who had attained at least a secondary level of education were less likely to have home delivery assisted by untrained birth attendant compared to women without education.

In analyzing socio-demographic and obstetric factors that influence health facility delivery in a rural district in Ghana, Boah et al. (2018) collected data from 423 rural women on antenatal care

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use and place of delivery in June 2016. Estimating the relationship between women's socioeconomic and obstetric characteristics and place of delivery, about 92 per cent and 64 per cent of women who delivered at health facilities had at least secondary education and exposed to delivery care information, respectively. The adjusted multiple logistic regression reported that compared to women exposed to delivery care information (irrespective of the source), women with no information on delivery care were 94 per cent less likely to deliver at a health facility although maternal education increased the odds of facility delivery, it remained an insignificant predictor of health facility delivery.

Controlling for the effect of media exposure in a study to examine the role of antenatal care (ANC) in predicting the choice of health facility delivery, Obago (2013) analyzed data from Kenya's 2008-09 DHS. Assuming homogeneity in health facility delivery, the results from the adjusted logistic regression estimation reported that, women with exposure to any two media sources (radio, TV or newspaper) at least once a week were more likely to have institutional delivery compared to women who are exposed to the media less than once a week. For educational levels, women with at least primary education were more likely to have health facility delivery. Accounting for heterogeneity in health facility delivery, similar results were reported by Chepkoech (2014) using similar data and control variables. However, the study limited media exposure to a woman's frequency of listening to the radio.

Classifying delivery location choices into three mutually exclusive categories (home, public and private facility delivery), Thind et al. (2008) employed the Andersen's Behavioral Model of Health Services Utilization and the second wave of India's National Family Health Survey (NFHS) dataset

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to investigate the determinants of delivery location among women in an Indian state (Maharashtra). The univariate and bivariate analysis indicated that the majority (37%) of women delivered at home with media exposure and maternal education significantly associated with delivery choice, respectively. Though nationally unrepresentative, scoring media exposure as the sum of weekly continuous exposure to newspapers, radio and television, the multinomial logistic regression analysis reported that compared to a public or private facility, an additional exposure to the media decreased the likelihood of home delivery by 38 per cent and 40 per cent, respectively. Also, compared to home and public facility, women with higher education were more likely to use a private facility. Other factors that increased the odds of facility delivery include birth order, location, maternal age, ANC visits, religion, spousal education and wealth (standard of living).

Aside the three mutually exclusive categories of delivery choice outlined by Thind et al. (2008), Gayawan (2014) in analyzing the determinants of delivery choices in Nigeria included ‘others' (birth location not covered by any of the three categories) as a fourth categorical variable in his analysis. Employing the multinomial logistic regression model, the study used data from the 2008 edition of Nigeria Demographic and Health Survey. From the estimation results, compared to women with no media exposure, women who read newspapers were more likely to deliver in public facility while those who listen to radio were more likely to deliver in a private or public facility. Thus, the study recommended that effective usage of the media can be used to target women who are less likely to use health facilities for deliveries. Concerning education levels, compared to women with no education, women who had attained at least a secondary level of education were more likely to deliver in a public, private or other facilities.

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3.2.2 Media Exposure, Education and Child Vaccination

In the wake of Wakefield controversy on the link between measles-mump-rebulla (MMR) and autism, Chang (2018) examined the role of parental factors and media exposure that influences the uptake of MMR in the United States. The study used the National Immunization Survey data from 1995 to 2006 for children aged 19 to 35 months. For ease of interpretation, the linear probability regression model was employed. The study reported that, although media exposure – measured as the number of articles linked with vaccines and autism published by the radio, newspaper and TV – had no significant effect on the uptake of MMR, there was a greater reduction in MMR uptake for children whose mothers had college education after 2000. In addition, by interacting with media exposure and education, the study assessed media effect across education groups. Even though the main effects of both media exposure and education were insignificant, it was discovered that in the presence of the media, highly educated mothers were more likely to refuse immunization for their children. This inverse relationship according to the study was because highly educated mothers strongly react to negative media controversies about vaccinations compared to less-educated mothers.

In addressing the limitations of the linear probability model, Walsh et al. (2015) in examining factors that caused the 2012/2013 measles outbreak in South Wales used the adjusted logistic regression model. Using a case-control group of children between age 2½ and 3 years in a community affected by measles outbreak between July-September 2001; the case group was defined as children who have received all basic vaccines except measles-mump-rebulla (MMR) by their second birthday. Although cases (66) did not match controls (242), factors that influence the parental decision on MMR uptake were examined by analyzing two local authority area with

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low MMR uptake and predominantly negative newspaper stories on MMR. The study reported a negative relationship between parents in the case group and the media (television, newspapers and the internet) after adjusting for education. The negative relationship was attributed to the fact that, though the media is important in conveying health information, potential negative media reports may impact health care.

Rahman and Obaida-Nasrin (2010) in their objective to predict predisposing, enabling and needs factors that influence complete childhood vaccination of rural children applied the binary logistic regression on Bangladesh's 2004 DHS. Categorizing media exposure (TV and radio) as regular, irregular and not at all, the study showed a positive correlation between the media and immunization status. The adjusted multivariate logistic regression reported that mothers with regular exposure to media had about 55 per cent likelihood of fully immunizing her child as compared to mothers with no media access. For education level, mothers with higher education had about 18 per cent higher chances of fully immunizing their children relative to uneducated mothers.

Bugvi et al. (2014) used the 2006/07 Pakistan Demographic and Health Survey to describe individual determinants of incomplete immunization among children between age 12-23 months. From their study, a child's immunization status was computed if he\she have received 12 doses of five vaccines (BCG, Polio, Measles, DPT and HBV) or not. Controlling for mother's age, education and wealth quintile, the multivariable logistic regression estimations reported that children whose mothers had no access to information (not exposed to TV, radio or computer) were 35 per cent more likely to be incompletely immunized.

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McGlynn et al. (2014) pooling data from the 1998, 2003 and 2008 rounds of the GDHS accessed the effect of increased maternal health care (MHC) on immunization coverage, proper care for fever and diarrhoea for children between age 12-23 months. Employing the logistic regression and the Andersen's Behavioural Model (to ascertain other covariates) for analysis, the effect of media exposure was ascertained by collectively scoring media exposure based on whether a woman read the newspaper every week, watched TV at least once a week or listened to the radio practically every day. In the bivariate analysis, media exposure and education were significantly associated with childhood immunization. For the multivariate logistic regression, it was reported that mothers with some secondary education with most media exposure (exposed to two or more media forms) were more likely to receive all eight basic vaccines.

In analyzing the supplementary effect of the mass media on the uptake of basic vaccines (BCG. DPT, Polio and Measles) in Sub-Saharan Africa, Jung et al. (2015) pooled the Demographic and Health Survey data for children between age 12-23 months of 13 Sub-Saharan African countries from 2004-2010. Limiting vaccination coverage to the initial dose of all basic vaccines, the standardized dataset measured mass media as the exposure to television, radio and newspaper. The hierarchical logistic regression analysis reported that though education and wealth significantly affected vaccine intake, its effect was weakened after controlling for mass media. This is probably because regardless of socio-economic status, an individual exposed to the media is more likely to protect his/her child's health. For media exposure, mothers who watched television and listened to the radio were more likely to vaccinate their children against BCG, DPT and Polio whereas those who watched television were more likely to receive measles vaccine. Though there were

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differences in survey years, the study recommended that reduction in communication inequalities among socioeconomic groups will improve health equality. In a similar analysis, Sohn et al. (2018) pooled DHS data for six countries in South and Southeast Asian – Bangladesh (2011), Cambodia (2014), Indonesia (2012), Nepal (2014), Pakistan (2012) and Philippines (2013) to analyzed the relationship between maternal decisional authority and media use on the uptake of four basic vaccines (BCG, DPT, polio and measles). The hierarchical multivariable logistic regression analysis revealed that adjusting for decisional authority and cofounders, media access, especially newspaper and television, improved childhood vaccination coverage.

Tsawe et al. (2015) used data from Swaziland's 2006/07 Demographic and Health Survey to assess factors that influence maternal healthcare services and childhood immunization. The univariate analysis reported that about 88 per cent of children had been immunized while the bivariate analysis showed a significant correlation between child immunization and exposure to the radio. Though statistically insignificant in the multivariate analysis, children of primary educated mothers and mothers who listen to the radio less than once a week were more likely to fully immunize their children compared to mothers who are uneducated and unexposed to the radio. Other factors such as maternal age, birth order, wealth and residence/location significantly influenced child immunization.

In a cross-sectional descriptive and analytical study to identify maternal sociodemographic factors that influence immunization uptake, Chidiebere, Uchenna, and Kenechi (2014) used data from the 2008 edition of Nigeria's Demographic and Health Survey to ascertain immunization status for children who have received all eight basic vaccines by age 23 months. With 30.6 per cent of

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children receiving full immunization, the findings from both bivariate and logistic regression reported mothers with media access (though constituents were unknown) were more likely to fully immunize their children compared to mothers with no media access. Similarly, educated mothers were more likely to complete immunization for their children because aside from the tendency of having decisional autonomy, they are more likely to appreciate the need for childhood vaccination as compared to uneducated women.

