Comparative Regional-level Analysis of Complete Child Immunization in Ghana

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Dedication

"The happiest moments of my life have been the few which I have passed at home in the bosom of my family" - Thomas Jefferson

This work is dedicated to the sweet memory of my dear mother and mentor, Madam Monica Ama Ansuaa. Mom, I am so much grateful to you for being my first teacher. May the Almighty keep your strong and gentle soul safely, till we meet again!

When the roll is called up yonder, I know I shall meet you there!!

Acknowledgement

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List of abbreviations

BCG   Bacille Calmette Guerin

DPT   Diphtheria and Pertussis, with Tetanus vaccine

DPT3   Third dose of DPT

DHS Demographic and Health Survey

EPI   Expanded Program on Immunization

GDHS Ghana Demographic and Health Survey

GOG Government of Ghana

ICF Inner City Fund

IMF International Monetary Fund

IMCI Integrated Management of Childhood Illness

MDG Millennium Development Goal

MEASURE DHS Monitoring and Evaluation to Assess and Use Results Demographic and Health Surveys

PDRs   Positive Deviant Regions

PHC   Primary Health Care

SPSS Statistical Package for the Social Sciences

UNDP United Nations Development Programme

UNICEF United Nations' Children's Fund

USAID United States Agency for International Development

WHO World Health Organization

Abstract

Background: *Achieving complete child immunization is a rare phenomenon in developing countries, however, even in the face of abject poverty and extreme deprivations, two regions in Ghana (PDRs) have thrived to do so. Effectively addressing variations in coverage among the regions, to inform immunization strategies in Ghana and elsewhere, requires understanding of such regions.*

Objective: *Comparing the PDRs with each other, and with the other eight regions, the study investigated if there were regional-level characteristics that were unique to the PDRs, and that differentiated them from the other eight regions.*

Methods: *With women response rate of 96.5%, a two-stage design was adopted. The first stage was analysis of data on 542 children (12-23months), to calculate the dependent variable "complete/incomplete immunization" and then to compute the rate of complete immunization for each region. The second stage was cluster analysis of the regional-level factors, with the dependent variable.*

Results: *Findings showed that besides complete child immunization rates of over 90%, the PDRs were also unique on frequent use of maternal health facilities, and on high maternal health care decision. However, exploratory hierarchical cluster analysis, applying squared Euclidean Distance, as the similarity measure, revealed not homogeneity, but great heterogeneity, in the socio-demographic composition and health care services availability-and-use characteristics of the PDRs.*

Conclusions: *With evidence from the PDRs, it concluded that even with the poorest of all regions, with very disparate characteristics, it is possible to achieve high immunization coverage. Nevertheless, the GDHS data do not help to develop hypotheses to explain why the PDRs are positive deviant.*

Keywords: Child immunization coverage, variation in coverage, positive deviant regions, DHS, DPT, polio 0, cluster analysis.

CHAPTER ONE

1.0 Introduction

1.1 Overview of the problem

The 2015 deadline for attaining the Millennium Development Goals (MDGs) is barely a year away. Yet, Africa is significantly behind the rest of the world in its commitment to reduce child mortality by two-thirds, between 1990 and 2015. Of all the continents, Africa has the highest under-five mortality rate, with 40% of all deaths in under five globally, occurring in countries located in sub Saharan Africa (Wiysonge, Uthman, Ndumbe, & Hussey, 2012). As a result, effective life saving and less costly interventions, with adequate focus on developing countries, must be undertaken to ensure that under five mortality is reduced to the barest minimum. What is of relevance is to speed up the interventions to achieve the goal in a shortest possible time, even if it is not possible before 2015.

There is a need to sustain sufficient coverage of proven disease prevention interventions. Therefore, the global health community has been searching for less costly disease prevention measures and 'best practices', with a broader goal of obtaining better health results (Naimoli, Challa, Schneidman, & Kostermans, 2008). One of the most economical interventions developed up to this point has been the vaccine (Armstrong, 2007). According to both UNICEF and the World Bank, immunization is one of the most powerful and cost-effective of all health interventions (UNICEF, 2012a).

Over the past years, immunization has made significant achievements. These include, the eradication of smallpox, an accomplishment that has been called one of humanity's greatest triumphs (UNICEF, 2012a). Immunization has lowered the global incidence of polio by 99%. It has reduced disabilities and deaths from diphtheria, tetanus, whooping cough and measles (UNICEF, 2012b). Apart from safe drinking water, no other modality, not even antibiotics, has had such a major mortality reduction, as immunization (Plotkin, Orenstein, & Offit, 2008). By 2011, 107 million children had been vaccinated with three doses of DPT (Diphtheria and Pertusis with Tetanus vaccine) and global immunization rate was at 83% (UNICEF, 2012b). Millions of child deaths are averted annually through immunization programs alone worldwide. Preventing childhood deaths through commitment to fully immunizing children from vaccine-preventable

diseases is seen as imperative for the achievement of MDG4 (WHO, UNICEF, & WorldBank, 2009). It then appears that a better place to begin, in promoting child health, is with childhood immunization (Naimoli et al., 2008).

Despite the immense contribution of immunization, many of the world`s children do not enjoy its benefits. About 19.3 million children (almost 20% of children born each year) are not immunized. Many children do not complete all the vaccination schedules (UNICEF, 2012b). Still, thousands of children continue to die from vaccine-preventable diseases. As at 2012, estimated number of all deaths in children under five years was 5.2 million; 29% was vaccine preventable (UNICEF, 2012a). Unfortunately, compounded with these challenges are the large variations in child immunization coverage that exist between and within countries. The variations in coverage remain mostly among developing or low income countries (Brown et al., 2011).

The 2008 Ghana Demographic and Health Survey (GDHS) report indicated that, the percentage of children aged 12-23 months who have fully been immunized has increased over the past 20 years, from 47% in 1988 to 79% in 2008, [55% in 1993, 62% in 1998 and 69 % in 2003]. At least 96 % of these children have received the BCG and the first doses of both DPT and polio vaccines (Ghana Statistical Service, Ghana Health Service, & Macro., 2009). Regardless that coverage for these vaccines is relatively high; there is a gap between reported national vaccine rate and coverage in the regions: that is, variations exist in coverage among the 10 regions in Ghana, and also, coverage declines with subsequent doses.

The variation in child immunization coverage in the regions is indeed an issue of inequity in child health. Consequently, there is a need to attain and sustain equitable and high child immunization coverage in all regions, through understanding of regions that are making enviable progress. Urgent steps are required to address the variations in coverage within the regions. This will help accelerate the Expanded Programme on Immunization to reach every district.

Though, achieving complete child immunization has been very challenging in developing countries, yet, even in the face of abject poverty and extreme deprivations, two regions in Ghana (PDRs) have thrived to do so. Effectively addressing variations in coverage among the regions,

to inform immunization strategies in Ghana and elsewhere, requires understanding of these two PDRs.

1.2 Aim

a. To compare two positive deviant Ghanaian regions with each other, and with the other eight regions, to find out if there are regional-level characteristics that are unique to the PDRs, and that differentiate them from the other regions, measured by the rank order of the regions in socio-demographic and health care services availability-and-use-characteristics.

1.3 Research question

Comparing two Ghanaian PDRs with each other, and with the other eight regions, are there regional-level characteristics that are unique to the PDR, and that differentiate them from the other regions, measured by the rank order of the regions in these factors:

a. Ethnicity and religion?
b. Household-level socioeconomic status?
c. Maternal health literacy?
d. Maternal decision latitude?
e. Use of maternal and child health facilities?
f. Participation in public health child vaccination campaigns?
g. Community health infrastructure and health status?

1.4 Relevance and contribution to health promotion

In fact, due to many reasons, individuals experience different levels of health and they suffer differently from diseases and disabilities. Inequality is a fact of life. Some of the inequalities in health that is found within and between societies have been attributed to forces beyond the individual's control. However, some health inequalities have been linked to social injustice or unfair circumstances, that researchers have advocated that society should not tolerate

(Mittelmark, Kickbusch, Rootman, Scriven, & Tones, 2007). Consequently, inequity in child health should not be tolerated. In fact, health is a basic human and societal need, hence health equity is a basic human right (UN, 1948). In this regard, the Ottawa Charter participants had commitment to health promotion which was, *"to respond to the health gap within and between societies, and to tackle the inequities in health…" (WHO, 1986, p. 4).*

Since tackling health inequities is very essential to health promotion, understanding regional-level characteristics that are unique to the PDRs will help in developing effective health promotion interventions that are aimed at ensuring equity in coverage among all regions. According to WHO, equity in child health will imply that, ideally, every child should have a fair opportunity to attain his/her full health potential, and that, no child should be disadvantaged from achieving this potential if it can be avoided (WHO, 1986). Healthy public policy ought to be characterized by a clear concern for health and equity in all areas of policy. Thus, advocating legal frameworks for immunization as a child right may be crucial to implementing equitable policies. Such a policy will definitely make healthy choices easier for mothers of unimmunized children. Indeed, building healthy public policies is one of the major concepts in health promotion.

Moreover, coverage levels for DPT are considered good indicators of health system performance (UNICEF, 2012b). Levels and trends of immunization coverage are used to monitor the performance of immunization services at local, national and at international levels, in order to guide control strategies for vaccine preventable diseases (Brown et al., 2011).

The Alma-Ata Declaration recognized immunization, as one of the essential activities contributing to access to Primary Health Care (PHC) (WHO, 1978). Aside immunization being an essential activity to PHC, the Ottawa Charter participants also had a commitment to health promotion, *"to recognize health and its maintenance as major social investment…*While the Bangkok charter had a required action to invest in sustainable policies and actions (WHO, 1986, p. 4; 2005). Health investment is therefore one of the priorities in health promotion. Promoting population health, through child immunization, is an appropriate and less costly health investment that health promotion advocates for.

In addition, this study will make relevant contribution to literature on child health, by offering understanding of regional characteristics of health, that are responsible for variations in child immunization coverage, since efforts have consistently been made by researchers to understand determinants of health at all levels. Understanding relevant regional-level characteristics that are unique to the PDRs will also be very crucial in raising performance of all other regions. This will help identify regions that may require focused attention. It may also help inform decisions as to whether new vaccines should or should not be introduced into existing immunization programmes.

Furthermore, child immunization programs could be strengthened with results from evidence-based research and practice. For instance, the 2013 WHO report; "Research for Universal Health Coverage", has argued that, universal health coverage, with full access to high-quality services for prevention and treatment, cannot be achieved without the evidence provided by scientific research. Consequently, the report has called for an increased international and national investment in research, like this sort.

Finally, and more importantly, findings from this study can aid practical theory building about why some immunization programmes are more successful than others, and more specifically, why some regions thrive to achieve complete child immunization, than their peers, given similar circumstances.

CHAPTER TWO

2.0 Literature Review

2.1 Background

Ghana is a tropical country on the west coast of Africa. The country shares borders with Burkina Faso to the north, Cote D`Ivoire to the west and Togo to the east. Lying at the south is the Gulf of Guinea. Administratively, Ghana is divided into 10 regions (figure 1), namely: 1) Western, 2) Central, 3) Greater Accra, 4) Volta, 5) Eastern, 6) Ashanti, 7) Brong-Ahafo, 8) Northern, 9) Upper East, and 10) Upper West. Each region is subdivided into decentralized districts. After the 2010 Population and Household Census, Ghana`s population was estimated at 24.87 million, with females accounting for 51.2 % and 48.8 % being males. Life expectancy is estimated at about 56 years for men and 57 years for women, while adult literacy rate stands at 65 %. Estimates indicate that Christianity is the dominant religion, forming about 71 % of the total population, followed by Islam (18 %). Ghana's economy, until 2006 was dominated by agriculture, but it is now led by services (48.5%), followed by industry (25.9%) and agriculture (25.6%) (UNDP & NDPC/GOG, 2012).

Distribution of wealth is extremely unequal in Ghana. Results from health and quality of life indicators summarized by the 2013 Human Development Index, as estimates for 2012, placed Ghana at 135th position, out of 187 countries (Wikipedia, 2014). Notwithstanding the economic development that the last decades have brought to the country, Ghana is still one of the poorest in the world. As others too have observed, one important characteristic of the country is the "strong divide" between the "lush" south, and the poorer "arid and less developed north", with about 54% of the population dwelling in rural areas (Mittelmark & Bull, 2010). In other words, poverty is highest in the three northern regions. Brong Ahafo, Volta and Western regions also have higher poverty ratio than the national average (UNDP & NDPC/GOG, 2012).

Brong Ahafo (PDR1)

Brong Ahafo is one of the regions referred to as positive deviant regions (PDRs) in this study. The region has a territorial size of 39,557 square kilometers, which makes it the second largest in the country (16.6%). About 42 % of the population aged six and older has never been to school. This picture is only better than that of the three Northern Regions. Agriculture is the major

occupation in all districts. Christianity (70.8%) has the largest following, followed by Islam (16.1%) and no religion (7.8%). Being predominantly rural (63.4%), the region has 71.1 % of residential houses in rural settlements. Infant mortality rate, as at 2008, stood at 50 per 1,000 live births (GOG, 2014).

Figure 1: Map of Ghana
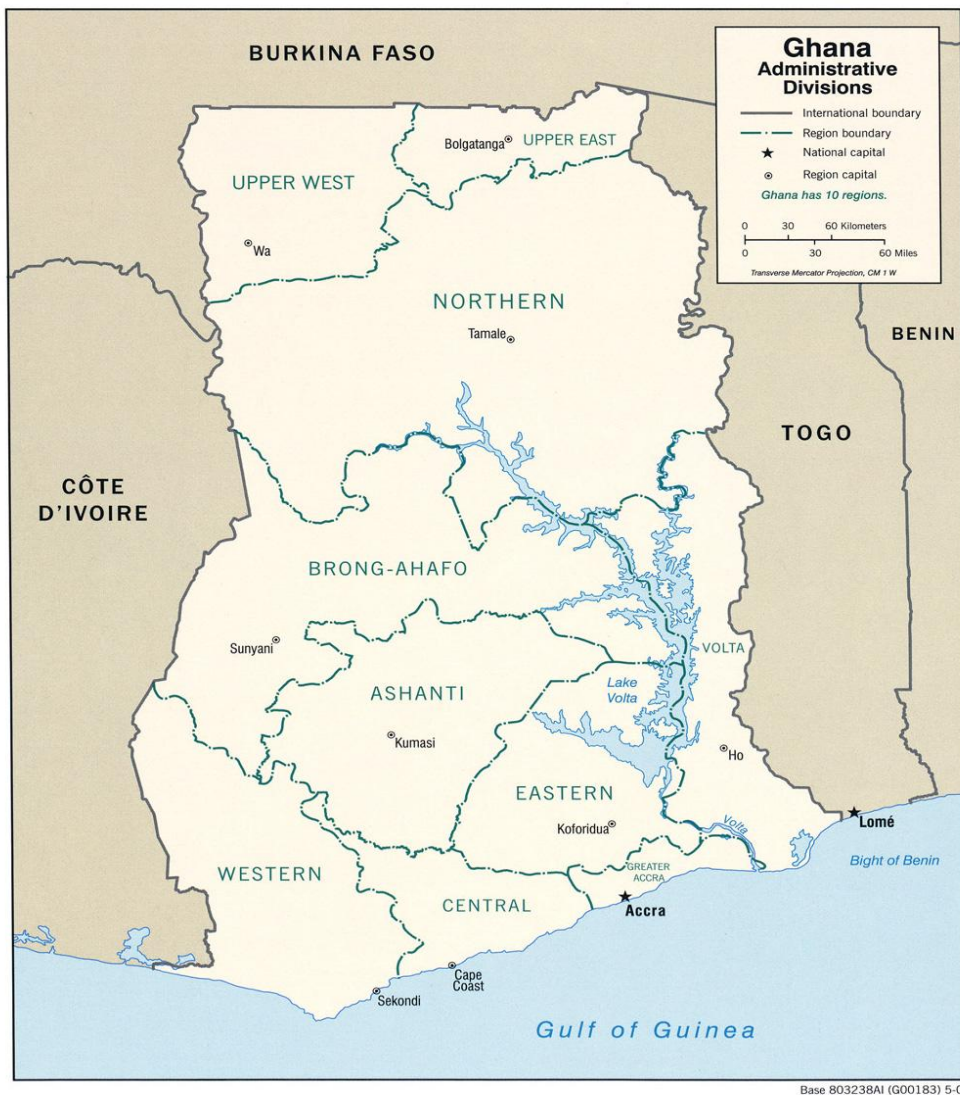
Source: www.map.com

Upper West (PDR2)

Upper West is the other positive deviant region. The region covers a geographical area of approximately 18,478 square kilometres. This constitutes about 12.7% of the total land area of Ghana. The total population of the region is about 576,583. This represents 3% of the national population. The region's population is predominantly rural (82.5%). Comparatively, Upper West is larger than Upper East with regard to land size, however, it has a smaller population. The region is second to Upper East Region as the least urbanized. The main economic activity of the region is peasant farming: 72.2 % of the economically active group is engaged in agriculture. In the region, 69.8 % of the population has never attended school (GOG, 2014).

2.2 Review of previous studies

Numerous studies have been conducted to examine factors associated with childhood immunization in sub-Saharan Africa (Antai, 2009; Babalola, 2009; Duah-Owusu, 2010; Haddad et al., 2009; Naimoli et al., 2008; Sanou et al., 2009; Wiysonge et al., 2012). Majority of these studies have concentrated on individual level factors, while many others have also focused on system level determinants, or both. Yet, few of these studies have specifically focused on understanding the disparities in chilhood immunization coverage that exist within countries, and more specifically, why some regions and districts are more succesful in increasing coverage levels than others. Before these few related studies will be reviewed in detail, it is important to review what many other researchers have reported as important determinants of childhoold immunization coverage. Most of these factors are significant to this study.

Ethnicity and religion

Findings on possible relationship between culture and the initiation and completion of immunization schedules are limited. Possibly, this is because researchers are very sensitive to issues of culture. Nevertheless, some findings seem to indicate that, religious factors positively affect children's immunization coverage: Lower odds of DPT3 uptake, in Muslim children of Nigeria, have been documented (Babalola, 2009; Sanou et al., 2009).

Household-level socioeconomic status

Education: Level of education has been found to be closely associated with health of women and children. Studies have shown that, complete immunization increased with the educational level of the mother (Rahman & Obaida-Nasrin, 2010). In one district in Ghana, knowledge about immunization was significantly related to educational status, while completion of immunization schedules by one year was positively associated with ability of both parents to speak English (Brugha & Kevany, 1995; Matthews & Diamond, 1997). Less than six years of parental education has also been related to not immunizing children (Cassell, Leach, Fairhead, Small, & Mercer, 2006). Divergent findings indicate that, mothers with no education are more likely to immunize their children than those with primary education (Babalola, 2011). Another study also found vaccine completeness to be significantly higher in the least-educated communities in Nova Scotia, Canada (Dummer, Trevor, Cui, Strang, & Parker, 2012). Due to contradictory findings and the fact that ability to speak English may not sufficiently be enough to measure educational attainment in Ghana, educational attainment will be analyzed to verify these findings.

Wealth index: Some research findings in Ghana indicated that, completion of immunization schedules by one year was positively associated with wealth or possession of a sewing machine by the mother, the occupation of the child's parents or the mother's socioeconomic status (Brugha & Kevany, 1995; Matthews & Diamond, 1997; Singh, Singh, & Singh, 2012). In rural Bangladesh, women with the highest wealth index were also more likely to fully immunize their children (Rahman & Obaida-Nasrin, 2010).

Maternal health literacy

Previous studies have shown that, exposure to mass media has positive significant association with full vaccination (Rahman & Obaida-Nasrin, 2010). In assessing the level of maternal health literacy in the PDRs, knowledge of vaccination and schedules are very vital. For instance, increased ideation, good communication, availability of immunization booklets and parental knowledge of preventive value of immunization have been found to positively affect children's immunization status (Babalola, 2009; Sanou et al., 2009). Even though 79.3% of mothers in Bosomtwe district of Ghana had good understanding of immunization, 71% did not know the correct time for initiating the schedules. Mothers with high health literacy could be more

empowered to take effective decision on the health of their children. This underscores the important role that maternal health literacy can play in raising child immunization coverage.

Maternal decision latitude

Maternal decision latitude has been regarded as one of the three measures of women's empowerment used in the DHS (NPC & Macro, 2009; Olorunsaiye, 2011). There have been sizeable number of studies on maternal decision latitude and childhood immunization (Olorunsaiye, 2011). Analysis of DHS data from 30 countries, cited in a study, suggested that, in many households, particularly in South Asia and sub-Saharan Africa, women have little control of health related decisions. Also, in Burkina Faso, Mali, Nigeria, Bangladesh and Nepal, husbands alone make decisions about the women's health care (Olorunsaiye, 2011). Another study also showed a strong positive association between increasing maternal decision making autonomy and the likelihood of complete child immunization, just as was also found in North India (Bloom, Gupta, & Wypij, 2001; Woldemicael, 2007).

In Ghana, the proportion of seats held by women in national parliament is one of the indicators used to track progress towards the goal of promoting women empowerment in decision making. Progress towards improving women representation in Parliament suffered a setback in 2009, when seats held by women dropped from 10% in 2005 to 8.3% in 2009. Similarly, the proportion of women elected as members of District Assemblies declined from 11% in 2009 to 7% in 2010 (UNDP & NDPC/GOG, 2012).

Use of maternal and child health facilities

Health facilities` use could predict the frequency of health care visits, which ultimately may determine the immunization status of the child. No previous child medical health service utilization has been found to be a factor related to not immunizing children (Cassell et al., 2006). Adequate antenatal care has also been found to be significantly associated with initiation and completion of immunization by seven months (Bates, Fitzgerald, Dittus, & Wolinsky, 1994). Several studies in Uganda, Mozambique, Ethiopia and Bangladesh have also reported a relationship between delivery at health facility, distance and tetanus toxoid injection, to be significantly associated with complete immunization (Jani, De Schacht, Jani, & Bjune, 2008; Odiit & Amuge, 2003; Rahman & Obaida-Nasrin, 2010; Weiss, Anderson, & Lasker, 2002). The

child being previously treated for illness at the local hospital has also been reported in Ghana (Brugha & Kevany, 1995).

Participation in public health child vaccination campaigns

Despite the contradictory effects that have been reported of immunization days on child immunization status in other countries, it has also been added that, neither immunization days nor vaccination campaigns have any measurable impact on the performance of routine vaccination services (Haddad et al., 2009).

Mass immunization campaigns have been held in Ghana since 1974, with National Immunization Days been conducted since 1996, to prevent the spread of vaccine-preventable diseases. Although, Ghana has had several immunization campaigns, the scope and aim of the campaigns have varied (Belcher, Nicholas, Ohosu-Amaah, & Wurapa, 1978). In an attempt to increase rates of childhood immunization, the Ministry of Health and Ghana Health Services implemented an integrated measles and polio national immunization campaign in November 2006. This campaign had the theme, *"For Health Childhood, Lets Fight Measles, Polio and Malaria".* It was aimed at immunizing about 11 million children (Ghana Web, 2006).

