THE EFFECT OF HEALTH STATUS ON VULNERABILITY TO POVERTY AMONG HOUSEHOLDS IN GHANA

Master of Arts (Economics) Thesis

By

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DECLARATION

I, the undersigned, hereby declare that this thesis is my original work and has not been submitted to any other institution for similar purposes. Where other studies have been used, acknowledgments have been made.

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Signature

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CERTIFICATE OF APPROVAL

The undersigned certify that this thesis represents the student's own work and effort and has been submitted with our approval.

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DEDICATION

To my late Dad and Hero, Stephen and Sefora, my mum

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ABSTRACT

This study examines the effect of health status on vulnerability to poverty among households in Ghana using cross section data from the fifth round of the Ghana Living Standards Survey (GLSS 5). Employing a vulnerability estimation procedure suggested by Chaudhuri (2000), the study shows that good household health status has a significant negative impact on vulnerability to poverty. Households with sick members were found to be more vulnerable to poverty. Moreover, households with poor hygiene conditions were also more vulnerable to poverty. Using an upper poverty line, the estimates of vulnerability show that about 56% of households in Ghana are vulnerable to poverty in the future and this is higher than the observed poverty level of about 28%. The estimates were however sensitive to the poverty line used and different for various household characteristics. Moreover, vulnerability to poverty and poverty were found to be two independent concepts. It is therefore recommended that while policies directed towards vulnerability to poverty and poverty reduction should target household health status, including hygienic conditions, various household characteristics should not be taken for granted if efficiency is to be achieved in the implementation of such policies. Also, policies that target the current poor and neglect the current non-poor but vulnerable to poverty should be discouraged.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADL:	Activity for Daily Living
AERC:	African Economic Research Consortium
AIDS:	Acquired Immune Deficiency Syndrome
BMI:	Body Mass Index
DALY:	Disability Adjusted Live Years
GDHS:	Ghana Demographic and Health Survey
EU:	European Union
FGLS:	Feasible Generalized Least Squares
FGT:	Foster, Greer and Thorbecke
GHS:	Ghana Health Service
GLSS:	Ghana Living Standards Survey
GPRS:	Ghana Poverty Reduction Strategy
GSS:	Ghana Statistical Service
GHDR:	Ghana Human Development Report
HIV:	Human Immuno-Deficiency Syndrome
ITNs:	Insecticide Treated Nets
MDGs:	Millennium Development Goals
MoH:	Ministry of Health
NGOs	Non-Governmental Organizations
NHIS	National Health Insurance Scheme
OLS	Ordinary Least Squares
PSI	Presidential Special Initiative

QALY	Quality Adjusted Life Years
SSA	Sub-Sahara Africa
TB	Tuberculosis
TH/SI	Teaching Hospitals/Specialized Institutions
UNDP	United Nations Development Programme
VEP	Vulnerability as Expected Poverty
VER	Vulnerability as Uninsured Exposure to Risk
VEU	Vulnerability as Low Expected Utility
WB	World Bank
WHO	World Health Organization
WLS	Weighted Least Squares

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Health shocks are defined as a sudden deterioration in the state of health of an individual, caused by circumstances such as an illness and/or an injury. The impact of health shocks on the welfare of individuals and households as a whole has been a major concern among policy makers. While many other shocks such as droughts and floods are seen to have significant impact on welfare, health shocks are believed to be one of the most important and unpredictable shocks and are also one of the greatest challenges that any household has to face (Narayan *et al.*, 2000). For example, Somi *et al.*, (2009) noted that the nature of health shocks and its associated costs have both short and long run impacts on household welfare. In the short-run, due to the limited nature of resources, households are forced to substitute consumption expenditure away from other items (such as food) to health care (such as medicines and hospital bills). In the long-run, returns from investment in productive activities tend to reduce. This implies that, rational individuals will not only work towards improving their current health status but also their future state of health (Grossman, 1972a).

Grossman (1972a) also argued that individuals do not desire good health for the sake of it but for the stream of "healthy time" that it produces and payoffs that determine market and non-market participations. For market activities, the healthy time enables individuals to invest in productive activities which yield income that improves welfare. For non-market activities, good health enables individuals to take part in other activities that, even though not productive, enters into their utility functions positively thereby improving their welfare.