However, Abshoko (2016) using the 2011 edition of Ethiopia's Demographic and Health Survey analyzed the determinants of full immunization among children below 5 years in rural and urban households of Southern Nations, Nationalities, and People's Regional State (SNNPRS) reported that only 18.3 per cent of children had been fully immunized. Controlling for confounders, the results from the logistic regression estimations showed that women exposed to the media were 42.3 per cent less likely to fully immunize their children compared to those without media exposure. The negative relationship between media exposure and child immunization status according to the study was possibly because media exposure is related to urbanization, several services opportunities and higher living standards. For maternal education, there were significant variations among educated and uneducated mothers, with highly educated women more likely to complete immunizations for their wards because they are more responsive to the benefits of immunization.

Using Ethiopia’s 2011 Demographic and Health Survey, Abadura, Lerebo, Kulkarni, and Mekonnen (2015) assessed individual and community (direct and aggregate) factors that predict full immunization uptake for children between 12–59 months. With about 26 per cent of children

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been fully immunized, the multivariate multilevel regression analysis reported that women with media access (access to TV and radio at least once a week) were 25 per cent more likely to complete immunization for their children compared to mothers without media access when adjusted for individual and community factors. Similar results were obtained for education levels. Mothers with at least a secondary level of education were 95% more likely to fully immunized their children compared to uneducated mothers. This is consistent with the findings by Bago, Terefe, and Mirutse (2018) in their quest to determine individual and community-level factors associated with immunization defaults though they reported an insignificant relationship between education and immunization uptake.

Wiysonge, Uthman, Ndumbe, and Hussey (2012) used a multilevel logistic regression analysis to determine individual, community and country-level factors that predict immunization for children between age 12–23 months. Pooling data from 24 Demographic and Health Surveys in Sub-Saharan Africa between 2003 and 2010, a child's immunization status was determined if he/she had received the DPT 3 vaccine or not. Measuring an individual's media access as exposure to radio, television and newspaper, the study reported a negative relationship between maternal access to media and unimmunized children. Also, children whose community have high media access were less likely to be unimmunized. For educational differences, the study concluded that controlling for individual, community and country level cofounders, mothers with no or primary education were 35 per cent and 26 per cent, respectively more likely not to immunize their children compared to mothers with secondary education.

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In a similar and more recent study in Nigeria, Adedokun, Uthman, Adekanmbi, and Wiysonge (2017) used the 2013 edition of Nigeria's Demographic and Health Survey to examine individual characteristics and contextual factors that influence incomplete childhood immunization among children between 12-23 months. Full immunization status was determined if a child had received all basic vaccines in addition to polio at birth. From the multilevel multivariable logistic regression analysis, media exposure (measured as the frequency in accessing at least either radio, TV or newspaper) was an insignificant determinant of incomplete childhood immunization though children of educated mothers were more likely to be fully immunized compared to children of uneducated mothers.

3.3 Conclusion

Most empirical studies found a positive relationship between the mass media and birth location preferences and child vaccination even though the proxy for media exposure varied across studies. As indicated by WHO (2012) cited by Sokey (2016), repeated exposure to a message from multiple media sources may strengthen influence on targeted audiences and for that matter, the collective effects of media information on health are assumed to be more significant compared to a single media source. On the other hand, although media exposure contributes to health awareness and outcomes, GDHS (2014) indicated that media exposure is associated to educational level. For this reason, this study adds to the body of knowledge by examining the possibility of a woman's level of education moderating the effect of media exposure on birth location preferences and child vaccination limiting media exposure to the watching TV, listening to radio and their collective effect. This is because, in addition to lower levels of wealth (inability to afford newspapers on

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routine basis), language barrier renders the print media – printed in English - a limited medium of mass exposure in Ghana (Thompson & Yeboah, 2013).

CHAPTER FOUR

METHODOLOGY AND DATA SOURCES

4.0 Introduction

This chapter presents the methodology and data source used for this study. It highlights the main variables selected for estimation, diagnostic checks and the estimation technique used.

4.1 Estimation technique for Birth Location Preference

4.1.1 Random Utility Model

Although individuals are assumed to rationally maximize utility, the random utility model encourages the assumption of randomness/inconsistency among individuals. The random utility theory as a discrete choice model explains decision-making based on the unexplained variations among individuals. The model serves as a guiding philosophy that leads to a more realistic and better understanding of behavioural representation by incorporating individual heterogeneity. According to Lungu, Obse, Darker, and Biesma (2018), the random utility model splits an individual's utility into explainable and stochastic components. The deterministic component is observable to the researcher while the error term represents all unobservable factors that influence the utility of the respondent. Though the decision-maker has perfect discrimination capability

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(knowing what influences his/her utility), the researcher can only perceive the probabilities of choice since he/she cannot observe all the relevant factors that change utilities over time. Assuming utilities as a function of descriptive variables, individuals are assumed to choose an alternative that yields the highest utility from a set of mutually exclusive alternatives.

For birth location preferences, the random utility is based on the assumption that an expectant mother in the absence of any complications chooses her birth location before her delivery. That is, since her choice of delivery at either a public health facility, private health facility or home cannot be directly determined, her probabilistic utility function is specified as a random utility given as:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \qquad (1)$$

Where $i = 1,..., N$ represents all expectant mothers, $j = 1,..., J$ includes all alternatives for delivery, V_{ij} is the deterministic utility function and ε_{ij} is the unobservable component of the utility function. Given the function of the deterministic utility function as:

$$V_{ij} = \beta_{0j} + \beta_{1j} X_i \qquad (2)$$

Where X_i captures the individual characteristics component, β_{0j} and β_{1j} are vectors of individual and alternative attributes which varies based on the alternative j. The utility derived by an expectant mother i in choosing an alternative that yields the maximum level of utility between two alternatives – *1* and *J* - is given by:

$$Prob(U_{iJ} > U_{i1}) = Prob(V_{iJ} + \varepsilon_{iJ} > V_{i1} + \varepsilon_{i1}) = Prob(V_{iJ} - V_{i1} > \varepsilon_{i1} - \varepsilon_{iJ}) \qquad (3)$$

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From equation (3), the utility derived from a desired alternative should be higher than other available alternatives. Therefore, a pregnant woman probability of choosing a particular alternative if her derived utility for that alternative is higher than other alternatives is depicted by:

$$Prob(y_i = j \mid X_i) = \frac{e^{X_i \beta_j'}}{1 + \sum_{j=1}^{J} e^{X_i \beta_k'}} \quad , where \text{ j = 1,2,3 ... J} \qquad (4)$$

In estimating the random utility model, the multinomial logit model which is an extension of the binomial logit is used to determine the effects of mass media exposure and the moderating role maternal education plays on birth location preferences. The multinomial logit for a qualitative response with three alternatives takes the form:

$$L_i = \ln \frac{P_{ij}}{P_{oi}} = Q_i = \beta_0 + \beta_i X_i + \mu_i \text{, where } j = 0,1,2. \qquad (5)$$

Where P_{ij}, denotes the probability of the i^{th} individual choosing alternative j, P_{0i} is the probability of the i^{th} individual choosing the base alternative. With the dependent outcomes represented by $y = 0$ (delivery at home) been the base category, $y = 1$ (delivery at public facility) and $y = 2$ (delivery at private facility) and the probability of choosing public and private facility delivery as compared to home delivery is given by equation (6) and (7) respectively.

$$\ln = \frac{P_{1i}}{P_{0i}} = \beta_0 + \beta_i X_i + \mu_i \qquad (6)$$

Where P_{1i} is an individual i's choice of a public facility delivery compared to home delivery.

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$$\ln \frac{P_{2i}}{P_{0i}} = \beta_0 + \beta_i X_i + \mu_i \qquad (7)$$

Where P_{2i} is an individual i's choice to delivery in a private health facility compared to home delivery.

However, to test the suitability of the multinomial logit, the study specifies the independence of irrelevant alternative (IIA) test which implies that the adding or deleting an alternative outcome do not affect the odds among the remaining outcomes. This can be done by using the Hausman-McFadden test after a multinomial regression. The conclusion of the test is based on the null hypothesis that; odds are independent of other alternatives. The IIA assumption is not violated when none of the test statistics fail to reject the null hypothesis. Following the rule of thumb by Long and Freese (2001), the outcome of the Hausman-McFadden test reported that the IIA assumption of the multinomial assumption has not been violated. (results shown in appendix 1).

Again, the study test whether it is appropriate to combine some categories of the dependent variable. That is, whether the independent variables differentiate pairs of outcome categories. The results from appendix 2 shows that at 5% level of significance, no pair of dependent variable can be combined.

4.1.2 Model Specification for Birth Location Preferences

Following from Greene (2003), given delivery at home as the base category, the probability of an individual delivering in any of the three alternatives - y = 0 for home delivery, y = 1 for public

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facility delivery and y = 2 for private facility delivery - given their socio-cultural characteristics X is represented by:

$$\Pr ob\left(y=0 \mid X_i\right)=\frac{1}{1+e^{X_i\beta_1'}+e^{X_i\beta_2'}} \tag{8}$$

$$\Pr ob\left(y=1 \mid X_i\right)=\frac{e^{X_i\beta_1'}}{1+e^{X_i\beta_1'}+e^{X_i\beta_2'}} \tag{9}$$

$$\Pr ob\left(y=2 \mid X_i\right)=\frac{e^{X_i\beta_2'}}{1+e^{X_i\beta_1'}+e^{X_i\beta_2'}} \tag{10}$$

Therefore, specifying the conditional utility function, the characteristics of an expectant mother is expressed as a functional form:

$$\Pr ob_{ij} = f\begin{pmatrix} MEDIA, EDULE, ANC, RELIGION, AGE, BORD, RESIDENCE, \text{REGION}, \\ WORKSTAT, WEALTH, \text{H\_INS}, \text{FEDULE} \end{pmatrix}$$

Where $\Pr ob_{ij}$ is the probability of i^{th} person choosing facility j, $MEDIA$ denotes the broadcast media (TV and Radio), $EDULE$ represents a mother's educational level, ANC represents number of antenatal care visits, $RELIGION$ represents a woman's religious affiliation, AGE is mother's current age, $BORD$ is the birth order of the woman, $RESIDENCE$ and $REGION$ are the current place of residence and administrative region respectively, $WORKSTAT$ refers to whether a woman is currently working or not, $WEALTH$ denote a woman's wealth quintile, H_INS denote if the woman is covered by health insurance or not and $FEDULE$ represents spousal educational level.