Also, in November 2007, IMCI/Child Health Campaign was implemented, with a focus on administration of polio vaccinations to children under five. Under the theme, *"Healthier mothers and children in Ghana's Golden Jubilee Year and beyond,"* the campaign staff visited over 67,000 households and vaccinated 195,762 children. Messages promoting the services were delivered nationwide (Ghana Web, 2006).

Rural-urban impact

Contextual factors have been associated with childhood immunization. Region and location, being urban or rural, have been reported as determinants of complete immunization (Matthews & Diamond, 1997). In one study, urban children were found to be more likely to be unimmunized than rural children (Wiysonge et al., 2012). Also, completion of immunization schedules by one year among 294 children in the Eastern region of Ghana was positively associated with the town of residence of the child and mother (Brugha & Kevany, 1995).

Heterogeneity in coverage

Immunization coverage has been found to vary considerably across and within regions. In Burkina Faso for example, a national survey of immunization coverage showed a difference of 41% (31% –72%) between regions with the lowest and regions with the highest rates. A 35 % difference (58%–93%) was also observed for diphtheria, tetanus, polio and pertussis (DTPP3) vaccines (Haddad et al., 2009).

Few of the related studies that have focused on understanding the variations in child immunization coverage, which is found within and between countries, and why some regions are more succesful in raising coverage than others, have been reviewed in details in the subsequent paragraphs. These studies are very much related to this thesis.

The first related study focused mainly on district-level factors that were hypothesized to be important in explaining the variations in immunization coverage, among six districts. Discussions with decision makers allowed the researchers to preselect a number of district-related factors regarded as potentially influential. Subsequently, based on the literature review, the research team translated the factors into seven research hypotheses. One group of hypotheses focused on resources, stating that, all else being equal, immunization coverage should be higher in districts where: i) donor-supported projects provide resources for routine vaccination activities; ii) the creation of new health posts has improved service accessibility; iii) health posts meet the staffing standards; and iv) there is no discontinuity in supplies, nor cold chain failures.

The remaining three hypotheses referred to circumstances which were management-focused. Thus, it was hypothesized that, immunization coverage should be moving forward in districts where: i) the management has introduced immunization strategies to complement the usual EPI-recommended activities; ii) the team copes appropriately with events such as outbreaks and immunization days that could disrupt routine activities, and lastly, iii) when the District Medical Officer demonstrates a high level of dynamism and commitment. The results indicated that, the districts which performed best were those which were able to assemble a set of favourable conditions. Yet, the leadership of the district medical officers was very instrumental and a rallying point for the conditions (Haddad et al., 2009).

The second related study, aimed at practical theory building about why some immunization programmes in sub-Saharan Africa are more successful than others. Using techniques from `*performance benchmarking*` and `*positive deviance*` inquiries (both of which try to explain why certain programmes, regions or individuals experience better outcomes than their peers under similar circumstances) the researchers investigated what appeared to work best in immunization. Thus, using data from a larger sample of six sub-Saharan countries (i.e. Ghana, Rwanda, Malawi, Mauritania, Ethiopia and Cameroon), for the period 2000 to 2004, the researchers discovered considerable variation in immunization coverage. They noted that, even in the case of a well-established intervention such as immunization, there are "serious" coverage shortfalls. (Naimoli et al., 2008).

Their findings, suggested that, there may be different paths to success and not only what regions do, but how they execute their immunization programmes may seem to make a difference in coverage outcomes.

The last study in these related studies revealed large variations in childhood immunization coverage between and within four districts in Pakistan. Findings showed that despite common factors which were observed, pattern of variables related to measles vaccination differed between and within districts, and between urban and rural areas in any district. They also observed that while many of the variables associated with vaccination were common across different localities, their relative importance varied. Consequently, it was suggested that effective and equitable planning of immunization services ought to differ between districts. Further study was recommended to be carried out, in order to verify if similar analyses of factors related to immunization coverage will reveal the same degree of local heterogeneity in other countries (Cockcroft et al., 2009).

2.3 Emerging issues and the need for empirical research

Several of the studies reviewed have outlined factors that influence child immunization coverage. Though majority of these studies focused on sub-Saharan Africa at large, very little focused on Ghana in particular. So far, literature seems to overemphasize the influence of individual maternal characteristics that influence child immunization coverage, to the neglect of other relevant regional-level determinants of child health. Much attention has not been paid to

the impact of health care availability-and-use characteristics. It appears researchers have done very little on the extent to which these determinants of health can explain for instance, the gap between reported national immunization rates and the variations in coverage among regions. Where researchers have tried to investigate this, findings are either not clear or inconsistent. This calls for further empirical research in this area.

As the 2013 WHO report has indicated, many questions about universal health coverage require local answers, such as health seeking behaviours and how to measure progress. Therefore, every country has been called upon to be both producers of research, as well as consumers (WHO, 2013). Health promoting researchers in Ghana must not disappoint the world in this regard. So far, a careful review of the literature has shown that, in Ghana, no research has been conducted with the sole aim of investigating why some regions experience better outcomes of child immunization coverage than others. Indeed, there is a need to compare the regions to know which regions are doing well and which regions may need assistance, in order to improve their coverage levels.

2.4 Conceptual framework

To inform future vaccine adherence research, a model (figure 2) has been developed to organize potential determinants of immunization. The model was developed to improve understanding of the structural & socio-cultural barriers and facilitators which impact vaccine uptake, adherence and completion (Katz et al., 2010). Since the model was originally developed to explain adolescent vaccine adherence, it is being used as a starting model.

The model is based on a systematic review of literature. The constructs in the model have been shown to be important predictors of immunization. It also emphasizes the Health Belief Model (Becker, 1974). As the authors argued, although the Health Belief Model may be relevant in vaccination adherence, it can neglect the relationships among individuals, socio-cultural and political-economic conditions. However, the model recognizes various contextual forces at play. Core concepts and interrelationships among the various variables are depicted in figure 2.

Figure 2: The Vaccine Perceptions, Acceptability and Adherence Model (Katz et al., 2010).
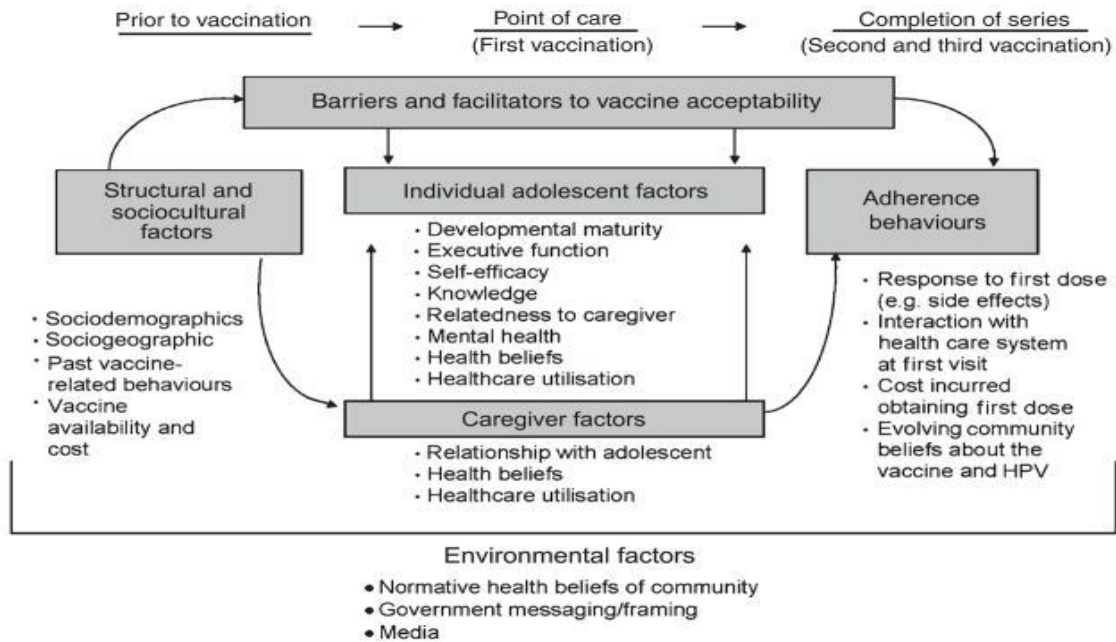
Factoring in past immunization history, along with socio-demographic factors and social norms, barriers and facilitators to vaccine acceptability are generated. Both the structural and socio-cultural factors, coupled with side-effects associated with the first dose have impact on immunization completion. Also, interaction with the health care system, cost and the evolving community beliefs regarding vaccine effectiveness have impact.

Factors that may be relevant in this current study are caregiver's knowledge of vaccines, health care utilization, and health beliefs of severity and the likelihood of getting any of the vaccine preventable diseases. These factors are generally connected to the caregiver's trust of the health care system and in vaccination as being effective disease prevention strategy.

The focus in this current work is to analyze how the structural and the caregiver factors, together with the environmental factors, impact on child immunization coverage.

A new model (figure 3) was, developed to factor in the specific variables that are of relevance to this study. As shown in figure 3, contextual factors and the health care system, as well as caregiver factors were predicted to influence the frequency of health care visits. Subsequently, frequency of healthcare visits was expected to determine the immunization status of the child.

Figure 3: Child Immunization Model (Mittelmark, M. B. & Kyere, P., 2014).

Contextual factors
- Region (north/south)
- Rural/Urban

Health Care System
- Access
- Vaccination campaigns
- Community health infrastructure

Caregiver factors
- Socio-economic status
- Health Literacy
- Empowerment
- culture
- health facilities` use
- etc.

Health Care Visits

Immunization

Complete immunization

Incomplete immunization
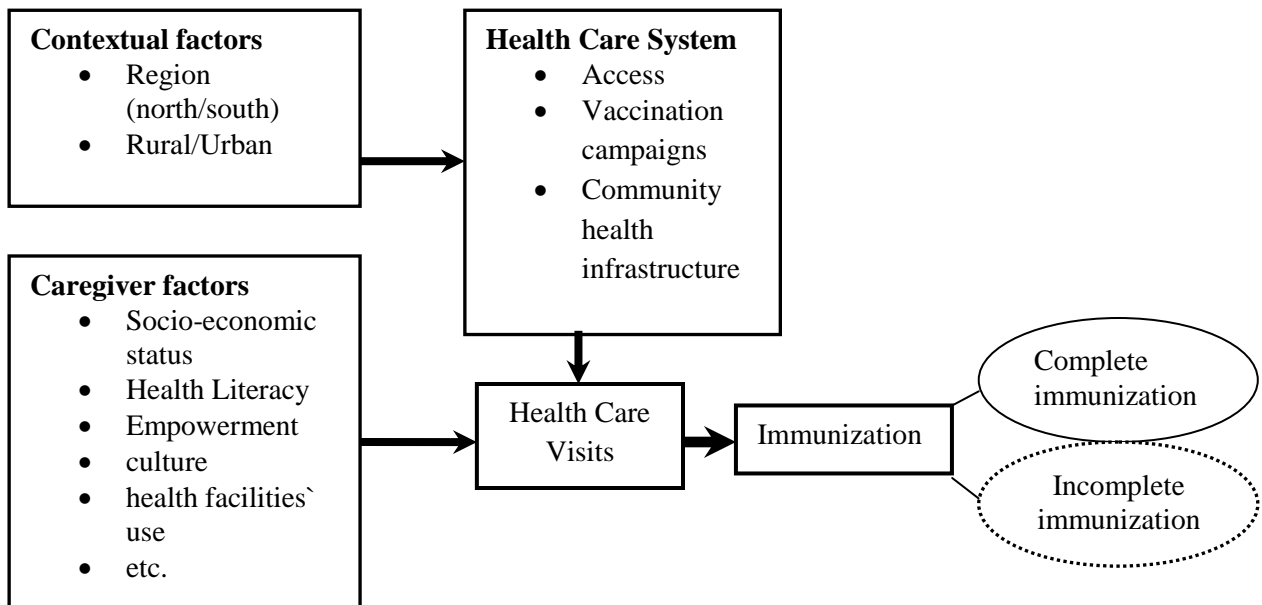
CHAPTER THREE

3.0 Methods

Since 1984, MEASURE DHS (Monitoring and Evaluation to Assess and Use Results Demographic and Health Surveys) project has provided technical assistance to more than 260 surveys in many countries, advancing global understanding of health and population trends in developing countries. DHS has earned a worldwide reputation for collecting and disseminating accurate, nationally representative data on fertility, family planning, gender, HIV/AIDS, malaria, nutrition and maternal and child health (ICF, 2014). DHS surveys normally collect primary data, using three types of questionnaires: Household questionnaire, women's and men's questionnaires. In majority of DHS surveys, eligible individuals include women of reproductive age (15-49) and men (15-59). The questionnaires used in one country, while containing essentially the same information, may be different in many ways from those used in another country. The US Agency for International Development (USAID) funds the grant for DHS projects (ICF, 2014).

Many DHS have been conducted in Ghana. The 2008 Ghana DHS (GDHS) is the most recent and the fifth in a series of national-level population and health surveys, conducted in the country since 1988, as part of the global DHS programme. The survey was a national survey covering all the ten regions in the country. It was designed to provide information to monitor the population and health situation in Ghana, as follow-on to the 1988, 1993, 1998 and 2003 surveys. The 2008 GDHS collected, analyzed and disseminated detail information on housing and household characteristics, education, maternal health and child health, nutrition, knowledge and behaviour related to sexually transmitted infections (STIs), etc.

The long-term objective of GDHS includes, strengthening the technical capacity of major government institutions, such as the Ghana Statistical and Health Services. GDHS also aim to provide comparable data for long-term trend analysis in the country, since they have been implemented by the same organization, following similar data collection procedures. GDHS also add to the international database on demographic and health-related information for research purposes (Ghana Statistical Service, Ghana Health Service, & Macro, 2009).

Planning and implementation of the 2008 GDHS was carried out jointly by Ghana Statistical Service and the Ministry of Health/Ghana Health Service. An international organization, ICF Macro, provided technical support through the MEASURE DHS programme. Funding came from USAID and Government of Ghana. Other financial support came from the United Nations Population Fund, UNICEF, Ghana AIDS Commission and the Danish Development Agency. Data collection took place over a three-month period, from early September to late November 2008 (Ghana Statistical Service, Ghana Health Service, & Macro, 2009).

Pre-test training and field work practice entailed classroom discussions of the questionnaires used, interviewing techniques and contents of the GDHS. Trainees were recruited based on language skills. Most of them had prior experience as interviewers in previous GDHS. Just as most DHS do, the household questionnaire, the men's and the women's questionnaires were used in the 2008 GDHS. The questionnaires were translated from English into three major local languages, namely: Akan, Ga, and Ewe. Much emphasis has been placed on the women's questionnaire more than the men's questionnaire, in this work, since information on child immunization was collected mainly from the mother.

During data collection period, in each of the households visited, information was obtained using the household questionnaire, for instance, to list all the usual members and visitors in the household. Information on each person listed, included age, sex, education, etc. The household questionnaire also obtained information on characteristics of the household's dwelling unit, such as source of water, type of toilet facilities, materials used for the floor and roof of the house, ownership of various durable goods and many other such household characteristics. The women's questionnaire was used to collect information from all eligible women for the interview. These women were asked questions about themselves and their children born in the five years since 2003, on series of topics including vaccinations and childhood illnesses, education, media exposure, antenatal and delivery care, employment, awareness and behaviour about tuberculosis and STIs, etc. Included in the Appendix are samples of both the household and the women`s questionnaires.

3.1 Study design

Every empirical study has an implicit, if not explicit, research design. Research design has been defined as the logic that links the data to be collected and the conclusions to be drawn, to the initial questions of a study (Yin, 2003).

This research was purely an exploratory one. The study used the 2008 GDHS design in its first stage of analysis; however it also had a second stage that went beyond the original design of the GDHS. The first stage was an analysis of child-level data of 542 children, using mothers' self-reports to calculate the dependent variable, "complete/incomplete vaccination" and then to compute the rate of complete vaccination for each region. The second stage was an analysis of region-level data, with the dependent variable.

The GDHS used two-stage stratified sampling design. It used the 2000 Population and Housing Census as a sampling frame. The population covered in the survey was defined as the universe of all women aged 15-49 in Ghana, in a sample of 6,180 selected households. The GDHS design made provision for separate estimates of key indicators for each of the 10 regions.

The specific research design adopted in the second stage of analysis of data and the study question was a type of case study design, which has been called 'hypothesis-generating' or 'heuristic' (Eisenhardt & Graebner, 2007; Kaarbo & Beasley, 1999). Specifically, it was a 'structured, focused comparison case study' design (ibid). In this sense, the study could also be regarded even more specifically as *'sub-national comparative case study*, that integrated survey research (Gable, 1994; Snyder, 2001). This design allowed the PDRs to be compared with each other, and with the other eight regions, on the regional-level characteristics. More importantly, this design helps to avoid a situation where most often, national mean coverage is used to represent that of regions.

Without comparability, of course, the researcher would not know if the variation seen in the cases was due to the explanatory variable under consideration or to other differences between the cases (Kaarbo & Beasley, 1999). Comparability is the basis in which the researcher chooses cases as similar as possible, to minimize the number of explanatory variables. These assumptions underlie the choice of sub-national comparative case study as the appropriate design for this research work.

A case is considered to be an instance or a data point, while a case study is a method of obtaining a "case" or a number of "cases" (Kaarbo & Beasley, 1999). Case study method is seen as preferred research strategy, especially when "how" or "why" questions are being posed (Yin, 2003). It may also include both within-case analysis of single cases and comparisons of a small number of cases (George & Bennett, 2005). When doing case studies, the analyst specifically investigates a case, in an effort to develop testable hypotheses. The focus shifts from explaining the case, to being explicitly on the theory (Eckstein, 1975). In this sense, the case study is being used to build a theory. As some researchers have observed, building theory from case studies is a research strategy: however when this strategy is used, they admonish researchers to take the added step of justifying why the question is better addressed by theory building rather than theory testing research (Eisenhardt & Graebner, 2007). It was very important to compare the regions in order to understand why the PDRs are positive deviant.

A good guide for comparative case study research, that has been offered, is Alexander George's "method of structured, focused comparison". The comparison is seen as "focused" because, it deals selectively with only certain aspects of the historical case. It is "structured" because, it employs general questions to guide the data collection analysis in that historical case (George & Bennett, 2005).

The sub-national comparative design has some strengths, with regard to research designs, one of which is making it easier to construct controlled comparisons (Snyder, 2001). That is, what may appear to be a single-case study, or a study of only few cases, may actually contain many potential observations at different levels of analysis. In this regard, two strategies of sub-national analysis are distinguished: *Between-nation comparisons* (that focus on sub-national cases across countries); and *within-nation comparisons* (that focus on sub-national cases within a single country). The latter is what is depicted in this work.

Even though this thesis may be seen mainly as a quantitative study, since it analyzed secondary source of quantitative data, it was also a case study of two positive deviant cases (regions). Others have observed that, because case studies can achieve high construct validity, statistical research is not only usefully preceded by case study research to identify relevant variables, it is often followed by case study work that focuses on deviant cases to further refine concepts

(George & Bennett, 2005). The case for combining research methods generally and specifically, for combining qualitative and quantitative methods is seen to be "strong" (Gable, 1994). Obviously, this is because each method has its own strengths and weaknesses. In addition, some researchers have drawn no particular line of distinction between qualitative and quantitative aspects of a case study, since case studies can be very qualitative and narrative in form. Yet, they can also be very quantitative and analytic in form (Kaarbo & Beasley, 1999). This explains why comparative case study design was adopted in this quantitative research work.

3.2 Participants

In the households selected for individual women`s interview, a total of 5,096 eligible women were identified. However, interviews were completed with 4,916 of these women, yielding a response rate of 96.5%. All women were asked about the vaccination status of their children under age five. Information from the most recent born child was utilized to assess vaccination history. Women with at least one birth were 3, 299 and those with most recent birth were 2,061. In order to make the data more manageable, data on only mothers who had children 12-23 months of age, (i.e. the youngest cohort of children who had reached the age by which they should be fully vaccinated) was generated. This reduced the sample size from 2,112, (children less than five years who received specific vaccines at any time before the 2008 GDHS) to 542 children (12-23months only). Although, data on complete child immunization was generated from 542 children, it is important to add that the analysis was done at the regional level and not at the individual level; hence the sample was the 10 regions in Ghana. Data on the 542 children were only used to rank the regions on their performance on child immunization coverage.

3.3 Measures

Outcome variable

The outcome variable was child immunization status, a categorical variable, consisting of "complete" and "incomplete immunization". The Government of Ghana has adopted the WHO and UNICEF`s guidelines for vaccinating children. According to these guidelines, to be considered fully vaccinated, a child should receive 1 dose each of both Bacille Calmette Guerin

(BCG) and measles, 3 doses of polio vaccine, and 3 doses of DPT vaccine. DPT vaccine protects against Diphtheria, Pertussis (whooping cough) and Tetanus. Polio 0 is also given at birth or within 13 days of birth. DPT (usually given in the thigh) and polio vaccines (given orally) require doses at approximately 6, 10, and 14 weeks of age. BCG (which is received in the upper arm and normally leaving a scar) protects against tuberculosis. It ought to be given at birth or at first clinical contact. The measles vaccines (received in the upper arm) should be given at nine months of age (Ghana Statistical Service, Ghana Health Service, & Macro., 2009).

In the 2008 GDHS, information on vaccination status of the child was obtained in two ways; from health cards of the children and from mother's verbal reports. All eligible mothers were asked to show the interviewers the health cards on which the child's immunizations were recorded. If the card was available, the interviewers copied the dates of each vaccination received. If a vaccination was not recorded on the card, the mother was asked to recall whether that vaccination had been given. Also, where the mother was unable to present a card for a child, she was asked to recall whether the child had received BCG, polio, DPT or measles` vaccinations. If she recalled that the child had received any of the vaccines, she was asked about the number of dose(s) received, and when the child received it/them.

The original coding of the responses, as to whether a child had received certain vaccine or not, was: 0 = "no", 1= "vaccination date on card", 2= "reported by mother" and 3= "vaccination mark on card". However, in this study, the responses 1, 2 and 3 were combined into one response, and re-coded as, "received basic vaccine". A "no" response was interpreted as "no basic vaccine received". A "complete immunization" variable was computed, by adding all of the "received basic vaccines variables" together to generate a composite score. This score was then recoded into a dichotomous variable of complete and incomplete child immunization for cluster analysis.
Interpretation methods: Completion of all basic vaccines, according to DHS definition, was labeled as: "yes, all basic vaccination received". While non-completion of all vaccines was labeled as, "no basic vaccination received". In other words, completion of the required doses of BCG, Polio 0-3, DPT1-3 and measles vaccines before or by the 23rd month was interpreted as "complete immunization". While failure to complete all the schedule by the same period was interpreted as, "incomplete immunization". Statistical tables and figures were used to aid interpretation.

Predictors

With the model in Figure 3 as a guide, factors selected for investigation were regional-level characteristics, consisting of socio-demographic status and access to-and-use of health care services. During preliminary data analysis, most of the original coding in the GDHS, which had many responses, was re-coded into fewer categories. In some instances, continuous variables were collapsed to make it easier to compare across regions. The household and the women's questionnaires have been attached (Appendix) to provide detail information on how responses to questions were originally coded.

