

**REGIONAL INSTITUTE FOR POPULATION STUDIES
UNIVERSITY OF GHANA**

**MATERNAL CHARACTERISTICS AND MALARIA
PREVALENCE AMONG CHILDREN IN GHANA**

BY

AHIATI, RICHARD

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ACCEPTANCE

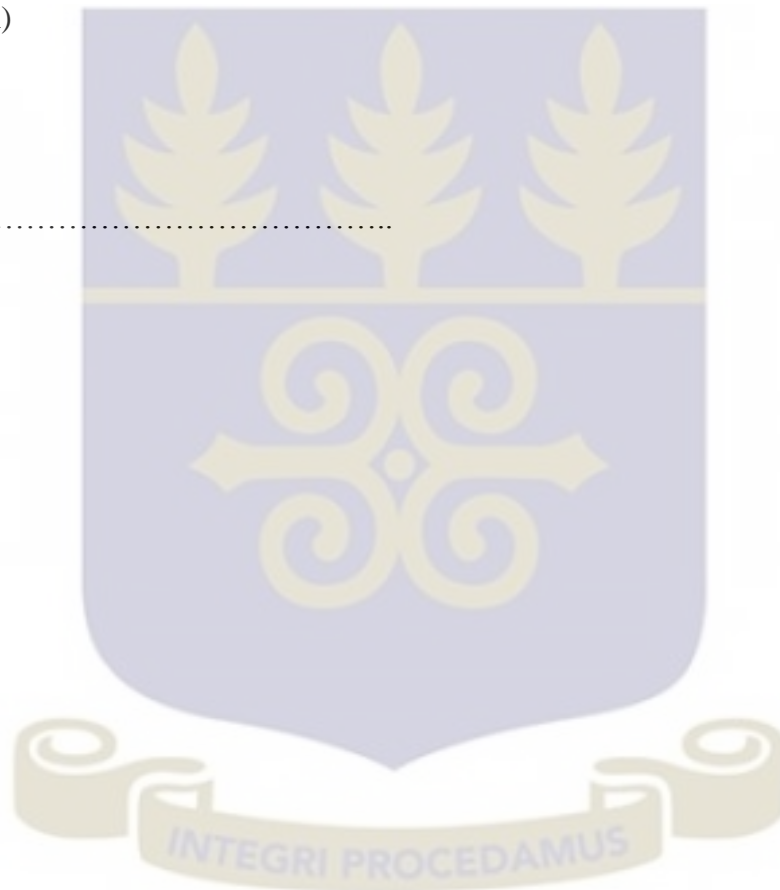
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SIGNED:

PROF. A.F. ARYEE

(SUPERVISOR)

DATE:



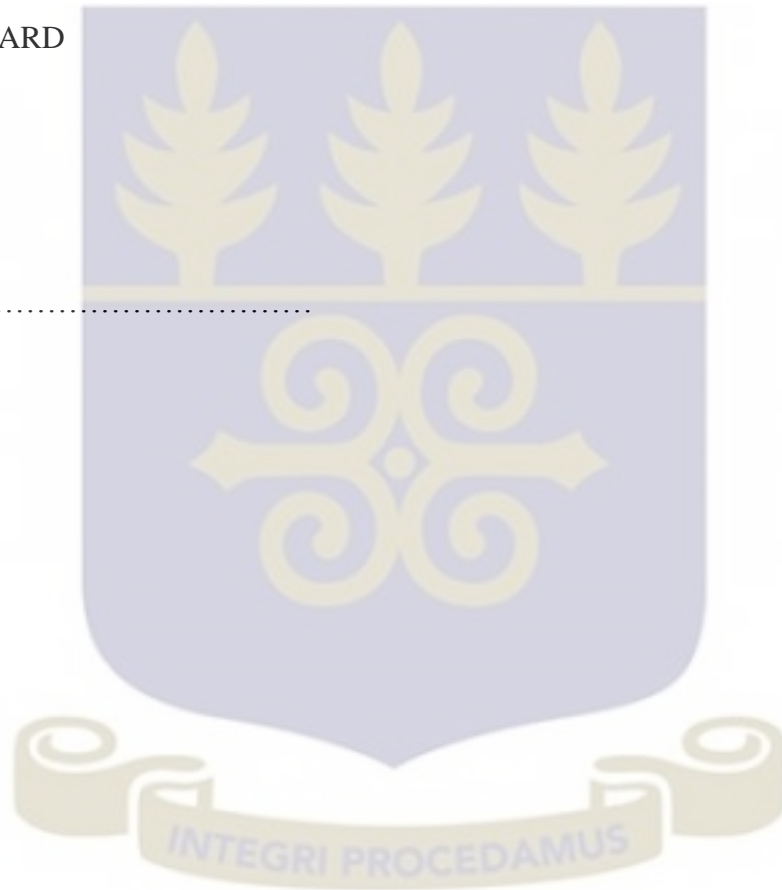
DECLARATION

I hereby declare that except for references to other researchers' works which have been duly acknowledged, this dissertation is the result of my own research and it has neither in part nor in whole been presented elsewhere for another degree.

SIGNED:

AHIATI, RICHARD
(STUDENT)

DATE:



DEDICATION

I dedicate this work to my wife Sefakor Adzo Abusah- Ahiati, my child Ahiati Woelinam Afi and my brothers and sisters.



ACKNOWLEDGEMENT

I wish to express my sincere gratitude to the Almighty God for the strength and health He provided me throughout this programme. I am grateful and will continue to serve you.

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MAY ALMIGHTY GOD BLESS YOU

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JULY, 2015.

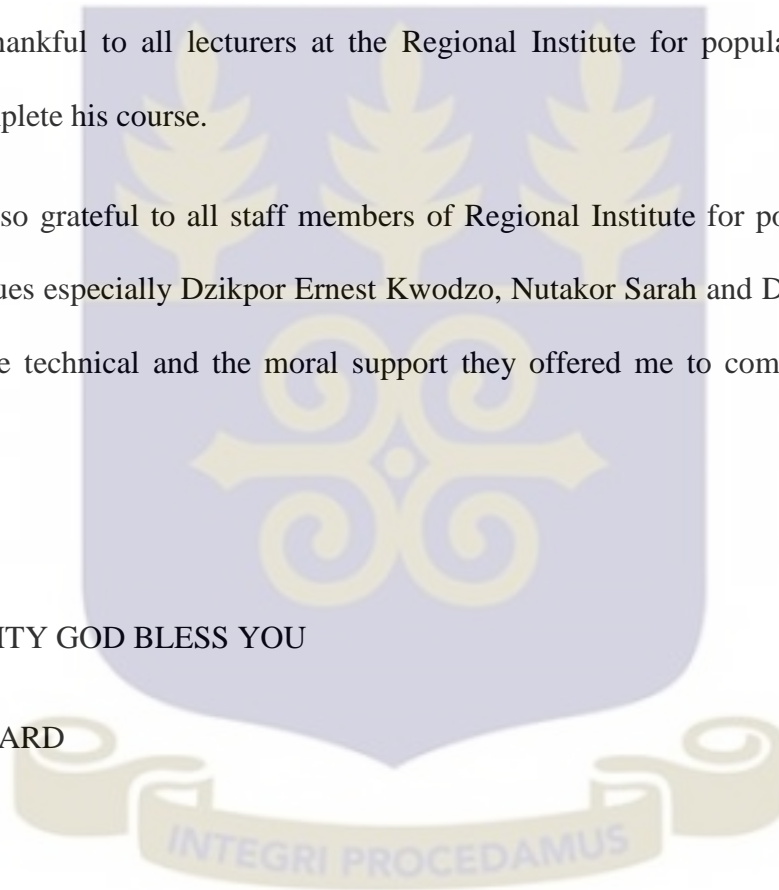


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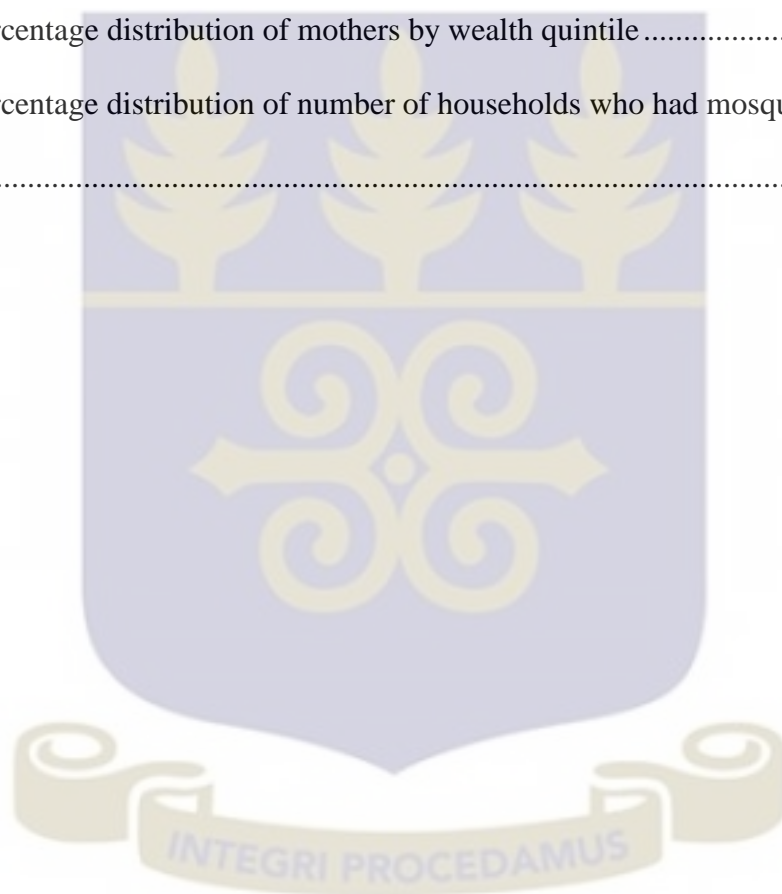


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ABSTRACT

Malaria threatens the lives of billions of people globally and leads to over one million deaths annually (WHO 2010). More than 90 per cent of the clinical cases and deaths in sub-Saharan Africa are caused by malaria (WHO 2011). Malaria kills an estimated one million children under five years of age per year or one child in every 30 seconds. Malaria is hyper-endemic in Ghana, accounting for 44% of outpatient attendance, 13% of all hospital deaths, and 22% of mortality among children less than five years of age. The study examined the maternal characteristics that influence the prevalence of malaria among children less than five years in Ghana, using a binary logistic regression model. Data for the study was obtained from 2008 Ghana Demographic and Health Survey (GDHS). The results showed that maternal characteristics such as, education, region of residence and religion were important predictors of malaria prevalence among children less than five years. However, it was found that the maternal characteristics such as; age, type of place of residence (rural and urban), ethnicity, marital status and wealth quintile were not good predictors of malaria prevalence. It was recommended, among other things that Government should also use religious leaders in scaling up the campaign to prevent and treat malaria. That is the communication and awareness committee of ministry of health and roll back malaria initiative programme in the country should see the importance of integrating religious gatekeepers in order to provide awareness about the position of religion on any policy or program to be implemented

CHAPTER ONE INTRODUCTION

1.1 Background to the study

Globally, an estimated 3.4 billion people are at risk of malaria. World Health Organization (WHO 2013) estimated that 207 million cases of malaria occurred globally in 2012 and 627000 deaths. Most cases (80%) and deaths (90%) occurred in Africa and most deaths (79%) were in children under 5 years of age (WHO, 2013).

The hundreds of millions of cases worldwide, Africa accounts for roughly 90% (Sachs & Melaney, 2002). The estimated 90% global malaria burden borne by Africa falls heavily on children under-5 years and pregnant women and accounts for about 40% of public expenditure in high transmission areas (WHO, 2010).

Within Africa, malaria is highly endemic in Nigeria, one of the leading five countries with the highest malaria burden in the world, along with the Democratic Republic of Congo, Ethiopia, Tanzania and Kenya. Malaria currently accounts for about 60% of all outpatient visits to health facilities, 30% of total hospitalizations, 30% childhood deaths, 25% infant deaths, 11% maternal deaths and an estimated 300,000 deaths annually in Nigeria (Federal Ministry of Health, 2008; Onyebuchi, 2012). As of 1983, malaria accounted for roughly 30% of all deaths in Zaire (now Democratic Republic of the Congo). By 1986, it had grown to account for over 50% of all deaths in the country (Garrett, 1994).

Indeed malaria prevalence has been high per the above statistics but very little is known about maternal characteristics and malaria prevalence among children. Prevalence is the number of cases of a specific disease present in a given population at certain time (Dorland Medical Dictionary for Health, Consumer, 2007).

Maternal characteristics are the factors that are likely to influence the prevalence (the number of malaria cases) of malaria among children less than five years. Mothers play crucial roles in the life of every child. The health of a child depends largely on the wellbeing of the mother. The child's life will be negatively affected if the characteristics of the mother are not improved or empowered. The maternal characteristics are; mother's age, her educational level, wealth quintile, religion, region of residence, type of place of residence (urban and rural), marital status and ethnicity.

The health of a child is influenced by the age of the mother. Older mothers are well experienced and more likely to be exposed to better and innovative ways of doing things than their counterparts who are younger based on personal experience. Malaria infection among children is associated with adverse maternal-fetal outcome which is more evident among teenage mothers. (Omolola et al., 2012).

Educational level of a mother is very critical in the life of every child. Villamor et al. (2003) found that maternal schooling strongly reduces malaria risk in children when other socioeconomic factors are controlled for. When a mother is educated, it reduces her child's chances of getting malaria, because educated mothers are more likely to be well informed about the management and control of malaria. Where mothers had no education, children had higher malaria prevalence rate.

Wealth quintile plays a significant role in the life of every mother which affects her positively or negatively. It is more likely that women who are in the higher wealth quintiles or rich categories (richer and richest) may have resources to buy intermittent treatment net and insecticides, get educated, live in clean and hygienic environment, have better access to information and resources for treatment and generally engage in preventive measures than their counterparts in the lower wealth quintiles (poorer and poorest), (Olaide and Gbemiga, 2013).

Religion is also one of the characteristics of mothers that influence malaria prevalence among children. Followers' adherence to beliefs and practices could expose children to malaria infection. Religious practices such as all-night services, performance of annual rituals or sacrifices which sometimes happen deep into the night may expose these children to mosquito bites which may trigger malaria infection among them (Ndugga et al, 2009).