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4.2 Estimation technique for Child Vaccination

For the estimation of child vaccination, the study employs a count model to ascertain the relationship between the media, the moderating role of education and the number of childhood vaccines received. Following from Long and Freese (2001), the fundamental regression model used in understanding the count model is the univariate Poisson model which is given by:

$$p_r\left(y/\mu\right)=\frac{e^{-\mu}\mu^{y}}{y!} \qquad \text{where} \quad y=0,1,2,... \quad \text{and} \quad \mu>0 \qquad (11)$$

where μ is the mean of the distribution and y is non-negative integers of the number of childhood vaccines received.

The Poisson model assumes that the mean μ is drawn from a Poisson distribution and estimated from observed characteristics $\left(x_i\right)$. Since the counts can only be zero or positive integers, the mean is derived from the exponent of unknown parameters $\left(\beta\right)$ and observed characteristics given by the structural equation:

$$\mu_i=E\left(y_i/x_i\right)=\exp\left(x_i\beta\right) \qquad (12)$$

With the right specification of random sample and observed characteristics, maximizing the log-likelihood function produces a consistent, asymptotically efficient and asymptotically normal estimation for β. However, an important drawback of the Poisson distribution is that, it rarely fit due to the underestimation of the level of dispersion in the outcome variable. In addressing the limitation of the Poisson model, the negative binomial regression is employed. The model introduces an additional parameter that reflects unobservable heterogeneity among observation which is given by:

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$$\mu^* = \exp(x_i\beta)\exp(f_i) \tag{13}$$

Where $\exp(f_i) = Q_i$, is the unobservable heterogeneity.

$$E(\mu^*) = \exp(x_i\beta)E(Q_i) \tag{14}$$

Thus, the distribution of the negative binomial given observation characteristics (x_i) and unobserved heterogeneity (f_i) is given as:

$$p_r(y_i / x_i, f_i) = \frac{e^{-\mu^*_i}\mu_i^{*y_i}}{y!} \tag{15}$$

Given that $Q = 1$ or $E(f) = 0$, from equation (9):

$$E(\mu^*) = \mu \tag{16}$$

Thus, in the absence of unobservable heterogeneity, the mean structure for the negative binomial model is the same for the Poisson model although the standard errors for the Poisson model will be biased downwards. Therefore, the decision to use either the Poisson model or the negative binomial model is carried out by testing $f_i = 0$ using the likelihood ratio test. Rejection is an indication of over dispersion; hence the negative binomial becomes more appropriate.

For the interpretation of results, given that the mean structure is identical for both models, with a change of Q in x_k, the expected count increases by a factor of $\exp(\beta_k{}^*Q)$, holding other variables constant as shown by equation (14):

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$$\frac{E\left(y/x, x_k + Q\right)}{E\left(y/x, x_k\right)} = e^{\beta} k^{Q} \qquad (17)$$

Where $E\left(y/x, x_k\right)$ is the expected count for a given x where x_k, is clearly noted and $E\left(y/x, x_k + Q\right)$ is the expected count after changing x_k by Q units.

For the Poisson model, a goodness-of-fit test of the model is performed to check the suitability of the Poisson regression model. If the deviance goodness-of-fit and the Pearson goodness-of-fit tests are insignificant, the Poisson model becomes more appropriate whiles the negative binomial becomes more appropriate when the test statistics are significant. The goodness of fit measure reported that, the deviance goodness-of-fit and the Pearson goodness-of-fit are insignificant at 5% significance level (results shown in appendix 3). Therefore, the Poisson model becomes more appropriate for the estimation of the rate of child vaccination.

4.2.1 Model Specification for Child Vaccination

Following Andersen and Newman (1973), the possibility of a mother increasing the rate of child vaccination is dependent on individual and societal characteristics given by:

$$CHV_{ij} = f\begin{pmatrix} MEDIA, EDULE, CHAG, GENDER, AGE, BORD, RESIDENCE, \text{REGION}, \\ WEALTH, RELIGION, WORKSTAT, MARISTA, \end{pmatrix}$$

Where CHV_{ij} represents the number of childhood vaccines received by the i^{th} child. *MEDIA* represents exposure to the broadcast media (TV and Radio), *EDULE* represents mother's educational level, *CHAG* represents the age of a child, *GENDER* represents the sex of the child

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(either a male or a female), *AGE* is mother's current age, *BORD* is birth parity of the woman, *RESIDENCE* and *REGION* are the current place of residence and administrative region respectively , *WEALTH* denote a wealth quintile, *RELIGION* refers to a mother's religious affiliation, *WORKSTAT* denotes if a mother is currently working or not and *MARISTA* denote the marital status of the mother.

4.3 Source of data

The 2014 Ghana Demographic and Health Survey (GDHS) is the source of data for this study. It provides updated estimates of health and demographic indicators in the previous rounds of 1988, 1993, 1998, 2003, and 2008 surveys. It is the sixth round of a nationally representative and a standardized survey which employed a two-stage stratified probability sampling design with a sampling frame updated from the 2010 Ghana Population and Housing Census. The 2014 GDHS followed a two-stage sample design to estimate national indicators for both rural-urban settlement and the ten administrative regions. From the total of 427 clusters selected; 11,835 households were sampled for the survey with 9,396 eligible women aged between 15-49 years and 4,388 eligible men aged between 15-59 years interviewed for the women and men questionnaire, respectively. The survey was designed to generate reliable information on fertility, infant and child mortality, maternal and child health, family planning and nutrition. This study, however, focuses on the women data file, in particular, the sections on pregnancy and child immunization.

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4.4 Definition and measurement of variables

4.4.1 Dependent variables

Birth Location Preferences: it captures the choice of place of delivery of an expectant mother. Using data on the most recent birth 5-year preceding the survey, the variable is categorized into "0" for home delivery if most recent births occurred at the respondent's home or other homes. Even though there are similarities among facility delivery, the perceived quality of service and shorter waits are the primary reason for selecting a private health facility whereas relatively lower charges serve as a feature for choosing public facilities. For this reason, the variable is coded "1" for public health facility delivery if the most recent birth occurred at a government hospital, clinic/health centre, Community-based Health Planning, and Services (CHPS) or other public healthcare centres. "2" for private health facility delivery if most recent births occurred in private hospital, maternity home, a mobile clinic and other private medical centres.

Child vaccination: based on World Health Organization (WHO) recommendation, children are considered fully vaccinated when they have received one dose of Bacillus Calmette-Guerin (BCG), three doses each of diphtheria–pertussis–tetanus (DPT), polio vaccines and a measles vaccination by the age of 12 months. The analysis is limited to the most recent birth to minimize biases resulting from women with more than one child in the age category (Wiysonge et al., 2012). Data on child vaccination 5-year preceding the survey was obtained from vaccination cards and mother's oral reports. For this study, child vaccination is measured by the number of vaccines taken by children who were at most 5years at the time of the survey. This is variable ranges between 0 to 8 vaccines.

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4.4.2 Independent Variable

The main independent variables are mass media exposure and maternal education. Other control variables include the place and region of residence, birth order, wealth, maternal age, child's age, gender, antenatal care (ANC) visits, if an individual is covered by health insurance or not, paternal education, religion and marital status which were selected based on theory, existing literature and availability of data.

Exposure to Mass Media: In most developing countries with weaker health systems, the media plays a vital role in healthcare utilization. For this study, irrespective of the frequency of exposure, the mass media is categorized as "0" if not exposed to TV or/and radio, "1" if exposed to radio, "2" if exposed to TV and "3" if exposed to both TV and radio.

Maternal Educational Level: remains a significant determinant of healthcare utilization. Maternal education makes a mother more receptive to healthcare information which then improves healthcare behaviour (Balogun et al., 2017). Thus, delivery at health care facilities and the uptake of full vaccination is possibly related to higher levels of education. Maternal level of education is categorized as "0" for no education, “1” for primary education and “2” for at least secondary education.

Wealth: as measured in the 2014 GDHS is a combination of a household's cumulative living standard which is usually reflective of income and expenditure. It is generated by the principal components analysis which captures assets such as bicycle, television, car as well as consumer items such as sanitation facilities and source of drinking water and place individuals on a continuous scale of wealth. The scale is divided into five indices with 20 per cent belonging to each quintile. As a measure of income, wealth has consistently been proven to positively impact

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health outcomes. The variable as is coded as: “0” for poorest, “1” for poor, “2” for poor, “3” for middle, “4” for richer and “5” for richest.

Residential location: refers to the place of residence of a respondent which is classified as either urban or rural. In the 2014 GDHS urban areas are classified into large cities and small cities with over a million and 50,000 populations, respectively and otherwise for rural areas. For this reason, compared to rural areas, urban areas have increased accessibility to health centers and services. As a dichotomous variable, "0” represents urban and “1” represents rural.

Regional location: refers to the region of residence of a respondent. With 10 regions in Ghana, regional location is categorized as “1” Greater Accra “2” Central “3” Western “4” Volta “5” Eastern “6” Ashanti “7” Brong Ahafo “8” Northern “9” Upper East and “10” Upper West.