Ethnicity and religion

In the analysis, the ethnic groups in Ghana were grouped into either "Akan" or "non-Akan". The rationale was because; Akan is the largest ethnic group in Ghana. Any other ethnic group apart from Akan was regarded "non-Akan". Also, there were so many religious denominations in the GDHS data; however they were categorized into Christians and Muslims.

Household-level socioeconomic status

Wealth index, educational attainment, employment, maternal health insurance coverage and money for health care services were grouped under household-level socio-economic status. In the GDHS data, wealth index was categorized into different quintiles, from the lowest to the highest, using information on household ownership of consumer items, ranging from television to bicycle or a car. Wealth index also consisted of dwelling characteristics, such as source of drinking water, sanitation facilities, type of flooring materials of the house, access to mass media, type of roofing, etc. Each household was assigned a score for each asset, and the scores were summed for each household. Respondents were ranked according to the total score of the household in which they resided. The sample was then divided into: 1= lowest quintile, 2 = second quintile, 3 = middle quintile, 4 = fourth quintile and 5 = highest quintile. For purposes of analysis, this variable was re-coded. New wealth index was made, using the visual binning command in SPSS. After binning, two new groups were created. Mothers who were originally in the lowest and the second quintiles were classified as "poorest" and those who were either in the middle, the fourth or the highest quintiles were classified as "richest".

Educational attainment: Educational attainment was re-coded as either "no education", "primary education" or "higher education". The original coding was: 0 = no education, 1= incomplete primary education, 2 = complete primary education, 3 = incomplete secondary school, 4 = complete secondary school and 5= higher. The original responses, 0 and 1, were considered as "no education" and response 2 was maintained as "primary education". Responses 3, 4 and 5 were labeled together as "higher education".

Employment: Respondents were asked whether they were employed at the time of the survey and, if not, whether they were employed in the 12 months preceding the survey. The measurement of employment, according to GDHS report was "difficult" because some work like family farms, family businesses or those in the informal sector were often not perceived as employment, and hence not reported as such. To avoid underestimating respondent's employment status, respondents were asked several questions to probe for their employment status. Respondents were considered "employed" if they even worked seven days prior to the interview or if they worked at any time during the 12 months preceding the survey. The original responses for employment status were, 0= no and 1= yes, for unemployment and employment respectively.

Money for health care was analyzed, considering whether getting money needed for treatment was a "big problem" or "no problem".

Maternal health literacy

Maternal health literacy consisted of, exposure to mass media, participation in literacy, as well as awareness of tuberculosis (TB), HIV/AIDS and other STDs. The GDHS collected information on respondent's exposure to mass media and their health knowledge. For instance, the women could be asked questions on their knowledge of TB; whether they had heard of TB, whether they knew that TB is spread through the air by coughing or believed that TB can be cured, etc. No recoding was done for the responses for TB awareness and knowledge of HIV/AIDS, and other STIs. Respondents' exposure to mass media was assessed by asking how often they read newspapers, watched television or listened to radio. Frequency of reading newspapers was re-categorized from the response range: 0 = not at all, 1= less than once a week, 2= at least once a week, 3= almost every day, to only two categories; "not at all" and "usually", based on the frequency distribution of the responses. Responses 1, 2 and 3 were combined and relabeled as "usually".

Frequency of listening to radio and watching television also had the same response range. However, the relabeling was different. Responses 0 and 1 were labeled together as, "almost never", response 2 was considered as "at least once a week", and response 3 as "almost every day".

Maternal decision latitude

This variable assessed whether or not women had say in decision on their own healthcare, as well as in making daily or large household purchases` decision. It also consisted of whether mothers could visit health facilities without permission. Responses to decision making was originally coded as: 1= respondent alone, 2= respondent and husband/partner, 3= respondent and other, 4= husband/partner alone, 5= someone else, 6= other. These were re-coded into, 1= "respondent alone", 2= "other" and 3= "respondent and other". The first response was re-coded as "respondent alone". Responses 2 and 3 were interpreted as "respondent and other" while 4, 5 and 6 were interpreted as "other person alone".

Use of maternal and child health facilities

Maternal and child health facilities` use consisted of, whether the mother was assisted by medical doctor or by nurse\midwife during delivery, place of delivery, and number of antenatal visits. No re-coding was done for both "maternal health facilities` visit" and "assistance during delivery". The continuous variable, "total number of antenatal visits" was `collapsed` and relabeled. Original responses ranged from 1 visit to 21 visits. Afterwards, this variable was labeled into two categories as, "less than or equal to 5 visits (<=5)" or "6 or more visits (6+)".

Participation in public health child vaccination campaigns

Children who received one or more vaccinations, mothers were asked to report during which campaign (whether November 2006 Campaign and/or the November 2007 Campaign) the vaccination was received. A "yes" to any of the campaigns meant that the child took part in that campaign. A "no" response meant the child did not take part in the campaign.

Community health infrastructure and health status

No recoding was done for distance to medical health facilities. The original responses to this variable were: 0 = "Not big problem" and "1= Big problem". Further information on how the original responses were coded can be found in the questionnaires in the Appendix. For both data cleaning and analysis, the Statistical Package for Social Sciences (SPSS) version 19.0 was used. Also, SPSS and Microsoft PowerPoint were used for figure and table generation.

3.4 Data analysis

SPSS version 19.0 was used to analyze all data. To ensure no violations of the assumptions underlying the statistical tests which were used, there were preliminary analyses, using descriptive and graphical representation of data. Subsequently, cross tabulation was used to produce prevalence rates for the regions. Afterwards, performance of the regions was ranked from best (rank 1) to worst (rank 10). Next, bivariate analysis was conducted to assess correlation among variables.

Finally, exploratory data analysis was undertaken using cluster analysis method. Cluster analysis has occasionally been applied to group variables rather than observations. This is mostly done in the exploratory phase of research where there is no *'a priori'* hypotheses (Tryfos, 1997). This method of analysis has been defined as an exploratory data analysis tool for organizing observed data into meaningful taxonomies, groups, or clusters, based on combinations of independent variables, which maximizes the similarity of cases within each cluster, while maximizing the dissimilarity between groups that are initially unknown (Burns & Burns, 2009).

3.5 Quality assurance

Pre-test field work was done in several stages of the survey. Due to its relevance for policy planning and implementation, the survey was carried out by experienced team from the Ghana Statistical and the Health Services (Ghana Statistical Service, Ghana Health Service, & Macro, 2009). This adds credibility to the source of the data. All interviewers were trained on interviewing techniques and the contents of the questionnaires. Also, during training, it was emphasized that only female interviewers interview respondents for the women's questionnaire.

This provision, possibly made respondents more comfortable, in providing more accurate information. Furthermore, the survey had a high women response rate of 96.5%. All these measures give assurance of validity and reliability to the source of data used in this work.

In addition, during the preliminary analyses, data was cleansed: all data which were skewed were re-coded to ensure that the polarized nature of some responses did not affect the outcome of the results. All these measures were taken with extreme cautiousness. Finally, in analyzing the data, no data was "cooked"; results were reported as they were found.

3.6 Ethical considerations

Since, this thesis used secondary source of data, there was no need for a clearance from research ethical board, because this had already been done. The 2008 GDHS team reported that they followed ethical procedures such as confidentiality, informed consent and anonymity, to ensure that the rights of the respondents were respected. Respondents were informed that the information collected would be used for the exact purposes for which they were collected. In addition, the team which collected the data consisted of professionals who knew ethical issues regarding research procedures.

CHAPTER FOUR

4.0 Results

The main research question was: comparing two Ghanaian PDRs with each other and with the other eight regions, is there regional-level characteristics that are unique to the PDR, and that differentiate them from the other regions, measured by the rank order of the regions in: Ethnicity and religion, household-level socioeconomic status, maternal health literacy, maternal decision latitude, use of maternal and child health facilities, participation in public health child vaccination campaigns and community health infrastructure & health status?

Different tables containing the results have been presented in this section. Tables A-G consist of prevalence and rank order tables which show percentage scores of all the regions and their respective ranks on each variable. Tables I-VI is Spearman rank order correlations which show how the dependent variable, "complete child immunization" correlated with each predictor. Finally, figures 4-10 are pictorial representation showing how the regions formed clusters. Data presented here are for the 542 children, aged 12-23 months. It is important to restate that the immunization data based on the individual children were only used to rank the regions to provide a basis for comparison.

The first row of each table repeats the immunization ranks of the regions from most complete (1) to least complete (10), to facilitate comparison with the other rank data in the tables. Ranks that have been given to the regions correspond to their percentage scores on a variable. First rank represents highest score, while tenth rank represents lowest score, i.e. rank 1= best, rank 10 = worst. For example, for "complete child immunization", Brong-Ahafo ranked first, with 91.7% of children surveyed, reported by their mothers to have complete child immunization. This made Brong-Ahafo the region with highest child immunization coverage. Upper West ranked second; with 90.8% complete child immunization coverage. Northern region had worst child immunization coverage of 57.7%, representing 10th rank. Consequently, Brong-Ahafo and Upper West have been referred to as, `Positive Deviant Regions` (PDRs) for comparison throughout this work, since the two regions recorded relatively very high rates than their peers.

In using a case as a deviant case, the analyst chooses a case that deviates from the pattern predicted by theory. He then attempts to examine the pattern in an effort to uncover additional variable that may be lacking in the original theory (Kaarbo & Beasley, 1999; Yin, 2003). By comparing the PDRs, the goal was to identify any observed pattern of similarity between them, and possibly help to explain why they are positive defiant.

Results showed that, Brong-Ahafo ranked better than Upper West, on eight out of the nine indicators on *household-level socioeconomic status*. For instance, while Brong-Ahafo ranked 2nd (70.8%) on money for health care services, Upper West ranked 7th (44.6%). Brong-Ahafo also ranked better than Upper West on both maternal and paternal education. Their respective ranks on paternal higher education was relatively lower than most of the other regions. While Upper West ranked better (3rd) on maternal employment than Brong-Ahafo (9th), it ranked poorly (10th) on paternal employment. On wealth index, Brong-Ahafo performed relatively better and shared the same ranking (5th, 52.1%) with Western region, but not with Upper West (7th, 23.1%). The regional distribution of performance showed that, Greater Accra was the richest region, with 89.1% (1st) score on wealth index.

By comparing the level of *maternal health literacy* in the PDRs, results in the rank tables show that Brong-Ahafo ranked better on health knowledge (i.e. awareness on TB, HIV/AIDS and other STDs) than Upper West. It also ranked relatively better on exposure to mass media. Specifically, it ranked best on frequency of listening to radio (1st; 70.8%) and better on frequency of watching television (3rd; 52.1 %) than Upper West, which ranked 8th (43.1%) and 7th (23.1%) respectively on those two indicators. On the contrary, the ranks for Upper West on participation in literacy education and frequency of reading newspapers were better than Brong-Ahafo.

The results from *maternal decision latitude* rank order table indicates that Upper West ranked best (1st) on maternal healthcare decision, and better (4th) on deciding daily household purchases than Brong-Ahafo (2nd and 10th respectively). On the other hand, Brong-Ahafo had better rankings in deciding main purchases (3rd) and in deciding visits to health facilities (5th) than Upper West, which ranked 4th and 9th respectively. Thus, though Upper West ranked best on maternal healthcare decision, it ranked poorly on decision to visit health facilities.

Except on the variable "maternal health facilities` use" where the PDRs were nearly similar in rank, and Upper West performed better (2nd) than Brong-Ahafo (3rd), they were not similar in the remaining 5 variables analyzed under *use of maternal and child health facilities.*

Results on *participation in public health child vaccination campaigns* during November 2006 and November 2007 campaigns showed that, the PDRs did not perform similarly, especially in the 2007 campaign, where participation of Brong-Ahafo was more than twice (50.0%, 2nd) Upper West`s (21.9%, 9th). The findings also showed that apart from Volta and Western regions, none of the remaining regions recorded participation rate of even 5%, during the November 2006 campaign!

Finally as Table G shows, Brong-Ahafo and Upper West were not ranked near one another on four indicators of *community health infrastructure and health status.* There was also a discord in ranking for the four indicators. While Brong-Ahafo ranked best (1st) on distance to medical care facilities, and under five mortality (3rd), it ranked poorly (7th) on nursing coverage. On the contrary, while Upper West ranked 1st on nursing coverage, it ranked poorly on distance to medical care (8th) and under five mortality (9th). The PDRs were also not found homogenous on *ethnicity and religion.* In sum, all the seven rank order and prevalence tables, considered together, have revealed that the PDRs had disparities in rankings in the regional-level characteristics analyzed.

Bivariate analysis, using Spearman`s rank order correlations was further undertaken to show how the variables correlated individually with complete child immunization. As results in the rank order correlation tables (I-VI) show, wealth index had correlation coefficient of -.063 with the complete child immunization. Also, maternal education had -.057 correlation coefficient with complete child immunization, just as paternal education (-.135**) and maternal health insurance coverage (-.167**). Both maternal and paternal employments, as well as money for health care, all correlated positively with complete child immunization.

Almost all the maternal health literacy indicators correlated negatively with complete child immunization. However, two variables of maternal health literacy, that is, maternal participation in literacy education (.046) and the frequency of reading newspapers (.021) had positive relationship with complete child immunization.

Findings in the rank order tables showed that the PDRs made considerable use of maternal health facilities. They also had frequent antenatal visits. Doing bivariate analysis, both variables correlated negatively with complete child immunization. However, distance to medical health facilities and complete child immunization correlated positively (.049). As observed earlier, the PDRs had considerable influence in deciding major purchases. This variable had positive association (0.33) with complete child immunization.

It could also be noted that the PDRs were very close in ranking in maternal health care decision. Specifically, Upper West ranked best in maternal healthcare decision, and better in deciding daily purchases than Brong-Ahafo. Maternal health care decision (-.021) and decision in daily purchases (-.041) both had negative association with complete child immunization. On the other hand, Brong-Ahafo had better rankings in deciding main purchases and in deciding visits to health facilities than Upper West. Deciding main purchases (.033) and deciding visits to health facilities (.024) both correlated positively with the dependent variable.

Results in the rank tables demonstrated that, Brong-Ahafo ranked better on participation in public health child vaccination campaigns than Upper West. Participation in the November 2007 Campaign had Spearman correlation coefficient of -.092, which was significant at the 0.05 level (rho=.032, n= 538, 2-tailed). While participation in the November 2006 Campaign had correlation coefficient of -.076, which was not significant (rho=.077, n= 538, 2-tailed).

Lastly, exploratory data analysis using cluster method was undertaken. Cluster analysis is a statistical technique, the main objective of which is to classify sample members into relatively homogeneous and distinct groups (Tryfos, 1997). In cluster analysis, there is no prior knowledge about which elements belong to which clusters. This type of analysis is a discovery process, revealing associations and structure in a dataset. There are varieties of clustering methods, of which hierarchical clustering is the major one. Different methods results in different cluster patterns (Tryfos, 1997).

This study adopted a *hierarchical cluster analysis*, using Ward's method and applying Squared Euclidean Distance, as the similarity measure. Hierarchical clustering was used because the procedure could compute a matrix of similarity of every region with every other region in the

dataset. The method starts with each case (region) as a separate cluster and then combines the clusters (regions) sequentially, reducing the number of groups at each step until only one group is left (Tryfos, 1997). The rationale for doing this analysis was to allocate every region in the sample to a particular cluster, by identifying which region belonged to which group, and more especially, whether the PDRs belonged to similar group on the regional-level characteristics that were analyzed. The dendrogram plots, (figures 4-10) show how the regions formed clusters. Briefly, dendrograms are hierarchical tree diagrams, produced by SPSS to represent the process of going from individual cases to one large cluster. They allow one to visually see the links between cases. The length of the branches in the plots show how far apart each region was from other regions when they were combined into a cluster. The plot rows represent each region on the Y axis, and the X axis is rescaled distance coefficients (i.e. linkage distance) (Tryfos, 1997). Regions with high similarity are close to each other.

The dendrogram on household-level socioeconomic status shows that all the regions clustered into two major groups (high socioeconomic status group: Eastern, Ashanti, Western, Brong-Ahafo, Central and Volta regions) and low socioeconomic status group: Upper West, Upper East and Northern region. In the high socioeconomic status group, Ashanti region was similar to Eastern region than any other region, since they clustered together first. The second region to join this group was Western region, before the positive deviant Brong-Ahafo. On the other hand, positive deviant Upper West was similar to Upper East in the low socioeconomic status group; they joined together at the early stage of clustering. It was after several clustering that the PDRs combined into one cluster. A critical look at the locations of the PDRs showed that, they were not homogenous on household-level socioeconomic status. It could also be observed that, Greater Accra was extremely different from the rest of the regions; hence it did not belong to any of the two major clusters. Greater Accra, with the highest socioeconomic status, and the two major clusters combined at the very last stage of clustering.

Moreover, the PDRs belonged to two different groups on maternal health literacy. Brong-Ahafo, Ashanti, Greater Accra and Eastern regions were similar to each other and hence belonged to one group. Upper West, Central, Western and Volta regions also belonged to a different group. Upper East and Northern region formed a third but small cluster since they were not similar to any of the two groups. Similarly, the dendrogram for community health infrastructure and health

status indicate that, there were two major distinct groups. Each of the PDRs belonged to one of those groups. This implies that, the PDRs were not homogenous on community health infrastructure and health status.

A careful observation of the rest of the dendrograms (for religion and ethnicity, use of maternal and child health facilities, and participation in public health child vaccination campaigns) shows that the PDRs belonged to different clusters. They were not homogenous on any of these regional-level characteristics. Arguably, it was on maternal decision latitude that the PDRs were found to be almost similar. Yet, they did not join each other in the very first stage of clustering.

Table A: Prevalence and rank order for ethnicity and religion.

VARIABLE	REGION									
	Brong Ahafo	Upper West	Ashanti	Upper East	Volta	Western	Eastern	Greater Accra	Central	Northern
Complete child immunization										
%	91.7	90.8	85.7	84.6	82.5	78.7	76.8	76.1	71.1	57.7
Rank	1	2	3	4	5	6	7	8	9	10
Ethnicity(Akan)										
%	60.4	0.0	72.6	0.0	2.5	66.7	58.9	50.0	89.5	6.4
Rank	4	9	2	9	8	3	5	6	1	7
Religion (Christian)										
%	75.0	44.6	77.4	63.2	72.5	85.4	87.5	87.0	92.1	20.5
Rank	6	9	5	8	7	4	2	3	1	10
Religion (Muslim)										
%	18.8	40.0	13.1	5.3	7.5	12.5	1.8	10.9	0.0	56.4
Rank	3	2	4	8	7	5	9	6	10	1

Table B: Prevalence and rank order for household-level socioeconomic status.

VARIABLE	REGION									
	Brong-Ahafo	Upper West	Ashanti	Upper East	Volta	Western	Eastern	Greater Accra	Central	Northern
Complete child immunization										
%	91.7	90.8	85.7	84.6	82.5	78.7	76.8	76.1	71.1	57.7
Rank	1	2	3	4	5	6	7	8	9	10
Wealth index (richest)										
%	52.1	23.1	67.9	17.9	42.5	52.1	55.4	89.1	71.1	16.7
Rank	5	7	3	8	6	5	4	1	2	9
Maternal education (primary)										
%	4.2	3.1	8.3	5.1	12.5	8.3	8.9	4.3	13.2	2.6
Rank	7	8	4	5	2	4	3	6	1	9
Maternal education (higher)										
%	45.8	15.4	57.1	12.8	35.0	47.9	64.3	73.9	42.1	9.0
Rank	5	8	3	9	7	4	2	1	6	10
Paternal education (primary)										
%	14.9	11.7	7.8	20.5	8.6	7.3	8.2	2.3	14.8	5.8
Rank	2	4	7	1	5	8	6	10	3	9
Paternal education (higher)										
%	63.8	26.7	81.8	25.5	71.4	80.5	89.8	90.7	70.4	14.5
Rank	7	8	3	9	5	4	2	1	6	10
Maternal employment (skilled)										
%	4.2	18.8	15.5	18.4	12.5	18.8	19.6	21.7	7.9	9.1
Rank	9	3	5	4	6	3	2	1	8	7
Paternal employment (skilled)										
%	42.2	13.5	50.0	25.0	45.9	40.9	51.1	67.4	40.0	17.3
Rank	5	10	3	8	4	6	2	1	7	9
Maternal health insurance coverage										
%	58.3	46.2	35.7	63.2	23.1	33.3	51.8	26.1	15.8	25.6
Rank	2	4	5	1	9	6	3	7	10	8
Money for health care										
%	70.8	44.6	53.6	25.5	17.9	81.3	64.3	60.9	55.3	38.5
Rank	2	7	6	9	10	1	3	4	5	8

Table C: Prevalence and rank order for maternal health literacy.

VARIABLE	REGION									
	Brong-Ahafo	Upper West	Ashanti	Upper East	Volta	Western	Eastern	Greater Accra	Central	Northern
Complete child immunization										
%	91.7	90.8	85.7	84.6	82.5	78.7	76.8	76.1	71.1	57.7
Rank	1	2	3	4	5	6	7	8	9	10
Maternal literacy education										
%	4.4	10.3	5.2	16.7	0.0	2.3	6.1	0.0	2.9	10.7
Rank	6	3	5	1	9	8	4	9	7	2
Read newspapers										
%	6.3	9.2	7.1	7.7	5.0	12.5	18.2	23.9	7.9	1.3
Rank	8	4	7	6	9	3	2	1	5	10
Listen to radio										
%	70.8	43.1	59.5	12.8	45.0	54.2	52.7	67.4	50	33.3
Rank	1	8	3	10	7	4	5	2	6	9
Watch television										
%	52.1	23.1	56.0	23.1	23.1	41.7	44.6	89.1	39.5	16.7
Rank	3	7	2	7	7	5	4	1	6	8
Tubercluosis awareness										
%	91.7	80.0	92.9	59.0	90.0	81.3	94.6	87.0	84.2	59.0
Rank	3	8	2	9	4	7	1	5	6	9
HIV\AIDS awareness										
%	97.0	95.4	98.8	100	95.0	95.8	100	97.8	94.7	92.3
Rank	4	6	2	1	7	5	1	3	8	9
STD awareness										
%	97.9	95.4	98.8	100	95.0	95.8	100	97.8	94.7	94.9
Rank	3	6	2	1	7	5	1	4	9	8

Table D: Prevalence and rank order for maternal decision latitude.

VARIABLE	REGION									
	Brong-Ahafo	Upper West	Ashanti	Upper East	Volta	Western	Eastern	Greater Accra	Central	Northern
Complete child immunization										
%	91.7	90.8	85.7	84.6	82.5	78.7	76.8	76.1	71.1	57.7
Rank	1	2	3	4	5	6	7	8	9	10
Woman decides main purchases										
%	48.8	46.7	25.0	73.7	34.2	39.0	39.1	34.9	57.1	27.0
Rank	3	4	10	1	8	6	5	7	2	9
Decides daily purchases										
%	9.3	16.7	11.8	13.2	26.3	9.8	10.9	18.6	25.0	10.8
Rank	10	4	6	5	1	9	7	3	2	8
Maternal decision on own healthcare										
%	23.3	26.7	22.4	21.1	7.9	19.5	18.2	19.0	22.2	21.6
Rank	2	1	3	6	10	7	9	8	4	5
Can visit health facility										
%	95.8	83.1	95.2	64.1	92.3	97.9	98.2	97.8	100	83.3
Rank	5	9	6	10	7	3	2	4	1	8

Table E: Prevalence and rank order for use of maternal and child health facilities.