This implies that, households do not only suffer from the pain of a sickness but also the loss of income and deteriorating welfare that come with poor health. The labour force of

the household is reduced and health expenditure is increased due to poor health. It is worth noting that although only one household member might be sick at a particular time, the burden of the illness is not borne by that individual alone but by the entire household as some members have to withdraw from productive activities while others commit their financial resources. The situation is worsened when the bread winner of the household suffers from an illness. Indeed several researchers including Monk and Teal (2008) and Lucas and Bloom (2006) have all identified a significant negative effect that health shocks have on the impoverishment of households through a reduction in the labour supply of these households. In the case of Ghana, Asante and Asenso-Okyere (2003) did an assessment of the economic burden of malaria and found that a percentage increase in malaria morbidity rate results in a decrease in growth in real GDP by about 0.4%.

While some of the literature, including Lindelow and Wagstaff (2005), have looked at the effect of health shocks on ex-post welfare loss, economists have identified the need for ex-ante welfare to be considered in policy directed towards poverty eradication and prevention (Chaudhuri, 2003 and Azam and Imai, 2009). An ex-ante analysis of the impact of health shocks on welfare does not only look at how poor households or individuals will be today due to destitution caused by health shocks but also the possibility that these households or individuals will be poor in the future due to these health shocks. The presence of risk and uncertainty in most activities has triggered several debates on the need to consider the dynamic aspect of poverty interventions rather than the usual static measure of poverty. As noted by Ligon and Schechter (2003), a household's sense of wellbeing depends not just on its average income or expenditures but on the risks it faces as well, particularly in households with fewer resources.

An emerging concept that considers ex-ante welfare is the concept of vulnerability. The concept provides an insight on how the impact of shocks that households face today is going to affect their wellbeing in the future. Chaudhuri *et al.*, (2002) define vulnerability to poverty as the ex-ante risk that a household will be poor in the future, irrespective of

their current state of welfare. The concept supports measuring welfare not only by observed poverty but future poverty hence giving a dynamic perspective of welfare as opposed to static welfare measures.

This study is, therefore, motivated by the view that static measures of welfare are less exhaustive in terms of policy interventions. Tendon and Hasan (2005) viewed poverty measures that include lack of social protection and lack of access to consumption smoothening mechanisms as informative but admitted that this measure has not been easy to implement empirically. They argued that poverty should not be conceptualized in terms of monetary and social deprivations but also in terms of exposure to shocks (such as illness, flood and drought shocks). Understanding the effects of such shocks helps effective policy interventions as key micro-level binding constraints are identified.

An additional motivation of this study is from the growing literature (Appiah-Kubi *et al.*, 2005; Azam and Imai, 2009) that provides evidence to suggest that there is a significant difference between the current poor and the vulnerable and in most cases vulnerability to poverty was found to be higher than static poverty levels. For instance in the case of Ghana, Appiah-Kubi *et al.,* (2005) found vulnerability to poverty level in 1998/99 to be about 50% whereas the observed poverty level was estimated to be 39.5%. A proper policy intervention therefore needs a succinct understanding of how a population health affects vulnerability to poverty and not just observed poverty.

The need for this investigation in Ghana arises due to the state of the populations' health. Although the government has made some efforts[1] to improve health status, there seem to be much more room for improvement. Table 1.1 presents a comparison of population health status among different regions for the year 2007. A look at the figures for the three sub-Saharan Africa (SSA) countries (Ghana, Nigeria and Botswana) suggests that the population health among Ghanaians is quite impressive. However the concern arises

[1] Including the National Health Insurance Scheme introduced in 2003

when the figures are compared to such emerging economies as Malaysia. For instance, whilst Ghana's under-5 mortality rate is at 115, Malaysia has under-5 mortality of only 11 and same situation is observed for all the other indicators of population health.

Table 1.1 A Comparison of Population Health Status in 2007 Figures

	Ghana	Nigeria	Botswana	Malaysia
Under-5 mortality rate*	115	189	40	11
Adult mortality rate**	317	414	514	143
Life expectancy at birth***	57	49	56	72

Source: WHO (2009), World Health Statistics Report

Note: 1. *: Number of deaths by age 5 per 1000 live births

2. **: Number of deaths between 15 and 60 years per 1000 population

3. ***: Number of years expected to live before death

Similar situation prevails at the individual level where about 21% of the population is reported to have suffered from an illness and/or an injury in 2006 (GSS, 2008). Moreover, while 28% of Ghanaian children are stunted, 14% are underweight which suggests problems of malnutrition among Ghanaian children[2] (GHS, 2008).