Maternal Age: Aging according to Grossman (2000) leads to health stock depreciation. Therefore, as one increases in age, investments in health is expected to increase. Some studies (Adokiya, Baguune, & Ndago, 2017; Antai, 2010; Thind et al., 2008) have indicated that older women are more likely to have institutional delivery and complete vaccination for their children. Conversely, younger women are more inclined to modern healthcare services and as such will patronize maternal and child healthcare more than their older counterparts. Thus, this study categorizes age as “0” for ages between 15-24years “1” for 25-35years and “2” for at least 35years.

Work Status: refers to whether a woman is currently working or not. The work status of a mother is a possible determinant of a woman’s choice of place of delivery and vaccination uptake. Some studies (Adokiya et al., 2017; Antai, 2009b; Thind et al., 2008) indicated that work status (currently working) increases one’s socio-economic status. Work status is categorized as “0” for a woman who is currently not working and “1” for a woman who is currently working.

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Birth Order: gives the order in which children were born. It is an indicator for a mother's previous experience which determines her current decision on her choice of delivery and whether or not to vaccinate her child. For instance, birth order as an indicator for experience in healthcare use assumes that women with lower birth order may be inexperienced and may require some assistance in delivery and vaccination uptake, unlike multiparous women. This suggests that women with lower birth parity may be more likely to patronize healthcare services. Birth order as coded by the study ranges from 1 to 13 births.

Religion: some studies (Antai, 2009a; Gayawan, 2014; Soura, Pison, Senderowicz, & Rossier, 2013) have signalled the tendency of a mother's religious affiliation in inducing the choice of place of delivery and the uptake of vaccination. Women who affiliate themselves with religions that are organized and led by influential leaders are likely to adhere to the counsel provided by their leaders on healthcare utilization. As a categorical variable, it is coded as: "0" for others (merging no religion and traditional because of fewer cases), "1" for Christian (Catholic, Anglican, Methodist, Presbyterian, Pentecostal/charismatic and Other Christian) and "2" as Muslim.

Spousal Education: measures the highest education of a partner or spouse. Some studies (Dickson, Adde, & Amu, 2016; Shariff & Singh, 2002) provide evidence on how significant a partner's education is in influencing a woman's decision on where to deliver. According to Dickson et al. (2016), the significant effect of spousal education supports the arguments that men usually have control over a woman's healthcare decisions, especially in patriarchy dominated society. Spousal education takes the value of "0" if no education, "1" if primary education and "2" if at least secondary education.

Marital Status: it represents the marital status of the woman. As indicated by Adokiya et al. (2017) and Haynes and Stone (2004), married women are more likely to have complete vaccination

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for their wards. According to Adokiya et al. (2017), married mothers are more likely to vaccinate their wards because relative to their unmarried counterparts, they are psychologically stable and free from the stigma and socioeconomic challenges associated with unplanned pregnancies. Marital status is coded "0" if the individual is single or has never been married, "1" for currently married (married or those currently living with a partner) and "2" for formerly married (widows, divorced and separated).

Gender: captures the sex of a child – either female or male. In settlements where male children are more preferable to females, Parashar (2005) and Rahman and Obaida-Nasrin (2010) discovered household discrimination among female children in terms of childhood vaccination. On the other hand, Adokiya et al. (2017) indicated that a female child is more likely to receive complete vaccination. However, in some studies (Kiros & White, 2004; Soura et al., 2013), a child's gender does not influence the uptake of full vaccination. A child's gender as a dummy variable that takes "0" if the child is a male and "1" if the child is a female.

Health Insurance: In Ghana, ANC visits and delivery are covered by health insurance. Thus, an expectant mother with valid health insurance has a greater likelihood to attend ANC as well as deliver at an accredited healthcare facility. This is evident in studies (Mubarik, Al-hassan, Owoo, & Boakye-Yiadom, 2016; Nketiah-Amponsah & Arthur, 2014). It is coded as "0" if not covered by health insurance and "1" if covered by health insurance.

ANC Visit: The WHO advises that any pregnant woman without complications make at least four antenatal care visits to the health facility before childbirth. Nevertheless, the World Health Organization (WHO) introduced a new guideline in 2016 increasing ANC visits to eight. This is in an attempt to prioritize healthcare and wellbeing and to curb maternal mortality. Thus, complications are early detected by ANC visits which increases the chances of institutional

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delivery. For this study, a minimum of four ANC visit is desirables since it covers WHO old and new guidelines for ANC visits. The variable is coded as "0" with no ANC visits, "1" representing 1-3 ANC visits and "2" at least four ANC visits.

Child's age: it provides the current age of a living child in years. Per the WHO recommendation, every child who has received all dosage of the eight required vaccines by age 12 months is considered fully vaccinated. Abshoko (2016) and Gram et al. (2014) indicated that timeliness in vaccination uptake significantly impacts the duration of protection. The age of the child is measured as a continuous variable.

4.5 Conclusion

This chapter discussed the framework of birth location preferences and child vaccination which is based on the random utility model and the Anderson-Newman's behavioural model. Also, discussions were made on data sources, the estimation techniques -multinomial logit and Poisson model – and diagnostics tests. Also, independent and control variables to be included in the estimation of child vaccination uptake and birth location preferences were outlined and discussed. The subsequent chapter presents the descriptive statistics, empirical results and analysis.

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CHAPTER FIVE

PRESENTATION AND DISCUSSION OF RESULTS

5.0 Introduction

This chapter presents the descriptive analysis of all variables used as well as the findings from the estimations using the 2014 GDHS data and the logit regression analysis.

5.1 Descriptive Statistics

The descriptive statistics discussed in this section provides a summary of the dependent and independent variables used in the study. From Table 5.1, majority of sampled women delivered in public facilities (65.05%), with 28.50 per cent and 6.45 per cent delivering at home and private facilities, respectively. For child vaccination, with a sample of 2,959 children, the majority of children (73.81%) have been fully vaccinated.

Table 5.1: Summary Statistics for Birth Location Preferences and Child Vaccination

VARIABLES	Frequency	Percentage
Birth Location Preferences *(N = 3,831)*		
Home delivery	1,092	28.50
Public facility delivery	2,492	65.05
Private facility delivery	247	6.45
Child Vaccination *(N = 2,959)*		

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Not fully vaccinated	775	26.19
Fully vaccinated	2,184	73.81

Source: Author's compilation from the 2014 GDHS

Using the chi-square test, the results from Table 5.2 indicate that all the selected independent variables were significant at the bivariate level except for maternal age and work status of a woman. The bivariate analysis reported that, whiles majority of women who were exposed to both TV and radio delivered in a public facility (72.4%), a little over half of women not exposed to any form of media delivered at home (54.1%). Majority of women (76.1%) and their spouses (72.8%) with a minimum of secondary education delivered in public facilities whiles 46.3% and 47.6% of women and their spouses with no education delivered at home, respectively. Lastly, majority of women who delivered in public facilities are in the rich quintile (84.3%), live in urban areas (78.4%), at most 24 years of age (66.0%), affiliated to Christianity (68.1%), not working (67.0%), covered by health insurance (68.9%), had at least 4 ANC visits (70.1%) and reside in the Upper East region (80.8%)

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Table 5.2: Descriptive Statistics for Independent variables (Birth Location Preferences)

VARIABLES	Birth Location Preference (Total Sample = 3,831)			
	Home Delivery (%)	**Public Facility (%)**	**Private Facility (%)**	**Chi Square Test**
Media Exposure				359.4460***
Not exposed	264 (54.1)	214 (43.9)	10 (2.0)	
Exposed to Radio	364 (38.4)	552 (58.2)	32 (3.4)	
Exposed to TV	170 (21.5)	564 (71.4)	56 (7.1)	
Exposed to Radio & TV	294 (18.3)	1,162 (72.4)	149 (9.3)	
Maternal Education				490.0088***
No education	630 (46.3)	698 (51.3)	32 (2.4)	
Primary education	239 (31.0)	499 (64.8)	32 (4.2)	
Secondary education+	223 (13.1)	1,295 (76.1)	183 (10.8)	
Wealth				740.8061***
Poorest	582 (47.6)	626 (51.1)	16 (1.3)	
Poor	306 (38.2)	462 (57.7)	33 (4.1)	
Middle	154 (22.5)	482 (70.6)	47 (6.9)	
Rich	38 (6.1)	519 (84.3)	59 (9.6)	
Richest	12 (2.3)	403 (79.5)	92 (18.2)	
Residence				513.8226***
Urban	159 (10.1)	1,231 (78.4)	180 (11.5)	
Rural	933 (41.2)	1,261 (55.8)	67 (3.0)	

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Maternal age				8.1204
At most 24 years	189 (28.5)	436 (66.0)	36 (5.5)	
Between 25 and 35 years	576 (27.4)	1,381 (65.8)	143 (6.8)	
Above 35 years	327 (30.5)	675 (63.1)	68 (6.4)	
Religion				243.9168***
Others	196 (66.2)	93 (31.4)	7 (2.4)	
Christian	667 (24.6)	1,846 (68.1)	198 (7.3)	
Muslims	229 (27.8)	553 (67.1)	42 (5.1)	
Currently working				6.7122
Yes	910 (29.2)	2,014 (64.6)	193 (6.2)	
No	182 (25.49)	478 (67.0)	54 (7.6)	
Health Insurance				71.4051***
Not covered	436 (38.3)	637 (56.0)	65 (5.7)	
Covered	656 (24.3)	1,855 (68.9)	182 (6.8)	
Spouse Education				360.3113***
No education	546 (47.6)	577 (50.3)	24 (2.1)	
Primary education	145 (31.6)	295 (64.3)	19 (4.1)	
Secondary education+	401 (18.0)	1,620 (72.8)	204 (9.2)	
ANC Visits				448.7167***
No ANC visit	103 (88.0)	13 (11.1)	1 (0.9)	
Between 1-3 ANC visits	230 (59.5)	145 (37.6)	111 (2.9)	
4+ANC visits	759 (22.8)	2,334 (70.1)	235 (7.1)	