VARIABLE	REGION									
	Brong-Ahafo	Upper West	Ashanti	Upper East	Volta	Western	Eastern	Greater Accra	Central	Northern
Complete child immunization										
%	91.7	90.8	85.7	84.6	82.5	78.7	76.8	76.1	71.1	57.7
Rank	1	2	3	4	5	6	7	8	9	10
Maternal health facilities use										
%	77.1	81.5	59.5	84.6	70.0	64.6	55.4	71.9	57.9	62.3
Rank	3	2	8	1	5	6	10	4	9	7
Assistance at delivery by physician										
%	10.4	6.2	17.9	0.0	2.5	6.3	5.4	30.4	5.3	1.3
Rank	3	5	2	10	8	4	6	1	7	9
Assistance at delivery by nurse\midwife										
%	66.7	38.5	63.1	28.2	40.0	47.9	60.7	71.7	44.7	21.8
Rank	2	8	3	9	7	5	4	1	6	10
Antenatal visits (6+visits)										
%	62.5	56.9	61.9	51.3	32.5	54.2	37.5	78.3	39.5	23.1
Rank	2	4	3	6	9	5	8	1	7	10
Public health centre delivery										
%	68.8	42.2	64.3	39.5	40.0	46.8	60.7	69.6	34.2	24.4
Rank	2	6	3	8	7	5	4	1	9	10
Private health centre delivery										
%	4.2	0.0	8.3	0.0	5.0	4.3	3.6	13.0	7.9	2.6
Rank	6	9	2	9	4	5	7	1	3	8

Table F: Prevalence and rank order for participation in public health child vaccination campaigns.

VARIABLE	REGION									
	Brong Ahafo	Upper West	Ashanti	Upper East	Volta	Western	Eastern	Greater Accra	Central	Northern
Complete child immunization										
%	91.7	90.8	85.7	84.6	82.5	78.7	76.8	76.1	71.1	57.7
Rank	1	2	3	4	5	6	7	8	9	10
Child vaccinated, Nov. 2006 campaign										
%	4.2	3.1	3.6	0.0	17.5	6.3	1.8	0.0	0.0	3.9
Rank	3	6	5	8	1	2	7	8	8	4
Child vaccinated, Nov. 2007 campaign										
%	50.0	21.9	24.1	2.6	37.5	25.0	26.8	37.0	55.3	29.9
Rank	2	9	8	10	3	7	6	4	1	5

Table G: Prevalence and rank order for community health infrastructure and health status.

VARIABLE	REGION									
	Brong Ahafo	Upper West	Ashanti	Upper East	Volta	Western	Eastern	Greater Accra	Central	Northern
Complete child immunization										
%	91.7	90.8	85.7	84.6	82.5	78.7	76.8	76.1	71.1	57.7
Rank	1	2	3	4	5	6	7	8	9	10
Under five mortality										
Rate	76.0	142.0	80.0	78.0	50.0	65.0	81.0	50.0	108.0	137
Rank	3	9	5	4	1	2	6	1	7	8
Distance to health care services										
%	87.5	53.8	76.2	28.2	66.7	70.8	73.2	80.4	73.7	47.7
Rank	1	8	3	10	7	6	5	2	4	9
Physician to population coverage										
Ratio	22012	44736	9861	33843	28490	32761	17817	5177	26689	70744
Rank	4	9	2	8	6	7	3	1	5	10
Nursing to population coverage										
Ratio	1169	885	1382	966	909	1458	973	919	913	1577
Rank	7	1	8	5	2	9	6	4	3	10

Table I: Spearman rank order correlations for ethnicity and religion.

			Complete child immunization	Akan ethnicity	Religion
Spearman's rho	Complete child immunization, DHS definition	Correlation Coefficient	1.000	.023	.100[*]
		Sig. (2-tailed)	.	.586	.020
		n	541	541	540
	Akan ethnicity	Correlation Coefficient	.023	1.000	.351[**]
		Sig. (2-tailed)	.586	.	.000
		n	541	542	541
	Religion	Correlation Coefficient	.100[*]	.351[**]	1.000
		Sig. (2-tailed)	.020	.000	.
		n	540	541	541

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table II: Spearman rank order correlations for household-level socioeconomic status.

			Complete child immunization	Wealth index	Maternal education	Maternal employment	Paternal education	Paternal employment	Health insurance coverage	Money for health care
Spearman's rho	Complete child immunization, DHS definition	Correlation Coefficient	1.000	-.063	-.057	.008	-.135**	.068	-.167**	.029
		Sig. (2-tailed)	.	.145	.186	.860	.003	.130	.000	.503
		n	541	541	541	538	486	495	539	540
	Wealth index	Correlation Coefficient	-.063	1.000	.445**	-.130**	.474**	-.432**	.195**	-.229**
		Sig. (2-tailed)	.145	.	.000	.003	.000	.000	.000	.000
		n	541	542	542	539	487	496	540	541
	Maternal education	Correlation Coefficient	-.057	.445**	1.000	-.118**	.534**	-.306**	.168**	-.269**
		Sig. (2-tailed)	.186	.000	.	.006	.000	.000	.000	.000
		n	541	542	542	539	487	496	540	541
	Maternal employment	Correlation Coefficient	.008	-.130**	-.118**	1.000	-.156**	.144**	-.146**	.128**
		Sig. (2-tailed)	.860	.003	.006	.	.001	.001	.001	.003
		n	538	539	539	539	484	495	537	538
	Paternal education	Correlation Coefficient	-.135**	.474**	.534**	-.156**	1.000	-.429**	.174**	-.163**
		Sig. (2-tailed)	.003	.000	.000	.001	.	.000	.000	.000
		n	486	487	487	484	487	476	485	486
	Paternal employment	Correlation Coefficient	.068	-.432**	-.306**	.144**	-.429**	1.000	-.196**	.133**
		Sig. (2-tailed)	.130	.000	.000	.001	.000	.	.000	.003
		n	495	496	496	495	476	496	494	495
	Health insurance coverage	Correlation Coefficient	-.167**	.195**	.168**	-.146**	.174**	-.196**	1.000	-.226**
		Sig. (2-tailed)	.000	.000	.000	.001	.000	.000	.	.000
		n	539	540	540	537	485	494	540	540
	Money for health care	Correlation Coefficient	.029	-.229**	-.269**	.128**	-.163**	.133**	-.226**	1.000
		Sig. (2-tailed)	.503	.000	.000	.003	.000	.003	.000	.
		n	540	541	541	538	486	495	540	541

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table III: Spearman rank order correlations for maternal health literacy.

			Complete child immunization	Literacy education	Read newspaper	Listen to radio	Watch TV	TB awareness	HIV/AIDS awareness	STD awareness
Spearman's rho	Complete child immunization, DHS definition	Correlation Coefficient	1.000	.046	.021	-.134**	-.061	-.204**	-.108*	-.098*
		Sig. (2-tailed)	.	.313	.632	.002	.154	.000	.012	.022
		n		541	487	540	540	540	541	541	541
	Literacy education	Correlation Coefficient	.046	1.000	-.018	-.010	-.015	-.065	-.006	-.001
		Sig. (2-tailed)	.313	.	.684	.828	.740	.149	.888	.986
		n	487	488	488	488	487	488	488	488
	Read newspaper	Correlation Coefficient	.021	-.018	1.000	.123**	.263**	.104*	.060	.056
		Sig. (2-tailed)	.632	.684	.	.004	.000	.016	.164	.191
		n	540	488	541	540	540	541	541	541
	Listen to radio	Correlation Coefficient	-.134**	-.010	.123**	1.000	.331**	.316**	.139**	.143**
		Sig. (2-tailed)	.002	.828	.004	.	.000	.000	.001	.001
		n	540	488	540	541	540	541	541	541
	Watch TV	Correlation Coefficient	-.061	-.015	.263**	.331**	1.000	.264**	.153**	.144**
		Sig. (2-tailed)	.154	.740	.000	.000	.	.000	.000	.001
		n	540	487	540	540	541	541	541	541
	TB awareness	Correlation Coefficient	-.204**	-.065	.104*	.316**	.264**	1.000	.285**	.284**
		Sig. (2-tailed)	.000	.149	.016	.000	.000	.	.000	.000
		n	541	488	541	541	541	542	542	542
	HIV/AIDS awareness	Correlation Coefficient	-.108*	-.006	.060	.139**	.153**	.285**	1.000	.941**
		Sig. (2-tailed)	.012	.888	.164	.001	.000	.000	.	.000
		n	541	488	541	541	541	542	542	542
	STD awareness	Correlation Coefficient	-.098*	-.001	.056	.143**	.144**	.284**	.941**	1.000
		Sig. (2-tailed)	.022	.986	.191	.001	.001	.000	.000	.
		n	541	488	541	541	541	542	542	542

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table IV: Spearman rank order correlations for maternal decision latitude.

			Complete child immunization	Woman decides main purchases	Woman decides daily purchases	Woman has final say on own health	Woman can visit health facility
Spearman's rho	Complete child immunization, DHS definition	Correlation Coefficient	1.000	.033	-.041	-.021	.024
		Sig. (2-tailed)	.	.473	.370	.639	.576
		n	541	486	486	482	540
	Woman decides main purchases	Correlation Coefficient	.033	1.000	.302**	.014	-.095*
		Sig. (2-tailed)	.473	.	.000	.763	.037
		n	486	487	487	483	486
	Woman decides daily purchases	Correlation Coefficient	-.041	.302**	1.000	-.187**	.089*
		Sig. (2-tailed)	.370	.000	.	.000	.050
		n	486	487	487	483	486
	Woman has final say on own health	Correlation Coefficient	-.021	.014	-.187**	1.000	.047
		Sig. (2-tailed)	.639	.763	.000	.	.304
		n	482	483	483	483	482
	Woman can visit health facility	Correlation Coefficient	.024	-.095*	.089*	.047	1.000
		Sig. (2-tailed)	.576	.037	.050	.304	.
		n	540	486	486	482	541

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table V: Spearman rank order correlations for use of maternal and child health facilities.

		Complete child immunization	Maternal health facility visit	Place of delivery	MD delivery	Midwife/nurse delivery	Antenatal visits	Distance to medical help
Spearman's rho	**Complete child immunization, DHS definition**							
	Correlation Coefficient	1.000	-.037	-.076	-.032	-.050	-.111[**]	.049
	Sig. (2-tailed)	.	.393	.078	.452	.244	.009	.259
	n	541	541	538	541	541	541	540
	Maternal health facility visit							
	Correlation Coefficient	-.037	1.000	.076	.103[*]	.094[*]	.213[**]	-.103[*]
	Sig. (2-tailed)	.393	.	.076	.017	.029	.000	.017
	n	541	542	539	542	542	542	541
	Place of delivery							
	Correlation Coefficient	-.076	.076	1.000	.293[**]	.805[**]	.381[**]	-.231[**]
	Sig. (2-tailed)	.078	.076	.	.000	.000	.000	.000
	n	538	539	539	539	539	539	538
	Physician delivery							
	Correlation Coefficient	-.032	.103[*]	.293[**]	1.000	.115[**]	.209[**]	-.103[*]
	Sig. (2-tailed)	.452	.017	.000	.	.007	.000	.017
	n	541	542	539	542	542	542	541
	Midwife/nurse delivery							
	Correlation Coefficient	-.050	.094[*]	.805[**]	.115[**]	1.000	.399[**]	-.208[**]
	Sig. (2-tailed)	.244	.029	.000	.007	.	.000	.000
	n	541	542	539	542	542	542	541
	Antenatal visits							
	Correlation Coefficient	-.111[**]	.213[**]	.381[**]	.209[**]	.399[**]	1.000	-.131[**]
	Sig. (2-tailed)	.009	.000	.000	.000	.000	.	.002
	n	541	542	539	542	542	542	541
	Distance to medical help							
	Correlation Coefficient	.049	-.103[*]	-.231[**]	-.103[*]	-.208[**]	-.131[**]	1.000
	Sig. (2-tailed)	.259	.017	.000	.017	.000	.002	.
	n	540	541	538	541	541	541	541

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table VI: Spearman rank order correlations for participation in public health child vaccination campaigns.

			Complete child immunization	Child vaccinated during Measles/Poli	Child vaccinated during IMCI/Child
Spearman's rho	Complete child immunization, DHS definition	Correlation Coefficient	1.000	-.076	-.092[*]
		Sig. (2-tailed)	.	.077	.032
		n	541	538	538
	Child vaccinated during Nov 2006 Campaign	Correlation Coefficient	-.076	1.000	.229[**]
		Sig. (2-tailed)	.077	.	.000
		n	538	539	539
	Child vaccinated during Nov 2007	Correlation Coefficient	-.092[*]	.229[**]	1.000
		Sig. (2-tailed)	.032	.000	.
		n	538	539	539

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Figure 4

**Cluster analysis with regions as cases,
data from Ghana Demographic and Health Survey 2008 and Ghana Health Service 2008**
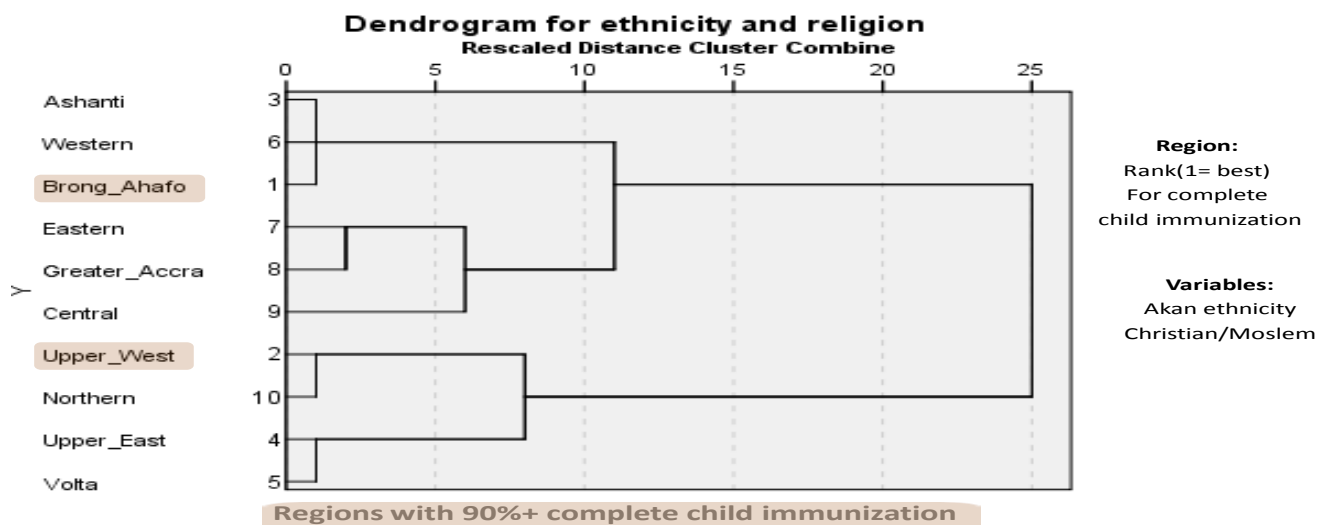
Figure 5

**Cluster analysis with regions as cases,
data from Ghana Demographic and Health Survey 2008 and Ghana Health Service 2008**
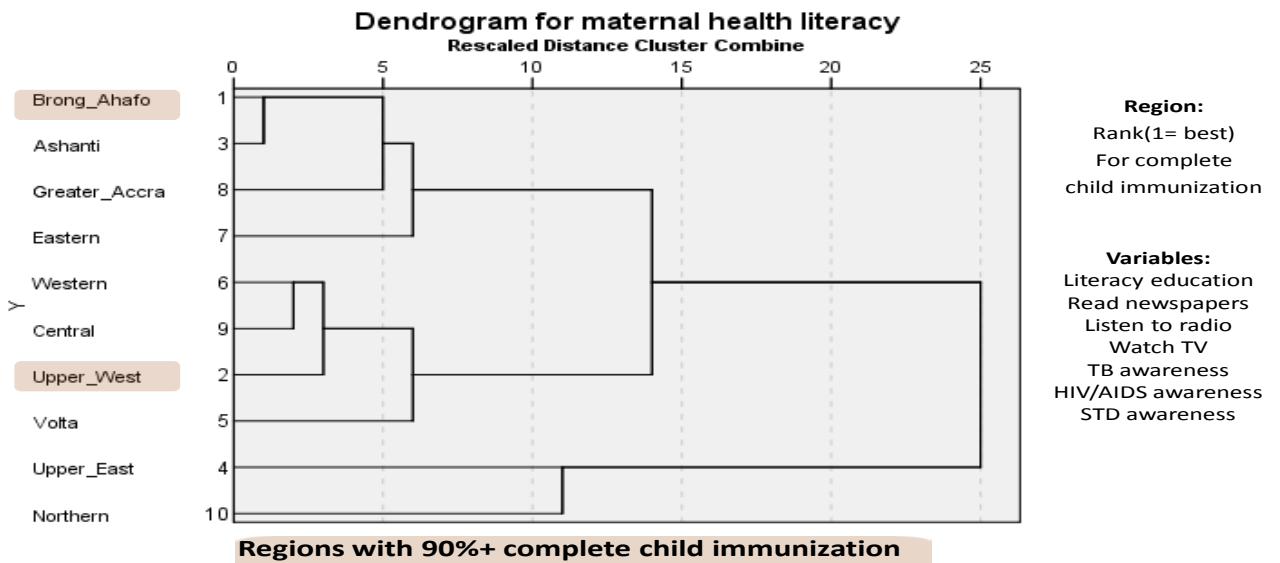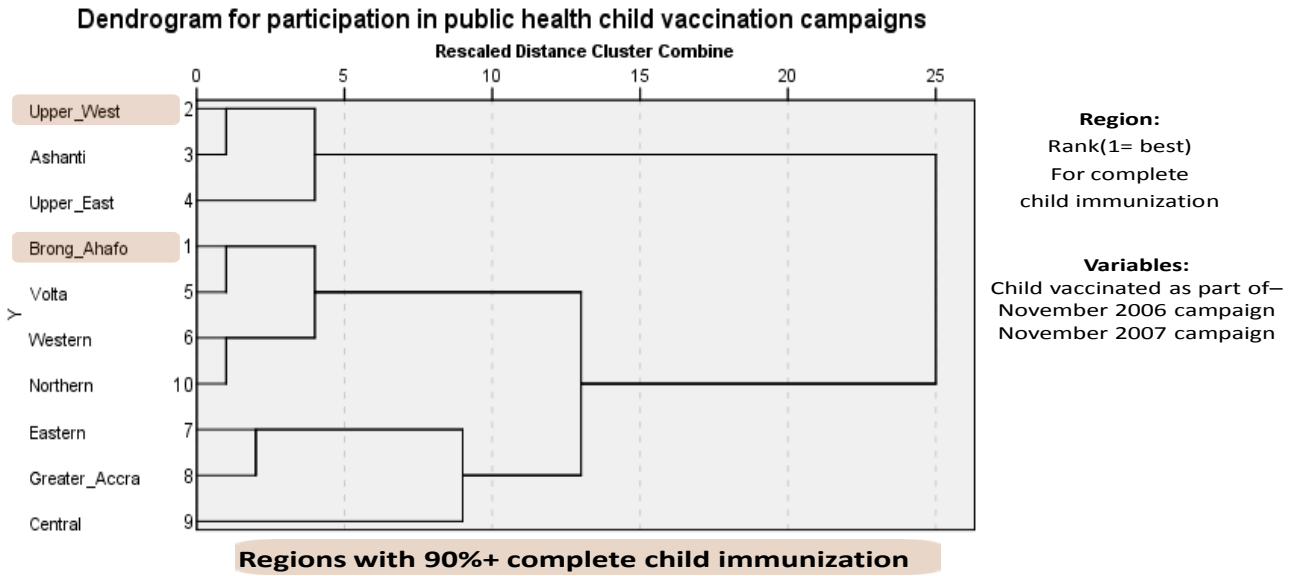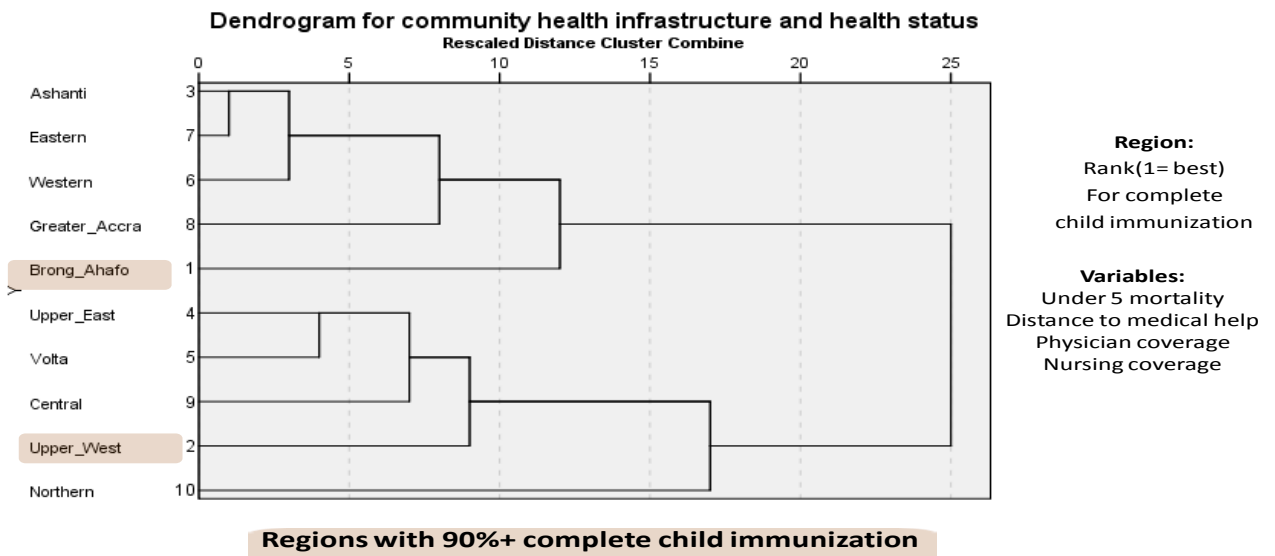
Dendrogram for household-level socioeconomic status
Rescaled Distance Cluster Combine

Region:
Rank(1= best)
For complete
child immunization

Variables:
Wealth index
Maternal education
Maternal employment
Paternal education
Paternal employment
Health insurance
Money for health care