1.2 Problem Statement

An understanding of the complex relationship between health shocks and welfare is crucial for critical policy intervention. For example, in the occurrence of an illness, labour supply is reduced and households tend to substitute consumption towards health care and/or increase total consumption expenditure as care of the sick places additional burden on the household. Consequent reductions in income due to health care expenditure entails reduced household food consumption which will possibly further impact on labour productivity. The situation overtime will lead households to rundown savings which will possibly force them to borrow at high interest rates. Households with physical assets are also likely to sell them to cushion the burden. Such distress sale of

[2] See chapter two and three for further discussion of individual level health indicators

assets including land, livestock or production tools and equipment will further reduce income flows making it difficult for these households to smooth consumption (Lucas and Bloom, 2006).

Nonetheless, most studies have assessed the impact of health shocks on static welfare rather than a dynamic welfare analysis. In the case of Ghana, studies that sought to assess the impact of health shocks on population welfare did that only for ex-post welfare rather than ex-ante (Asante and Asenso-Okyere, 2003). On the other hand studies that analysed ex-ante welfare or vulnerability to poverty did not consider the impact of health shocks (Appiah-Kubi *et al.*, 2005). It is however estimated that about 59% of individuals who suffered poor health in 2006 had to stop their usual income generating activities (GSS, 2008). This situation motivated the current study to examine the relationship and the effect of health shocks on vulnerability to poverty in Ghana. While the study seeks to add to the scanty literature on vulnerability to poverty in Ghana, it goes a step further to find the effect of health shocks on vulnerability to poverty.

A brief understanding of the situation of population health in Ghana shows why the effect of such shocks cannot be underestimated when they occur. WHO (2009) shows that while infant mortality rate (number of deaths between birth and age 1 per 1000 live births) has reduced from 76 in 1990 to 73 in 2007, under-5 mortality rate (number of deaths by age 5 per 1000 live births) has reduced from 120 in 1990 to only 115 in 2007. Moreover, adult mortality rate (number of deaths between 15 and 60 years per 1000 population) has increased from 271 in 1990 to 317 in 2007 with life expectancy at birth falling from 58 in 1990 to 57 as at 2007 which raises worries. In relation to the fourth (reduce by two-thirds, between 1990 and 2015, the under-five mortality ratio) and fifth (reduce by three quarters, between 1990 and 2015, the maternal mortality ratio) Millennium Development Goals (MDGs), the above figures suggest that there seems to be much more room for improvements to achieve these goals and perk up the welfare of the population.

The purpose of this study is therefore to provide empirical evidence on the effect of poor health status on vulnerability to poverty among households in Ghana.

1.3 Significance of Study

Several countries especially in Africa have made poverty reduction and hence improvement in income and welfare a prime area in their growth and development agenda. Most of the policy interventions adopted by these countries have however only focused on poverty at a point in time. For instance economists have described the first Millennium Development Goal of reducing the proportion of people living on less than $1-a-day by 50% over the period 1990-2015 as a static measure of welfare and hence less exhaustive as it fails to consider the vulnerable. They advocate for a more dynamic measure of welfare (Tandon and Hasan, 2005). Vulnerability to poverty is seen widely as a better dynamic measure of welfare.

This implies that a sustainable poverty reduction will be difficult to achieve unless household vulnerability and resilience to shocks are improved. However, while much effort is directed towards shocks such as flood and drought in developing countries, health shocks have received little attention even though they are seen as a major problem in any household (Lucas and Bloom, 2006). Even though a country might succeed in the reduction of the level of poverty, it might be reversed to poverty or even extreme poverty if health shocks cause individuals to run down savings and fall on their physical assets to cope in their impoverishment caused by poor health status.

In the case of Ghana most studies on poverty have only focused on poverty at a point in time (Asenso-Okyere *et al.*, 1997; Boateng *et al.*, 2001; Canagarajah *et al.*, 1998). The dynamic aspect of poverty and the effect of household health status on this aspect of poverty have received little attention from researchers. For example, while Appiah-Kubi *et al.*, (2005) presented a vulnerability profile for various household characteristics in

Ghana, health shocks were not included. This study, therefore, seeks to go a step further to determine the impact of household health status on vulnerability to poverty.