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Region				547.4114***
Greater Accra	23 (7.5)	237 (77.7)	45 (14.8)	
Central	105 (27.1)	256 (66.2)	26 (6.7)	
Western	97 (26.6)	235 (64.4)	33 (9.0)	
Volta	105 (34.6)	185 (61.1)	13 (4.3)	
Eastern	103 (30.2)	217 (63.6)	21 (6.2)	
Ashanti	50 (13.8)	260 (71.6)	53 (14.6)	
Brong Ahafo	94 (21.9)	298 (69.3)	38 (8.8)	
Northern	340 (58.3)	241 (41.3)	2 (0.3)	
Upper East	63 (15.5)	329 (80.8)	15 (3.7)	
Upper West	112 (32.3)	234 (67.4)	1 (0.3)	
Birth Order	1,092 (28.5)	2,492 (65.0)	247 (6.5)	245.7730***

Source: Author's compilation from the 2014 GDHS

For child vaccination, the results from Table 5.3 reported place of residence, maternal age, religion, work and marital status, region of residence, child's age and birth order as significant determinants at the bivariate level. Majority of mothers who fully vaccinated their children were exposed to radio (76.8%), had at least secondary education (75.1%), currently working (74.3%), live in the rural areas (75.8%), are in the poor wealth quintile (76.1%), above 35 years (74.9%), affiliated to Islam (76.4%), married (75.6%) and reside in the Upper West region (87%).

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Table 5.3: Descriptive Statistics for Independent variables (Child Vaccination)

VARIABLES	Child Vaccination (Total Sample = 2,959)		
	Incomplete Vaccination (%)	**Complete Vaccination (%)**	**Chi Square Test**
Media Exposure			2.0394
Not exposed	97 (27.7)	253 (72.3)	
Exposed to Radio	164 (23.2)	542 (76.8)	
Exposed to TV	178 (27.4)	472 (72.6)	
Exposed to Radio & TV	336 (26.8)	917 (73.2)	
Maternal Education			4.5191
No education	254 (26.3)	710 (73.7)	
Primary education	175 (28.9)	431 (71.1)	
Secondary education+	346 (24.9)	1,043 (75.1)	
Wealth			3.5710
Poorest	218 (24.7)	664 (75.3)	
Poor	154 (23.9)	489 (76.1)	
Middle	144 (26.4)	402 (73.6)	
Rich	140 (28.9)	345 (71.1)	
Richest	119 (29.5)	284 (70.5)	
Residence			4.0879*
Urban	358 (28.9)	879 (71.1)	
Rural	417 (24.2)	1,305 (75.8)	

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Maternal age			44.8594***
At most 24 years	164 (30.1)	381 (69.9)	
Between 25 and 35 years	396 (25.4)	1,162 (74.6)	
Above 35 years	215 (25.1)	641 (74.9)	
Religion			15.5549***
Others	73 (35.4)	133 (64.6)	
Christian	559 (26.0)	1,588 (74.0)	
Muslims	143 (23.6)	463 (76.4)	
Currently working			41.3739***
Yes	141 (25.7)	353 (74.3)	
No	634 (28.5)	1,831 (71.5)	
Child's gender			0.4562
Male	407 (26.5)	1,129 (73.5)	
Female	368 (25.9)	1,055 (74.1)	
Marital Status			15.1727**
Single	86 (38.4)	138 (61.6)	
Married	607 (24.4)	1,881 (75.6)	
Formerly married	82 (33.2)	165 (66.8)	
Region			56.6231***
Greater Accra	73 (27.8)	190 (72.2)	
Central	94 (30.5)	214 (69.5)	
Western	100 (34.1)	193 (65.9)	

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Volta	55 (22.9)	185 (77.1)	
Eastern	85 (30.5)	194 (69.5)	
Ashanti	68 (24.0)	215 (76.0)	
Brong Ahafo	66 (18.8)	285 (81.2)	
Northern	144 (35.6)	260 (64.4)	
Upper East	59 (19.7)	240 (80.3)	
Upper West	31 (13.0)	208 (87.0)	
Birth Order	775 (26.2)	2,184 (73.8)	21.6333***
Child's age	775 (26.19)	2,184 (73.8)	28.0299***

Source: Author's compilation from the 2014 GDHS

5.2 Empirical Results and Discussions

5.2.1 The Effect of Mass Media and the moderating role of Maternal Education on Institutional Choice of Delivery

From the estimation results in Table 5.4, although media exposure increased the chances of a woman having an institutional delivery, exposure to radio proved a significant predictor for the choice of public facility delivery. The odds of choosing a public facility delivery is 1.340 higher for women who are exposed to radio compared to the odds of women without media exposure. This finding is consistent with the study by Chepkoech (2014) and Gayawan (2014). It supports the claim of the media providing platforms for disseminating health-related information, especially in most developing countries because it is a vital source of information (Jung et al., 2015).

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For education levels, consistent with the findings by Kamal et al. (2015), Amano et al. (2012) and Thind et al. (2008) women with education are more likely to patronize institutional delivery. Higher education increases an individual's socioeconomic status, provides better receptivity to health-related information and improves an individual's confidence level in making health decisions. Relative to the odds of uneducated women, the odds for choosing facility delivery for women with at least secondary education is 1.855 and 2.617 times greater for public and private facilities, respectively.

Table 5.4: Multinomial Logit Estimation Results for the Effect of Mass Media on Institutional Choice of Delivery.

VARIABLES	Public Facility		Private Facility	
	logit coefficient	Odds ratio	logit coefficient	Odds ratio
Media Exposure (Ref: not exposed)				
Exposed to Radio	0.293**	1.340**	0.364	1.439
	(0.136)	(0.182)	(0.393)	(0.565)
Exposed to TV	0.172	1.188	0.0277	1.028
	(0.159)	(0.189)	(0.401)	(0.412)
Exposed to Radio and TV	0.0362	1.037	-0.00585	0.994
	(0.149)	(0.155)	(0.389)	(0.387)
Maternal Education (Ref: no education)				
Primary education	0.188	1.206	0.0818	1.085
	(0.124)	(0.150)	(0.291)	(0.316)
Secondary education+	0.618***	1.855***	0.962***	2.617***
	(0.132)	(0.246)	(0.270)	(0.708)
Spouse Education (Ref: no education)				
Primary education	0.233	1.262	0.222	1.248
	(0.144)	(0.182)	(0.349)	(0.435)
Secondary education+	0.300**	1.350**	0.334	1.396
	(0.125)	(0.168)	(0.288)	(0.403)
Maternal age (Ref: at most 24 years)				
Between 25 and 34 years	0.0440	1.045	0.180	1.197

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	(0.131)	(0.137)	(0.244)	(0.292)
Above 35 years	0.400**	1.491**	0.690**	1.993**
	(0.180)	(0.268)	(0.316)	(0.629)
Birth Order	-0.0925***	0.912***	-0.150***	0.861***
	(0.0283)	(0.0258)	(0.0569)	(0.0490)
Wealth				
(Ref: Poorest)				
Poor	0.266**	1.304**	0.709**	2.032**
	(0.129)	(0.168)	(0.357)	(0.725)
Middle	0.594***	1.812***	1.058***	2.881***
	(0.163)	(0.296)	(0.389)	(1.122)
Rich	1.548***	4.700***	1.884***	6.581***
	(0.239)	(1.123)	(0.454)	(2.986)
Richest	1.934***	6.918***	2.695***	14.81***
	(0.365)	(2.523)	(0.548)	(8.121)
Currently working				
(Ref: No)				
Yes	0.00318	1.003	-0.182	0.833
	(0.119)	(0.119)	(0.202)	(0.169)
Place of Residence				
(Ref: Urban)				
Rural	-0.833***	0.435***	-1.382***	0.251***
	(0.129)	(0.0560)	(0.230)	(0.0577)
ANC Visits				
(Ref: no ANC visit)				
Between 1 and 3 visits	1.507***	4.512***	1.456	4.291
	(0.347)	(1.565)	(1.087)	(4.663)
4+ visits	2.481***	11.96***	2.364**	10.63**
	(0.330)	(3.941)	(1.044)	(11.10)
Religion				
(Ref: Others)				
Christian	0.830***	2.294***	0.304	1.355
	(0.161)	(0.370)	(0.432)	(0.586)
Muslim	0.869***	2.385***	0.704	2.022
	(0.179)	(0.427)	(0.463)	(0.936)
Health Insurance				
(Ref: not covered by insurance)				
Covered by health insurance	0.425***	1.530***	0.483***	1.621***
	(0.0979)	(0.150)	(0.180)	(0.293)
Region				
(Ref: Greater Accra)				
Central	-0.527*	0.590*	-0.779**	0.459**
	(0.299)	(0.177)	(0.391)	(0.179)
Western	-0.554*	0.575*	-0.444	0.641