Regions with 90%+ complete child immunization
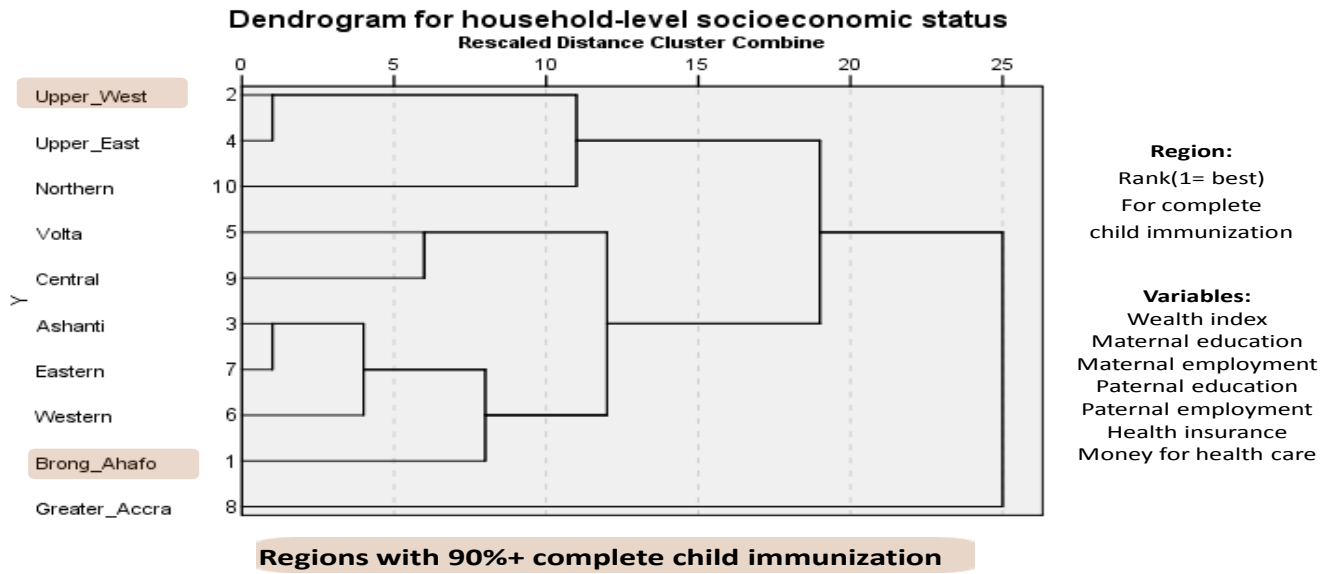
Figure 6

**Cluster analysis with regions as cases,
data from Ghana Demographic and Health Survey 2008 and Ghana Health Service 2008**

Dendrogram for maternal health literacy
Rescaled Distance Cluster Combine

Region:
Rank(1= best)
For complete
child immunization

Variables:
Literacy education
Read newspapers
Listen to radio
Watch TV
TB awareness
HIV/AIDS awareness
STD awareness

Regions with 90%+ complete child immunization

Figure 7

**Cluster analysis with regions as cases,
data from Ghana Demographic and Health Survey 2008 and Ghana Health Service 2008**

Regions with 90%+ complete child immunization
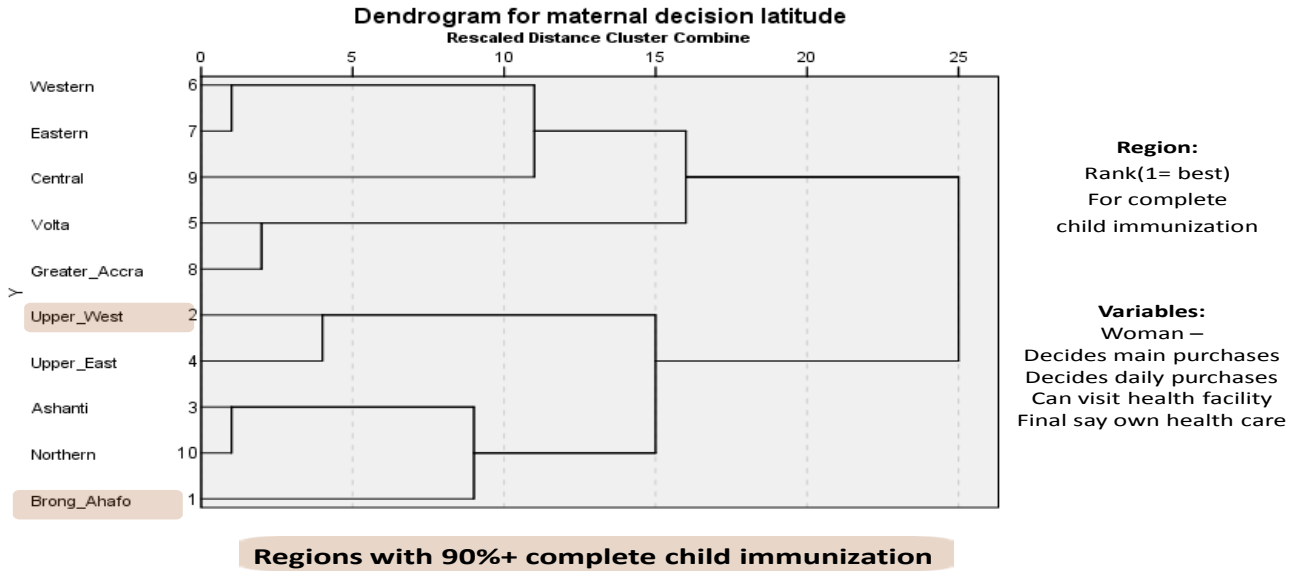
Figure 8

**Cluster analysis with regions as cases,
data from Ghana Demographic and Health Survey 2008 and Ghana Health Service 2008**

Regions with 90%+ complete child immunization
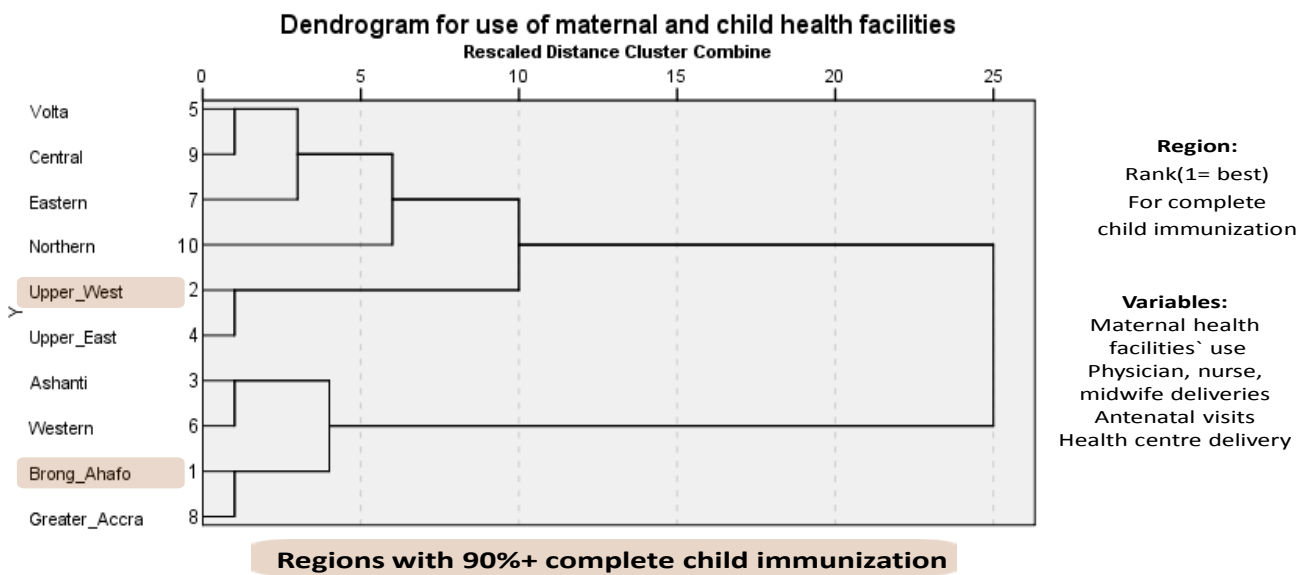
Figure 9

**Cluster analysis with regions as cases,
data from Ghana Demographic and Health Survey 2008 and Ghana Health Service 2008**

Dendrogram for participation in public health child vaccination campaigns

Region:
Rank(1= best)
For complete
child immunization

Variables:
Child vaccinated as part of—
November 2006 campaign
November 2007 campaign

Figure 10

**Cluster analysis with regions as cases,
data from Ghana Demographic and Health Survey 2008 and Ghana Health Service 2008**

Dendrogram for community health infrastructure and health status

Region:
Rank(1= best)
For complete
child immunization

Variables:
Under 5 mortality
Distance to medical help
Physician coverage
Nursing coverage

CHAPTER FIVE

5.0 Discussion

The 2003 GDHS reported child immunization coverage of 79.0 % for Brong-Ahafo region and 60.3% for Upper West region. Analysis of the most recent GDHS data (2008) indicated a tremendous increase in coverage of over 90% for the two Positive Deviant Regions (PDRs). In other words, the results showed that complete child immunization rates of over 90% (according to WHO`s definition), have been achieved in two, poor and extremely challenged regions, while all other regions have much lower rates. The implication of this finding is that, the PDRs have made desirable achievement in child immunization coverage in the past few years, especially in the case of Upper West, which has recorded over 30% increase. The percentage difference for Upper West between 2003 and 2008 is the highest when compared with all the other regions.

Besides their uniqueness of high child immunization rates, the PDRs were also found to be unique in terms of high maternal health care decision. They were also similar on frequent use of maternal health facilities.

Nonetheless, as did others, the study did not find significant association between participation in public health child vaccination campaigns and complete child immunization (Haddad et al., 2009; Naimoli et al., 2008). Even though this finding has support, it is surprising, since ordinarily one would associate vaccination campaigns with complete child immunization.

The results also seemed to indicate no positive association between household-level socioeconomic status and complete child immunization. This is also an unexpected finding, considering that majority of studies have reported strong correlation between socio-economic status and complete child immunization (Antai, 2010; Babalola, 2011; Wiysonge et al., 2012).

In addition, using the 2008 GDHS data only, no testable hypotheses could be developed to explain why the PDRs are positive deviant. This is also consistent with what other researchers have observed. Thus, other researchers have argued that statistical methods, like those used in this study, can identify deviant cases that may lead to new hypotheses, but in and of themselves the methods lack any clear means of actually identifying new hypotheses. For instance, some variables of interest to the researcher may not be measurable by this method. This obviously suggests the need for further qualitative case study to complement these findings, since case

studies are perceived to be "generally strong" precisely where statistical methods and formal models appear to be weak. Of course, this may require detailed consideration of contextual variables, that are extremely difficult to carry out in quantitative studies (Gable, 1994; George & Bennett, 2005). Though a handful of the findings are consistent with previous studies, majority of them were unexpected. Further explanations to these findings are discussed in detail in the subsequent sections.

Ethnicity and religion

Ethnicity and religion could not provide adequate explanation as to why the PDRs are unique on complete child immunization. Religious affiliation has been shown to positively affect children's immunization status, with Christian children having higher immunization coverage than Muslim children (Babalola, 2009; Sanou et al., 2009). In Nigeria for instance, the three southern regions have significantly better health outcomes than the three northern regions. Particularly, regional variations in child immunization coverage were evident among the North-West and the South-East regions. These variations have largely been attributed to many factors, including the diversity and variations in cultures, religion, political and economic situations (Antai, 2009; Babalola, 2009; Duah-Owusu, 2010; Olorunsaiye, 2011). Culture comprises so many variables however, only ethnicity and religion could be identified in the 2008 GDHS data. Further studies are still required to investigate the actual relationship between culture and child immunization status.

Household-level socioeconomic status

It has been reported earlier in Ghana that completion of immunization schedules by one year was positively associated with wealth. Other studies also point to the importance of socio economic determinants of complete child immunization (Antai, 2010; Brugha & Kevany, 1995; Wiysonge et al., 2012). However, this study revealed something different, which is worth studying in detail.

Ordinarily, one would expect high socio-economic status to correlate positively with complete child immunization, since many findings have shown that socio-economic characteristics significantly attenuate the risks of full immunization (Antai, 2010; Olorunsaiye, 2011; Wiysonge et al., 2012).

Contrary to many reports in the literature, wealth index for instance, was not significantly associated with complete child immunization. Results from the bivariate analysis indicated that wealth index had Spearman correlation coefficient of -.063 with complete child immunization, which was not significant. This result is has support from other studies (Babalola, 2009; Dummer et al., 2012).

Considering the inconsistencies in findings, it is important to point out that the role of wealth index in child immunization coverage is debatable. The wealth index used in the DHS may not be a good proxy for socioeconomic position. As common to most DHS, they do not collect data on household income or on expenditure. Income and expenditure are normally the indicators used to measure wealth. As explained in the methodology and consistent with the observation of other researchers, the assets-based wealth index used in the DHS is only a proxy indicator for household economic status. This may not always produce results similar to those obtained from direct measurements of income and expenditure (Antai, 2010; Filmer & Pritchett, 2001; Howe, Hargreaves, Gabrysch, & etal, 2009). Results in the rank tables revealed great disparities in wealth index performance among the regions. Thus, distribution of wealth was found to be unequal among the regions, especially between the regions in the north and those located in the south. This has also been reported to be true in other research studies in Ghana (Mittelmark & Bull, 2010).

Similarly, the bivariate analysis indicated that there is no significant relationship between educational attainment in the PDRs and complete child immunization. Children of mothers with higher education were expected to have significant higher coverage than those whose mothers had lower or no education. Yet, this was not the case. Educated mothers were also expected to know more about the side effects of not immunizing children. Nevertheless, educational attainment could not explain why the PDRs were unique on complete child immunization. Other regions seemed to have better educational attainment that the PDRs. Most findings in the literature show that education is one of the strongest predictors of childhood immunization. Increasing maternal education for instance, has been shown to be strongly associated with the increase in the likelihood of childhood immunization (Barata, Ribeiro, de Moraes, & Flannery, 2012; Olorunsaiye, 2011; Wiysonge et al., 2012).

Although the PDRs were not similar on employment status, this variable correlated positively with complete child immunization. Some studies have reported that, children whose mothers

were unemployed were more likely to be unimmunized than those whose mothers were employed (Antai, 2010; Wiysonge et al., 2012).

Moreover, the PDRs had an appreciable performance on maternal health insurance coverage. Probably, health insurance coverage could partially explain why the PDRs have done so well on child immunization; however this may be just the tip of the iceberg.

Maternal health literacy
Maternal health literacy could not explain why the PDRs are positive deviant. The results from cluster analysis showed that the PDRs did not belong to the same group; hence they were not similar in performance on maternal health literacy. Critical assessment of the results on maternal health literacy showed that the PDRs differed in ranking. Almost all the maternal health literacy indicators correlated negatively with complete child immunization. Results in the rank tables also indicated that almost none of the variables of maternal health literacy could successfully explain the relatively high child immunization coverage of the PDRs. It was in one instance (i.e. frequency of listening to radio) that positive deviant Brong-Ahafo recorded the best ranking than all the regions. However, its counterpart, Upper West, ranked poorly on that variable. Thus, if mass media exposure can be an explanatory factor at all, it can only be so for Brong-Ahafo, but not for Upper West.

Other studies have found that maternal access to mass media reduces the odds of a child being unimmunized (Wiysonge et al., 2012). Reasons for failure to immunize children have also been attributed to lack of knowledge or misconceptions about immunization. In rural Bangladesh, mass media was significantly positively associated with full vaccination (Rahman & Obaida-Nasrin, 2010; Toikilik et al., 2010; Wiysonge et al., 2012). Considering the key role mass media plays in persuading individuals to adopt healthy behaviours, mass media was expected to significantly raise awareness of health promoting issues, including risks to incomplete child immunization.

Maternal decision latitude
Women's decision making autonomy has been regarded as one of the three measures of women's empowerment that is used in the DHS (NPC & Macro, 2009; Olorunsaiye, 2011). Arguably, the PDRs were found to be almost similar on maternal decision latitude, as the dendrogram plot in figure 7 suggested. More specifically, the PDRs were unique in performance on maternal health

care decision, where they ranked best than all the other eight regions. Since they had high performance in maternal healthcare decision, one would have expected that they would have little problem accessing health facilities. Surprisingly, their respective ranks on maternal decision to visit health facilities were not appreciable. The rank order correlations indicated that maternal decision to visit health facilities had positive association with complete child immunization. On the other hand, maternal decision on healthcare correlated negatively with complete child immunization. This finding is actually interesting, since it is extremely difficult to understand why the PDRs would have no problem with maternal health care decision, yet they would have problem with maternal decision to visit health facilities. It is hard to reconcile these results.

In an attempt to partially resolve this controversy, a study on women decision making autonomy and childhood immunization in Nigeria may offer some explanation. As cited in the study, findings from an analysis of DHS data from 30 countries suggested that, in many households, particularly in South Asia and sub-Saharan Africa, women have little control of health related decisions. For instance, a sizeable number of women respondents in Burkina Faso, Mali and Nigeria reported that husbands alone make decisions about the women's health care. Moreover, in Bangladesh and Nepal in South Asia, husbands alone make decisions about the women's healthcare for most of the women respondents (Olorunsaiye, 2011).

What these findings seem to suggest is that women from developing countries are less empowered to make decisions on their own health care. Though these findings are not from Ghana, most of them are from sub Saharan African countries. Nonetheless, a similar study is required in Ghana to confirm this conclusion. The significance of women empowerment in taking healthcare decisions, both for themselves and for their children, cannot be underestimated.

Another study, using demographic data from Ethiopia and Eritrea, showed a strong positive association between increasing maternal decision making autonomy and the likelihood of completing childhood immunizations in both countries (Bloom et al., 2001; Woldemicael, 2007). Other findings also indicate that children of mothers who have final say, either alone or jointly with others in daily household purchases decision, are more likely to receive all the necessary vaccinations. In Ethiopia in particular, decision making in daily household purchases were significant (Woldemicael, 2007). The PDRs were found to have considerable influence in

deciding main household purchases. However, they differed with respect to decision in daily household purchases.

Use of maternal and child health facilities

Results on maternal and child health facilities' use indicated that the PDRs had appreciable level of performance on health care utilization. More specifically, findings in the rank tables showed that the PDRs made considerable use of maternal and child health facilities. They also had frequent antenatal visits. The implication is that, majority of mothers in both regions access maternal health facilities more than their counterparts in the other regions. Since the PDRs were similar on maternal health facilities` use and antenatal visits, these variables appear good to be relied on in explaining the success of the two regions on child immunization. Although there appear to be limited research evidence on use of maternal and child health facilities, mothers with health seeking behaviours have been found to be less likely to have children that are unimmunized. Home delivery has also been associated with lower risks of full immunization, as compared to living in a community with high proportion of hospital delivery. The reason advanced for this finding has been that, mothers who deliver at home are generally more likely to be non-users of health services (Antai, 2010; Kishor & ORCMacro, 2005; Wiysonge et al., 2012).

Participation in public health child vaccination campaigns

Even though results in the rank tables demonstrated that Brong-Ahafo was more successful in participation in public health child vaccination campaigns than Upper West, neither participation in the November 2006 Measles/Polio Campaign, nor the participation in the November 2007 IMCI/Child Health Campaign had a positive Spearman correlation coefficient with complete child immunization.

The November 2006 campaign was expected by many, including UNICEF, to ensure that Ghana continued its good record with these diseases. This was because there have been no reported measles` deaths in Ghana since 2002, and no polio cases since 2003. The one-week integrated health campaign was to boost the chances of survival for millions of children across the country. The campaign was led by the Ministry of Health and the Ghana Health Service, in collaboration with other key government ministries. It was supported by the Government of Japan, UNICEF,

WHO, World Bank, USAID, UN Foundation and other development partners. As UNICEF noted, massive effort was required in the campaign "to spread the word" to every family to take their children to the closest immunization site (UNICEF, 2006).

Though the finding may appear interesting, participation in public health child vaccination campaigns correlating negatively with complete child immunization may not be very surprising. One possibility could be that the immunization days were not convenient to mothers, hence the low turn-out. Particularly, this could be true for the November 2006 campaign in which apart from Volta and Western regions none of the remaining regions recorded participation of even 5%, as the results indicated.

Another possibility could be that, the immunization days confused mothers as to which vaccines their children were going to receive. It could also be possible that mothers were unsure whether their children had already received those vaccines or not. These assumptions might or might not be the case. However, in one study, mothers saw ``Immunization Days`` as confusion about where to send their children for routine immunization in the future. Several respondents also expressed worry that Immunization Days do not only divert districts' attention and resources, but also "demotivate" populations. This was found to be the case, especially with the "door-to-door" activities. These activities were seen to be different from those used in routine vaccination activities, which was believed to promote encounters between health personnel and members of the population at village gathering points. The researchers admitted that while their study introduced "factual data" into the current controversy on the potentially negative impacts of immunization days on routine activities, it does not resolve it. They however submitted that, contrary to what has been reported earlier in India and Pakistan, in practice, neither immunization days nor vaccination campaigns seem to have any measurable impact on the performance of routine vaccination services (Haddad et al., 2009).

Again, the findings on participation in public health child vaccination campaigns could be discussed in relation to what another group of researchers have observed; that the solutions to overcoming the challenge of sustained coverage do not necessarily reside within reach of only immunization programmes:

"contextual challenges and opportunities in the larger health system, if properly addressed, could enhance the more direct efforts undertaken by immunization programmes, to improve their performance (Naimoli et al., 2008, p. 388)".

Community health infrastructure and health status

Regardless that the PDRs were not ranked near one another on four indicators of community health infrastructure and health status, arguably, a good hypothesis could be that some key variables of health care services availability-and-use characteristics are more likely to explain the positive deviant status of the PDRs on child immunization, considering that the PDRs recorded frequent antennal visits, as well as frequent use of maternal health facilities. Similarly, maternal decision making on healthcare was high in the PDRs. Adequate antenatal care has been found to be significantly associated with initiation and completion of immunization by seven months (Bates, Fitzgerald, Dittus, & Wolinsky, 1994). Other reasons which have been advanced for failure to immunize children have included, living in communities with low proportion of mothers who have hospital. In fact, community health services have been found to be important correlates of health outcomes in developing countries (Antai, 2010; Toikilik et al., 2010).

5.1 Implications

Considering the inadequate progress that has been made towards reaching the child mortality reduction goal (MDG4) in sub Saharan Africa, it is hard to disagree that between and within country theory building about why some immunization programmes perform better than others is urgently needed (Naimoli et al., 2008). This will surely speed up the Ottawa Charter participants' commitment to health promotion, of responding to health gaps within and between societies.

Though this thesis has revealed great heterogeneity in the socio-demographic composition and health care services availability-and-use characteristics of the PDRs, and also between the regions in the northern Ghana and those in the south, the focus of the analysis was not so much on comparing the regions in the north with those in the south. Neither was it also interested in finding out why Upper West (extremely deprived region) for instance, has achieved complete child immunization coverage of 90.8% than Greater Accra (76.1%), the richest region. The study

generally sought to find out why the PDRs have been more successful in child immunization than the other regions. It was suspected that contextual factors might have played a major role in their success. Yet, the discussion so far seems to be silent on specific contextual/regional-level characteristics which are crucial in explaining why the PDRs are positive deviant. Using only DHS data, the study was handicapped to assess the effects of other contextual factors, otherwise not captured in the 2008 GDHS.