This study will be significant in guiding policy makers to make appropriate choices in terms of policy targets. Moreover, the study is important as it addresses the research gap that exists by adding to the scanty literature that exists in the area of vulnerability to poverty in Ghana.

1.4 Objectives of the Study

The general objective of the study is to determine the effect of poor health status on vulnerability to poverty among households in Ghana.

1.4.1 Specific Objectives

The specific objectives of the research are to;

- determine the significance of poor health status on vulnerability to poverty
- assess vulnerability to poverty profile for various household characteristics

1.5 Hypotheses

The following are the null hypotheses to be tested.

- Household health status does not affect their vulnerability to poverty.
- Vulnerability to poverty does not differ for various household characteristics.

1.6 Organization of the Study

The rest of the study is organized as follows; chapter two comprises of an overview of poverty and vulnerability in Ghana and the structure and organization of health systems in the country including the population health status. Chapter three presents a review of theoretical and empirical literature that provides an understanding into the relationships under investigation. Chapter four discusses the methodology to be used in the study.

Chapter five and six discuss the findings and the appropriate policy implications respectively.

CHAPTER TWO

VULNERABILITY, POVERTY AND HEALTH BACKGROUND OF GHANA

2.1 Introduction

This chapter gives a brief background of the nature of vulnerability and health in Ghana. The chapter is divided into two parts. It first presents the state of poverty and vulnerability in the country. The second part gives an overview of the health sector, structure of the sector and disease profiles including some health indicators.

2.2 Poverty and Vulnerability to Poverty in Ghana

The government of Ghana over the years has directed policies to achieving the first goal of the Millennium Development Goals (MDGs) which is to eradicate extreme poverty and hunger. While quantitative data provided by the various Ghana Living Standard Surveys (GLSS) on the trends of poverty in most recent years suggests an improvement in the level of poverty, it will be erroneous to conclude that vulnerability levels have also moved in the same direction.

Available data shows that poverty levels in Ghana reduced from 51.7% in 1990/91 to 39.5% in 1998/99 and further to 28.5% in 2005/2006. About 18.2% of the population was described as extremely poor[3] in the 2005/06 period which shows an improvement on the 1998/99 figure of 26.8% (UNDP, 2007). The incidence of poverty in the administrative regions indicates a reduction over 1991 to 2006. With exception of the Greater Accra and Upper West regions, all other administrative regions in Ghana experienced reduction in extreme poverty. However, the Greater Accra region experienced a reduction in poverty from 15.2% to 11.8% between 1998/99 and 2005/06. The Central and Eastern regions experienced the largest decline in poverty of about 28.5%. It is speculated that, this

[3] Extreme poverty is defined here as the proportion of the population living below the lower poverty line of 2,884,700 Cedis

decline is as a result of the concentration of programmes implemented under the President's Special Initiative (PSI) on cassava, pineapples and palm oil in the Central region and export crops of pineapples and cocoa in the Eastern regions (GSS, 2007).

The trend of poverty in Ghana shows that, the incidence of poverty has been a rural phenomenon over a long period. While about 86% of the total poor population 2005/06 live in rural areas, 83% of the total poor population in 1998/99 live in rural areas. This shows a slight increase in the population of rural poverty over the period. Table 2.1 gives a summary of the incidence of poverty from 1991 to 2006.

Table 2.1 Summary of Poverty Headcounts in Ghana

	1991/92	1998/99	2005/06
National Poverty	51.7	39.5	28.5
Rural	64	50	39
Urban (Accra)	23	4	11

Source: GLSS 2005/06 Report

Note: Figures in the Table are measured by the percentage of people living below the upper poverty line (3,708,900 Cedis)

The Table shows that poverty levels in Ghana have declined over the years and rural poverty incidence has been higher than urban poverty. However, a striking case is seen from the incidence of poverty in the urban areas. While there was a significant reduction in poverty form 23% in 1991/92 to 4% in 1998/99, it rose again to 11% in 2005/06. It is speculated that the sudden increase in poverty in the region is due to the large number of migrants to the region.