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	(0.302)	(0.173)	(0.382)	(0.245)
Volta	-0.313	0.731	-0.839*	0.432*
	(0.308)	(0.225)	(0.450)	(0.195)
Eastern	-0.460	0.631	-0.772*	0.462*
	(0.304)	(0.192)	(0.409)	(0.189)
Ashanti	-0.164	0.849	0.106	1.111
	(0.317)	(0.269)	(0.376)	(0.418)
Brong Ahafo	0.0430	1.044	0.102	1.108
	(0.304)	(0.317)	(0.387)	(0.429)
Northern	-0.709**	0.492**	-3.392***	0.0336***
	(0.306)	(0.151)	(0.804)	(0.0270)
Upper East	1.078***	2.939***	0.329	1.390
	(0.323)	(0.951)	(0.473)	(0.657)
Upper West	0.130	1.139	-3.075***	0.0462***
	(0.315)	(0.359)	(1.068)	(0.0493)
Constant	-2.534***	0.0794***	-4.292***	0.0137***
	(0.487)	(0.0386)	(1.242)	(0.0170)
Observations	3,831	3,831	3,831	3,831

LR chi2(60) = 1485.07 Prob > chi2 = 0.0000 Pseudo R2 = 0.2380
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's compilation from the 2014 GDHS

Given that individuals with lower levels of education are less likely to be exposed to the media (GDHS, 2014); there is a likelihood that media response on health utilization may vary with education levels (Chang, 2018). As a result, the study evaluates whether primary and secondary education moderates the relationship between the radio, TV and both radio and TV and the use of facility delivery. From Table 5.5, compared to women with no education, primary education reduces the odds for choosing a public health facility for women who are exposed to TV (OR=0.52) and both TV and radio (OR=0.45). This negative relationship could possibly be attributed to the fact that, educated women may already be knowledgeable about healthcare and thus, media exposure may not play as substantial a role for accessing healthcare among educated women compared to uneducated women (Lariscy, 2020).

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For spousal education, the estimation results show that the odds of choosing an institutional delivery declines with higher education. Compared to the odds of spouses with no education, the odds for public facility delivery is 1.34 times higher for spouses with at least secondary education. This finding is consistent with studies by Smith, Tawiah, and Badasu (2012) and Chowdhury et al. (2013). According to Smith et al. (2012), a spouse's contribution is relevant in a patriarchal society like Ghana. This is because educated partners are more likely to better understand the importance for institutional delivery and as such may be more accepting of their wives' mobility and decision making in terms of health-care seeking (Chowdhury et al., 2013).

Further, compared to the odds for women who are at most 24 years, the odds of choosing public or private facility delivery are 1.48 and 1.98 times higher for women above 35 years. This is consistent with the study by Thind et al. (2008). This is possible because, although age is associated with experience in childbirth, older women are more likely to choose institutional delivery due to the general perception that childbirth at an advanced age is associated with a higher risk.

As an indicator of experience, women with additional births are 9% and 14% less likely to choose public and private facility delivery, respectively. This is due to past experiences gained from childbirth which makes higher parity women less likely to seek delivery assistance from skilled birth attendants.

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Table 5.5: Multinomial Logit Estimation Results for the Moderating Role of Maternal Education on Institutional Choice of Delivery

VARIABLES	Public Facility		Private Facility	
	logit coefficient	odds ratio	logit coefficient	odds ratio
Media Exposure (Ref: not exposed)				
Exposed to Radio	0.366**	1.443**	0.622	1.862
	(0.169)	(0.244)	(0.702)	(1.307)
Exposed to TV	0.308	1.360	0.463	1.589
	(0.220)	(0.299)	(0.742)	(1.179)
Exposed to Radio and TV	0.273	1.314	0.830	2.292
	(0.198)	(0.260)	(0.684)	(1.568)
Maternal Education (Ref: no education)				
Primary education	0.711**	2.035**	0.885	2.424
	(0.308)	(0.626)	(0.969)	(2.348)
Secondary education+	0.733**	2.081**	1.757**	5.797**
	(0.332)	(0.691)	(0.819)	(4.750)
Media Exposure # Maternal Educational Level (Ref: not exposed # no education)				
Exposed to Radio # primary education	-0.442	0.643	-0.368	0.692
	(0.354)	(0.227)	(1.098)	(0.760)
Exposed to Radio # secondary education+	-0.0642	0.938	-0.568	0.566
	(0.383)	(0.359)	(0.935)	(0.529)
Exposed to TV # primary education	-0.656*	0.519*	-0.820	0.441
	(0.396)	(0.205)	(1.118)	(0.492)
Exposed to TV # secondary education+	-0.103	0.902	-0.724	0.485
	(0.404)	(0.365)	(0.940)	(0.456)
Exposed to Radio and TV # primary education	-0.790**	0.454**	-1.426	0.240
	(0.367)	(0.166)	(1.059)	(0.254)
Exposed to Radio and TV # secondary education+	-0.282	0.754	-1.210	0.298
	(0.374)	(0.282)	(0.877)	(0.262)
Spouse Education (Ref: no education)				
Primary education	0.221	1.247	0.188	1.207
	(0.144)	(0.180)	(0.350)	(0.422)
Secondary education+	0.289**	1.335**	0.307	1.360
	(0.125)	(0.167)	(0.288)	(0.392)
Maternal age (Ref: at most 24 years)				
Between 25 to 34 years	0.0351	1.036	0.169	1.184
	(0.131)	(0.136)	(0.245)	(0.290)
Above 35 years	0.392**	1.479**	0.681**	1.976**

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	(0.180)	(0.266)	(0.317)	(0.625)
Birth Order	-0.0899***	0.914***	-0.148***	0.862***
	(0.0283)	(0.0259)	(0.0572)	(0.0494)
Wealth				
(Ref: poorest)				
Poor	0.260**	1.296**	0.662*	1.938*
	(0.129)	(0.168)	(0.358)	(0.694)
Middle	0.604***	1.830***	1.029***	2.799***
	(0.164)	(0.300)	(0.388)	(1.086)
Rich	1.579***	4.851***	1.880***	6.555***
	(0.241)	(1.167)	(0.453)	(2.968)
Richest	1.974***	7.200***	2.709***	15.01***
	(0.368)	(2.648)	(0.548)	(8.231)
Currently working				
(Ref: No)				
No	0.00214	1.002	-0.174	0.841
	(0.119)	(0.120)	(0.203)	(0.170)
Place of Residence				
(Ref: Urban)				
Rural	-0.824***	0.439***	-1.379***	0.252***
	(0.129)	(0.0566)	(0.231)	(0.0581)
ANC Visits				
(Ref: no ANC visit)				
Between 1 and 3 visits	1.513***	4.541***	1.427	4.168
	(0.347)	(1.575)	(1.086)	(4.525)
4+ visits	2.484***	11.99***	2.323**	10.21**
	(0.329)	(3.948)	(1.043)	(10.65)
Religion				
(Ref: Others)				
Christian	0.824***	2.279***	0.262	1.300
	(0.162)	(0.369)	(0.434)	(0.564)
Muslim	0.848***	2.336***	0.652	1.919
	(0.180)	(0.421)	(0.466)	(0.894)
Health Insurance				
(Ref: not covered by insurance)				
Covered by health insurance	0.424***	1.529***	0.486***	1.626***
	(0.0982)	(0.150)	(0.181)	(0.294)
Region				
(Ref: Greater Accra)				
Central	-0.537*	0.585*	-0.789**	0.454**
	(0.300)	(0.175)	(0.392)	(0.178)
Western	-0.570*	0.565*	-0.449	0.638
	(0.302)	(0.171)	(0.383)	(0.244)
Volta	-0.321	0.726	-0.851*	0.427*

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	(0.309)	(0.224)	(0.452)	(0.193)
Eastern	-0.515*	0.597*	-0.832**	0.435**
	(0.306)	(0.183)	(0.410)	(0.179)
Ashanti	-0.190	0.827	0.0799	1.083
	(0.318)	(0.263)	(0.377)	(0.409)
Brong Ahafo	0.0466	1.048	0.119	1.126
	(0.305)	(0.319)	(0.389)	(0.438)
Northern	-0.730**	0.482**	-3.441***	0.0320***
	(0.307)	(0.148)	(0.805)	(0.0258)
Upper East	1.054***	2.868***	0.307	1.359
	(0.324)	(0.930)	(0.474)	(0.644)
Upper West	0.115	1.122	-3.093***	0.0454***
	(0.316)	(0.354)	(1.069)	(0.0485)
Constant	-2.617***	0.0730***	-4.619***	0.00986***
	(0.493)	(0.0360)	(1.319)	(0.0130)
Observations	3,831	3,831	3,831	3,831

LR chi2(72) = 1492.96 Prob > chi2 = 0.0000 Pseudo R2 = 0.2393
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's compilation from the 2014 GDHS

Also, wealth remains a significant determinant of institutional choice of delivery despite the introduction of free maternal healthcare services. This indicates that, although maternal services are generally free under the national health insurance scheme, there are other indirect costs such as transportation that influences institutional delivery choices. Since the rich are more likely to afford private facility compared to poorest quintile, the odds for choosing private facility are 1.94, 2.80, 6.56 and 15.01 times higher for women in the poor, middle, rich and richest wealth quintiles, respectively compared to the poorest quintile. For public facility delivery, the odds are 1.30, 1.83, 4.85 and 7.20 times higher for women in the poor, middle, rich and richest quintile, respectively compared to the poorest quintile. This is consistent with the finding by Kesterton, Cleland, Sloggett, and Ronsmans (2010) which showed that higher levels of wealth increase a woman's tendency for health facility delivery.