Maternal characteristics are incomplete without region of residence, type of place of residence (urban and rural), marital status and ethnicity. Region of residence as a characteristic of a mother is important because every region exhibits different characteristics in relation to malaria prevalence. There are differences in temperature, rainfall and humidity patterns as well as the ecology, account for these variations (Felix Ankomah and Asenso-Okyere, 2003).

Type of place of residence is also important because the prevalence of malaria among children living in the rural areas is higher than those in the urban areas. (Ghana Urban Malaria Study, 2013). Marital status is one of the maternal characteristics that influence malaria prevalence among children. This is because children of divorced mothers may not have the complete care that they need (from mother and father) in order to survive (Samuel and Anastasia, 2014). Finally, ethnicity as a characteristic of a mother also influences malaria prevalence among children because specific socio-cultural practices may vary among different ethnic groups; as they affect childhood morbidity and mortality (Fayehun and Omololu, 2011).

Malaria is hyper-endemic in Ghana, accounting for 44% of outpatient attendance, 13% of all hospital deaths, and 22% of mortality among children less than five years of age (WHO 2005 and Abuaku et al., 2005). Though malaria is responsible for 9% of overall mortality in Ghana, at least 40% of malaria deaths occur among infants and children under the age of five (Asenso-Okyere and Dzator, (1997).

This study seeks to find out the influence of maternal characteristics on malaria prevalence among children less than five years in Ghana. In the study, fever will be used as a proxy for testing for malaria prevalence.

1.2 Statement of the problem

According to Factsheet on Malaria in Ghana, UNICEF Factsheet July 2007, 3.5 million people suffer from malaria every year. Malaria is endemic and perennial in all parts of Ghana, with seasonal variations that are more pronounced in the north. Ghana's entire population of 24.2 million in 2010 was at risk of malaria infection and children under five years of age and pregnant women were at higher risk of severe illness due to lower immunity (President's Malaria Initiative, Ghana Malaria Operational Plan FY 2014).

Global funding towards malaria control has increased significantly in recent years, rising from \$0.3 billion in 2003 to nearly \$1.7 billion in 2009 due largely to contributions from the Global Fund to fight AIDS, tuberculosis and malaria, along with more recent commitments from the World Bank, the US President's Malaria Initiative, and the Bill & Melinda Gates Foundation, among others (World Malaria Day 2010: Africa Update).

The World Health Organization (WHO) initiated Roll Back Malaria program (RBM), of which Ghana is a beneficiary, to increase the availability and the procurement and coverage of mosquito nets particularly insecticide treated nets (ITNs) by NGOs. Mosquito nets have reduced disease and mortality associated with malaria. There was 48-50% reduction in malaria prevalence as a result of the use of the ITNs (Lengeler et al, 2004). ITN could prevent approximately 7% of global under five mortality if used universally. Between 2004 and 2013, more than 700 million nets were delivered to countries in sub-Saharan Africa. However, only an estimated 36% of the population living in malaria-risk areas in sub-Saharan Africa were sleeping under an ITN in 2013 (MDG Report 2014).

Ghana took a pragmatic step by distributing insecticide treated nets with support from Global Fund within a framework of public private partnership. Ministry of health distributed free bed nets to pregnant and children under five years on the occasion of immunization campaigns. Ghana Health Service also promotes the ownership and use of mosquito nets (ITNs) as one of the primary interventions for reducing malaria transmission in the country through the distribution of free nets in child welfare and antenatal clinics of the public health facilities (Ghana Health Service report, 2013). The Government of Ghana has since 2000 waived taxes on the importation of mosquito nets into the country as additional measure of making it more affordable. These interventions have resulted in an increase in household ownership of mosquito bed nets between the 2003 and 2008 (Ghana Statistical Service, 2008).

It is true that the interventions above resulted into a significant reduction in malaria infection; the disease is still prevalent in Ghana especially among children less than five years. The distribution and ownership of mosquito bed net alone was not enough to solve health problems associated with malaria in Ghana. There is one thing to own a bed net and another thing to use bed net. People will own the distributed net but may not use it. Even if it were used; malaria problem is still not solved entirely. There are other factors that can influence malaria prevalence especially, among children less than five years that ownership and use of bed net cannot solve. For instance, when a mother is poor, she cannot afford basic necessities of life for her child. These factors are the maternal characteristics that health policies, financial aids, programmes and interventions failed to address. It is based on this premise that this study is designed to explore maternal characteristics that influence malaria prevalence among children less than five years in Ghana.

1.3 Research questions

1. How does mother's education influence malaria prevalence among children in Ghana?

2. Does mother's region of residence influence malaria prevalence among children in Ghana?
3. How does mother's religious affiliation influence malaria prevalence among her children?

1.4 Objectives of the study

The main objective of the study is to examine maternal characteristics that influence malaria prevalence among children less than five years in Ghana.

1. To find out how mother's education influences malaria prevalence among children in Ghana.
2. To find out whether mother's region of residence determines the number of malaria cases among children less than five years in Ghana.
3. To find out the influence of mother's religious affiliation on malaria prevalence among children less than five years in Ghana.
4. Finally, to make the necessary recommendations based on the outcome of the study for policy decisions.

1.5 Rationale of the study

Malaria contributes to death in children through cerebral malaria, severe malaria anaemia, respiratory defects and low birth weight. In pregnant women, the disease causes anaemia and leads to miscarriage, still birth, underweight babies and maternal death.

The government and its development partners in health and allied sectors have been making efforts to promote ownership and use of mosquito bed net in the country in order to control malaria infection in both the young children and pregnant women. Mosquito nets, particularly ITNs are very effective in the management and control of malaria. But the disease still affects a lot of people especially children under five years and pregnant women.

Furthermore, malaria control can contribute to the achievement of several of the Millennium Development Goals (MDGs). It will contribute to MDG 4 (child survival) and MDG 6 (malaria reduction) MDG 4 target: 'By 2015 reduce by two thirds the mortality rate among children under five. (World Malaria Day 2010: Africa Update).

Malaria is a disease of poverty. Its control will help reduce the gap between the poorest and least-poor households. Malaria directly affects women of reproductive age and is an important cause of maternal morbidity. Placental malaria infection contributes both to premature delivery and low birth weight, which are major contributors to early childhood mortality (Worrall et al., 2005).

Besides, the study will contribute to literature regarding maternal characteristics and malaria prevalence among children in Ghana. Also, it will recommend policies and programmes that will help politicians, NGOs, development partners, government and all stakeholders to devote the needed attention and resources to combating this disease.



CHAPTER TWO LITERATURE REVIEW

2.1 Brief introduction to literature review

The fight against malaria has been a global health concern. In 1998, the Roll Back Malaria (RBM) initiative was launched by World Health Organization (WHO). The overall goal of the RBM in Ghana was to facilitate human development by reducing the malaria disease burden by fifty (50) percent by 2010 (Ministry of Health, 1999). Some of the main intervention components which were recommended include, promoting insecticide treated nets (ITNs), drainage, mosquito proofing and general sanitation, in-door and outdoor residual spraying and chemoprophylaxis for pregnant women and non-immunes. (African Malaria Report, 2003).

Since the inception of the Roll Back Malaria (RBM) initiative in 1998 and particularly since the Abuja summit in 2000, malaria prevention and control have become both domestic and international priorities. International spending on malaria has increased at least two folds. The Abuja declaration which was signed at Abuja, Nigeria, among 44 countries included a plan of action against malaria. In the declaration, African heads of states agreed to meet the following targets by 2005:

- (i) At least sixty (60) percent coverage of pregnant women at risk of malaria with the most suitable combination of personal and community protective measures.
- (ii) At least sixty (60) percent of all pregnant women at risk of malaria, especially those in their first pregnancies would have access to intermittent preventive treatment (Africa Malaria Report, 2003).

To reach the Abuja summit goal, three pronged approach was recommended: Intermittent preventive treatment, use of insecticide treated nets, effective case management malaria

illness (Africa Malaria Report, 2003). After some years, most countries in Africa committed themselves to the plan by reducing malaria by fifty (50) percent in 2010.

This study draws on research studies from a range of fields, including infectious disease, and anthropology of malaria. The transmission patterns or etiology of malaria, the effect of maternal characteristics such as education, age, place of residence, wealth quintile, region, religion, marital status and malaria prevalence among children, and the impact of malaria in Ghana must all be part of the discussion in order to fully appreciate the problem at hand.

Malaria affects every individual especially, children less than five years. A wide range of factors have been found to be linked with its prevalence. As such, the literature builds a strong case for the proposed hypothesis: improved maternal characteristics will lead to a lower prevalence rate of malaria among children.

2.2 Overview of Malaria prevalence

Malaria is a parasite which thrives in the stomachs of mosquitoes of the *Anopheles* genus as well as the bodies of humans and animals. The malarial life-cycle begins as the female *Anopheles* mosquito injects her proboscis into the skin of an infected human or animal and takes a blood feast, at which point malarial parasites enter the mosquito's body. Male and female gametocytes of the parasite then spend the next one to three weeks in the stomach of the mosquito, where they produce thousands of sporozoites in a sac in the mosquito's gut. Once this

sac reaches its limit, it explodes and releases thousands of parasites into the stomach of the mosquito which, not surprisingly, cause no harm to the insect itself (Garrett, 1994).

Some of these parasites eventually make their way into the salivary glands of the mosquito, from which they are injected into the next human or animal on which the insect feasts. Having been injected into the human bloodstream *via* mosquito bite, the malaria parasites make their way to the liver, where they invade oxygen-carrying red blood cells. Once inside

the red blood cell, they continue multiplying to the point at which the cell ruptures (Garrett, 1994).

The result for the human or animal is anaemia (lack of oxygen in the blood) which if left unchecked, eventually leads to the failure of the body's major organ systems and death. During the process of human infection, some male and female plasmodium gametocytes are manufactured and infect the next mosquito to bite the human. Thereby the malarial life cycle continues (Garrett, 1994). The three most common varieties of the parasite are *Plasmodium vivax*, *Plasmodium malariae* and *Plasmodium falciparum*. Of these, *P. falciparum* is the most lethal (Gallup & Sachs, 2001). Mosquitoes are located in the tropical regions of the world, where high temperatures promote quick turnover in the malarial life cycle. As outside temperatures drop, the life cycle slows, thereby slowing the parasite's reproductive cycle. With lower temperatures, fewer parasites are produced, and the effect of medicinal and insecticidal interventions increases. This occurs with progressively lower temperatures until transmission of malaria becomes extremely unlikely at temperatures below 18 degrees Celsius (Sachs & Melaney, 2002). By these means countries in the northern hemisphere such as Algeria, Egypt, Libya, Morocco and Tunisia have managed to fully eradicate malaria from within their borders. In these countries, the disease was mainly caused by mosquitoes that were much easier to control than those in the sub-Saharan Africa (Africa Malaria Report 2003).

2.3 Maternal Education and Malaria Risk in Children

Villamor et al. (2003) found that maternal schooling strongly reduced malaria risk when other indicators of socioeconomic status were controlled for; where mothers had no education, children had 43% higher adjusted prevalence. In Mali, maternal completion of primary school halved the risk of severe malaria in their children; even though most educated

mothers (84.2%) did not have adequate knowledge about malaria (Safeukui-Noubissi et al. 2004).

There was a study done in Nigeria on mother's socio-economic status and malaria prevention. The study revealed that the educational attainments of mothers and ever- had malaria of at least one child was significant. Ever-had malaria of children was shown to be closely correlated with the educational level of mothers as malaria prevalence generally decreased with mother's educational levels; except among mothers with primary-level education. Of mothers that reported that their children ever-had malaria, 38.2% had no formal education, 19.8% primary education while 8.3% post-secondary education (Olaide and Gbemiga, 2013). Again, a study done in nine countries in sub-Saharan Africa showed that maternal education was strongly associated with childhood malaria risk in children. The magnitude of the association between higher maternal education and lower malaria risk in children was substantial and statistically significant. Controlling for other factors, completion of six years of primary school by the mother was associated with a reduction in the odds of malaria infection in her child of about 27% (Siri, 2014).

In Kuwait Teaching Hospital, Ali et al (2011) found literate mothers to be significantly more likely to vaccinate their children than illiterate mothers. Gakidou et al (2010) found the effect of maternal education on child health outcomes to have no ceiling, estimating that the education of women of reproductive age in recent decades may account for as much as half of the reduction in under-5 mortality in the 175 countries covered by their study. Returning to the root causes of the relationship between maternal education and child health, more educated mothers are better able to make use of modern health care. Engle et al, 1999, founds that higher maternal education improved the mother's ability to process information, acquire skills, and model behavior for their children.

2.4 The burden of malaria in rural and urban areas

The 2011 Multiple Indicator Cluster Survey (MICS) indicated that the burden of malaria was significantly lower in Accra, Kumasi and Tamale than in smaller communities located in the same ecological zone. Compared to children living in smaller communities of the same ecological zone, the prevalence of malaria parasite among children living in the largest cities of each zone was 73% to 86% lower in Accra, 79% to 85% lower in Kumasi, and 34% to 68% lower in Tamale (Ghana Urban Malaria Study, 2013). The 2011 MICS showed that malaria transmission and the prevalence vary greatly between neighborhoods of Accra and Kumasi. Transmission of malaria and prevalence of malaria in children are on average, were higher near areas of urban agriculture. The prevalence of malaria among children living in the poorest households in Accra and Kumasi was 50% to 100% higher than the average for children in these two cities (Ghana Urban Malaria Study, 2013).

On average, the populations of Accra and Kumasi were wealthier, better educated and had better access to health facilities than other Ghanaians. Findings from the 2011 MICS also showed that a higher percentage of residents in these cities had been exposed to malaria control messages.

Malaria is a major health problem with *plasmodium vivax* becoming a predominant species in Jimma town, south –west of Ethiopia. The prevalence was strongly associated with proximity of residence to potential mosquito breeding sites. Malaria was affecting significant proportions of the urban settlers. Human activities nevertheless, played an important role in bringing the mosquito breeding sites closer to the people (Abebe et al., 2011).

Sub-Saharan Africa is characterized by a wave of rapid urban population increase particularly in areas where the highest rates of *plasmodium falciparum* are common. Rapid urbanization brings about major changes in ecology, social structure and disease patterns in these

countries. It was estimated that 300 million people currently live in urban areas in Africa and two-thirds of them are at risk of malaria. Ethiopia towns were characterized by poor housing, lack of proper sanitation, poor drainage of surface water, weak health services and widespread economic disparity, which independently or together facilitate urban malaria transmission (Govoetchan et al. 2014).