The extent or depth of poverty in Ghana shows that even though incidence of poverty has reduced significantly, the average consumption of the poor fall significantly below the poverty line. The income gap ratio, which shows the proportion by which the average consumption level of poor households falls below the poverty line, gives indications that

average consumption among the poor was about 34% below the upper poverty line in 2005/06. However, in the case of extreme poverty, the depth of poverty is estimated to be 31.3% in 2005/06. This implies that average consumption among the extreme poor is about 31% below the lower poverty line. These figures suggest that a substantial proportion of the poor still have even worse welfare and therefore not likely to move out of poverty in the near future.

Even though very little work has been done to assess vulnerability to poverty levels in Ghana, Appiah-Kubi *et al.,* (2005) provided evidence to show that vulnerability to poverty levels are higher than observed poverty levels in Ghana. They showed that about 50% of the population in 1998/99 were vulnerable to poverty and are likely to experience episodes of poverty in the future. And like in many other countries, vulnerability to poverty among households in Ghana is higher than the incidence of observed poverty. While observed poverty rate among households in 1998/99 is estimated to be 39.5%, vulnerability to poverty rates was estimated to be about 50%. This implies that even though poverty rates in Ghana seem to have improved over the years, there is no reason to believe that levels of vulnerability to poverty has also improved. The reductions in poverty over the years also give room to speculate that policies have mainly been directed towards static poverty and not vulnerability to poverty. However, as noted earlier, sustainable poverty reduction policies need to have vulnerability as an important component.

Different types of risks have been identified among households in Ghana. These risks are likely to lead households into vulnerability to poverty in the future. They include both household and individual specific risks (idiosyncratic) and risks related to the community in which the households or individuals find themselves (covariate). According to Kunfaa (1999) bush fires, infertile lands, snake bites and poor sanitary conditions are some of the sources of risk among rural communities in Ghana. These risks affect the well-being of most rural household's agricultural productivity directly or indirectly hence pushing them

into poverty in the near future since their main source of livelihood is destroyed. While bush fires and land infertility directly affect productivity, snake bites and poor sanitation are likely to affect the health status of these households making them less productive on their farms and other economic activities they engage themselves in.

2.3 The Health Sector in Ghana – An Overview

The main objective of any health sector is to ensure that the health of the population is in line with the national vision. The national vision of Ghana is to attain a middle-income status with a minimum of $1000 per capita by the year 2015. Furthermore the national vision for health is to create wealth through good health and to contribute to the national vision of attaining middle-income status by 2015 (MoH, 2007).

The Ministry of Health (MoH) is the government agency charged with the responsibility of providing overall health policy directions for all players in the country's health sector. The mission of the MoH is to provide socio-economic development and wealth creation by promoting health and vitality, ensuring access to quality health, population and national services for all people living in Ghana and promoting the goals of the local health industry (MoH, 2007). The MoH has an ultimate role of a purchaser and regulator of service provision while its agencies play the provider role. The agencies under the MoH include; the Ghana Health Service (GHS), Teaching Hospitals/Specialized Institutions (TH/SI), Quasi Government Organizations and the Private Sector (include NGOs that provide essentially public health services, Mission Institutions and Private For-Profit Institutions) (MoH, 2001).

These agencies have the responsibility of working towards achieving the ultimate health sector goal ensuring a healthy and productive population that reproduces itself safely. This goal will be achieved through pursuing some objectives which are first, to ensure that people live long, healthy and productive lives and reproduce without an increased risk of injury or death. Second is to reduce the excessive risk and burden of morbidity,

mortality and disability in the poor and marginal groups. Finally is to reduce inequalities in access to health, population and nutrition services and health outcome (MoH, 2007).

Given these goals and objectives, some of the major challenges facing the health sector are the inequalities in the distribution of health resources and financing health care delivery. Inequalities in health care delivery mainly exist between regions and districts and between the rich and poor in Ghana. Access to health services is more inadequate in deprived and rural areas (MoH, 2007). The National Health Insurance Scheme (NHIS) which was established in 2003 to replace the 'Cash and Carry' system serves as a source of funding to the health sector through the National Health Insurance Levy. Other sources of funds include 2.5% of the Social Security contributions of all workers and contributions from donors which are pooled into the health fund established by the MoH (MoH, 2007). Health care financing therefore becomes a problem as only about one-half of the Ghanaian population are estimated to have registered with the NHIS.