Evidence of contextual phenomenon or setting shaping children's risk of being unimmunized has already been reported in sub-Saharan Africa. One study showed that contextual factors may be associated with childhood immunization. What this suggests is that, in order to be effective interventions, public health programmes designed to address barriers to complete child immunization may have to address people and the settings in which they live. Thus, this ought to be an integral component of childhood immunization programmes (Wiysonge et al., 2012).

Indeed, the question of why some immunization programmes are more successful than others, or why some regions thrive in child immunization coverage than their peers arouses curiosity. Unfortunately, this has not been frequently investigated by researchers. When this question was explored in six sub-Saharan African countries, findings suggested that there are different paths to success, and not only what countries do, but how they execute their programmes appear to make difference in coverage outcomes. It was also observed that in some cases, contextual factors can help explain these variations. Similar studies have been recommended to be carried out to validate the hypotheses generated in the study. The goal of the recommendation was to help raise confidence in policy implications that will emerge in the future. The participants in the countries studied also recommended that, such "highly participatory investigation" be applied within countries to explore why some districts are more successful than others (Naimoli et al., 2008).

Regional variations in health care services utilization, particularly in child immunization coverage, do not seem to be a public health issue in Ghana alone, as several studies have shown. Previous researches and DHS reports continue to indicate that, for instance, there are regional variations in the utilization of maternal and child health services in many developing countries (Haddad et al., 2009; Toikilik et al., 2010).

Others have tried to explain the existence of disparities in immunization coverage among districts in particular, by focusing mainly on district-level factors. Findings indicated that districts which perform best are those which have the ability to assemble a set of favourable conditions. Also, the leadership of the district medical officer appeared to be the main "conduit" and the rallying point for these favourable conditions. Thus, a recognized strong leadership was found to be more capable of ensuring smooth operation of vaccination services (Haddad et al., 2009).

Finally, one important implication of this study is that reported national means of many health-related issues are normally different from the mean performance of the regions within the countries concerned. This may explain how misleading national means could sometimes be; a phenomenon which has been called *"whole nation bias"* (Rokkan, 1970; Snyder, 2001). For example, national child immunization coverage of 79%, which was reported after the 2008 GDHS, actually masks the regional variations in coverage. Consequently, it becomes difficult to trace and improve performance of regions which are not doing well in child immunization.

Thus, regarding variations in health-related issues found within and between countries, this study has confirmed that, "restricted generalisability" is not an issue in rest patterns alone, as others have reported in Ghana (Mittelmark & Bull, 2010). It is an issue that is found in other health endpoints, such as in childhood immunization. Therefore, in order to avoid this bias, national/international findings from research on determinants of health should be generalized with great caution, if it has to be done at all (Mittelmark & Bull, 2010).

5.2 Recommendations

It is important to point out that other factors not addressed in the present study are also likely to be important determinants of complete child immunization. Survey research has already been accused of being inflexible to discoveries during data collection. Thus, once data collection is going on, there seems to be little one can do upon realizing that some crucial items were omitted from the questionnaire or upon discovering that a question was ambiguous to respondents (Gable, 1994).

It is in this light that a qualitative case study approach is being recommended to complement the findings of this study. This is to help develop hypothesis to explain why the PDRs are positive deviant. The recommendation is very crucial, considering others` observation that statistical methods lack accepted procedures for inductively generating new hypotheses (George & Bennett, 2005). In addition, statistical studies which omit contextual factors except those codified in the variables selected for measurement could also leave out many contextual and intervening variables. This is seen to be true of all studies, including this one, that use or modify slightly existing database without recourse to primary sources. Statistical researchers are admonished do their own archival work, or face-to-face surveys with open ended questions, otherwise they have no inductive means of identifying left-out variables (George & Bennett, 2005).

In fact, the problem of the regional variations in child immunization rates in Ghana may be addressed effectively if the factors contributing to the success of the PDRs could be found out in their totality in a qualitative case study. Contextual factors peculiar to these regions may be very important here. Consequently, the qualitative case study method is recommended to be a contextual comparison which will address the issue of variations in child immunization coverage in the ten regions.

Under-five mortality is one of the major public health concerns in Ghana. Data from Interagency Group Child Mortality Estimation showed that, under-five mortality rate in Ghana decreased from 122 deaths per 1,000 live births in 1990, to 74 deaths per 1000 live births in 2010, with 2.5% annual rate of reduction (UNDP & NDPC/GOG, 2012). With this rate of reduction, there is clearly a challenge for Ghana to be able achieve the target of reducing under five mortality to 41deaths per 1000 live births by 2015, unless extraordinary efforts are implemented to scale-up child survival interventions which have brought about these improvements. This explains why the recommendation above is so vital. The recommendation underscores the important role of complete childhood immunization coverage in reducing under five mortality in Ghana.

Again, one broad issue identified from papers and case studies presented at a survey colloquium was that, survey research while very useful, is greatly improved when used in conjunction with other qualitative research methods. This, would require detailed consideration of contextual

variables, which is extremely difficult to carry out in statistical studies, but common in case studies (Gable, 1994; George & Bennett, 2005).

Until pure qualitative case study is done to complement findings of this study, it could only be said that, to help other regions achieve complete child immunization coverage, like the PDRs, interventions to address barriers to child immunization in every region ought to be undertaken in the context of the region. The reason is that, this exploratory regional-level analysis, with support from other studies seems to suggest that, there may be different paths to success and not only what regions do, but how they execute their regional public health policies may appear to yield good results in child immunization coverage.

5.3 Limitations

The findings of this study should be considered in light of the following limitations. First, the study used secondary source of data which was not collected purposely for immunization purposes. However, since one of the major aims of the survey was on child health or on child immunization, this may not be a strong limitation.

Also, estimates derived from a sample survey are mostly affected by two types of errors: 1) non-sampling errors, and 2) sampling errors.

Non-sampling errors are the results of mistakes made in implementing data collection and data processing such as, failure to locate and interview the correct households, misunderstanding of the questions on the part of the interviewer or the respondent, as well as data entry errors. Although "numerous" efforts were made during the implementation of the survey to minimize this type of error, non-sampling errors seem impossible to avoid and difficult to evaluate statistically (Ghana Statistical Service, Ghana Health Service, & Macro, 2009).

With sampling errors, the sample of respondents selected in the 2008 GDHS was only one of many samples that could have been selected from the same population, using the same design. Obviously, each of these samples would have yielded results that would have differed somewhat from the results of the actual sample selected in the survey. Sampling error is a measure of the variability between all possible samples. Although the degree of variability is not known exactly,

it can be estimated from the survey results. A sampling error is usually measured in terms of the standard error for a particular statistic (mean, percentage, etc.).

In addition, as others have also noticed, the idea of collapsing many of the variables into fewer categories, though this was appropriate and convenient for analyzing the research question, it could cause loss of information, which subsequently could impact the interpretation given thereof (Edwards, 2010).

Despite these limitations, the strengths of this study are worthy of mention. First, results from DHS data analysis makes it possible for comparison to be made with other countries, since DHS are used in several countries. In other words, DHS surveys are nationally representative. They allow generalization of results, since variables in the DHS are defined similarly across countries (Antai, 2010).

Secondly, as far as analysis of the DHS data is concerned, quantitative research method is preferred to qualitative method. Of course, qualitative case study could have been adopted to answer the research question, however, since the data was quantitative in nature, qualitative method alone could have been probably impossible to use.

Finally, so far, a review of the literature has shown that this study is unique, since no study of this kind has been conducted either in Ghana or elsewhere. That is, the study adopted cluster analysis method to compare regions as cases, with positive deviance applied at the regional level. It also used current DHS data. In this regard, the study has given a new dimension to the application of positive deviance and the use of cluster data analysis method. Obviously, this has added to the stock of knowledge in the literature which can be adopted in further studies.

5.4 Conclusions

A bivariate and cross tabulation analysis of the 10 regions in Ghana found that complete child immunization rates of over 90% (according to WHO`s definition), have been achieved in two relatively poor and extremely challenged regions (i.e. PDRs; Brong-Ahafo and Upper West), while all other regions have much lower rates. The PDRs were also found to be unique in terms of frequent use of maternal health facilities. They also shared in common high maternal health care decision. Nevertheless, exploratory hierarchical cluster analysis of the 10 regions, using Ward's method, and applying squared Euclidean Distance as the similarity measure, revealed not homogeneity but great heterogeneity in the socio-demographic composition and health care services availability-and-use characteristics of the PDRs. The 2008 GDHS report cautioned that, *"the regional differences in vaccination coverage should be interpreted with caution because of the small number of cases"* (Ghana Statistical Service, Ghana Health Service, & Macro, 2009, p. 168). The findings imply that, it is feasible to achieve complete child immunization in all the other eight regions as well. Thus, with evidence from the PDRs, it is concluded that, even with the poorest of all regions, with very disparate characteristics, it is possible to achieve very high immunization coverage. However, the GDHS data do not help to develop hypotheses about why the PDR's are positive deviant, hence, a case study method with a qualitative approach is suggested.

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Appendix

Questionnaire serial no._____

GHANA DEMOGRAPHIC AND HEALTH SURVEY
HOUSEHOLD QUESTIONNAIRE

SEPTEMBER 2008

MINISTRY OF HEALTH, GHANA

GHANA STATISTICAL SERVICE

IDENTIFICATION

LOCALITY NAME _____

NAME OF HOUSEHOLD HEAD _____

EA NUMBER ....

STRUCTURE NUMBER ....

HOUSEHOLD NUMBER ....

REGION ....

DISTRICT ....

URBAN/RURAL (URBAN = 1; RURAL = 2) ....

CITY/LARGE TOWN/SMALL TOWN/VILLAGE   (CITY=1, LARGE TOWN=2, SMALL TOWN=3, VILLAGE=4)

HOUSEHOLD SELECTED FOR INDIVIDUAL INTERVIEW(S) (YES = 1, NO = 2) ....

PERSON TO BE INTERVIEWED WITH THE DV MODULE IN THIS HOUSEHOLD ....
(WOMAN = 1, MAN = 2, NO ONE = 3)

INTERVIEWER VISITS

	1	2	3	FINAL VISIT	
DATE	_____	_____	_____	DAY	
				MONTH	
				YEAR	2 0 0 8
INTERVIEWER'S NAME	_____	_____	_____	INT. NUMBER	
RESULT*	_____	_____	_____	RESULT	
NEXT VISIT: DATE	_____	_____		TOTAL NUMBER OF VISITS	
TIME	_____	_____			

*RESULT CODES:
1   COMPLETED
2   NO HOUSEHOLD MEMBER AT HOME OR NO COMPETENT RESPONDENT AT HOME AT TIME OF VISIT
3   ENTIRE HOUSEHOLD ABSENT FOR EXTENDED PERIOD OF TIME
4   POSTPONED
5   REFUSED
6   DWELLING VACANT OR ADDRESS NOT A DWELLING
7   DWELLING DESTROYED
8   DWELLING NOT FOUND
9   OTHER _____
                                       (SPECIFY)

TOTAL PERSONS IN HOUSEHOLD

TOTAL ELIGIBLE WOMEN

TOTAL ELIGIBLE MEN

TOTAL ELIGIBLE DEATHS FOR VERBAL AUTOPSY

LANGUAGE OF QUESTIONNAIRE: [1]   LANGUAGE OF INTERVIEW: [ ]

LANGUAGE OF RESPONDENT [ ]   TRANSLATOR USED: [ ]
(YES = 1, NO = 2)

LINE NO. OF RESPONDENT TO HOUSEHOLD QUESTIONNAIRE

LANGUAGE CODES: ENGLISH = 1, AKAN = 2, GA = 3, EWE = 4, NZEMA = 5, DAGBANI = 6, OTHER = 7 (SPECIFY)

SUPERVISOR	FIELD EDITOR	OFFICE EDITOR	KEYED BY
NAME _____	NAME _____		
DATE _____	DATE _____		

Introduction and Consent

Hello. My name is _____ and
I am working for Ghana Statistical Service and Ministry of Health.
We are conducting a national survey about various health issues.
We would very much appreciate your participation in this survey. The survey usually
takes between 10 and 20 minutes to complete.

As part of the survey we would first like to ask some questions about your household.
All of the answers you give will be confidential and will not be seen by anyone other than
members of our survey team.
Participation in the survey is completely voluntary.
If we should come to any question you don't want to answer, just let me know and I
will go on to the next question; or you can stop the interview at any time.
However, we hope you will participate in the survey since
your views are important.

At this time, do you want to ask me anything about the survey?
May I begin the interview now?

Signature of interviewer:_____   Date:_____

RESPONDENT   RESPONDENT
AGREES TO BE INTERVIEWED ... 1   DOES NOT AGREE TO BE INTERVIEWED ..... 2 → END

HOUSEHOLD SCHEDULE

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	IF AGE 15 OR OLDER MARITAL STATUS	ELIGIBILITY		
	Please give me the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household. AFTER LISTING THE NAMES AND RECORDING THE RELATIONSHIP AND SEX FOR EACH PERSON, ASK QUESTIONS 2A-2C TO BE SURE THAT THE LISTING IS COMPLETE. THEN ASK APPROPRIATE QUESTIONS IN COLUMNS 5-32 FOR EACH PERSON.	What is the relationship of (NAME) to the head of the household? SEE CODES BELOW.	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)?	What is (NAME'S) current marital status? 1 = MARRIED OR LIVING TOGETHER 2 = DIVORCED/ SEPARATED 3 = WIDOWED 4 = NEVER-MARRIED AND NEVER LIVED TOGETHER	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15-49	CIRCLE LINE NUMBER OF ALL MEN AGE 15-59	CIRCLE LINE NUMBER OF ALL CHILDREN AGE 0-5
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
			M F 1 2	Y N 1 2	Y N 1 2	IN YEARS				
01		☐☐	1 2	1 2	1 2	☐☐	☐	01	01	01
02		☐☐	1 2	1 2	1 2	☐☐	☐	02	02	02
03		☐☐	1 2	1 2	1 2	☐☐	☐	03	03	03
04		☐☐	1 2	1 2	1 2	☐☐	☐	04	04	04
05		☐☐	1 2	1 2	1 2	☐☐	☐	05	05	05
06		☐☐	1 2	1 2	1 2	☐☐	☐	06	06	06
07		☐☐	1 2	1 2	1 2	☐☐	☐	07	07	07
08		☐☐	1 2	1 2	1 2	☐☐	☐	08	08	08
09		☐☐	1 2	1 2	1 2	☐☐	☐	09	09	09
10		☐☐	1 2	1 2	1 2	☐☐	☐	10	10	10

CODES FOR Q. 3: RELATIONSHIP TO HEAD OF HOUSEHOLD

01 = HEAD	08 = BROTHER OR SISTER
02 = WIFE OR HUSBAND	09 = NIECE/NEPHEW BY BLOOD
03 = SON OR DAUGHTER	10 = NIECE/NEPHEW BY MARRIAGE
04 = SON-IN-LAW OR DAUGHTER-IN-LAW	11 = OTHER RELATIVE
05 = GRANDCHILD	12 = ADOPTED/FOSTER/ STEPCHILD
06 = PARENT	13 = NOT RELATED
07 = PARENT-IN-LAW	98 = DON'T KNOW

HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

101	What is the main source of drinking water for members of your household?	PIPED WATER
		    PIPED INTO DWELLING/INDOOR 11
		    PIPED TO YARD/PLOT 12
		    PUBLIC TAP/STANDPIPE 13
		TUBE WELL OR BOREHOLE 21
		DUG WELL
		    PROTECTED WELL 31
		    UNPROTECTED WELL 32
		WATER FROM SPRING
		    PROTECTED SPRING 41
		    UNPROTECTED SPRING 42
		RAINWATER 51
		TANKER TRUCK 61
		CART WITH SMALL TANK 71
		SURFACE WATER (RIVER/DAM/
		    LAKE/POND/STREAM/CANAL/
		    IRRIGATION CHANNEL) 81
		BOTTLED WATER 91
		SACHET WATER 92
		
		OTHER _____ 96
		          (SPECIFY)
			→106
			
			→103
			
			→106
			
			→103
			
			→103

102	What is the main source of water used by your household for other purposes such as cooking and handwashing?	PIPED WATER
		    PIPED INTO DWELLING/INDOOR 11
		    PIPED TO YARD/PLOT 12
		    PUBLIC TAP/STANDPIPE 13
		TUBE WELL OR BOREHOLE 21
		DUG WELL
		    PROTECTED WELL 31
		    UNPROTECTED WELL 32
		WATER FROM SPRING
		    PROTECTED SPRING 41
		    UNPROTECTED SPRING 42
		RAINWATER 51
		TANKER TRUCK 61
		CART WITH SMALL TANK 71
		SURFACE WATER (RIVER/DAM/
		    LAKE/POND/STREAM/CANAL/
		    IRRIGATION CHANNEL) 81
		BOTTLED WATER 91
		SACHET WATER 92
		
		OTHER _____ 96
		          (SPECIFY)
			→106
			
			→106

103	Where is that water source located?	IN OWN DWELLING .... 1 IN OWN YARD/PLOT .... 2 ELSEWHERE 3	→106
104	How long does it take to go there, get water, and come back?	MINUTES .... ☐☐☐ DON'T KNOW 998	

105	Who usually goes to this source to fetch the water for your household?	ADULT WOMAN 01
		ADULT MAN 02
		FEMALE CHILD
		    UNDER 15 YEARS OLD 03
		MALE CHILD
		    UNDER 15 YEARS OLD 04
		FEMALE AGE 15-17 YEARS OLD 05
		MALE AGE 15-17 YEARS OLD 06
		
		OTHER _____ 96
		          (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
106	Do you do anything to the water to make it safer to drink?	YES .... 1 NO .... 2 DON'T KNOW 8	→ 108

107	What do you usually do to make the water safer to drink?
	
	 Anything else?
	
	 RECORD ALL MENTIONED.
		BOIL .... A
		 ADD BLEACH/CHLORINE/ALLOY .... B
		 STRAIN THROUGH A CLOTH C
		 USE WATER FILTER (CERAMIC/
		    SAND/COMPOSITE/ETC.) .... D
		 SOLAR DISINFECTION .... E
		 LET IT STAND AND SETTLE .... F
		
		 OTHER _____ X
		               (SPECIFY)
		 DON'T KNOW .... Z	

108	What kind of toilet facility do members of your household usually use?	FLUSH OR POUR FLUSH TOILET
		   FLUSH TO PIPED SEWER SYSTEM 11
		   FLUSH TO SEPTIC TANK 12
		   FLUSH TO PIT LATRINE 13
		   FLUSH TO SOMEWHERE ELSE 14
		   FLUSH, DON'T KNOW WHERE 15
		 PIT LATRINE
		   VENTILATED IMPROVED
		      PIT LATRINE 21
		   PIT LATRINE WITH SLAB 22
		   PIT LATRINE WITHOUT SLAB/
		      OPEN PIT 23
		 BUCKET/PAN 31
		 COMPOSTING TOILET 41
		 NO FACILITY/BUSH/FIELD 61
		
		 OTHER _____ 96
		             (SPECIFY)
			→ 111

109	Do you share this toilet facility with other households?	YES .... 1 NO 2	→ 111
110	How many households use this toilet facility?	NO. OF HOUSEHOLDS IF LESS THAN 10 .... [0][ ] 10 OR MORE HOUSEHOLDS .... 95 DON'T KNOW 98	
111	Does your household have: Electricity? A wall clock? A radio? A black/white television? A color television? A mobile telephone? A land-line telephone? A refrigerator? A freezer? Electric generator/Invertor(s)? Washing machine? Computer? Digital photo-camera? Non-digital photo-camera? Video deck? DVD/VCD? Sewing machine? Bed? Table? Cabinet/Cupboard?	YES NO ELECTRICITY .... 1 2 CLOCK .... 1 2 RADIO .... 1 2 BLACK/WHITE TELEVISION .... 1 2 COLOR TELEVISION .... 1 2 MOBILE TELEPHONE .... 1 2 LAND-LINE TELEPHONE .... 1 2 REFRIGERATOR .... 1 2 FREEZER .... 1 2 GENERATOR/INVERTOR .... 1 2 WASHING MACHINE .... 1 2 COMPUTER .... 1 2 DIGITAL CAMERA .... 1 2 NON-DIGITAL CAMERA .... 1 2 VIDEO DECK .... 1 2 DVD/VCD .... 1 2 SEWING MACHINE .... 1 2 BED .... 1 2 TABLE .... 1 2 CABINET/ CUPBOARD 1 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

112	What type of fuel does your household mainly use for cooking?	ELECTRICITY 01
		LPG 02
		NATURAL GAS 03
		BIOGAS 04
		KEROSENE 05
		CHARCOAL 06
		WOOD/FIREWOOD 07
		STRAW/SHRUBS/GRASS 08
		AGRICULTURAL CROP RESIDUE 09
		ANIMAL DUNG 10
		
		NO FOOD COOKED
		    IN HOUSEHOLD 95
		
		OTHER _____ 96
		            (SPECIFY)
			➔ 113A
			
			➔ 117

113	In this household, is food cooked on an open fire, an open stove or a closed stove?	OPEN FIRE 1
		COAL POT 2
		OPEN STOVE 3
		CLOSED STOVE/COAL POT WITH
		    CHIMNEY 4
		OTHER _____ 6
		            (SPECIFY)	

113A	What type of oil does your household mainly use for cooking?	PALM OIL .... 01 FRYTOL/FORTIFIED VEGETABLE OIL .... 02 OTHER VEGETABLE OIL .... 03 LARD OR SUET .... 04 BUTTER OR MARGARINE .... 05 SHEA BUTTER .... 06 OTHER _____ 96 (SPECIFY)	
115	Is the cooking usually done in the house, in a separate building, or outdoors?	IN THE HOUSE .... 1 IN A SEPARATE BUILDING .... 2 OUTDOORS .... 3 OTHER _____ 6 (SPECIFY)	➔ 117
116	Do you have a separate room which is used as a kitchen?	YES .... 1 NO 2	

117	MAIN MATERIAL OF THE FLOOR IN THE DWELLING.
	
	    RECORD OBSERVATION.
		NATURAL FLOOR
		    EARTH/SAND 11
		    DUNG 12
		RUDIMENTARY FLOOR
		    WOOD PLANKS 21
		    PALM/BAMBOO 22
		FINISHED FLOOR
		    PARQUET OR POLISHED
		        WOOD 31
		    VINYL OR ASPHALT STRIPS 32
		    CERAMIC TILES/TERRAZO 33
		    CEMENT 34
		    WOOLEN CARPET/SYNTHETIC CARPET ... 35
		    LINOLEUM/RUBBER CARPET 36
		OTHER _____ 96
		            (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

118	MAIN MATERIAL OF THE ROOF IN THE DWELLING
	
	RECORD OBSERVATION.
		NATURAL ROOFING
		   NO ROOF 11
		   THATCH/PALM LEAF/SOD 12
		RUDIMENTARY ROOFING
		   RUSTIC MAT 21
		   PALM/BAMBOO 22
		   WOOD PLANKS 23
		   CARDBOARD 24
		FINISHED ROOFING
		   METAL 31
		   WOOD 32
		   CALAMINE/CEMENT FIBER 33
		   CERAMIC TILES/BRICK TILES 34
		   CEMENT 35
		   ROOFING SHINGLES 36
		   ASBESTOS/SLATE ROOFING SHEETS . . . 37
		OTHER _____ 96
		             (SPECIFY)	