It was revealed that general awareness about malaria was high among Jimma urban communities in the country. It was also considered as a major health problem. About 71.8% of the people were aware of the fact that plasmodium was the cause of malaria. A total of 126 mosquito larval habitats were identified in Sonsoro (rural) and Gansosso (Urban) between May 2012 and April 2013 of which 30.95% were recorded during the dry season. In both sites, the trend was basically the same and mosquito breeding habitats were of a more diversified nature depending on the season. In the wet season (May-October 2012), rainwater collections and various holes were the majority constituting 51.43% of all larval habitats recorded in rural Kandi and 76.92% in urban Kandi (Govoetchan et al. 2014)

Saadou et al. (2007) studied 2,235 children hospitalized for malaria in a rural (Lambaréné) and urban (Libreville) areas in Gabon between January 2001 and December 2002. From children screened, 33% and 48% were hospitalized for malaria in Libreville and Lambaréné, respectively (Saadou et al., 2007). The study indicated that, lack of proper sanitation and poor drainage of surface water were the predictors of malaria in those areas.

Astatkie and Feleke (2009) found out that both ownership and use of mosquito bed net were highest in the rural areas than urban areas of Ethiopia. The reason was that all the campaigns about ownership and use of mosquito bed nets were geared towards rural households. The urban areas possessed protective socio-economic factors against malaria risk such as education and income that enabled them to resort to other malaria preventive strategies.

Samuel and Anastasia (2014) examined the factors that predicted malaria cases among under five children in Ghana. Their study revealed that mothers in the rural areas reported more malaria cases among their children than their counterparts in the urban areas. This implied that rural poverty could be a reason for higher malaria cases among rural under five children compared to their urban counterparts.

A study done in Ouagadougou, Burkina Faso showed that plasmodium falciparum parasite rate was at 24.1% in the urban center, 38.6% in its periurban surroundings and 68.7% in neighbouring rural areas. This was largely due to the fact that the city grew outwards with perimeters consisting of relatively underdeveloped, poorly serviced settlements. Also, migrants from rural areas brought their rural practices with them, creating a multitude of vector breeding sites; and poor quality housing provided less protection against mosquito bites (Prathiba and Marshall, 2012).

A similar study was done in Libreville, Gabon and Cotonou in Benin. In Libreville, the result showed that malaria transmission was found to be the highest in the urban center (87.9% infective bites per person per year) and the lowest in the periurban surroundings (13.3% per person per year) as a consequence of slum-like conditions in the urban center being surrounded by more affluent periurban suburbs. And in Cotonou, malaria prevalence was highest in an intermediate zone (among children aged 6–12 of 9.0%). It was 2.6% in the urban center and 2.5% in the periphery. This was explained by the abundance of urban agriculture in the intermediate zone and a salty lagoon at the periphery making it less conducive to the primary malaria vector anopheles gambiae (Prathiba and Marshall, 2012).

2.5 Religion and malaria

In Uganda, religion was highly significantly associated with the use of mosquito nets and treatment. It was revealed that most of the mothers knew that malaria was transmitted by mosquitoes. About 8% of mothers had misconceptions about the causes of malaria. Some

respondents reported that malaria was caused by eating mangoes and others mentioned eating maize as the cause, the reason being that malaria was more common during the season when these crops were also abundant (Ndugga et al, 2009).

Majority of mothers were Protestants (43%) followed by Catholics (33%) with a small proportion of Muslims (13%). Some 11% belonged to other religious denominations including the born-again churches and Seventh Day Adventists (Ndugga et al, 2009). The study also showed that the only significant predictor of both use of ITNs to prevent malaria and seeking treatment for malaria of children was religious affiliation. Muslims were 59% less likely than Catholics to seek malaria treatment for children. Religious bodies influence exposure to and treatment of malaria since the community listened and believed religious leaders more than any other group. Of the religious communities, it was found out that Moslems listened to their leaders more than any other religious group. This was because they were very strict with their religion and tended to believe their leaders more than other groups. On the contrary, Moslems were less likely to seek malaria treatment for their sick children. This could be attributed to their low levels of education which in turn led to use of traditional medicines instead of the western medicines (Ndugga et al, 2009).

A set of nine low-income countries of sub-Saharan Africa were selected and by using the information provided by the Demographic and Health Surveys Program to study the impact of religion on mortality. It was revealed that apart from Christians, Traditionalists or, Animists as well as non-religious individuals seemed to have an advantage in terms of child survival when compared to Muslims, while the same was true for non-religious in terms of under-five survival. Further examination revealed significant differences in terms of the mother's educational level between Muslims and non-religious groups. It was argued that since these groups seem to have the same socioeconomic status, this differential can either be explained by some differences in practices towards health and sanitation (Angeliki, 2015).

Shirayama, et al. (2006) did a study in southeast Asian precisely in Lao PDR on modern medicine and indigenous beliefs. Lao PDR is a Buddhist community but many ethnic groups hold an animist belief system called 'Sadsana-pee'. Lao PDR was at high risk of malaria infection due to their belief in traditional ways of healing. The promotion of malaria prevention and treatment with modern medicine was not always welcomed by the villagers. They also believed that evil spirits caused malaria and relied on traditional medicine and religious ceremonies for treatment.

Religion plays a role in women's decisions to seek antenatal care. A study done in Ethiopia by Iulia (2011) showed that in urban areas, more Orthodox (27.5%), Muslim (28.3%), and Protestant (24.8%) women used antenatal care services than women following traditional religions (11.3%). In general, Muslim women were 30% more likely to seek such services, in contrast to women from traditional faiths who were 50% less likely to seek these services compared to Orthodox/Catholic women. In rural areas, Muslim women were 1 ½ times more likely to seek antenatal care while women from traditional religions were 40% less likely to seek antenatal care than Orthodox/Catholic women.

There was a study aimed to explore the role of religion in determining household behaviour on malaria control in Zamfara state North West Nigeria revealed that though there was no provision that stated that if you were sick it was not allowed to go and seek for medical treatment or any other form of treatment, but still people were of the opinion that if they were sick, they would not seek any preventive treatment because God is the origin of everything and therefore He is the one to provide the solution. According to an interview conducted with malaria control staff at one facility center that were providing free malaria control measures in Zamfara state indicated during the interview that as a result of the people's perception about the position of their religion on seeking treatment and prevention, it was quite difficult to change their behaviour on that till after religious leaders were asked to

inform them about the position of religion on that program. This extract supported the above assertion; “Many of them do not agree to seek treatment especially the one that comes from western societies. They assumed any of those treatments and prevention that comes from western countries was just an attempt to destroy their religion and its followers “, (Ahmad and Kalthum , 2015).

Also, in response to the need to understand beliefs and practices that lead to acceptance or rejection of preventive and promotive health and social practices among Apostolic religious groups in Zimbabwe, focusing on those practices that affect women and children by Collaborating Center for Operational Research and Evaluation (CCORE, 2011), demonstrated that Apostolic religion was a key social structural factor influencing maternal and child health among Apostolic members, and affiliation to the ultraconservative.

Apostolic groups were strongly associated with poor or no uptake of modern health care services since these church principles forbid followers from seeking medical services. In such circumstances, ultraconservative Apostolic groups’ religious beliefs potentially resulted in negative health outcomes since they encouraged negative attitudes towards modern maternal and child health services. It was found that members of the ultra-conservative Apostolic groups were at risks of vaccine preventable diseases and avoidable deaths because of their resistance to uptake of modern medicines.

Vaccination is a crucial tool for preventing and controlling disease, but its use has been characterized by controversies worldwide. Religious affiliation and its activities have a diversity of lifestyles, practices and attitudes toward illness and health systems. Reluctance to vaccinate based on religious grounds, for example, had been reported in northern Nigeria (Kano, Zamfara and Kuduna) where in 2003, Muslim leaders called on parents to refuse to vaccinate children against polio, on the grounds that the vaccine might contain HIV or cause infertility. This might also have a direct relationship with the prevention and treatment of

malaria since the people's perception about the position of their religion on seeking prevention and treatment of diseases, was quite difficult to change (Jegade, 2007). In Kano, this boycott resulted in a 30% increase in the incidence of polio in 2004 (Jegade, 2007).

Again, there was a study carried out to uncover the determinants of reticence toward vaccination among the religious population such as Catholic, Protestants, and Islam in the cities of Parakou and Cotonou in Benin. The study revealed that the leaders and adherents of Protestant sects expressed the belief that it is God himself who gives life, and that the only protection necessary against diseases is not human but divine protection. Some of the reticent people also argued that vaccination goes against the will of God, that it is a poison from the “white witch doctor”, and that those who vaccinate their children are committing a sin. One pastor, in explaining this situation, said, “as soon as I find out this has happened, I punish these followers before the divine wrath comes down on them, because they are disobeying God.” (Fourn et al, 2009). According to them, vaccination is against the will of God; vaccinating a child is like making

a “deal with the Devil”; the act of vaccination is seen as “the work of the white witch doctor, contrary to biblical scriptures.” The faithful of the churches in Cotonou declared without hesitation that vaccines are “poisons created by white people to harm us and to do experiments on us in giving us diseases.” It is in this regard that the biblical passage from Isaiah, chapter

55, on the free blessings of God, is often cited (Fourn et al, 2009).

2.6 Ethnicity and malaria

Specific socio-cultural practices varied among different ethnic groups, as they affected childhood morbidity and mortality in Nigeria. Fever was assumed to be a common childhood morbidity in developing countries, especially Sub-Saharan Africa (SSA). It was quite alarming that within two weeks preceding the survey, about 39 out of 100 children under-five

among Hausa- Fulani, about 32 out of 100 among the Northern minorities and 31 out of 100 among the Southern minorities children under-five reported incidence of fever. About one third of the analytical sampled children under-five reported incidence of fever among the Hausa-Fulani, Northern and Southern minorities' ethnic groups. One of the factors responsible for this high incidence was overall low usage of mosquito net despite awareness on prevention of malaria through the use of mosquito net (Fayehun and Omololu, 2011).

There was a study in Bangladesh to investigate the role of environmental factors on malaria risk in Rajasthali and to quantify the geographical clustering of this risk. The results showed that ethnicity was significantly and positively correlated with the malaria risk among the people. The spatial distribution of malaria prevalence in the locations surveyed in Rajasthali showed that the distribution of malaria prevalence was heterogeneous across communities in the second and third fertile forest areas. People in Marma community (23.8%) were living in villages located in the Western and Central regions of Rajasthali. Household density was highest in the central area where most of the administrative buildings were located. Forest density was higher in the eastern parts of Rajasthali. The second fertile forest cover accounted for 17.6% were Bengali people with 14.5% of malaria prevalence. This was due to high altitude of about 51-100 m above sea level. Other communities including Khiang and Chakma (7.3%) and living at above 100 m altitude accounted for 9.3% and 6.5% malaria prevalence respectively. (Ubydul et al., 2011).

Three samples of surnames reported in the telephone directory of Cosenza province Italy, were used, singly and together, to detect the presence of genetic barriers to malaria and to analyze the genetic relationship between the Italian and the Italo-Albanian communities living in this area. It was revealed that malaria was prevalent in Italo-Albanians than Italians. The genetic structure of the population was characterized by the distinction between the northern and the southern region of the province. The valley along the Crati river (also

occupied by malaria fenlands), constituted a generic barrier between the northern Sila upland and the western coast. Surname similarities between Italians and Italo-Albanians could be the result of gene flow and or an initial choice of similar surnames. The second possibility accorded with the persistence of the Albanian cultural identity and the level of endogamy in Albanian communities (De Silvestri et al, 2000).

A study in Gambella hospital southwest of Ethiopia showed that malaria prevalence was a year-round problem irrespective of the season (raining season and dry season) prevailing at a particular point in time. The study further revealed that malaria prevalence did not significantly correlate with participant age or sex but rather ethnic group. The Nuer and Anuak were more frequently infected compared to the 'Highlanders' combined. Environmental and differences in exposure to infectious mosquito bites, among other things, might have accounted for this apparent difference (Arega et al., 2014).

2.7 Mother's age and malaria

Age influences malaria control through experience. Older mothers are more likely to be exposed to better and innovative ways of doing things than their counterparts who are younger based on personal experience. Malaria infection was associated with adverse maternal-fetal outcome which was more evident among teenage mothers. Overall prevalence of malaria among children was associated with mothers who were younger. (Omolola et al., 2012).

The prevalence of malaria was found to be associated with children whose mothers were young (15-20 years). The use of mosquito nets, sprays (insecticide) and other malaria prevention strategies are effective ways of reducing and management of malaria especially among children. However, non-usage of spray, bednets had been found to be associated with an increased risk of malaria infection among children with young mothers in Lagos Nigeria (Chimere and Wellington, 2013).

Custodio et al., (2009) critically examined the nutritional and socio-economic factors associated with plasmodium falciparum infection in children from Equatorial Guinea. The researchers found out that only 55% of children who had suffered from malaria were children of young mothers. The study further revealed that age of a mother among other things was associated with malaria prevalence among these children. Older women (mothers) were more likely to use bed net than younger women. This was as a result of aging and its associated experience.

Allai et al. (2003) also considered the factors that affected the adherence in a randomization trial in Western Kenya. The researchers studied 2,178 individuals who were given a net free-of-charge to ensure coverage. They found that 30% of the ITNs were unused. Age and temperature contributed to the use of the net. Older individuals were more likely to use a net and younger individuals were less likely to use a net when temperature was high.

A study done by Samuel and Anastasia (2014) revealed that malaria cases were more prevalent among children of older mothers. Highest proportion of malaria was observed among children whose mothers were age 40-49 years (23.8%), while the least malaria cases were found among children whose mothers were 15-19 (18%). This was attributed to the fact that children of older mothers may had weaker immune system due to maternal depletion resulting from higher number of births that older mothers had compared to the younger mothers. This was quite contrary to findings from a study by Phillips-Howard et al. (2003), that malaria was higher in children born to younger mothers aged 15-19 than older ones.

2.8 Marital status of mothers and childhood malaria

There was a study done to explore factors associated with delayed malaria treatment in under five children for the first time in Ethiopia. Marital status was one of the major factors associated with delay in malaria treatment in under five children (Getahun et al. 2010).