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Studies by Chepkoech (2014), Mubarik et al. (2016) and Gayawan (2014) highlighted residential differences in health care utilization. From the estimation results, at 1% significance, women residing in rural areas are less likely to choose facility delivery. urban women are more likely to access health facilities due to urbanization and its associated benefits.

Also, the odds for ANC visits increase institutional delivery at 1 per cent significance level for a public facility. The estimation result shows that the odds of having between 1 to 3 ANC visits is 4.54 times higher for public facility delivery compared to the odds of no ANC visit. Also, the odds for women who were able to meet the WHO recommendation (a minimum of 4 ANC visits to capture both old and new recommendations of 8 ANC visits) are 12 and 10.21 times higher for public and private facility delivery, respectively compared to the odds of no ANC visits. Similar findings were reported by Boah et al. (2018), Obago (2013) and Chepkoech (2014). This relationship as reported by Chepkoech (2014) results from the enlightenment women receive on the need to have institutional delivery while Boah et al. (2018) points out that, ANC visits contribute to a woman's level of confidence and trust and by this encourages institutional delivery.

The results present differences in religious affiliations. Christian and Muslim women are more likely to patronize public facilities for delivery services. This is consistent with findings by Thind et al. (2008) and Boah et al. (2018). The increased likelihood of Christian and Muslim women choosing institutional delivery can be attributed to the fact that, they belong to organized religious bodies spearheaded by leaders who are usually influential and as such their counsel on facility

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delivery may be adhered to. For Christian and Muslim women, the odds of choosing public facility delivery is about 2.3 times greater than the odds of women affiliated to other religion.

Consistent with the findings by Nketiah-Amponsah and Arthur (2014), Brugiavini and Pace (2016) and Mubarik et al. (2016), health insurance reduces an expectant mother's financial burden by offering a system of risk-sharing which in turn increases health care utilization. Compared to the odds of women not covered by health insurance, women with insurance have 1.53 and 1.63 times higher odds for choosing public or private facility delivery, respectively.

For regional differences, the Greater Accra region is set as the reference category due to the influx of health facilities. In the exception of the Upper East region (OR=2.877), women residing in the Central, Western, Volta, Eastern, Northern and Upper West Regions are less likely to use facility delivery compared to women in the Greater Accra region. The increased patronage of health facility in the Upper East region is as a result of the increasing number of hospitals in most areas of the northern regions since 2012 compelling expectant mothers to choose institutional delivery (Cilbastone, 2018).

5.2.2 Presentation of Results and Discussion of the Poisson Regression Model. Dependent Variable: Number of Childhood Vaccines Taken.

The estimation results from Table 5.6 examines the role of the mass media and the moderating effect of maternal education on the number of vaccines taken by a child. The decision to use the Poisson regression results from the likelihood ratio test estimated by the negative binomial regression (shown in appendix 4). The test reports the absence of over dispersion since we fail to

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reject the null hypothesis. From the estimation results however, neither media exposure nor maternal education determines the rate of child vaccination.

Table 5.6: Poisson Estimation Results. Dependent Variable: Number of Childhood Vaccines Taken.

VARIABLES	Poisson Coefficient	Incidence Rate Ratio
Media Exposure (Ref: not exposed)		
Exposed to Radio	0.0254	1.026
	(0.0249)	(0.0255)
Exposed to TV	0.0255	1.026
	(0.0271)	(0.0278)
Exposed to Radio and TV	0.0273	1.028
	(0.0258)	(0.0265)
Maternal Education(Ref: no education)		
Primary education	-0.00548	0.995
	(0.0209)	(0.0208)
Secondary education+	0.0188	1.019
	(0.0205)	(0.0209)
Wealth (Ref: poorest)		
Poor	0.00487	1.005
	(0.0228)	(0.0230)
Middle	0.00345	1.003
	(0.0272)	(0.0273)
Rich	-0.0128	0.987
	(0.0320)	(0.0316)
Richest	-0.0154	0.985
	(0.0375)	(0.0369)
Currently working (Ref: No)		
Yes	0.0227	1.023
	(0.0192)	(0.0196)
Religious affiliation (Ref: Others)		
Christian	0.0463	1.047
	(0.0292)	(0.0306)
Muslim	0.0676**	1.070**
	(0.0319)	(0.0342)
Place of residence (Ref: urban)		
Rural	0.0221	1.022
	(0.0193)	(0.0197)
Marital status (Ref: single)		
Currently married	0.0479*	1.049*
	(0.0288)	(0.0302)

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Formerly married	0.0267	1.027
	(0.0363)	(0.0372)
Sex of child (Ref: male)		
Female	0.0163	1.016
	(0.0137)	(0.0139)
Birth order	-0.00540	0.995
	(0.00477)	(0.00474)
Child's age	-0.0165**	0.984**
	(0.00671)	(0.00660)
Maternal age (Ref: at most 24 years)		
Between 25 and 34 years	0.0336	1.034
	(0.0213)	(0.0220)
Above 35 years	0.0462	1.047
	(0.0287)	(0.0301)
Region (Ref: Greater Accra)		
Central	-0.0151	0.985
	(0.0330)	(0.0325)
Western	-0.0770**	0.926**
	(0.0335)	(0.0310)
Volta	-0.00162	0.998
	(0.0357)	(0.0357)
Eastern	-0.0334	0.967
	(0.0342)	(0.0331)
Ashanti	-0.00224	0.998
	(0.0324)	(0.0323)
Brong Ahafo	0.0280	1.028
	(0.0327)	(0.0336)
Northern	-0.0746**	0.928**
	(0.0358)	(0.0332)
Upper East	0.0184	1.019
	(0.0361)	(0.0368)
Upper West	0.0193	1.019
	(0.0369)	(0.0376)
Constant	1.868***	6.478***
	(0.0578)	(0.375)
Observations	2,959	2,959

LR chi2(29) = 58.35 Prob > chi2 = 0.0010 Pseudo R2 = 0.0046
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's compilation from the 2014 GDHS

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After the introduction of maternal education as a moderating variable in Table 5.7, both media exposure and maternal education and their interactions remained statistically insignificant.

For religious affiliations, at 5 per cent significance, Muslim mothers are more likely to vaccinate their children compared to mothers of other religions (IRR=1.070). This is possibly because Muslims mothers belong to organized religious bodies with leaders that play a significant role in establishing societal values. As such, influence or counsel by their leaders on child vaccination are more likely to be adhered to.

Table 5.7: Poisson Estimation Results for the Moderating Role of Maternal Education on Vaccination Uptake

VARIABLES	Poisson Coefficient	Incidence Rate Ratio
Media Exposure (Ref: not exposed)		
Exposed to Radio	0.0467	1.048
	(0.0322)	(0.0337)
Exposed to TV	0.0613	1.063
	(0.0409)	(0.0435)
Exposed to Radio and TV	0.0206	1.021
	(0.0368)	(0.0376)
Maternal Education (Ref: no education)		
Primary education	0.0584	1.060
	(0.0550)	(0.0583)
Secondary education+	0.0240	1.024
	(0.0546)	(0.0559)
Media Exposure # Maternal Educational Level (Ref: not exposed # no education)		
Exposed to Radio # primary education	-0.0765	0.926
	(0.0640)	(0.0593)
Exposed to Radio # secondary education+	-0.0290	0.971
	(0.0632)	(0.0614)
Exposed to TV # primary education	-0.0814	0.922
	(0.0691)	(0.0637)
Exposed to TV # secondary education+	-0.0398	0.961
	(0.0649)	(0.0624)
Exposed to Radio and TV # primary education	-0.0596	0.942

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	(0.0649)	(0.0611)
Exposed to Radio and TV # secondary education+	0.0247	1.025
	(0.0607)	(0.0622)
Wealth (Ref: poorest)		
Poor	0.00674	1.007
	(0.0230)	(0.0232)
Middle	0.00412	1.004
	(0.0273)	(0.0274)
Rich	-0.0135	0.987
	(0.0321)	(0.0316)
Richest	-0.0188	0.981
	(0.0378)	(0.0371)
Currently working (Ref: No)		
Yes	0.0224	1.023
	(0.0192)	(0.0196)
Religious affiliation (Ref: Others)		
Christian	0.0449	1.046
	(0.0294)	(0.0307)
Muslim	0.0680**	1.070**
	(0.0321)	(0.0344)
Place of residence (Ref: urban)		
Rural	0.0221	1.022
	(0.0193)	(0.0197)
Marital status (Ref: single)		
Currently married	0.0475*	1.049*
	(0.0288)	(0.0302)
Formerly married	0.0249	1.025
	(0.0363)	(0.0372)
Sex of child (Ref: male)		
Female	0.0170	1.017
	(0.0137)	(0.0139)
Birth order	-0.00557	0.994
	(0.00478)	(0.00475)
Child's age	-0.0160**	0.984**
	(0.00672)	(0.00661)
Maternal age (Ref: at most 24 years)		
Between 25 and 34 years	0.0337	1.034
	(0.0213)	(0.0220)
Above 35 years	0.0473*	1.048*
	(0.0287)	(0.0301)
Region (Ref: Greater Accra)		
Central	-0.0141	0.986

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	(0.0330)	(0.0325)
Western	-0.0759**	0.927**
	(0.0335)	(0.0311)
Volta	-0.0000878	1.000
	(0.0358)	(0.0358)
Eastern	-0.0339	0.967
	(0.0343)	(0.0332)
Ashanti	-0.00250	0.998
	(0.0324)	(0.0324)
Brong Ahafo	0.0283	1.029
	(0.0328)	(0.0337)
Northern	-0.0727**	0.930**
	(0.0358)	(0.0333)
Upper East	0.0184	1.019
	(0.0362)	(0.0368)
Upper West	0.0199	1.020
	(0.0370)	(0.0377)
Constant	1.856***	6.395***
	(0.0599)	(0.383)
Observations	2,959	2,959

LR chi2(35) = 62.78 Prob > chi2 = 0.0027 Pseudo R2 = 0.0049
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's compilation from the 2014 GDHS

Mothers who are currently married are more likely to vaccinate their children. This positive relationship according to Baguune (2017) is probably because, in addition to the support they receive, married mothers are more likely to make healthy choices because they are most likely to discuss the health needs of their children including immunization with their spouses. Married mothers compared to single mothers are expected to have a rate 1.049 times greater for child vaccination.