119	MAIN MATERIAL OF THE EXTERIOR WALLS.
	
	RECORD OBSERVATION.
		NATURAL WALLS
		   NO WALLS 11
		   CANE/PALM/TRUNKS 12
		   DIRT 13
		RUDIMENTARY WALLS
		   BAMBOO WITH MUD 21
		   STONE WITH MUD 22
		   UNCOVERED ADOBE 23
		   PLYWOOD 24
		   CARDBOARD 25
		   REUSED WOOD 26
		FINISHED WALLS
		   CEMENT 31
		   STONE WITH LIME/CEMENT 32
		   BRICKS 33
		   CEMENT BLOCKS 34
		   COVERED ADOBE 35
		   WOOD PLANKS/SHINGLES 36
		
		OTHER _____ 96
		             (SPECIFY)	

120	How many rooms in this household are used for sleeping?	ROOMS . . . . [ ][ ]	
121	Does any member of this household own: A bicycle? A motorcycle or motor scooter? An animal-drawn cart? A car or truck? A boat with a motor? A boat without a motor?	YES NO BICYCLE . . . . 1 2 MOTORCYCLE/SCOOTER . . . . 1 2 ANIMAL-DRAWN CART . . . . 1 2 CAR/TRUCK . . . . 1 2 BOAT WITH MOTOR . . . . 1 2 BOAT WITHOUT MOTOR 1 2	
122	Does any member of this household own any agricultural land?	YES . . . . 1 NO 2	→ 124

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
123	How many hectares, acres or poles of agricultural land do members of this household own?	HECTARES .... 1 ☐☐ ACRES .... 2 ☐☐ POLES .... 3 ☐☐ 95 OR MORE .... 995 DON'T KNOW 998	
124	Does this household own any livestock, herds, other farm animals, or poultry?	YES .... 1 NO 2	→ 126
125	How many of the following animals does this household own? IF NONE, ENTER '00'. IF MORE THAN 95, ENTER '95'. IF UNKNOWN, ENTER '98'. 　　Cattle? 　　Milk cows or bulls? 　　Horses, donkeys, or mules? 　　Goats? 　　Sheep? 　　Pigs? 　　Rabbits? 　　Grasscutter? 　　Chickens? 　　Other poultry? _____ 　　　　　　　(SPECIFY) 　　Other? _____ 　　　　　　　(SPECIFY)	 CATTLE .... ☐☐ COWS/BULLS .... ☐☐ HORSES/DONKEYS/MULES .... ☐☐ GOATS .... ☐☐ SHEEP .... ☐☐ PIGS .... ☐☐ RABBITS .... ☐☐ GRASSCUTTER .... ☐☐ CHICKENS .... ☐☐ OTHER POULTRY .... ☐☐ OTHER .... ☐☐	
126	Does any member of this household have a bank account?	YES .... 1 NO 2	
126A	How many household members are covered by health insurance? IF NONE, RECORD '00'.	PERSONS .... ☐☐ DON'T KNOW/NOT SURE 98	
127	Does your household have any mosquito nets that can be used while sleeping?	YES .... 1 NO 2	→ 137A
128	How many mosquito nets does your household have? IF 7 OR MORE NETS, RECORD '7'.	NUMBER OF NETS .... ☐	

GHANA DEMOGRAPHIC AND HEALTH SURVEY
WOMAN'S QUESTIONNAIRE

MINISTRY OF HEALTH, GHANA   GHANA STATISTICAL SERVICE

IDENTIFICATION

LOCALITY NAME _____

NAME OF HOUSEHOLD HEAD _____

EA NUMBER . . . .

STRUCTURE NUMBER . . . .

HOUSEHOLD NUMBER . . . .

REGION . . . .

DISTRICT . . . .

URBAN/RURAL (URBAN = 1; RURAL = 2) . . . .

CITY/LARGE TOWN/SMALL TOWN/VILLAGE(CITY=1, LARGE TOWN=2, SMALL TOWN=3, VILLAGE=4)

NAME AND LINE NUMBER OF WOMAN _____

WOMAN SELECTED FOR DV INTERVIEW (YES = 1; NO = 2) . . . .

CHECK COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE. IF BOX IS MARKED 'DV' RECORD 1.
MAKE SURE LINE NUMBER CORRESPONDS TO THE WOMAN'S LINE NUMBER SELECTED FOR DV.

INTERVIEWER VISITS

	1	2	3	FINAL VISIT	
DATE	_____	_____	_____	DAY	
				MONTH	
				YEAR	2 0 0 8
INTERVIEWER'S NAME	_____	_____	_____	INT. NUMBER	
RESULT*	_____	_____	_____	RESULT	
NEXT VISIT: DATE	_____	_____		TOTAL NUMBER OF VISITS	
TIME	_____	_____			

*RESULT CODES:
 1 COMPLETED   4   REFUSED
 2 NOT AT HOME   5   PARTLY COMPLETED   7   OTHER _____
 3 POSTPONED   6   INCAPACITATED   (SPECIFY)

LANGUAGE OF QUESTIONNAIRE: [1]   LANGUAGE OF INTERVIEW: [ ]   LANGUAGE OF RESPONDENT   [ ]

LANGUAGE CODES: ENGLISH = 1, AKAN = 2, GA = 3, EWE = 4, NZEMA = 5, DAGBANI = 6, OTHER = 7 (SPECIFY)

TRANSLATOR USED: (YES = 1, NO = 2)   [ ]   _____

SUPERVISOR	FIELD EDITOR	OFFICE EDITOR	KEYED BY
NAME _____	NAME _____		
DATE _____ [ ][ ]	DATE _____ [ ][ ][ ]	[ ][ ][ ]	[ ][ ][ ]

INTRODUCTION AND CONSENT

```
INFORMED CONSENT

Hello. My name is _____ and I am working for Ghana Statistical Service and Ministry of Health.
We are conducting a national survey that asks women and men about various health issues. We would very much appreciate your
participation in this survey. This informaiton will help the government to plan health services.
The survey usually takes between 45 and 60 minutes to complete. Whatever information you provide
will be kept strictly confidential and will not be shown to anyone other than members of our survey team.

Participation in this survey is voluntary, and if we should come to any question you don't want to answer, just let me know and
I will go on to the next question; or you can stop the interview at any time. However, we hope that you will participate in this survey
since your views are important.
At this time, do you want to ask me anything about the survey? May I begin the interview now?

Signature of interviewer: _____          Date: _____

RESPONDENT AGREES TO BE INTERVIEWED  . . . . .  1        RESPONDENT DOES NOT AGREE TO BE INTERVIEWED  . . .  2 → END
```

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	RECORD THE TIME.	HOUR . . . . MINUTES	
102	How long have you been living continuously in (NAME OF CURRENT PLACE OF RESIDENCE)? IF LESS THAN ONE YEAR, RECORD '00' YEARS.	YEARS . . . . ALWAYS . . . . 95 VISITOR 96	→ 104
103	Just before you moved here, did you live in a city, in a town, or in the countryside?	CITY . . . . 1 TOWN . . . . 2 COUNTRYSIDE 3	
104	In the last 12 months, on how many separate occasions have you traveled away from your home community and slept away?	NUMBER OF TRIPS . . . . NONE 00	→ 106
105	In the last 12 months, have you been away from your home community for more than one month at a time?	YES . . . . 1 NO 2	
106	In what month and year were you born?	MONTH . . . . DON'T KNOW MONTH . . . . 98 YEAR . . . . DON'T KNOW YEAR 9998	
107	How old were you at your last birthday? COMPARE AND CORRECT 106 AND/OR 107 IF INCONSISTENT.	AGE IN COMPLETED YEARS	
108	Have you ever attended school?	YES . . . . 1 NO 2	→ 112
109	What is the highest level of school you attended: primary, middle/JSS, secondary/SSS, or higher?	PRIMARY . . . . 1 MIDDLE/JSS . . . . 2 SECONDARY/SSS . . . . 3 HIGHER 4	
110	What is the highest grade you completed at that level?	GRADE	
111	CHECK 109: PRIMARY OR ☐ SECONDARY/SSS ☐ MIDDLE/JSS↓ OR HIGHER		→ 115

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

112	Now I would like you to read this sentence to me.
	
	SHOW LITERACY CARD TO RESPONDENT.
	
	IF RESPONDENT CANNOT READ WHOLE SENTENCE, PROBE: Can you read any part of the sentence to me?
		CANNOT READ AT ALL 1
		ABLE TO READ ONLY PARTS OF
		   SENTENCE 2
		ABLE TO READ WHOLE SENTENCE. . 3
		NO CARD WITH REQUIRED
		   LANGUAGE _____ 4
		            (SPECIFY LANGUAGE)
		BLIND/VISUALLY IMPAIRED 5	

113	Have you ever participated in a literacy program or any other program that involves learning to read or write (not including primary school)?	YES . . . . 1 NO 2	
114	CHECK 112: CODE '2', '3', OR '4' CODE '1' OR '5' CIRCLED CIRCLED		→ 116
115	Do you read a newspaper or magazine almost every day, at least once a week, less than once a week or not at all?	ALMOST EVERY DAY . . . . 1 AT LEAST ONCE A WEEK . . . . 2 LESS THAN ONCE A WEEK . . . . 3 NOT AT ALL 4	
116	Do you listen to the radio almost every day, at least once a week, less than once a week or not at all?	ALMOST EVERY DAY . . . . 1 AT LEAST ONCE A WEEK . . . . 2 LESS THAN ONCE A WEEK . . . . 3 NOT AT ALL 4	
117	Do you watch television almost every day, at least once a week, less than once a week or not at all?	ALMOST EVERY DAY . . . . 1 AT LEAST ONCE A WEEK . . . . 2 LESS THAN ONCE A WEEK . . . . 3 NOT AT ALL 4	
118	What is your religion?	CATHOLIC . . . . 01 ANGLICAN . . . . 02 METHODIST . . . . 03 PRESBYTERIAN . . . . 04 PENTECOSTAL/CHARISMATIC . . . . . 05 OTHER CHRISTIAN . . . . 06 MOSLEM . . . . 07 TRADITIONAL/SPIRITUALIST . . . . 08 NO RELIGION . . . . 09 OTHER _____ 96 (SPECIFY)	
119	To which ethnic group do you belong?	AKAN . . . . 01 GA/DANGME . . . . 02 EWE . . . . 03 GUAN . . . . 04 MOLE-DAGBANI . . . . 05 GRUSSI . . . . 06 GRUMA . . . . 07 MANDE . . . . 08 OTHER _____ 96 (SPECIFY)	

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____

408	Where did you receive antenatal care for this pregnancy?
	
	Anywhere else?
	
	PROBE TO IDENTIFY TYPE(S) OF SOURCE(S) AND CIRCLE THE APPROPRIATE CODE(S).
	
	IF UNABLE TO DETERMINE IF A HOSPITAL, HEALTH CENTER, OR CLINIC IS PUBLIC OR PRIVATE MEDICAL, WRITE THE THE NAME OF THE PLACE.
	
	_____
	(NAME OF PLACE(S))
		HOME
		  YOUR HOME .... A
		  OTHER HOME .... B
		
		PUBLIC SECTOR
		  GOVT. HOSPITAL/
		    POLYCLINIC . C
		  GOVT. HEALTH
		    CENTER .... D
		  GOVT. HEALTH
		    POST/CHPS . E
		  MOBILE CLINIC F
		  OTHER PUBLIC
		    _____ G
		    (SPECIFY)
		
		PRIVATE MED. SECTOR
		  PVT. HOSPITAL/
		    CLINIC .... H
		  FP/PPAG CLINIC . I
		  MOBILE CLINIC J
		  MATERNITY HOME K
		  OTHER PRIVATE
		    MED. _____ L
		    (SPECIFY)
		
		OTHER_____ X
		    (SPECIFY)		

409	How many months pregnant were you when you first received antenatal care for this pregnancy?	MONTHS ... [ ][ ] DON'T KNOW 98		
410	How many times did you receive antenatal care during this pregnancy?	NUMBER OF TIMES . [ ][ ] DON'T KNOW 98		
411	As part of your antenatal care during this pregnancy, were any of the following done at least once? Were you weighed? Was your blood pressure measured? Did you give a urine sample? Did you give a blood sample?	YES NO WEIGHT ... 1 2 BP .... 1 2 URINE ..... 1 2 BLOOD ... 1 2		
412	During (any of) your antenatal care visit(s), were you told about the signs of pregnancy complications?	YES .... 1 NO .... 2 (SKIP TO 414) ◄┐ DON'T KNOW 8		
413	Were you told where to go if you had any of these complications?	YES .... 1 NO .... 2 DON'T KNOW 8		
414	During this pregnancy, were you given an injection in the arm to prevent the baby from getting tetanus, that is, convulsions after birth?	YES .... 1 NO .... 2 (SKIP TO 417) ◄┐ DON'T KNOW 8		
415	During this pregnancy, how many times did you get this tetanus injection?	TIMES .... [ ] DON'T KNOW 8		

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____
435	Who assisted with the delivery of (NAME)? Anyone else? PROBE FOR THE TYPE(S) OF PERSON(S) AND RECORD ALL MENTIONED. IF RESPONDENT SAYS NO ONE ASSISTED, PROBE TO DETERMINE WHETHER ANY ADULTS WERE PRESENT AT THE DELIVERY.	HEALTH PERSONNEL DOCTOR . . . . A NURSE/MIDWIFE . B AUXILIARY MIDWIFE . . . . C COMMUNITY HEALTH OFFICER/NURSE D OTHER PERSON TRAINED TRADITIONAL BIRTH ATTENDANT . . . E UNTRAINED TRADITIONAL BIRTH ATTENDANT . . . F COMMUNITY/VILLAGE HEALTH VOLUNTEER . . . . G TRADITIONAL PRACTICIONER... H OTHER X (SPECIFY) NO ONE . . . . . . Y	HEALTH PERSONNEL DOCTOR . . . . A NURSE/MIDWIFE B AUXILIARY MIDWIFE . . . . . C COMMUNITY HEALTH OFFICER/NURSE D OTHER PERSON TRAINED TRADITIONAL BIRTH ATTENDANT . E UNTRAINED TRADITIONAL BIRTH ATTENDANT . F COMMUNITY/VILLAGE HEALTH VOLUNTEER . . G TRADITIONAL PRACTICIONER. G OTHER X (SPECIFY) NO ONE . . . . . . Y	HEALTH PERSONNEL DOCTOR . . . . A NURSE/MIDWIFE B AUXILIARY MIDWIFE . . . . . C COMMUNITY HEALTH OFFICER/NURSE D OTHER PERSON TRAINED TRADITIONAL BIRTH ATTENDANT . E UNTRAINED TRADITIONAL BIRTH ATTENDANT . F COMMUNITY/VILLAGE HEALTH VOLUNTEER . . G TRADITIONAL PRACTICIONER. G OTHER X (SPECIFY) NO ONE . . . . . . Y
436	Where did you give birth to (NAME)? PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. IF UNABLE TO DETERMINE IF A HOSPITAL, HEALTH CENTER, OR CLINIC IS PUBLIC OR PRIVATE MEDICAL, WRITE THE THE NAME OF THE PLACE. _____ (NAME OF PLACE)	HOME YOUR HOME . . . . 11 OTHER HOME . . . . 12 (SKIP TO 443) PUBLIC SECTOR GOVT. HOSPITAL/ POLYCLINIC . . . 21 GOVT. HEALTH CENTER . . . . 22 GOVT. HEALTH POST/CHPS . . . 23 OTHER PUBLIC 26 (SPECIFY) PRIVATE MED. SECTOR PVT. HOSPITAL/ CLINIC . . . . 31 FP/PPAG CLINIC 32 MATERNITY HOME 33 OTHER PRIVATE MED. 36 (SPECIFY) OTHER 96 (SPECIFY) (SKIP TO 443)	HOME YOUR HOME . . . 11 OTHER HOME . . . 12 (SKIP TO 444) PUBLIC SECTOR GOVT. HOSPITAL/ POLYCLINIC . 21 GOVT. HEALTH CENTER . . . . 22 GOVT. HEALTH POST/CHPS . 23 OTHER PUBLIC 26 (SPECIFY) PRIVATE MED. SECTOR PVT. HOSPITAL/ CLINIC . . . . . . 31 FP/PPAG CLINIC 32 MATERNITY HOME 33 OTHER PRIVATE MED. 36 (SPECIFY) OTHER 96 (SPECIFY) (SKIP TO 444)	HOME YOUR HOME . . . 11 OTHER HOME . . . 12 (SKIP TO 444) PUBLIC SECTOR GOVT. HOSPITAL/ POLYCLINIC . 21 GOVT. HEALTH CENTER . . . . . 22 GOVT. HEALTH POST/CHPS . 23 OTHER PUBLIC 26 (SPECIFY) PRIVATE MED. SECTOR PVT. HOSPITAL/ CLINIC . . . . 31 FP/PPAG CLINIC 32 MATERNITY HOME 33 OTHER PRIVATE MED. 36 (SPECIFY) OTHER 96 (SPECIFY) (SKIP TO 444)
437	How long after (NAME) was delivered did you stay there? IF LESS THAN ONE DAY, RECORD HOURS. IF LESS THAN ONE WEEK, RECORD DAYS.	HOURS 1 DAYS 2 WEEKS 3 DON'T KNOW . 998	HOURS 1 DAYS 2 WEEKS 3 DON'T KNOW . . . 998	HOURS 1 DAYS 2 WEEKS 3 DON'T KNOW . . . 998
438	Was (NAME) delivered by caesarean section?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
439	Before you were discharged after (NAME) was born, did any health care provider check on your health?	YES . . . . 1 NO . . . . 2 (SKIP TO 442)	YES . . . . 1 (SKIP TO 455) NO 2	YES . . . . 1 (SKIP TO 455) NO 2
440	How long after delivery did the first check take place? IF LESS THAN ONE DAY, RECORD HOURS. IF LESS THAN ONE WEEK, RECORD DAYS.	HOURS 1 DAYS 2 WEEKS 3 DON'T KNOW 998		

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____

441	Who checked on your health at that time?
	
	PROBE FOR MOST QUALIFIED PERSON.
		HEALTH PERSONNEL
		  DOCTOR 11
		  NURSE/MIDWIFE 12
		  AUXILIARY
		     MIDWIFE 13
		  COMMUNITY HEALTH
		    OFFICER/NURSE 14
		OTHER PERSON
		  TRAINED TRADITIONAL
		    BIRTH
		    ATTENDANT . . . 21
		  UNTRAINED
		    TRADITIONAL BIRTH
		    ATTENDANT . . . 22
		  COMMUNITY/
		    VILLAGE HEALTH
		    VOLUNTEER 23
		  TRADITIONAL
		    PRACTICIONER... 24
		  RELATIVE/FRIEND 25
		  OTHER _____ 96
		     (SPECIFY)
		
		   (SKIP TO 453) ◄—		

442	After you were discharged, did any health care provider or a traditional birth attendant check on your health?	YES 1
		  (SKIP TO 445) ◄—
		NO 2
		  (SKIP TO 453) ◄—
			YES 1
			  (SKIP TO 455)◄—
			NO 2
				YES 1
				  (SKIP TO 455)◄—
				NO 2

443	Why didn't you deliver in a health facility?
	
	PROBE: Any other reason?
	
	RECORD ALL MENTIONED.
		COSTS TOO MUCH . . . A
		FACILITY NOT OPEN . . B
		TOO FAR/ NO
		  TRANSPORTATION . C
		DON'T TRUST
		  FACILITY/POOR
		  QUALITY SERVICE . D
		NO FEMALE PROVID-
		  ER AT FACILITY . . . E
		NOT THE FIRST CHILD. . F
		NOT NECESSARY . . . G
		FATHER DIDN'T THINK IT
		  WAS NECESSARY . H
		FAMILY DIDN'T THINK IT
		  WAS NECESSARY . I
		HUSBAND/FAMILY
		  DID NOT ALLOW . . . . J
		NOT CUSTOMARY . . . . K
		DID NOT KNOW WHERE
		  TO GO L
		NO ONE TO ACCOMPANY M
		INCONVENIENT SERVICE
		  HOUR . . . . N
		AFRAID TO GO . . . . O
		LONG WAITING TIME . P
		
		OTHER _____ X
		    (SPECIFY)		

444	After (NAME) was born, did any health care provider or a traditional birth attendant check on your health?	YES . . . . 1 NO . . . . 2 (SKIP TO 449) ◄—	YES . . . . 1 NO 2	YES . . . . 1 NO 2
445	How long after delivery did the first check take place? IF LESS THAN ONE DAY, RECORD HOURS. IF LESS THAN ONE WEEK, RECORD DAYS.	HOURS 1 DAYS 2 WEEKS 3 DON'T KNOW 998		

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____

451	Who checked on (NAME)'s health at that time?
	
	PROBE FOR MOST QUALIFIED PERSON.
		HEALTH PERSONNEL
		  DOCTOR 11
		  NURSE/MIDWIFE 12
		  AUXILIARY
		     MIDWIFE 13
		  COMMUNITY HEALTH
		    OFFICER/NURSE 14
		OTHER PERSON
		  TRAINED TRADITIONAL
		    BIRTH
		    ATTENDANT 21
		  UNTRAINED
		    TRADITIONAL BIRTH
		    ATTENDANT 22
		  COMMUNITY/
		    VILLAGE HEALTH
		    WORKER 23
		  TRADITIONAL
		    PRACTICIONER... 24
		  RELATIVE/FRIEND 25
		  OTHER _____ 96
		      (SPECIFY)		

452	Where did this first check of (NAME) take place?
	
	PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE.
	
	IF UNABLE TO DETERMINE IF A HOSPITAL, HEALTH CENTER, OR CLINIC IS PUBLIC OR PRIVATE MEDICAL, WRITE THE THE NAME OF THE PLACE.
	
	_____
	(NAME OF PLACE)
		HOME
		  YOUR HOME 11
		  OTHER HOME 12
		
		PUBLIC SECTOR
		  GOVT. HOSPITAL/
		    POLYCLINIC 21
		  GOVT. HEALTH
		    CENTER 22
		  GOVT. HEALTH
		    POST/CHPS 23
		  OTHER PUBLIC
		    _____ 26
		     (SPECIFY)
		
		PRIVATE MED. SECTOR
		  PVT. HOSPITAL/
		    CLINIC 31
		  MOBILE CLINIC 32
		  FP/PPAG CLNIC . . 33
		  MATERNITY HOME 34
		  OTHER PRIVATE
		    MED. _____ 36
		     (SPECIFY)
		
		OTHER _____ 96
		     (SPECIFY)		

453	In the first two months after delivery, did you receive a vitamin A dose (like this/any of these)? SHOW COMMON TYPES OF AMPULES/CAPSULES/SYRUPS.	YES . . . . 1 NO . . . . 2 DON'T KNOW 8		

SECTION 5. CHILD IMMUNIZATION AND HEALTH AND CHILD'S AND WOMAN'S NUTRITION

501	ENTER IN THE TABLE THE LINE NUMBER, NAME, AND SURVIVAL STATUS OF EACH BIRTH IN 2003 OR LATER. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE LAST BIRTH. (IF THERE ARE MORE THAN 3 BIRTHS, USE LAST 2 COLUMNS OF ADDITIONAL QUESTIONNAIRES).			