Children who had monogamous parents were three times more likely to have delay in diagnosis and treatment of malaria when compared with children who had polygynous parents. Husbands in polygynous marriage might be overwhelmed by more farming activities for the livelihoods of their family. In such circumstances, decisions on health-seeking behaviour of children might be in the hands of wives who were more responsible than males for their children to seek early care (Getahun et al. 2010). Where as in monogamous marriage, males were responsible for every decision in the household and they might be more reluctant than females to take their children to the health facility early. On the other hand, wives in polygynous marriage could compete each other to make their children healthy and alive so as to get a blessing from their husband. Polygynous family might also have good income to take sick children early to the health institution than monogamous family (Getahun et al, 2010).

Finding by Samuel and Anastasia (2014) in Ghana indicated that there were more malaria cases among children of divorced mothers than married mothers. This could be because children of divorced mothers might not have the complete care that they needed (from mother and father) in order to survive.

Oresenya et al., (2008) also assessed the determinant for mosquito net ownership and utilization among children under five in Nigeria and found that many socio-economic variables including education, wealth, marital status and region of residence proved significant in predicting bed net utilization.

2.9 Mother's wealth quintile and malaria prevention

Child morbidity and mortality have been strongly associated with malaria in children in many developing countries, particularly Nigeria (WHO, 2010; UNICEF, 2010). Child morbidity data collected in the 2010 Nigeria malaria indicator survey, although subjective (being based on the perception of mothers) provided information on occurrence of episodes of fever and

treatment options adopted in the two weeks preceding the survey (Nigeria Malaria Indicator Survey, 2010).

It was also revealed that the wealth index of an indicator of the economic status of the household is significantly related to the prevalence of malaria among children. The prevalence of childhood malaria was highest (37.0%) among mothers in the poor category and lowest among the richest (16.9%). It was more likely that the rich would have resources to buy ITN and insecticides, get educated, lived in clean and hygienic environment, had better access to information and resources for treatment and generally engaged in preventive measures of diseases (Olaide and Gbemiga, 2013).

Worrall et al. 2010 found that malaria was highest among children from homes with low income. Besides, malaria in Africa had been described as the disease of rural population and communities which were homes of the poorest of the poor. That is to say malaria cases among under five children increased with a decrease in household income level.

Onwjekwe et al., 2005 considered consumer preferences and perceptions for distribution of ITNs in Nigeria. It was identified that people were generally knowledgeable about the benefits of using nets but very few spent money on malaria preventive tools. The study found that cost was the factor that prevented most individuals from purchasing a net and the preferred method of distribution was through a community-based strategy.

2.10 Use of Mosquito Nets by mothers and children

A study done in Nigeria revealed that 57.4% of mothers with no formal education reported that their infants slept under mosquito nets last night preceding the survey. Increase in the level of education decreased with the use of mosquito nets. The reasons might not be farfetched from the fact that they might be using insecticide instead of the nets (Olaide and Gbemiga, 2013).

Sleeping under mosquito net, particularly insecticide treated nets (ITN) was acknowledged as one of the most effective ways of preventing malaria within the household setting. Ownership and use of mosquito nets (treated or untreated) at the household level was therefore considered an important indication of malaria prevention. In Nigeria, 44% of households across the country owned at least one mosquito net (either treated or untreated) while 27.0% own more than one net. Ownership of ITNs was slightly lower with 42% ownership of at least one and 25% ownership of more than one and varied from rural (27.9%) to urban (18.5%) areas. This was considered as an evidence of progress in malaria prevention from 17% ownership of mosquito nets by households in 2008 (NDHS, 2008). More rural households (47%) than urban households (36%) in the sample owned at least one mosquito net while ownership of mosquito nets was highest (67%) in the North-East and lowest (24%) in the South Western part of the country (Olaide and Gbemiga, 2013).

According to Noor *et al.*, 2006; and Maxwell *et al.*, 2006, free distribution of ITN would increase net coverage and would reduce the incidence of malaria especially in children less than five years and pregnant women because they were the most vulnerable to the disease due to weaker immune systems.

Use of insecticide treated nets (ITNs) was also an effective means for controlling malaria. This measure had been tested in many African countries such as Nigeria, Kenya and Mali had proven to be very effective. ITNs, if used during pregnancy in areas of stable malaria transmission, would reduce the overall risk of morbidity and mortality among pregnant women and their infants (Maxwell *et al.*, 2006).

Evidence from studies conducted in the Gambia revealed that during the rainy season, in villages where ITNs were used, the prevalence of malaria infection among pregnant women was lower (Africa Malaria Report, 2003). Prevention of malaria with ITNs was recommended; as this was very effective in the management of malaria.

Mushi et al. 2003 studied the pattern of mosquito net ownership and use for children under five in Uganda. They found that children who slept with their mothers were 21 times more likely to sleep under a net. This finding pointed out that increasing mosquito net coverage in households did not necessarily translate into increased use of mosquito net for children under five years of age. Large-scale trials of mosquito net had shown that they reduced malaria mortality and morbidity under a variety of epidemiological conditions (Nahlen, et al. 2003).

2.11 Extent of malaria in Ghana by region

Ghana can broadly be divided into three agro-ecological zones namely, the Coastal, the Forest and the Savannah. According to the Ministry of Health (MoH), each of these zones exhibits different characteristics in relation to the vector and the parasite. Differences in temperature, rainfall and humidity patterns as well as the ecology account for these variations. Several species of the anopheles mosquito carry the four species parasites namely, plasmodium falciparum, plasmodium vivax, plasmodium ovale and plasmodium malariae, which cause malaria in humans. Epidemiological analysis in Ghana had revealed that only three species of the plasmodium are present; plasmodium falciparum (80%-90%), plasmodium malariae (20%-36%) and plasmodium ovale (0.15%). The plasmodium falciparum was the predominant parasite species carried by a combination of vectors. The principal vectors were the anopheles gambiae complex, which was most widespread and difficult to control, and the anopheles funestus accounted for 95% of all cases (MOH, 1991).

Malaria transmission was intense and perennial in the rain forest zone (Eastern, Ashanti and Brong Ahafo regions) with slight fluctuations but the peak transmission occurred shortly after the major rainy season. Malaria was stable and the level of prevalence in the forest zone was high since favourable environment existed throughout the year for disease transmission. The principal vector was the anopheles gambiae complex while the predominant parasite species was the plasmodium falciparum, which was quite fatal (Asenso and Felix, 2003).

The coastal zone falls into two eco-epidemiological areas. Just along the coast were the coastal lagoons and mangrove swamps. The principal vector was the *Anopheles melas*, which breeds in the lagoons and swamps. The zone also lied in the coastal savannah which stretched from the lower Volta Region through the Accra Plains to the lower Central Region. Malaria transmission was intense and perennial but markedly reduced during the dry season especially in the coastal savannah (Asenso and Felix, 2003).

The northern savannah zone covered the three Northern Regions of Ghana. Unlike the forest zone, the rainfall pattern there could be described as erratic. The principal vector was the *Anopheles arabiensis* while the predominant parasite was the *Plasmodium falciparum*.

Though transmission was intense and perennial, it reduced during the long dry season that was from October to April (Felix Ankomah and Asenso- Okyere, 2003).

2.12 Malaria prevention and treatment

Malaria prevention and control was a major foreign assistance objective of the U.S. Government (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a comprehensive effort to reduce the burden of disease and promote healthy communities and families in fifteen countries around the world. Through the GHI, the United States hoped to help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns, and children. The President's Malaria Initiative (PMI) was a core component of the GHI (President's Malaria Initiative, Ghana Malaria Operational Plan FY 2014).

PMI was launched in June 2005 as a 5-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With the passage of the 2008 Lantos-Hyde Act, funding for PMI was extended and, as part of the GHI, the goal of PMI was adjusted to reduce malaria-related mortality by 70% in the 15 countries by the end of 2015. This would

be achieved by continuing to scale up coverage of the most vulnerable groups, children under five years of age and pregnant women with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (President's Malaria Initiative, Ghana Malaria Operational Plan FY 2014).

Ghana became a PMI country in December 2007. Other donor partners include the Global Fund to fight AIDS, tuberculosis and malaria (Global Fund), which provided an estimated \$145 million towards malaria control since 2003 and the Department for International Development DFID whose 5-year; \$16 million began in 2013.

The PMI/Ghana FY 2014 Malaria Operational Plan (MOP) was developed in collaboration with the Government of Ghana (GOG), National Malaria Control Program (NMCP), and other development partners; analyzed malaria control data and trends; and reviewed lessons learned over four years of PMI implementation. The 2011 Multiple Indicator Cluster Survey (MICS) provided data on point prevalence of as well as information on trends in malaria control interventions.

2.13 Conceptual framework

This framework is a modified version of Sheeran and Abraham's Health Believe Model (1995) and it seems the most appropriate for explaining maternal characteristics and prevalence of malaria among children less than five years in Ghana. The background characteristics of the mother were considered as the independent variables to the control of childhood malaria. Effective control of malaria depends to a large extent on the mother's background characteristics such as age, education, marital status, religion, region of residence, type of residence, ethnicity and household wealth index.

Maternal education also has the potential of determining whether a child under five years of age will use mosquito net. This variable equips the mother with the knowledge about the link

between malaria infection and mosquito bites. This knowledge will either spur her to put her under five years old child under the mosquito net in situations where educational level does not improve her income or make her stay in a netted house.

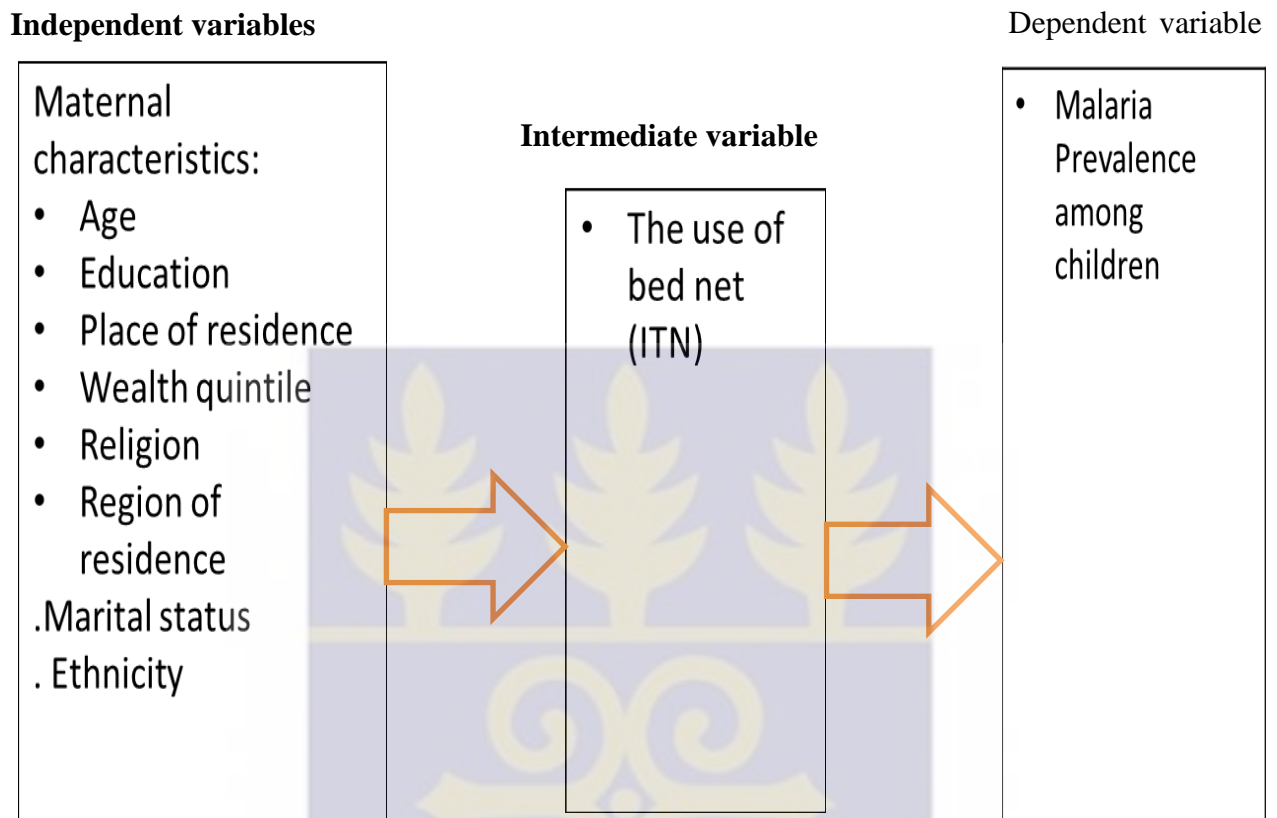
Age influences malaria control through experience. Older women are more likely to be exposed to better and innovative ways of doing things than their young counterparts based on personal experience.

The impact of religion on the use of mosquito nets is resulted from the fact that religious bodies influence exposure to and control of malaria because people listen and believe in their religious leaders. The current crop of religious leaders take it upon themselves to always inform their followers anytime there is a new government policy on health sector, and use of mosquito net. Also, there are differences in religious practices towards health and sanitation.

The wealth status can either be an incentive or disincentive to a child in the household sleeping under mosquito nets. Studies show that women from lower income households are more likely to have their children under five- years of age use mosquito net as compared to their counterparts in the highest income levels. The reason is that mothers in the lower income might find it hard to pay for the overwhelming curative health cost when a child is infected with malaria, and prevention therefore remains an important choice (Nketia-Amponsah 2010).

Malaria is very predominant in the rural areas than in the urban areas. Children in rural areas are more vulnerable to malaria than their counterparts in the urban areas. Affordability of ITNs and access to health facilities are more likely in the urban areas than in the rural areas. The type of residence has a direct link with malaria control through access to ITN and health care facilities.

Figure 2.1 A conceptual framework for maternal characteristics and malaria prevalence among children



Sheeran and Abraham's modified Health Belief Model (1995)

2.16 Based on the conceptual framework the study has the following hypotheses:

1. Children in high rainfall areas are more likely to suffer from malaria than their counterparts in the areas where rainfall is low.
2. Children of mothers with no education are more likely to suffer from malaria compared to children whose mothers have some level of education.
3. There is a no correlation between mother's marital status and malaria prevalence among children under five years.
4. There is a positive correlation between religious affiliation of mothers and malaria prevalence among their children.

CHAPTER THREE METHODOLOGY

3.1 Introduction

This chapter describes the research design, study population, the sample and sampling procedure used and also the data collection tools that were used to collect data. It also encloses source of data that the researcher used and also the limitations inherent in the data set. It also describes the unit of analysis and methods of analyses of the data.