2.4 Health Status in Ghana

Unlike many developed countries, communicable diseases continue to be the main source of mortality and morbidity in developing countries. In the case of Ghana, communicable diseases accounts for the majority of deaths despite efforts made by the health sector to control them. The main diseases that are a source of worry to many Ghanaians include Malaria, Tuberculosis and AIDS (GHS, 2008).

Malaria is hyper endemic in Ghana and continuous to be a leading cause of mortality and morbidity in the country. According to the Ghana Health Service (GHS) 2007 annual report, malaria was responsible for 38.6% of outpatient attendance in 2007 compared to 43.7% in 2006. It was also judged to be the highest cause of mortality, accounting for over 18% of deaths reported at health facilities (GHS, 2007). Prevalence rate of malaria increased from 42.9% in 2000 to 44.1% in 2004 (UNDP, 2007). To control malaria related deaths and sicknesses, the government has implemented a malaria control strategy that involves multi and inter-sectoral partnerships, working together on an agreed plan to

reduce death and illness due to malaria by 50% by the year 2010 (GHS, 2007). The strategies for control include prevention through the use of insecticide treated nets (ITNs), early detection and appropriate prompt treatment. Incidence of malaria is very prevalent among the poor and the vulnerable as well as in deprived communities in Ghana (UNDP, 2007).

AIDS is also still considered as a serious challenge to the health sector of Ghana (GDHS, 2008). According to the 2007 Ghana Human Development Report (GHDR), HIV/AIDS has become a major health, social and economic issue as it accounts for over 40% of outpatient visits, 12% of all deaths and resulting in about 140,000 children orphaned (UNDP, 2007). The prevalence of the syndrome however varies among the ten regions in Ghana. For instance the lowest prevalence in 2007 was in the Northern region with 1.7% and the highest prevalence was in the Eastern region with 4.3% (GHS, 2007). Efforts made by the government to curb the spread of the pandemic include establishment of counselling and testing centres, preventing mother to child transmissions, provision of treatment, care and support including highly active antiretroviral therapy service centres (UNDP, 2007; GHS, 2007).

Tuberculosis (TB) in Ghana has been described as the most common cause of premature death. However due to government's commitment and strategies the number of TB cases detected has stabilized over the years. For example, the national TB case detection rate decreased from 59.1 per 1000 people in 2002 to 58.4 in 2003 and then to 56.6 in 2004 (UNDP, 2007). The Central region recorded the highest case detection over the period while the Northern region recorded the lowest.

Other diseases in Ghana that need to be highlighted include Guinea worm, Diabetes, Cholera, Diarrhoea etc. For example, Ghana is ranked second in the world after Sudan in terms of Guinea worm prevalence (UNDP, 2007). However efforts made by the government have led to successful progress in eradication of the disease (GHS, 2007).

Even though the disease profiles discussed above may give some picture of the health situation in Ghana, it is important to analyse the trend of some significant health status indicators to assess the state of health of the Ghanaian populace. According to the WHO (2009), a summary measure of population health needs to capture both fatal and non-fatal health outcomes. The following aggregate measures of health will therefore be considered in the analysis of the state of health in Ghana; Fertility rates, Mortality rates and Life expectancy at birth.

Total fertility rates have slightly declined in Ghana over the years from 6.4 births per woman in 1988 to 5.2 in 1993, 4.4 in 1998 and 2003 and 4.0 in 2008 (GDHS, 2008). This shows a consistent decline in the number of births per woman in the country. Such declines are important in improving the welfare of both the woman and the household as a whole as dependency ratios tend to reduce the burden of caring for large families.

Both infant and child mortality (under-five mortality) have also declined over the years even though this decline is substantially marginal. As shown in Table 2.2, under five mortality reduced by only 5% between 1990 and 2007. Infant mortality only reduced by 3% over the same period. Adult mortality, however, increased by about 46% over this period. Life expectancy at birth decreased from 58 years in 2000 to 57 years in 2007. It's worth noting however that, healthy life expectancy at birth was at 50 years in 2007 (WHO, 2009). This situation definitely gives enough reason for worry about the health state of the population in Ghana. Table 2.2 summarizes the state of health in Ghana for some selected years.