502		LAST BIRTH	NEXT-TO-LAST BIRTH	SECOND-FROM-LAST BIRTH
	LINE NUMBER FROM 212	LINE NUMBER	LINE NUMBER	LINE NUMBER ....

503	FROM 212 AND 216	NAME_____ LIVING ☐ DEAD ☐ (GO TO 503 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 573)	NAME_____ LIVING ☐ DEAD ☐ (GO TO 503 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 573)	NAME_____ LIVING ☐ DEAD ☐ (GO TO 503 IN NEXT-TO-LAST COLUMN OF NEW QUESTIONNAIRE, OR IF NO MORE BIRTHS, GO TO 573)

504	Do you have a card where (NAME'S) vaccinations are written down? IF YES: May I see it please?	YES, SEEN .... 1 (SKIP TO 506) ← YES, NOT SEEN .... 2 (SKIP TO 508) ← NO CARD 3	YES, SEEN .... 1 (SKIP TO 506) ← YES, NOT SEEN .... 2 (SKIP TO 508) ← NO CARD 3	YES, SEEN .... 1 (SKIP TO 506) ← YES, NOT SEEN .... 2 (SKIP TO 508) ← NO CARD 3

505	Did you ever have a vaccination card for (NAME)?	YES .... 1 (SKIP TO 508) ← NO 2	YES .... 1 (SKIP TO 508) ← NO 2	YES .... 1 (SKIP TO 508) ← NO 2

506	(1) COPY VACCINATION DATE FOR EACH VACCINE FROM THE CARD. (2) WRITE '44' IN 'DAY' COLUMN IF CARD SHOWS THAT A VACCINATION WAS GIVEN, BUT NO DATE IS RECORDED. (3) IF MORE THAN TWO VITAMIN 'A' DOSES, RECORD DATES FOR MOST RECENT AND SECOND MOST RECENT DOSES.			

		LAST BIRTH	NEXT-TO-LAST BIRTH	SECOND-FROM-LAST BIRTH
		DAY MONTH YEAR	DAY MONTH YEAR	DAY MONTH YEAR
	BCG		BCG	BCG
	POLIO 0 (POLIO GIVEN AT BIRTH)		P0	P0
	POLIO 1		P1	P1
	POLIO 2		P2	P2
	POLIO 3		P3	P3
	DPT/HEP.B/INFL 1		DPTH1	DPTH1
	DPT/HEP.B/INFL 2		DPTH2	DPTH2
	DPT/HEP.B/INFL 3		DPTH3	DPTH3
	MEASLES		MEA/	MEA/
	YELLOW FEVER		YF	YF
	VITAMIN A (MOST RECENT)		VIT A1	VIT A1
	VITAMIN A (2nd MOST RECENT)		VIT A2	VIT A2

506A	CHECK 506:	BCG TO YELLOW FEVER ALL RECORDED ☐ OTHER ☐ (GO TO 510)	BCG TO YELLOW FEVER ALL RECORDED ☐ OTHER ☐ (GO TO 510)	BCG TO YELLOW FEVER ALL RECORDED ☐ OTHER ☐ (GO TO 510)

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____
507	Has (NAME) received any vaccinations that are not recorded on this card, including vaccinations received in a national immunization day campaign? RECORD 'YES' ONLY IF RESPONDENT MENTIONS BCG, POLIO 0-3, DPT/Hep/Infl.B, YELLOW FEVER AND/OR MEASLES VACCINES.	YES . . . . 1 (PROBE FOR ← VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 506) (SKIP TO 510) ← NO . . . . 2 (SKIP TO 510) ← DON'T KNOW 8	YES . . . . 1 (PROBE FOR ← VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 506) (SKIP TO 510) ← NO . . . . 2 (SKIP TO 510) ← DON'T KNOW 8	YES . . . . 1 (PROBE FOR ← VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 506) (SKIP TO 510) ← NO . . . . 2 (SKIP TO 510) ← DON'T KNOW 8
508	Did (NAME) ever receive any vaccinations to prevent him/her from getting diseases, including vaccinations received in a national immunization campaign?	YES . . . . 1 NO . . . . 2 (SKIP TO 512) ← DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 512) ← DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 512) ← DON'T KNOW 8
509	Please tell me if (NAME) received any of the following vaccinations:			
509A	A BCG vaccination against tuberculosis, that is, an injection in the arm that usually causes a scar?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8
509B	Polio vaccine, that is, drops in the mouth?	YES . . . . 1 NO . . . . 2 (SKIP TO 509E) ← DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 509E) ← DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 509E) ← DON'T KNOW 8
509C	Was the first polio vaccine received in the first two weeks after birth or later?	FIRST 2 WEEKS . . . 1 LATER 2	FIRST 2 WEEKS . . . 1 LATER 2	FIRST 2 WEEKS . . . 1 LATER 2
509D	How many times was the polio vaccine received?	NUMBER OF TIMES . . . . . [ ]	NUMBER OF TIMES . . . . . [ ]	NUMBER OF TIMES . . . . . [ ]
509E	A DPT/Hep B/Influenza vaccination, that is, an injection given in the thigh, to prevent him/her from getting tetanus, whooping cough, diphtheria, sometimes given at the same time as polio?	YES . . . . 1 NO . . . . 2 (SKIP TO 509G) ← DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 509G) ← DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 509G) ← DON'T KNOW 8
509F	How many times was a DPT/ HepB/Influenza vaccination received?	NUMBER OF TIMES . . . . . [ ]	NUMBER OF TIMES . . . . . [ ]	NUMBER OF TIMES . . . . . [ ]
509G	A measles injection - that is, a shot in the arm at the age of 9 months or older - to prevent him/her from getting measles?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8
509H	An injection to prevent yellow fever- a shot in the arm at the age of 9 months or older (sometimes given at the same time as measles)?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8
510	Were any of the vaccinations (NAME) received during the last two years given as part of a national immunization day campaign?	YES . . . . 1 NO . . . . 2 NO VACCINATION IN THE LAST 2 YRS. 3 DON'T KNOW . . . . . 8 (SKIP TO 512) ←	YES . . . . 1 NO . . . . 2 NO VACCINATION IN THE LAST 2 YRS. 3 DON'T KNOW . . . . . 8 (SKIP TO 512) ←	YES . . . . 1 NO . . . . 2 NO VACCINATION IN THE LAST 2 YRS. 3 DON'T KNOW . . . . . 8 (SKIP TO 512) ←

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____
511	At which national immunization day campaigns did (NAME) receive vaccinations? RECORD ALL CAMPAIGNS MENTIONED.	INTEGRATED MEASLES/ POLIO (NOVEMBER 2006) . . . . A IMCI/CHILD HEALTH CAMPAIGN (NOV. 2007) . . . . B	INTEGRATED MEASLES/ POLIO (NOVEMBER 2006) . . . . A IMCI/CHILD HEALTH CAMPAIGN (NOV. 2007) . . . . B	INTEGRATED MEASLES/ POLIO (NOVEMBER 2006) . . . . A IMCI/CHILD HEALTH CAMPAIGN (NOV. 2007) . . . . B
512	CHECK 506: DATE SHOWN FOR VITAMIN A DOSE	DATE FOR MOST RECENT VITAMIN A DOSE OTHER (SKIP TO 514)	DATE FOR MOST RECENT VITAMIN A DOSE OTHER (SKIP TO 514)	DATE FOR MOST RECENT VITAMIN A DOSE OTHER (SKIP TO 514)
513	According to (NAME)'s health card, he/she received a vitamin A dose (like this/any of these) in (MONTH AND YEAR OF MOST RECENT DOSE FROM CARD). Has (NAME) received another vitamin A dose since then? SHOW COMMON TYPES OF AMPULES/CAPSULES.	YES . . . . 1 (SKIP TO 515) NO . . . . 2 (SKIP TO 516) DON'T KNOW 8	YES . . . . 1 (SKIP TO 515) NO . . . . 2 (SKIP TO 516) DON'T KNOW 8	YES . . . . 1 (SKIP TO 515) NO . . . . 2 (SKIP TO 516) DON'T KNOW 8
514	HAS (NAME) ever received a vitamin A dose (like this/any of these)? SHOW COMMON TYPES OF AMPULES/CAPSULES.	YES . . . . 1 NO . . . . 2 (SKIP TO 516) DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 516) DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 516) DON'T KNOW 8
515	Did (NAME) receive a vitamin A dose within the last six months?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8
516	In the last seven days, did (NAME) take iron pills, sprinkles with iron, or iron syrup (like this/any of these)? SHOW COMMON TYPES OF PILLS/SPRINKLES/SYRUPS.	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8
517	Has (NAME) taken any drug for intestinal worms in the last six months?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8
518	Has (NAME) had diarrhea in the last 2 weeks?	YES . . . . 1 NO . . . . 2 (SKIP TO 533) DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 533) DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 533) DON'T KNOW 8
519	Was there any blood in the stools?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
801	CHECK 601 AND 602: CURRENTLY MARRIED/ LIVING WITH A MAN □ FORMERLY MARRIED/ LIVED WITH A MAN □ NEVER MARRIED AND NEVER LIVED WITH A MAN □		→ 803 → 807
802	How old was your husband/partner on his last birthday?	AGE IN COMPLETED YEARS □□	
803	Did your (last) husband/partner ever attend school?	YES .... 1 NO 2	→ 806
804	What was the highest level of school he attended: primary, middle/JSS, secondary/SSS, or higher?	PRIMARY .... 1 MIDDLE/JSS .... 2 SECONDARY/SSS .... 3 HIGHER .... 4 DON'T KNOW 8	→ 806
805	What was the highest grade he completed at that level?	GRADE .... □□ DON'T KNOW 98	
806	CHECK 801: CURRENTLY MARRIED/ LIVING WITH A MAN □ FORMERLY MARRIED/ LIVED WITH A MAN □ What is your husband's/partner's occupation? That is, what kind of work does he mainly do? What was your (last) husband's/ partner's occupation? That is, what kind of work did he mainly do?	□□ _____ _____	
807	Aside from your own housework, have you done any work in the last seven days?	YES .... 1 NO 2	→ 811
808	As you know, some women take up jobs for which they are paid in cash or kind. Others sell things, have a small business or work on the family farm or in the family business. In the last seven days, have you done any of these things or any other work?	YES .... 1 NO 2	→ 811
809	Although you did not work in the last seven days, do you have any job or business from which you were absent for leave, illness, vacation, maternity leave or any other such reason?	YES .... 1 NO 2	→ 811
810	Have you done any work in the last 12 months?	YES .... 1 NO 2	→ 818
811	What is your occupation, that is, what kind of work do you mainly do?	□□ _____ _____ _____	
812	CHECK 811: WORKS IN AGRICULTURE □ DOES NOT WORK IN AGRICULTURE □		→ 814
813	Do you work mainly on your own land or on family land, or do you work on land that you rent from someone else, or do you work on someone else's land?	OWN LAND .... 1 FAMILY LAND .... 2 RENTED LAND .... 3 SOMEONE ELSE'S LAND 4	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
814	Do you do this work for a member of your family, for someone else, or are you self-employed?	FOR FAMILY MEMBER . . . . 1 FOR SOMEONE ELSE . . . . 2 SELF-EMPLOYED 3	
815	Do you usually work at home or away from home?	HOME . . . . 1 AWAY 2	
816	Do you usually work throughout the year, or do you work seasonally, or only once in a while?	THROUGHOUT THE YEAR . . . . 1 SEASONALLY/PART OF THE YEAR . 2 ONCE IN A WHILE 3	
817	Are you paid in cash or kind for this work or are you not paid at all?	CASH ONLY . . . . 1 CASH AND KIND . . . . 2 IN KIND ONLY . . . . 3 NOT PAID 4	
818	CHECK 601: CURRENTLY MARRIED/LIVING WITH A MAN ☐ NOT IN UNION ☐		→ 827
819	CHECK 817: CODE 1 OR 2 CIRCLED ☐ OTHER ☐		→ 822

820	Who usually decides how the money you earn will be used: mainly you, mainly your husband/partner, or you and your husband/partner jointly?	RESPONDENT 1
		HUSBAND/PARTNER 2
		RESPONDENT AND
		   HUSBAND/PARTNER JOINTLY . . . 3
		OTHER _____ 6
		         (SPECIFY)	

821	Would you say that the money that you earn is more than what your husband/partner earns, less than what he earns, or about the same?	MORE THAN HIM . . . . 1 LESS THAN HIM . . . . 2 ABOUT THE SAME . . . . 3 HUSBAND/PARTNER DOESN'T BRING IN ANY MONEY . . . . 4 DON'T KNOW 8	→ 823

822	Who usually decides how your husband's/partner's earnings will be used: you, your husband/partner, or you and your husband/partner jointly?	RESPONDENT 1
		HUSBAND/PARTNER 2
		RESPONDENT AND
		   HUSBAND/PARTNER JOINTLY . . . 3
		HUSBAND/PARTNER HAS
		   NO EARNINGS 4
		OTHER _____ 6
		         (SPECIFY)	

823	Who usually makes decisions about health care for yourself: you, your husband/partner, you and your husband/partner jointly, or someone else?	RESPONDENT = 1 HUSBAND/PARTNER = 2 RESPONDENT & HUSBAND/PARTNER JOINTLY = 3 SOMEONE ELSE = 4 OTHER = 6 1 2 3 4 6	
824	Who usually makes decisions about making major household purchases?	1 2 3 4 6	
825	Who usually makes decisions about making purchases for daily household needs?	1 2 3 4 6	
826	Who usually makes decisions about visits to your family or relatives?	1 2 3 4 6	
826A	Who makes decisions about how many children to have?	1 2 3 4 6	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
901	Now I would like to talk about something else. Have you ever heard of an illness called AIDS?	YES . . . . 1 NO 2	→ 942
902	Can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has no other sex partners?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
903	Can people get the AIDS virus from mosquito bites?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
904	Can people reduce their chance of getting the AIDS virus by using a condom every time they have sex?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
905	Can people get the AIDS virus by sharing food with a person who has AIDS?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
906	Can people reduce their chance of getting the AIDS virus by not having sexual intercourse at all?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
907	Can people get the AIDS virus because of witchcraft or other supernatural means?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
908	Is it possible for a healthy-looking person to have the AIDS virus?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
909	Can the virus that causes AIDS be transmitted from a mother to her baby: During pregnancy? During delivery? By breastfeeding?	YES NO DK DURING PREG. . . . . . 1 2 8 DURING DELIVERY. . . 1 2 8 BREASTFEEDING . . . 1 2 8	

910	CHECK 909:
	    AT LEAST ☐ OTHER ☐
	    ONE "YES" ↓
			→ 912

911	Are there any special drugs that a doctor or a nurse can give to a woman infected with the AIDS virus to reduce the risk of transmission to the baby?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
912	Have you heard about special antiretroviral drugs (Nevirapine) that people infected with the AIDS virus can get from a doctor or a nurse to help them live longer?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	

913	CHECK 208 AND 215: NO BIRTHS ☐
	
	    LAST BIRTH SINCE ☐ LAST BIRTH ☐
	    JANUARY 2005 BEFORE JANUARY 2005
			→ 922
			
			→ 922

914	CHECK 407 FOR LAST BIRTH:
	        HAD NO
	  ANTENATAL ☐ ANTENATAL ☐
	    CARE ↓ CARE
			→ 922

914A	CHECK FOR PRESENCE OF OTHERS. BEFORE CONTINUING, MAKE EVERY EFFORT TO ENSURE PRIVACY.		
915	During any of the antenatal visits for your last birth, did anyone talk to you about: Babies getting the AIDS virus from their mother? Things that you can do to prevent getting the AIDS virus? Getting tested for the AIDS virus?	YES NO DK AIDS FROM MOTHER 1 2 8 THINGS TO DO . 1 2 8 TESTED FOR AIDS . 1 2 8	
916	Were you offered a test for the AIDS virus as part of your antenatal care?	YES . . . . 1 NO 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1001	Have you ever heard of an illness called tuberculosis or TB?	YES . . . . 1 NO 2	→ 1005

1002	How does tuberculosis spread from one person to another?
	
	PROBE: Any other ways?
	
	RECORD ALL MENTIONED.
		THROUGH THE AIR WHEN
		    COUGHING OR SNEEZING . . . . A
		THROUGH SHARING UTENSILS. . . . . . B
		THROUGH TOUCHING A PERSON
		    WITH TB C
		THROUGH FOOD . . . . D
		THROUGH SEXUAL CONTACT . . . . . . E
		THROUGH MOSQUITO BITES. . . . . F
		
		OTHER _____ X
		            (SPECIFY)
		DON'T KNOW . . . . Z	

1003	Can tuberculosis be cured?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
1004	If a member of your family got tuberculosis, would you want it to remain a secret or not?	YES, REMAIN A SECRET . . . . 1 NO . . . . 2 DON'T KNOW/NOT SURE/ DEPENDS 8	
1005	Now I would like to ask you some other questions relating to health matters. Have you had an injection for any reason in the last 12 months? IF YES: How many injections have you had? IF NUMBER OF INJECTIONS IS GREATER THAN 90, OR DAILY FOR 3 MONTHS OR MORE, RECORD '90'. IF NON-NUMERIC ANSWER, PROBE TO GET AN ESTIMATE.	NUMBER OF INJECTIONS . . . ▯▯ NONE 00	→ 1009
1006	Among these injections, how many were administered by a doctor, a nurse, a pharmacist, a dentist, or any other health worker? IF NUMBER OF INJECTIONS IS GREATER THAN 90, OR DAILY FOR 3 MONTHS OR MORE, RECORD '90'. IF NON-NUMERIC ANSWER, PROBE TO GET AN ESTIMATE.	NUMBER OF INJECTIONS . . . ▯▯ NONE 00	→ 1009

1007	The last time you had an injection given to you by a health worker, where did you go to get the injection?
	
	PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE.
	
	IF UNABLE TO DETERMINE IF HOSPITAL, HEALTH CENTER OR CLINIC IS PUBLIC OR PRIVATE MEDICAL, WRITE THE NAME OF THE PLACE.
	
	_____
	(NAME OF PLACE)
		PUBLIC SECTOR
		    GOVT. HOSPITAL/POLYCLINIC 11
		    GOVT. HEALTH CENTER 12
		    GOVT. HEALTH POST/CHPS 13
		    STAND-ALONE VCT CENTER 14
		    FAMILY PLANNING CLINIC 15
		    MOBILE CLINIC 16
		    FIELD/WORKER/OUTREACH/
		        PEER EDUCATOR 17
		    OTHER PUBLIC _____ 18
		                    (SPECIFY)
		
		PRIVATE MEDICAL SECTOR
		    PRIVATE HOSPITAL/CLINIC/
		        PRIVATE DOCTOR 21
		    STAND-ALONE VCT CENTER 22
		    PHARMACY 23
		    CHEMICAL/DRUG STORE 24
		    FP/PPAG CLINIC 25
		    MATERNITY HOME 26
		    OTHER PRIVATE
		        MEDICAL _____ 27
		                    (SPECIFY)
		OTHER PLACE
		    AT HOME 31
		
		OTHER _____ 96
		            (SPECIFY)	

1008	Did the person who gave you that injection take the syringe and needle from a new, unopened package?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
1009	Do you currently smoke cigarettes?	YES . . . . 1 NO 2	→ 1011
1010	In the last 24 hours, how many sticks of cigarettes did you smoke?	CIGARETTES . . . . ▯▯	
1011	Do you currently smoke or use any other type of tobacco?	YES . . . . 1 NO 2	→ 1012A

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

1015E	Why do you <u>not</u> have a valid NHIS card?	REGISTERED, NOT PAID FULLY....... 1
		REGISTERED, CARD NOT
		  RECEIVED 2
		REGISTERED, WAITING PERIOD....... 3
		NOT RENEWED REGISTRATION....... 4
		LOST NHIS CARD 5
		OTHER _____ 6
		      (SPECIFY)
			→1015I
			
			→ 1015G
			→ 1015I

1015F	How many weeks did it take you to obtain your NHIS card?	NUMBER OF WEEKS ☐☐ DON'T KNOW 98	→ 1015I
1015G	Do you plan to renew the NHIS card?	YES .... 1 NO .... 2 DON'T KNOW/NOT SURE 8	→1015I →1015I

1015H	Why do you <u>not</u> want to renew the NHIS card?
	
	Anything else?
	
	RECORD ALL MENTIONED.
		HAVE NOT BEEN SICK .... A
		PREMIUM EXPENSIVE............... B
		STILL PAY OUT OF POCKET C
		WORSE QUALITY CARE WITH CARD... D
		WAITING TIME FOR CARD LONG ..... E
		USED SERVICES NOT COVERED ..... F
		DID NOT USE ANY HEALTH SERVICES G
		USE CLINICS OR TRADITIONAL
		  PRACTITIONERS WHO ARE NOT
		    COVERED .... H
		OTHER _____ X
		      (SPECIFY)	

1015I	Do you have to pay out of pocket for drugs and services?	YES .... 1 NO .... 2 SOMETIMES 3	
1015J	Are there any services that you need from a health provider that are not covered by NHIS?	YES .... 1 NO 2	→1015L

1015K	What are these services?
	
	Anything else?
	
	RECORD ALL MENTIONED.
		FAMILY PLANNING .... A
		LABORATORY INVESTIGATIONS ..... B
		ANTENATAL CARE C
		POSTNATAL CARE .... D
		CARE FOR NEWBORN FOR UP TO
		   3 MONTHS .... E
		OTHER _____ X
		      (SPECIFY)	

1015L	In your opinion, do NHIS card holders get better/same/worse service than others?	BETTER .... 1 SAME .... 2 WORSE .... 3 DON'T KNOW/NOT SURE 8	

1015M	In your opinion, did you receive good service last time you were treated at a clinic or hospital?
	
	  IF NO, PROBE
		YES 1
		NO, WAITING TIMES WERE TOO LONG 2
		NO, STAFF NOT POLITE 3
		NO, DID NOT RECEIVE ENOUGH
		  INFORMATION ABOUT ILLNESS
		  AND TREATMENT 4
		OTHER _____ 6
		      (SPECIFY)	

1016	I am going to ask you about the time you spent being physically active in the last 7 days. This is about the activities you do at work, as part of your house and yard work, to get from place to place in your spare time, exercise or sport. Now, think about all the vigorous activities which take hard physical effort that you did in the past 7 days: activties that make you breathe much harder than normal and may include heavy lifting, digging, jogging, or fast bicycling.Think about only those physical activities that you did at least 15 minutes at a time. In the last 7 days, on how many days did you do vigorous physical activities that lasted for at least 15mins each time? IF 'NONE' RECORD '0'	NUMBER OF DAYS .... ☐☐ DON'T KNOW 8	

INTERVIEWER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT RESPONDENT:

_____
_____
_____
_____
_____
_____
_____

COMMENTS ON SPECIFIC QUESTIONS:

_____
_____
_____
_____
_____

ANY OTHER COMMENTS:

_____
_____
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_____
_____

SUPERVISOR'S OBSERVATIONS

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NAME OF SUPERVISOR: _____ DATE: _____

EDITOR'S OBSERVATIONS

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NAME OF EDITOR: _____ DATE: _____