3.2 Source of Data

The study used data collected from 2008 Ghana Demographic and Health Survey, which is a nationally representative survey (Ghana Statistical Service, 2009). This survey contains interview of women aged 15 to 49 living in the household. The women were sampled in multistage design. This study used data from the children Recode (file) data. The study looked at households with 2909 mothers with children under five years of age for the prevalence of malaria using fever as a proxy. Ghana Demographic and Health Survey contains definite questions on malaria prevention since 1998. In the 2008 GDHS, mothers were asked whether their children under five years had fever two weeks preceding the survey.

3.3 The Research Design

This is a survey research which employed the use of questionnaires to collect data from a nationally representative sample. The questionnaires were administered on each individual through face to face structured questions from which responses were collected and coded for analysis. The research is a quantitative research, employing frequencies, bivariate and multivariate analysis

3.4 Statistical Analysis

Data were analyzed using SPSS statistical software package. In univariate analysis, frequencies and descriptive statistics were generated on age, place of residence, level of education, region, religion, marital status, ethnicity and household wealth index.

Bivariate analysis was carried out to determine the association between the independent variables and the dependent variable. Statistical significance of the relationship between the dependent variable and the independent variables was interpreted using Pearson Chi-square test, which has a level of association of value at 0.05. The multivariate stage actually described the intensity and the direction of the relationship between the two variables, by the values of beta (B) and exponential beta (Exp.B). Binary logistic regression was applied to discover the characteristics of the mother that are influential in determining the prevalence of malaria among children under five years of age. This model has been used to estimate the Odds Ratio of differentials in maternal characteristics. Virtually, the whole analysis has been performed by using statistical software SPSS (version 20).

3.5 Unit of analysis: The study examined maternal characteristics and malaria prevalence among children in Ghana. Therefore the unit of analysis is mothers with children under five years.

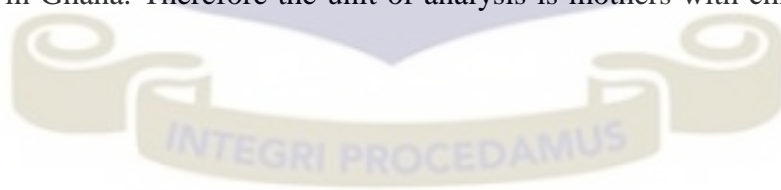


Table 3.1 Measurement of variables.

Variable	Level of measurement	Definition
Age of respondent	ordinal	Age was recoded and classified as: 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49.
Highest education attained	ordinal	Education was categorized as: no education, primary education, secondary and Higher.
Type of place of residence	nominal	Rural/urban
Region of residence	nominal	Region of residence was categorized and Western region put first, to serve as reference category.
Marital status	nominal	Categorized as: Never married, Currently married and Formally married.
Religion	nominal	Recoded and categorized into: Catholic, Other Christian, Muslim, Traditionalist, No Religion and Other Religions, since teachings and dogmas vary between regions.
Ethnicity	nominal	Categorized into: Akan, Ga/Dangme, Ewe, Guan, Mole Dagbani, and Others.
Wealth index	ordinal	Classified the respondents in wealth status as being: Poorest, Poorer, Middle, Richer and Richest.

3.6 Data Collection Tool

Three questionnaires were used for the 2008 GDHS: the household questionnaire, the women's questionnaire and the men's questionnaire. The content of the questionnaires were in conformity with the model questionnaire developed by MEASURE DHS. The household questionnaire enabled a household to be chosen for the men or women questionnaire to be administered to that household. Women questionnaire was used to collect data on women aged 15-49 in half of the selected households. Questions asked covered a wide range of topics some of which are on education, residential history, media exposure, reproductive history, knowledge and use of family planning methods and fertility preferences. The men's questionnaire was administered to men 15-59 years of age living in half of the selected households in the GDHS 2008 sample. Similar background information was taken from men but theirs were relative short because they do not have reproductive record.

The questionnaire was the main tool used to collect data for the survey. The household questionnaire was used to list all mothers in the selected households. The main objective of household questionnaire was to identify mothers who were eligible for the individual interviews. The household questionnaire collected information on the characteristics of the households' dwelling unit: age, type of place of residence, region, educational level, etc. The mothers were asked whether their children had fever two weeks preceding the survey. The questionnaire was used to collect data on mothers age 15-49 on behalf of their children.

3.7 Sample Design and Sampling Procedure

The 2008 GDHS was implemented in a representative probability sample of more than 12,000 households. The samples were selected taking cognizance of allowing separate estimates of key indicators for each of the 10 regions in Ghana, as well as for urban and rural differences.

The survey used a two-stage sample design. The first stage involved selecting sample points or clusters from a master sampling frame constructed from the 2000 population and housing census (PHC). In all, 412 clusters were selected from a master sampling frame. Systematic sampling with probability proportional to size was used to determine the first clusters.

A complete household listing was conducted in all the selected clusters to provide a sampling frame for the second stage which involved the systematic sampling of 30 of the households listed in each of the clusters. The sample size was 2909 mothers aged 15 to 49 who responded on behalf of their children.

3.8 Variable construction:

3.8.1 Predictor Variables/Independent variable: Background characteristics of women, such as age group of the respondents, type of place of residence, level of education, religion, wealth quintile of mothers, region of residence, ethnicity and marital status.

3.8.2 Outcome Variables /Dependent variable

Presence of fever among children less than five years was the main dependent variable of the study. It has been categorized using “yes” or “no” type of response as whether a child had fever two weeks prior to the survey.

3.9 Definition of key variables

Mosquito Net: any net that is used to reduce man-vector contact so as to cut in the life-cycle of malaria parasite.

Insecticide Treated Net (ITN): a factory-treated net that does not require any further treatment, or a pre-treated net obtained within the past 12 months, or a net that has been soaked in insecticide within the past 12 months.

Use of Mosquito Net: the percentage of children under five years of age in the household who slept under any mosquito nets (treated or untreated) the night before the survey.

Ownership of Mosquito Nets: the percentage of households with one or more mosquito nets.

3.10 Limitation of the study

Data collection in Ghana as in any sub-Saharan African country is still fraught with inaccuracies. What brought about this is the fact that demographic data are prone to errors due to age misreporting and under or over enumeration.

3.11 Organization of the study

The study has been presented in seven chapters; chapter one represents introduction which includes background, problem statement, significance of the study, objectives, and questions to be answered to guide the study. Literature review, conceptual framework and hypotheses form chapter two. Chapter three forms the methodology used, while frequencies and descriptive statistics form chapter four. There is also a bivariate analysis to determine the association between the independent variables and the dependent variables which forms chapter five. At the multivariate level, binary logistic regression was applied to discover maternal characteristics that are influential in determining malaria prevalence among children under five years of age, and this forms chapter six. Finally, summary, conclusion and recommendation of the study are also considered in chapter seven.

CHAPTER FOUR

STUDY AREA AND RESPONDENTS' CHARACTERISTICS

4.1 Profile of the study area

Ghana is an African country situated on the central part of West Africa located along the Atlantic Ocean with a total land area of 238,537 square kilometers. It shares territorial borders with Republic of Togo on the east, Burkina Faso on the north and La Cote D'Ivoire to the west.

The country is divided into 10 administrative regions namely; Greater Accra, Volta, Western, Eastern, Central, Brong Ahafo, Ashanti, Northern, Upper East and Upper West. The regions are sub-divided into 210 metropolitan/district assemblies to ensure equitable resource allocation and efficient and effective administration at the local levels. The regions are further divided into three main ecological zones referred to as the coastal, forest and savannah zones respectively (Ghana Demographic Trends, 2010).

The savannah zones are made up of the three northern regions, considered the poorest whilst the coastal and the forest zones are considered to be more endowed. The coastal and the forest zones also have all the major industries and most of the infrastructure development. This has made the forest and the coastal zones attractive to migrants who search for jobs especially in the regional capitals of Greater Accra, Eastern, Western and Ashanti regions.

Ghana had a population of 24,223,431, with a female population of 12,421,770 according to the 2010 Population and Housing Census data. The 2010 Census figures show that the country was made up of about 50.9% urban population and about 49.1% rural population (Ghana Statistical Service, 2010).

The economy of Ghana is dominated by agriculture, which employs about 40% of the working population. Ghana is the second leading exporter of cocoa in the world. Ghana has

mineral resources such as gold, diamond, manganese, limestone, bauxite, and iron ore. It is also the third largest producer of timber and the second largest exporter of wood and wood products in Africa and also exporter of petroleum oil.

Ghana has tropical climate. The temperature is generally between 21°C and 32°C (70-90°F). There are two rainy seasons from March to July and from September to October, separated by a short dry season in August and a relatively long dry season in the south from mid-October to March. The north also has a tropical climate, dry and falls partly within the Sahelian zone. Annual rainfall in the south averages 2,030 mm, but varies greatly throughout the country, with the heaviest rainfall in the south-western part.

The vegetation in the northern part of Ghana is predominantly savannah and the middle section is typically rainforest, while the coastal section has thicket interspersed with savannah. Urbanization in Ghana varies from one administrative region to the other. Greater Accra and the Ashanti regions have the highest percentage of urban dwellers in 2010 (Ghana Statistical Service, 2010). Ghana is blessed with numerous water bodies with the Volta River basin dominating the country's river system and includes the 8,480km² Lake Volta formed behind the Akosombo Hydroelectric Dam. The coastal area consists of plains and numerous lagoons near the estuaries of rivers.

4.2 Background characteristics of the respondents

The 2008 Ghana Demographic and Health Survey (GDHS) is a nationally representative one which contains interview of women aged 15 to 49 years living in the household who responded on behalf of their children. Below are the frequency distributions of background characteristics of mothers using tables and figures.

4.2.1 Age of the mother

Age is an important demographic variable. It is the basis for demographic classification of an individual's characteristics and has some relationship with most of the population phenomena such as fertility, mortality and migration. It is also employed as both the determinant and consequence of population dynamics.

Figure 4.2.1 Percentage distribution of mothers by age

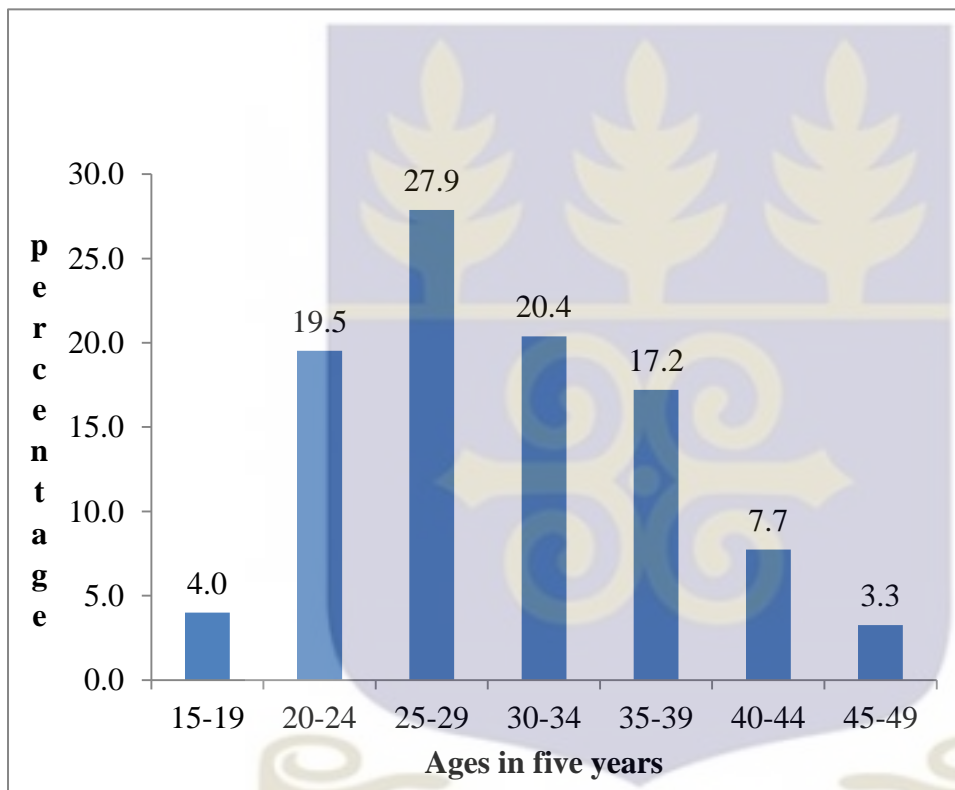


Figure 4.2.1 shows percentage distribution of respondents by five-year age groups. It shows that almost half of the respondents are below age 30 and about one third are between 30 and 39 years. Those between ages 40 and 49 represent about one tenth of the data. Generally, the data indicate the percentage increases from age group 20-24 to 25-29 decreases from 30-34 to 40-49. The overall assessment of the age distribution indicates a very youthful age structure. It is because age specific fertility rate increases from age 20 to 34 and declines after age 39. Age 15-19 and 40-49 have lower proportion of women who are mothers.

4.2.2 Educational level of mother

Education equips people with knowledge and necessary skills that have the propensity to improve the life of an individual (Caldwell and MacDonald, 1981). There is a positive correlation between maternal level of education and the health status of their children. Because mothers with high level of education are more likely to be equipped with information and skills needed for proper healthcare and management compared to their counterparts with lower level of education. According to Caldwell and MacDonald (1981), education gives women good insight into issues. The data collected in the 2008 GDHS on the level of education were grouped into four categories namely; no education, primary, secondary and higher education.