If a child's age increases by a year, the rate ratio for child vaccination would be expected to decrease by a factor of 0.984, consistent with the findings by Abshoko (2016). This is possibly because mothers perceive older surviving children to be less vulnerable to the adverse effects of

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disease and may pay less attention to them especially when they have siblings who are in their early months making them less likely to receive full vaccination.

At 10 per cent significance, mothers aged above 35 years compared to mothers who are at most 24years are likely to have a rate 1.048 times greater for child vaccination uptake. This is consistent with the findings by Antai (2010) and Adokiya et al. (2017). This direct relationship according to Adokiya et al. (2017) is because older mothers compared to younger mothers have a better knowledge of the importance and consequences of childhood vaccination because of their previous exposure.

For regional differences, the rate ratio for child vaccination would be expected to decreases by a factor of 0.927 and 0.930 for the Western and Northern regions compared to Greater Accra region, respectively. This negative relationship according to Yawson et al. (2017) is as a consequence of geographical inaccessibility of these region due to poor road networks, especially the Western region which is characterized by the prolonged rainy season.

5.3 Conclusion

This chapter analyzed the effect of the media as well as the moderating role of education on birth location preference and child vaccination. From the estimation results, although the media significantly predicts the choice for institutional delivery, it was not a statically significant determinant of full vaccination uptake. Also, the study highlighted that maternal education weakens the relationship between media exposure and choice of public facility delivery. From the estimation results, policies should be targeted at educated women with media exposure in other to improve maternal health in Ghana. Other significant factors were wealth, location of residence,

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age, health insurance, religion, birth order, ANC visits, region of residence, marital status and spousal education. The next and final chapter presents the summary, conclusions and the recommendations of the study.

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CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATION

6.0 Introduction

This chapter provides the summary, conclusions and policy recommendations of the study. It is organized in two sections - the first section outlines the summary and conclusion of key findings and the second section discusses the policy recommendations.

6.1 Summary and Conclusion

The study's objective was to analyze the effect of the media in addition to the moderating role of maternal education on birth location preferences and child vaccination in Ghana using the random utility model, the Andersen and Newman Behavioural model and the negative binomial regression technique. With exposure to TV and radio as a proxy for media exposure, the study used secondary data from Ghana's 2014 Demographic and Health Survey on 9,396 reproductive women between ages 15-49 years with a focus on the sections on pregnancy and child immunization. However, for this study, 3,831 and 2,929 women were sampled to examine birth location preferences and the uptake of full childhood vaccination, respectively.

The study revealed that although media exposure, specifically the radio, significantly increased the odds of public facility delivery, it remained an insignificant determinant for a child's full vaccination status. In spite of the positive effect of media exposure on public facility delivery, primary education weakened the effect of the media exposure on public facility delivery.

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Other covariates such as wealth, maternal and child age, birth order, religion, ANC visits, health insurance, residence and marital status significantly influence birth location preferences and child vaccination. Whereas maternal age, spousal education, religious affiliation, marital status, health insurance and ANC visits increased the odds of institutional delivery and child vaccination, rural residence, region of residence, birth order and child's age decreased the odds.

6.2 Recommendations

Following the results from this empirical study, it is important for governments to pay particular attention to the mass media to increase facility delivery. Given that the media significantly and positively predict the choice for facility delivery in Ghana, it is important that policymakers monitor its content and coverage to improve maternal health in Ghana.

Additionally, because maternal education and media exposure are non-complementary in choosing public facility delivery, reliable information on institutional delivery from medical practitioners should be made available for educated mothers. Thus, policy recommendation is to enforce that quality and routine information provided by health professionals on the risk and benefits of health facility delivery care be made available on booklets and brochures for educated expectant mothers during ANC visits.

Also, appropriate strategies and resources should be channelled effectively to address shortcomings in the public health delivery systems to improve on the quality and care provided by these facilities. It is therefore recommended that public-private partnerships (PPP) be encouraged to foster the establishment of additional facilities to reduce congestions in existing public facilities.

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6.3 Limitation of the Study

One major limitation of the study is the fact that the data used did not include the internet as a form of mass media, though in more recent times the internet has been a major source of health-related information.

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APPENDIX

Appendix 1

```
mlogtest, hausman


Hausman tests of IIA assumption (N=3831)


Ho: Odds(Outcome-J vs Outcome-K) are independent of other alternatives


                            chi2     df    P>chi2

home delivery               3.121     37    1.000
public health facility      6.652     37    1.000
private health facility    -13.246    37        .


Note: A significant test is evidence against Ho.
Note: If chi2<0, the estimated model does not meet asymptotic assumptions.
```

Appendix 2

```
Wald tests for combining alternatives (N=3831)


Ho: All coefficients except intercepts associated with a given pair of alternatives are 0 (i.e.,
alternatives can be combined)


                                      chi2     df    P>chi2

home delivery & public facility      689.193    36    0.000
home delivery & private facility     348.080    36    0.000
public facility & private facility   108.076    36    0.000
```

Appendix 3

```
estat   gof


        Deviance goodness-of-fit      =       1447.783
        Prob > chi2(2923)             =       1.0000
        Pearson goodness-of-fit       =       961.2142
        Prob > chi2(2923)             =       1.0000
```

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Appendix 4

Negative binomial regression — Number of obs = 2,959

LR chi2(35) = 62.78

Dispersion = mean — Prob > chi2 = 0.0027

Log likelihood = -6310.6747 — Pseudo R2 = 0.0049

CHV	IRR	Std. Err.	z	P>z	[95% Conf.	Interval]
MEDIA						
exposed to Radio	1.047812	.0337	1.45	0.146	.9837998	1.115989
exposed to TV	1.063234	.0434647	1.50	0.134	.9813682	1.151929
exposed to Radio and TV	1.020793	.0376004	0.56	0.576	.9496948	1.097214
EDULE						
primary education	1.060127	.0583139	1.06	0.288	.9517793	1.180809
secondary education+	1.024251	.0559157	0.44	0.661	.9203176	1.139922
MEDIA#EDULE						
Radio#primary	.926331	.0592666	-1.20	0.232	.8171585	1.050089
Radio#secondary+	.9714265	.0614413	-0.46	0.647	.8581688	1.099632
TV#primary	.9218059	.0636772	-1.18	0.239	.805081	1.055454
TV#secondary+	.9609402	.0623783	-0.61	0.539	.8461389	1.091317
Radio and TV#primary	.9421565	.0611298	-0.92	0.358	.8296495	1.06992
Radio and TV#secondary+	1.025054	.0622407	0.41	0.684	.9100441	1.154599
WEALTH						
poor	1.006764	.0231529	0.29	0.769	.9623924	1.053181
middle	1.00413	.0274093	0.15	0.880	.9518209	1.059315
rich	.9865695	.0316433	-0.42	0.673	.9264591	1.05058
richest	.9814234	.0370726	-0.50	0.620	.911387	1.056842
WORKSTATUS						
working	1.022622	.0196061	1.17	0.243	.984908	1.061781
RELIGION						
christian	1.045891	.030698	1.53	0.126	.9874222	1.107822
islam	1.070358	.0343753	2.12	0.034	1.005061	1.139898
RESIDENCE						
rural	1.02234	.0197386	1.14	0.252	.9843759	1.061768
MARIST						
currently married	1.048651	.0302048	1.65	0.099	.9910907	1.109554

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formerly married	1.025234	.0371917	0.69	0.492	.9548706	1.100782
GENDER						
female	1.017151	.0139147	1.24	0.214	.990241	1.044792
BORD	.9944446	.0047494	-1.17	0.243	.9851794	1.003797
CHAG	.984134	.0066095	-2.38	0.017	.9712644	.997174
AGE						
btn 25-35 years	1.034321	.0220183	1.59	0.113	.9920542	1.078389
above 35 years	1.048401	.030124	1.65	0.100	.9909911	1.109137
REGION						
central	.9859621	.0325314	-0.43	0.668	.9242196	1.051829
western	.926902	.0310778	-2.26	0.024	.8679489	.9898593
volta	.9999122	.0357776	-0.00	0.998	.9321917	1.072552
eastern	.9667036	.0331638	-0.99	0.324	.9038408	1.033938
ashanti	.9975036	.0323661	-0.08	0.939	.9360423	1.063001
brong ahafo	1.028674	.0336898	0.86	0.388	.9647176	1.09687
northern	.9298644	.0333108	-2.03	0.042	.8668157	.997499
upper east	1.01854	.0368343	0.51	0.611	.9488449	1.093354
upper west	1.020141	.0377225	0.54	0.590	.9488222	1.096821
_cons	6.395302	.3832905	30.96	0.000	5.686511	7.19244
/lnalpha	-29.92748	.		.	.	
alpha	1.01e-13	.		.		

LR test of alpha=0: chibar2(01) = 0.00 Prob >= chibar2 = 1.000