Table 4.2.1 Percentage distribution of mothers by their level of education

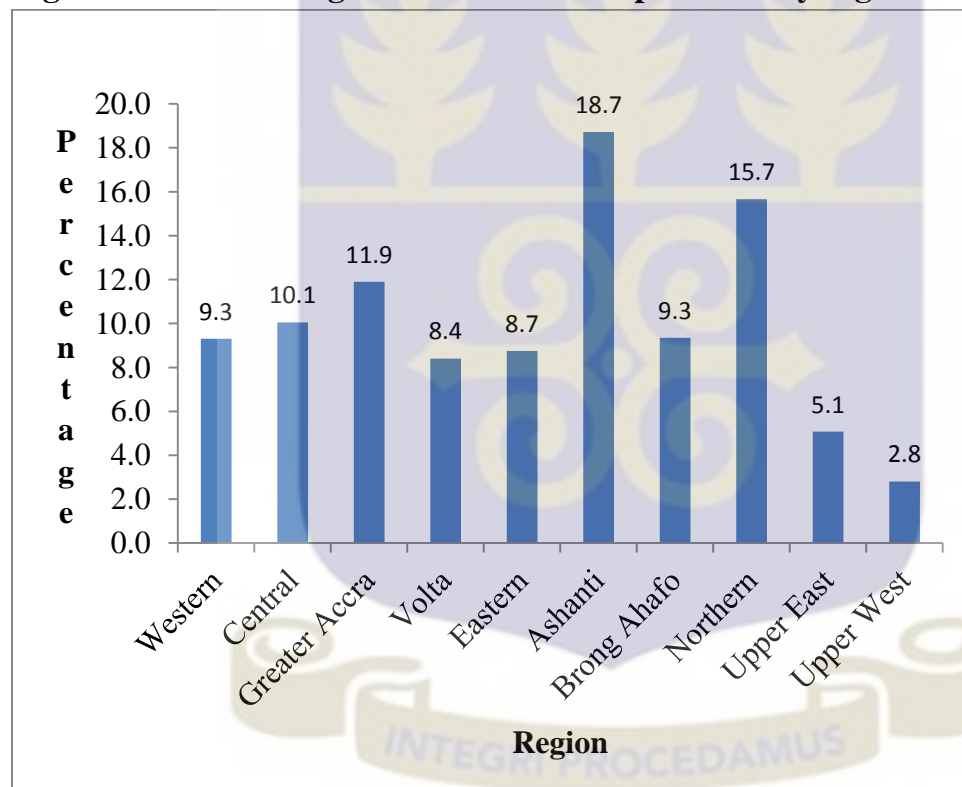
Level of education	Frequency	Percent
No Education	954	32.8
Primary	722	24.8
Secondary	1162	40.0
Higher	71	2.4
Total	2909	100.0

Table 4.2.2 shows the percentage distribution of mothers by their educational level. It shows that about 32.8% of respondents have no formal education, 24.8% had primary education; 40.0% had secondary and 2.4% up to higher level (tertiary).

4.2.3 Region of residence

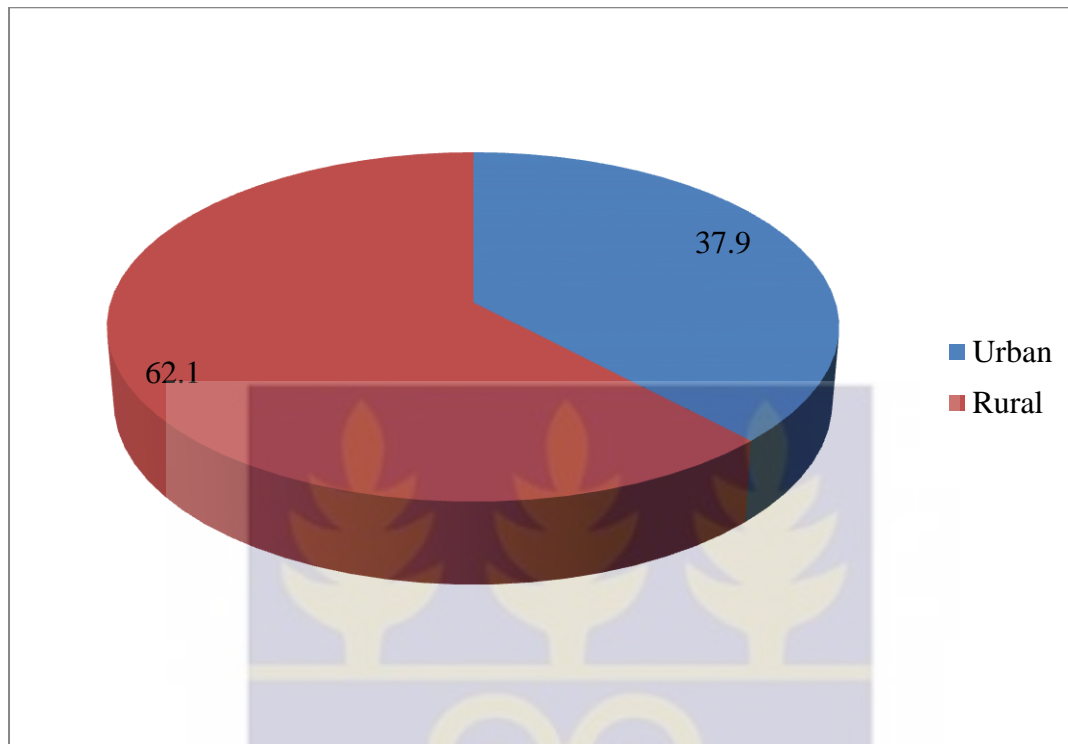
Region of residence plays a very crucial role in the management of childhood malaria. From figure 4.2.3 according to the 2008 GDHS data that covered the 10 regions, about 18.7% of the respondents come from Ashanti region. This is followed by Northern region with 15.7%. Greater Accra follows the trend with 11.9% while Western region constitutes about 9.3%. Upper East and Upper West constitute the least percentage of respondents with 5.1 and 2.8 respectively.

Figure 4.2.2 Percentage distribution of respondents by region



4.2.4 Place of Residence

Place of residence comprises urban and rural areas. Rural areas are areas with less than 5000 people while areas with more than 5000 people are termed as urban areas. This type of population distribution revealed that the majority of the people are dwelling in the rural areas. It may have some influence on the health seeking behavior since resource distribution goes with the size of the population living in a particular area.

Figure 4.2.3: Percentage distribution of mothers by place of residence

Majority of the women aged 15-49 years who were captured in the survey (62.1%) live in the rural areas while about 37.9% of them live in the urban areas.

4.2.5 Religion

Religion is linked with certain values and norms that play significant role in the lives of its followers in all aspects of human life. It plays an important role in shaping the behavior and attitude of individual. It also plays a very crucial role in health behavior in households, in Ghana for that matter sub-Saharan Africa. Some religious bodies in sub-Saharan Africa are against certain health practices such as immunization against certain diseases. This can affect the health of the under-five child (Ndugga et al, 2009).

Table 4.2.2 Percentage distribution of respondents by religion

Religion	Frequency	Percent
Catholic	343	11.8
Other Christian	1691	58.1
Moslem	552	19.0
Traditionalist/ Spiritualist	191	6.6
No Religion	126	4.3
Other	6	0.2
Total	2909	100.0

Table 4.2.5 shows the percentage distribution of mothers by their religious affiliation. From the table, about 11.8% of respondents are Catholic while about 58.1% represents other Christians. It also indicates that 19.0% of mothers are Muslims and 6.6% practice African Traditional Religion (ATR).

4.2.6 Wealth Index

Malaria has been seen as a disease of the poor, and there is strong evidence that the disease actually contributes to poverty and helps create under-development in affected areas or countries. It was found out that the disease is associated with poverty in a lot of households in Ghana (Asenso et al, 1996). A study done by Binka (1996) states that the poorer households use about one-third of their income in treating malaria while the affluent use only about one percent in treating the disease. It portrays that malaria puts an overwhelming financial burden on the poorer households because of the huge sums of money they use in treating it.

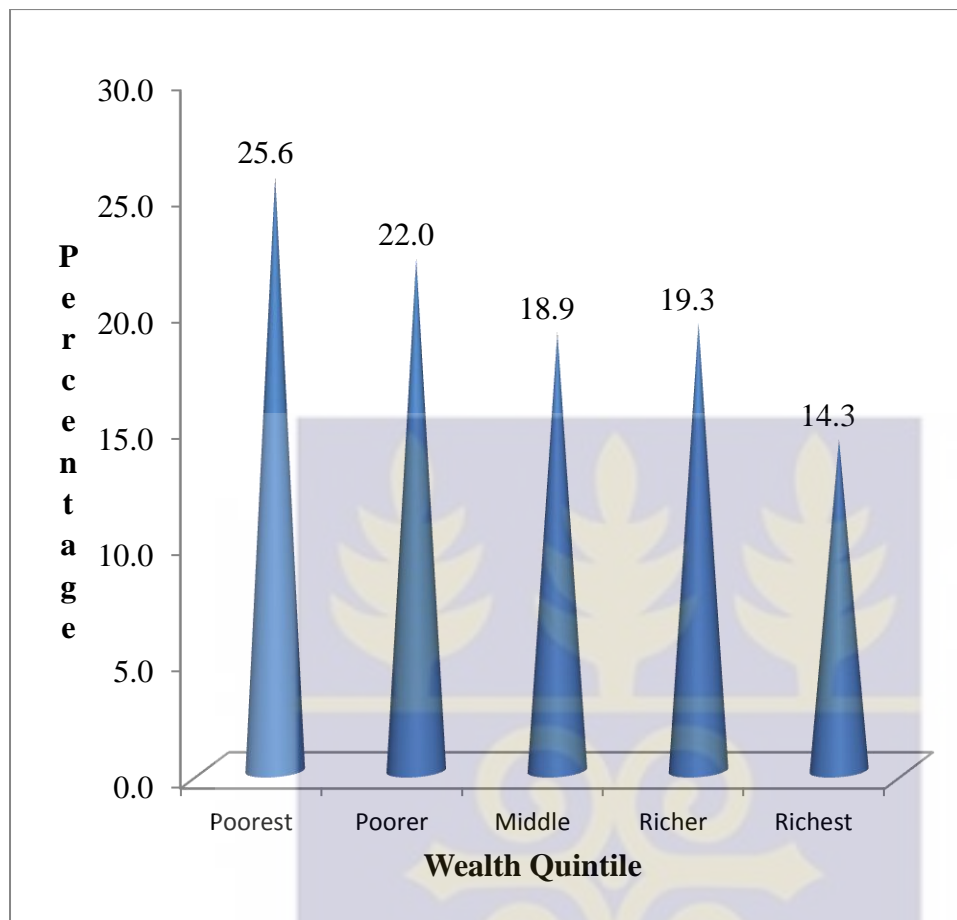
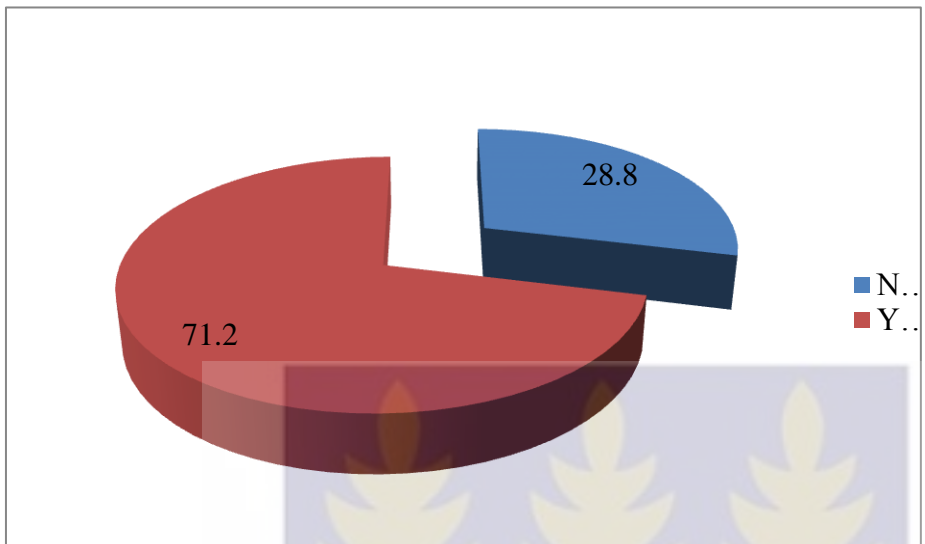
Figure 4.2.4 Percentage distribution of mothers by wealth quintile

Figure 4.2.6 shows the percentage distribution of respondents by wealth index. From the figure, about 25.6% of mothers are in the poorest wealth quintile; about 14.3% of them belong to the richest wealth quintile category. The remaining 22.0%, 18.9% and 19.3% are in the poorer, middle and richer quintiles respectively. The distribution shows mothers in the rich category (richer and richest) are few compared to mothers in the poor category (poorest and poorer).

4.2.7 Households that had mosquito bed net for sleeping

Figure 4.2.7 shows the percentage distribution of the households that had mosquito bednet for sleeping two weeks prior to the survey. About 29% of households had mosquito bednet for sleeping compared to 71% that did not have.

Figure 4.2.5 Percentage distribution of number of households who had mosquito bed net for sleeping



4.2.8 Ethnicity

The table 4.2.8 shows the percentage distribution of mothers by ethnicity. Forty six percent of the respondents are Akan forming the majority. According to the figure, mothers who are Guan are only 3% with the lowest number followed by Ga/ Dangme (5%).

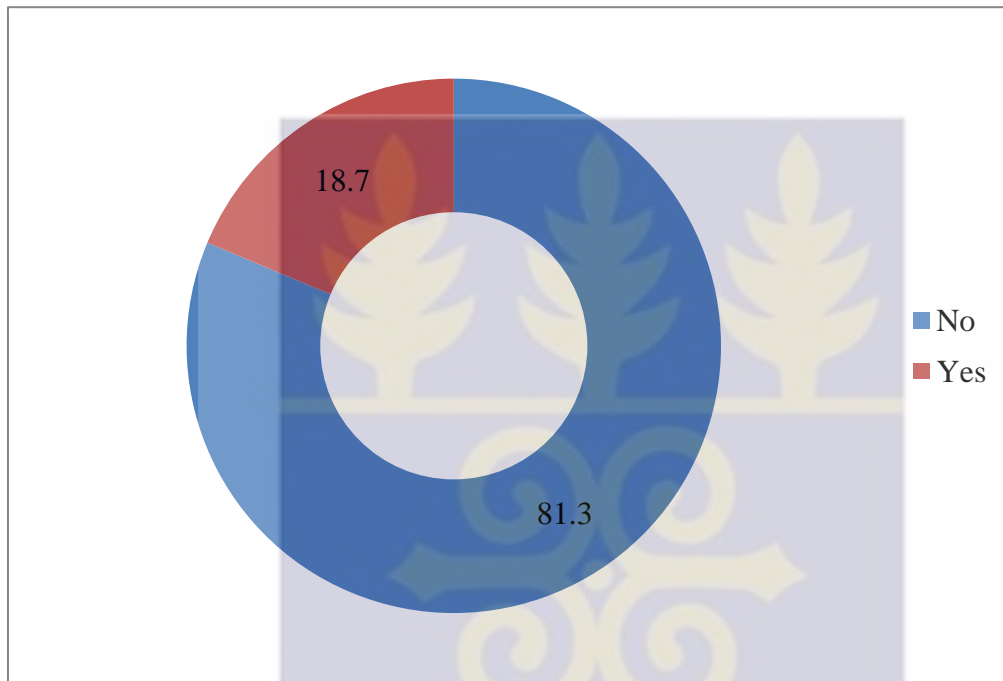
Table 4.2.3 Percentage distribution of respondents by ethnicity

Ethnicity	Frequency	Percent
Akan	1327	45.6
Ga/ Dangme	143	4.9
Ewe	360	12.4
Guan	84	2.9
Mole Dagbani	597	20.5
Other	398	13.7
Total	2909	100.0

4.2.9 Number of children who had fever

Figure 4.2.9 represents the percentage distribution of children less than five years in Ghana who had fever two weeks preceding the survey.

Figure 4.2.6: Percentage distribution of children who had fever two weeks prior to the survey



From the figure above, 19% of children had fever and 81% had no fever two weeks preceding the survey.



CHAPTER FIVE

ASSOCIATION BETWEEN BACKGROUND CHARACTERISTICS OF MOTHERS AND CHILDHOOD MALARIA

5.1 Introduction

This chapter examines the relationship between the background characteristics of mothers with children under five years and malaria prevalence among these children. In the data, fever was used as a proxy to identify mothers with children under five years with malaria. The characteristics of mothers are age, educational level, marital status, place of residence, religion, ethnicity, region of residence and household wealth quintile.

In the 2008 GDHS, 2909 mothers with children under five years were interviewed. In the survey, 2909 mothers were asked whether their children had fever two weeks preceding the survey. The data further showed that 544 children had fever two weeks preceding the survey.

5.2 Age of mothers and malaria prevalence among children

Table 5.1: Association between mother's age and children who had fever two weeks prior to the survey

Age	Had fever in the last two weeks		Total
	No	Yes	
15-19	82.4	17.6	116
20-24	82.7	17.3	568
25-29	82.0	18.0	811
30-34	81.5	18.5	593
35-39	79.2	20.8	501
40-44	82.1	17.9	225
45-49	74.3	25.7	95
Total	81.3	18.7	100.0
N	2366	543	2909

Source: 2008 Ghana Demographic and Health Survey (GDHS)

Computed p-values: 0.465 chi-square:5.641

Table 5.1 shows a cross tabulation of the age of mothers and prevalence of malaria among their children who are less than five years. Malaria prevalence is highest among children whose mothers are within 45-49 years age bracket followed by children with mothers age 35-39. It further reveals that children whose mothers are in the age groups 15-19 and 20-24 have the lowest prevalence rate. Age is correlated with experience so it is expected that the higher the age of a mother the more likely she is expected to be knowledgeable about disease control. The computed p-values indicate that the association between mother's age and malaria prevalence is not statistically significant.

5.3 Educational level and malaria prevalence among children

The proportion of mothers whose children had fever was highest among mothers with lower education (21.1%). This was followed by mothers with no education (18.1%) and those with secondary (17.8%).

Generally, the percentage of mothers whose children had fever varies with level of education. It ranges from 21.1 to 17.2 percent among primary and higher education respectively. Higher education is associated with acquisition of knowledge, so mothers with higher educational level are in a better position to control malaria better than their counterparts with lower level or no education. Computed p-values show that educational level is not statistically significant with malaria prevalence.

Table 5.2: Association between mother's level of education and children who had fever two weeks prior to the survey

Educational level	Had fever in the last two weeks prior to the survey		Total
	No	Yes	
No Education	81.9	18.1	955
Primary	78.9	21.1	722
Secondary	82.2	17.8	1162
Higher	82.8	17.2	70
Total	2365	544	2909

Source: 2008 Ghana Demographic and Health Survey (GDHS)

Computed p-value: 0.306 Chi-square: 3.614

5.4 Marital status of mothers and malaria prevalence among their children

The percentage of mothers whose children had fever is presented in Table 5.3. It can be seen from the table that malaria prevalence was highest among children whose mothers were formerly married (24.1%). Among the various groups, about 18.5 % of mothers who are married have children who had fever two weeks preceding the survey followed by mothers who are not married (16.6%). The computed p-values of the data show that there is no association between marital status of mothers and prevalence of malaria among their children.

Table 5.3: Association between mother's marital status and children who had or had no fever two weeks prior to the survey

Marital status	Percentage of children who had fever		Total
	No	Yes	
Never married	83.4	16.6	143
Currently married	81.5	18.5	2604
Formerly married	75.9	24.1	162
Total	81.3	18.7	100.0
N	2365	544	2909

Source: 2008 Ghana Demographic and Health Survey (GDHS)

Computed p-value: 0.166 Chi-square: 3.586

5.5 The Religion of mothers and malaria prevalence among their children

Table 5.4 indicates that about 39% of mothers who professed other religion had the highest prevalence rate of fever two weeks before the survey, followed by mothers who belong to No religion category (24.3%). It also shows that traditionalist/ spiritualist (10.4%) has the least prevalence rate of fever among the under five children. Computed p-values show that there is a statistically significant relationship between malaria prevalence among children and the religious affiliation of their mothers. It shows that religion is a determining factor for the prevalence of malaria.

Table5.4: Association between mother's religion and children who had fever two weeks prior to the survey

Religion	Percentage of children who had fever prior to the survey		
	No	Yes	Total
Catholic	80.9	19.1	343
Other Christian	81.7	18.3	1691
Moslem	79.0	21.0	552
Traditionalist/ Spiritualist	89.6	10.4	191
No Religion	75.7	24.3	127
Other Religion	60.9	39.1	5
Total	81.3	18.7	100.0
N	2365	544	2909

Source: 2008 Ghana Demographic and Health Survey (GDHS)

Computed p-value: 0.011 Chi-square: 14.906

5.6 Place of Residence of mothers and malaria prevalence among their children

The cross tabulation shows that mothers with children under five living in rural areas (19.2%) had higher rate of fever compared to their counterparts in the urban areas (17.9%). This is because urban mothers are more likely to be exposed to various ways of preventing malaria compared with mothers in the rural areas. However, the difference is insignificant. The computed p-values show that there is no relationship between type of place of residence and prevalence of malaria among children. It also indicates that place of residence is not a determining factor for malaria prevalence among children under the age of five in Ghana.

Table 5.5: Association between mother's type of place of residence and children who had fever two weeks prior to the survey

Type of place of residence	Percentage of children who had fever		
	No	Yes	Total
Urban	82.1	17.9	1103
Rural	80.8	19.2	1806
Total	2365	544	2909

Source: 2008 Ghana Demographic and Health Survey (GDHS)

Computed p-value: 0.367 Chi-square: .813

5.7 Region of Residence and malaria prevalence

Table 5.6 shows the proportion of mothers residing in the various regions. Western region has the lowest prevalence rate of fever (9.9%) among children under the age of five years followed by Greater Accra (11.9%). Brong Ahafo is leading the prevalence rate by 26.1%. The table further indicates that the number of children who had fever in the three Northern regions is still high compared to other regions. UNICEF is one of these organizations and has since 2002 been distributing ITN at highly subsidized cost to pregnant women and children under the age of five years in these areas. The computed p-value indicates a statistically significant association between region of residence and malaria prevalence among children less than five years. The summary of result is presented in the table below.

Table 5.6: Association between mother's region of residence and children who had fever two weeks prior to the survey

Region of residence	Percentage of children who had Fever		Total
	No	Yes	
Western	90.1	9.9	271
Central	78.7	21.3	292
Greater Accra	88.1	11.9	345
Volta	82.0	18.0	245
Eastern	85.2	14.8	254
Ashanti	76.6	23.4	545
Brong Ahafo	73.9	26.1	272
Northern	80.7	19.3	456
Upper East	78.9	21.1	147
Upper West	82.1	17.9	82
Total	2365	544	2909

Source: 2008 Ghana Demographic and Health Survey (GDHS)

Computed p-value: 0.000 Chi-square: 46.554

5.8 Wealth index and malaria prevalence among children

Table 5.7 indicates the proportion of mothers according to their wealth index whose children had fever two weeks preceding the survey. The analysis reveals an inverse relationship between household wealth index and malaria prevalence. About 21.3% of mothers with children under five years in household classified as poorer had fever in the weeks preceding the survey representing the highest in the group, followed by middle household (20.3%)

according to their wealth quintiles. Households classified as richest wealth index had only 13.6% children with fever. This is because children from the richest wealth index live in houses with good window netting and trap doors compared to their counterparts whose housing units do not have these facilities. Computed p-values show that there is a statistical relationship between household wealth index and malaria prevalence among children is statistically significant. This means that household wealth index is a determining factor for malaria prevalence among children.

Table 5.7: Association between mother's wealth quintile and children who had fever two weeks prior to the survey

Wealth Quintile	Percentage of children had Fever		Total
	No	Yes	
Poorest	81.7	18.3	743
Poorer	78.7	21.3	641
Middle	79.7	20.3	548
Richer	81.5	18.5	561
Richest	86.4	13.6	416
Total	2365	544	2909

Source: 2008 Ghana Demographic and Health Survey (GDHS) Computed p-value: 0.027

Chi-square: 10.950

5.9 Household that had mosquito bed net and malaria prevalence among children

The results in Table 5.8 indicate that approximately 19% of children who had fever did not use bednet two weeks preceding the survey. The table further indicates that 18% of children who had fever used bed net two weeks preceding the survey. However, the difference between these two figures is insignificant. The p-value 0.524 shows that ownership of bednet is not factor in predicting malaria prevalence among children.

Table 5.8 Association between households that had mosquito bed net for sleeping and children who had fever.

Household use of bed net	Percentage of children who had Fever		Total
	No	Yes	
No use of bed net	80.6	19.4	837
Use of bed net	81.6	18.4	2072
Total	2365	544	2909

Source: Ghana Demographic and Health Survey (GDHS)

Computed p-value: 0.524 Chi-square: 0.407

CHAPTER SIX

BINARY LOGISTIC REGRESSION OF MATERNAL CHARACTERISTICS AND MALARIA PREVALENCE AMONG CHILDREN

6.1 Introduction

Malaria control and prevention among children is associated with the socio-economic status of mother and demographic factors. As discussed in the previous chapter, prevalence of malaria among children under five years is mainly determined by the background characteristics of their mothers.

The bivariate analysis in the previous chapter was used to establish relationship that exists between the independent variables and the dependent variables but that was not enough, because it could not predict the strength of the relationship that exists between the independent and the dependent variables. In order to determine the importance of variables in the prevalence of malaria among children, binary logistic regression analysis was used.

A logistic regression analysis was used to predict categorical (dichotomous) variable from a set of predictor variables. The maternal characteristics include; age, educational level, marital status, religion, region of residence, type of place of residence and wealth quintile.

A binary logistic regression was used because the dependent variable (that is the number of children with fever) assumes a dichotomous response (yes and no). Dummy variables were created for some of the independent variables and reference categories were chosen to which other variables were compared.

In logistic regression, the odd ratio was used to indicate the probability of an event happening. A result in which the odd ratio is positive indicates a much more likelihood of the event occurring and negative odds show that the chance of an event happening is less likely.

The results of the logistic regression analysis indicate that the mother's level of education, region of residence and religious affiliation are the main characteristics of mothers with children under five years that determine malaria prevalence. This chapter discusses the results obtained after running a binary logistic model.

The summary of results is shown in Table 6.1

Table 6.1 Binary logistic regression model analysis of the effects of independent variables on the dependent variable (malaria prevalence).

Independent Variables (Age)	B	S.E.	Sig.	Exp(B)
15-19(RC)			.214	
20-24	.045	.281	.872	1.046
25-29	.113	.281	.688	1.119
30-34	.225	.288	.435	1.253
35-39	.400	.290	.168	1.492
40-44	.117	.321	.715	1.125
45-49	.572	.363	.115	1.771
Region				
Western (RC)			.000	
Central	.885	.254	.000	2.423
Greater Accra	.293	.289	.310	1.341
Volta	.819	.305	.007	2.269
Eastern	.490	.280	.081	1.632
Ashanti	1.028	.232	.000	2.795
Brong Ahafo	1.206	.255	.000	3.341
Northern	.913	.282	.001	2.491
Upper East	1.097	.339	.001	2.995

Upper West	.783	.385	.042	2.189
Type of place of residence				
Rural (RC)	-.032	.141	.820	.968
Urban	.026	.121	.833	1.026
Wealth Quintile				
Poorest (RC)			.286	
Poorer	.208	.155	.180	1.231
Middle	.116	.179	.517	1.123
Richer	.028	.199	.889	1.028

Richest	-.224	.253	.377	.799
Marital status				
Never married (RC)			.388	
Currently married	.012	.262	.964	1.012
Formally married	.296	.314	.346	1.344
Educational level				
No education (RC)			.137	
Primary	.317	.146	.030	1.373
Secondary	.140	.155	.365	1.150
Higher	.400	.366	.275	1.491
Use of bed net				
No use (RC)				
Use	-.078	.110	.482	.925
Ethnicity				

Akan (RC)			.379	
Ga/ Dangme	.124	.279	.657	1.132
Ewe	-.100	.220	.651	.905
Guan	.543	.278	.051	1.720
Mole Dagbani	.043	.211	.839	1.044
Other	.121	.199	.544	1.128
Religion				
Catholic (RC)			.036	
Other Christian	.134	.166	.419	1.144
Moslem	.198	.204	.332	1.219
Traditional/ Spiritualist	-.649	.296	.028	.523
No religion	.290	.258	.260	1.337
Other	.824	.931	.376	2.279

Dependent variable: Number of children with fever **Adjusted R²:0.049** **Reference category (RC).** -2Log likelihood: 2713.105 **Model Chi-square: 89.833** **Sig. 0.00**

6.2 Discussion of results

Table 6.1 presents the results of the binary logistic regression. The test was conducted at 0.05 significant level. Reference category (RC) was chosen for each of the independent variables. The table has values of the standard errors, the coefficients, the p – values and the odds ratios. The estimated coefficients for the independent variables represent the slopes (that is the rate of change) of a functional relationship between the dependent and the independent variables. In logistic regression model, the slope coefficient represents the change in the logit corresponding to a change of one unit in the independent variable.

From the table, age 15 to 19 years age group was chosen as the reference category. The results obtained for the age group indicated that mother's age was not statistically significant at 0.05 level of significance because at 0.05 level of significance, the p – value obtained for the various age groups are greater than 0.05. This finding is contrary to the work of Omolola et al. (2012) and Chimere and Willington (2013). The present study is also not consistent with the study done by Samuel and Anastasia (2014) who argued that malaria cases were more prevalent among children of older mothers.

Concerning education, mothers with no education was chosen as reference category. Looking at the various p-values obtained for the various education groups, malaria prevalence was statistically significant with mothers who had primary education only. The p-value obtained for primary education was 0.030. The finding is in line with the findings of Olaide and Gbemiga (2013); who argued that malaria prevalence among children was closely correlated with educational level of mothers. They said malaria prevalence among children generally decrease with mother's level of education. The higher the educational level of a mother, the less likely it is for her child to have malaria. This result indicated that education had a relationship with malaria prevalence.

In the religious affiliation category, mothers who were Catholic were used as reference category. From the table, it could be observed that religion was statistically significant for mothers who belonged to the traditional religion. The p-value obtained for this religion was less than 0.05 which confirmed that there is a relationship between religious affiliation of mothers and malaria prevalence among children. This finding is similar to the findings of Ndugga Patricia et al. 2009, CCORE 2011, Jegede, 2007, and Fourn et al, 2009.

According to Ndugga Patricia et al. 2009, Moslems listened to their leaders more than any other religious group. This was because they were very strict with their religion and tended to believe their leaders more than other groups. Hence, they were less likely to seek malaria

treatment for their sick children. CCORE 2011, reports that Apostolic religion was a key social structural factor influencing maternal and child health among Apostolic members, and affiliation to the ultraconservative. Apostolic groups' religious beliefs potentially resulted in negative health outcomes since they encouraged negative attitudes towards modern maternal and child health services. Fourn et al, 2009 also indicated that the leaders and adherents of Protestant sects, expressed the belief that it is God himself who gives life, and that the only protection necessary against diseases is not human but divine protection. Some of the reticent people also argued that vaccination goes against the will of God, that it is a poison from the "white witch doctor", and that those who vaccinate their children are committing a sin.

Rural residence was chosen as the reference category in which urban residence was compared. The results indicated that, there was no statistical relationship between types of place of residence and childhood malaria prevalence. The p- value obtained was greater than the significant level figure (that is 0.05). However this study did not support the studies done by Abebe et al., 2011, Govoetchan et al. 2014 and Prathiba and Marshall, 2012.

Western region was selected as the reference category in the mother's region of residence category. The results indicated a very strong statistical relationship between mothers region of residence and childhood malaria prevalence. Considering each of the regions, it can be observed that the p – values obtained for each region was less than 0.05 level of significant except for Greater Accra and Eastern regions. This indicated that mother's region of residence is very important in the management of disease. This finding is consistent with what Asenso and Felix, 2003 found. They indicated that malaria transmission was intense and perennial in the rain forest zone (Eastern, Ashanti and Brong Ahafo regions) with slight fluctuations but the peak transmission occurred shortly after the major rainy season.

Mothers who have never experienced marriage were selected as reference category for the study. From the results obtained marital status has no statistical relationship with childhood

malaria prevalence. As p – values obtained were all greater than 0.05 (the significant level value).

Household wealth index had no statistical association with childhood malaria prevalence. Computed p – values on Table 6.1 indicates that all the values obtained for the various household wealth index were more than 0.05. This showed that household wealth index of mothers was not significant in predicting childhood malaria prevalence. This study revealed that, age of mothers, types of place of residence, marital status, wealth quintile; ethnicity and use of bednet were not statistically significant in predicting childhood malaria prevalence.

Ethnicity of mothers was not a determining factor for malaria prevalence among children. Computed p – values on Table 6.1 indicated that all the values obtained for the various ethnic groups were more than 0.05. This showed that ethnicity of mothers was not significant in predicting childhood malaria prevalence.

The odds ratio is a measure of the association, which approximates how much more likely (or unlikely) it is for the outcome to be present. Odds ratio greater than 1 reflects the increase in odds of an outcome of one (the “response” category) with a one-unit increase in the predictor; odds ratio less than one reflect the decrease in odds of the outcome with one-unit change. The odds ratios were tabulated in table 6.1.

From the results, the odds ratio of mothers of the various age groups was compared to mothers of age between 15 to 19 years. The results indicate that the odds ratio of a child whose mother was between 20 to 24 years was 1.05 times more likely to suffer from malaria compared to mothers aged 15-19. In other words the odds of the child have increased by 1. The odds ratio of children with mothers between 25 to 29 years was 1.12 times more likely to suffer from malaria compared to mothers aged 15-19. Furthermore the odds ratio of children with mothers between ages 40 to 44 years was 1.125 times more likely to suffer from malaria infection compared mothers aged 15-19. In the education category, the odds ratio of a child

whose mother had primary education was 1.373 times more likely to suffer from malaria compared to a child whose mother had no education. This shows that the odds of children with primary educated mothers have increased by 1 compared to their counterparts with uneducated mothers. Again children whose mothers had secondary education were 1.15 times more likely to suffer from malaria compared to children with uneducated mothers. Further analysis revealed that children whose mothers acquired higher education had their odds increased by 1 compared to children with uneducated mothers. It can be observed that the odds ratio increased steadily up the education group from uneducated mothers to mothers with tertiary educational background. The results showed that the higher mother's educational background, the less likely her child is to suffering from malaria.

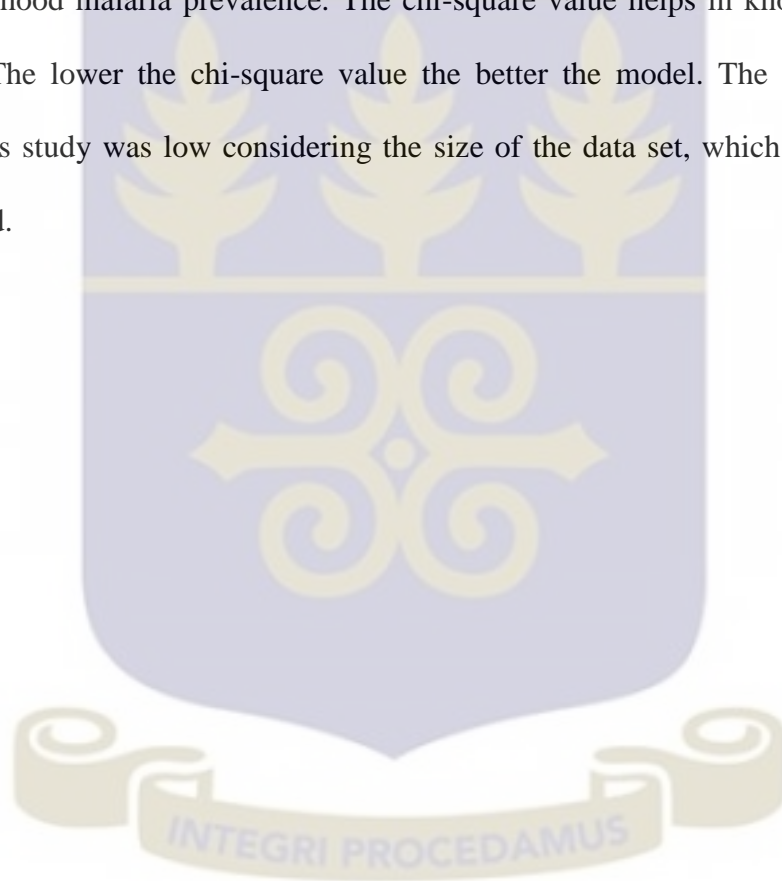
Looking at the odds ratio of the various regions it could be noticed that a child whose mother resides in the Brong Ahafo region was 3.341 times more likely to suffer from malaria compared to a child whose mother resided in the Western region. This indicated an increase of 3 in the odds of a child whose mother lived in Brong Ahafo region suffering from malaria compared to his counterpart in the Western region. It also showed that a child in the Brong Ahafo region would suffer from malaria 3 times compared to their counterparts in the Western region. The odds ratio of a child whose mother lived in the Northern region was 2.491 times more likely to suffer from malaria compared to their counterparts in the Western region. Again the odds ratio for a child who resided in the Upper East region was 2.995 times more likely to suffer from malaria compared to their counterparts in the Western region.

With regards to marriage, the odds ratio of a child whose mother was formerly married was 1.344 times more likely to suffer from malaria compared to a child whose mother had never married.

Religious affiliation of mothers had an association with childhood malaria prevalence. The results showed that children whose mothers belonged to the Traditional region were 0.523

times less likely to suffer from malaria compared to children whose mothers professed the Catholic faith. Again children whose mothers were Moslem 1.144 times more likely to suffer from malaria compared to children whose mothers professed the Catholic faith.

The log-likelihood makes it easy to check the significance of the model. It predicts how well the variables fit the model. The smaller the log-likelihood value the better the model. From this study the value obtained for the log-likelihood indicated that the model was good in predicting childhood malaria prevalence. The chi-square value helps in knowing how good the model is. The lower the chi-square value the better the model. The chi-square value obtained for this study was low considering the size of the data set, which showed that the model was good.



CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Summary

This chapter contains the summary, conclusion and policy recommendation for the study. The general objective of the study was to explain maternal characteristics that influence malaria prevalence among children less than five years in Ghana. The study used data from survey of mothers aged 15-49 years with their under five children who had fever two weeks preceding the survey. To detect whether a child had fever or not, the study employed a sample of mothers with children under five years surveyed in 2008 GDHS. This consists of 2909 mothers who responded on behalf of their children.

Different methods such as percentages, frequencies were used and cross tabulation was used to explore the relationship between the independent variables and the dependent variable. Logistic regression analysis was used to find out the influence of the independent variables on prevalence of fever among the children.

The following findings were obtained from the bivariate analysis. It was clear that 24% of children whose mothers were Moslem had fever two weeks preceding the survey. Brong Ahafo region recorded the highest number of children who had fever while Western region recorded the least. Additionally, children in the rural areas had fever (19.2%) and their counterparts in the urban areas also had 17.9% of fever.

With regard to wealth quintile, children in the poorer wealth quintile were found to have the highest fever prevalence rate (21.3%), followed by children in the middle household (20.3%). Children from the richest wealth quintile had the least prevalence rate of fever. This might be due to the fact that children from the richest wealth quintile might be exposed to the use of mosquito repellants, sprays and even ate balanced meals compared to their counterparts from

poorer wealth quintile who might be lacking all these. The variables that were statistically significant in determining malaria prevalence were religion, region of residence and wealth quintile.

In the binary logistic regression, mother's educational level, region of residence and religious affiliation were factors that predicted the prevalence of malaria among children less than five years in Ghana in 2008. Maternal education for instance, was positively related to childhood malaria prevalence. The result indicated that education, religion and region of the mother cannot be ignored especially in the prevalence of malaria.

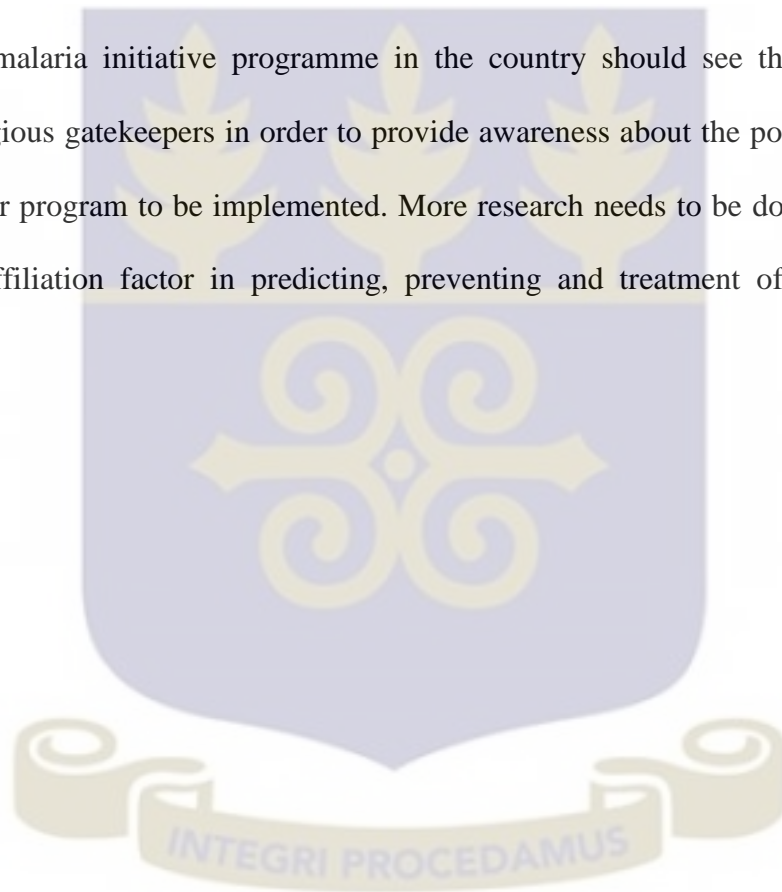
7.2 Conclusions

The results obtained show that malaria prevalence among children under five years is high. This high prevalence could be as a result of lack of health facilities and lower educational level of most mothers in the country. It also indicates that some religious activities influence malaria prevalence among children in Ghana. The study further revealed that region of residence is statistically significant in the prediction of malaria prevalence among children. Since the findings support the hypotheses, I failed to reject them. R^2 which is 0.049 explains only 49% of the variance by the independent variables (maternal characteristics) that predicted the prevalence of malaria (dependent variables) among children less than five years in Ghana. Which means there are other maternal characteristics or factors that could predict malaria prevalence among children less than five years that had not been captured in the model so further research is needed in order to explore some of these factors.

7.3 Recommendation

The following recommendations are therefore made to guide policy makers and health promoters. Maternal characteristics such as educational level, region of residence and religion are important in determining the prevalence of malaria among children less than five years in

Ghana. As such policy makers and public health promoters especially those in charge of, women, gender and child protection should formulate and implement policies that will improve the educational status of girls at the basic level because they are the potential mothers in the near future. Policies should also target mothers in Central, Ashanti, Brong Ahafo, Northern and Upper regions of Ghana to help prevent their children from getting malaria. Government should also use religious leaders in scaling up the campaign to prevent and treat malaria. That is the communication and awareness committee of ministry of health and roll back malaria initiative programme in the country should see the importance of integrating religious gatekeepers in order to provide awareness about the position of religion on any policy or program to be implemented. More research needs to be done to investigate the religious affiliation factor in predicting, preventing and treatment of malaria among children.



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