Table 2.2 Summary of Some Aggregate Level Health Indicator in Ghana

Year	1990	2000	2007
Fertility rate (per woman)	5.8	4.6	3.9
Infant Mortality rate	76	71	73
Under-5 Mortality rate	120	112	115
Adult Mortality rate	271	291	317
Life expectancy at birth (in years)	58	58	57

Source: WHO (2009), World Health Statistics Report

Health indicators at the individual level also suggest that much more work needs to be done to improve the health status. In the case of malaria, less than half (45%) of households own mosquito nets with one-third (33%) having ITNs. Only 28% of children and 20% of pregnant women use ITNs (GDHS, 2008). This implies that while government of Ghana has made efforts to reach out to the population with ITNs to reduce the prevalence of malaria, access of these ITNs seem to be low.

Malnutrition is an important individual level health indicator as it measures risks of mortality and morbidity and is also related to impaired mental development especially among children. At the individual level, information on height-for-age, weight-for-height and weight-for-age are used to measure nutritional status. Data from the GDHS (2008) shows that 28% of Ghanaian children are stunted (height-for-age is below minus two standard deviations (-2SD) from the median of the reference population) with 10% being severely stunted. Stunting is high among children age 18-23 months at 40%. In terms of weight-for-height, 9% of Ghanaian children are wasted or thin (weight-for-height is below -2SD from the median). Wasting levels are highest at age 6-11 months making such children more vulnerable to illness. While 14% of Ghanaian children are under weight (weight-for-age is below -2SD from the median), 3% are classified as severely underweight with peak levels among children aged 18-23 months. This measure reflects the effects of both acute and chronic malnutrition.

An analysis of the levels of poverty and state of health suggest that, while poverty reduction has been impressive over the years the poor state of health seems to nullify the possibility of a sustained welfare improvement. The figures presented above show a possibility of an occurrence of health shocks among the population. Such shocks are accompanied by high expenditure and loss of labour time. This implies that while individuals or households may not be poor, such shocks are likely to render them worse-off in some future time. Moreover, currently poor individuals will hardly escape the poverty trap if they are faced with such shocks. Understanding the effect of health shocks on a more dynamic welfare measure will therefore be crucial for an effective policy intervention.

2.5 Conclusion

This chapter has presented a brief synopsis of the state of poverty and vulnerability as well as an overview of the health sector and state of health in the country. Ghana's main health concerns are diseases such as HIV/AIDS, malaria and tuberculosis. The indicators of health shows that there is generally much more that needs to be done in order to address the health concerns of the population. Moreover, while the chapter has shown that Ghana has made significant progress towards achieving the first millennium development goal of halving poverty by 2015, the fourth and fifth goals of reducing child and maternal mortality still remains bleak.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

The chapter presents a summary and discussion of what other researchers have done in the area of health and vulnerability to poverty. The chapter has two sections. Section 3.2 provides some theoretical literature that gives the theoretical framework upon which the study is based. The second section, 3.3, presents some empirical evidence on the relationships between household health, household characteristics and vulnerability to poverty.

3.2 Theoretical Framework

3.2.1 Health and its Measurement

The WHO in 1948 defined health as "a state of complete physical, mental and social wellbeing not merely the absence of disease or infirmity" (WHO, 1948). Thus the idea of health status can be viewed as a balanced state and desired state. As a balanced state, health status is about the elimination of current infirmities in an individual to ensure that the individual is currently healthy. As a desired state health includes the creation of an environment that will ensure that the good health state persists into the future (Breslow, 1989). That is disease is not only the health issue nor is the absence of it the only health goal.

The WHO (1948) definition of health however still leaves a lot to be desired as a complete physical, mental and social wellbeing is difficult to measure and achieve. For instance, an individual who quits smoking may improve the physical wellbeing but the individual's mental and social wellbeing might be deteriorated since his/her satisfaction derived from smoking is taken away.

There have been various definitions thereafter. Among these include Parsons (1964) who expressed health as "the imputed capacity to perform tasks and roles adequately". Also Capra (1983) offered a further definition of health as "an experience of wellbeing resulting from a dynamic balance that involves the physical and physiological aspects of the organisms as well as its interactions with its natural and social environment". Health status can therefore be seen as the dynamic equilibrium of individuals or groups of people with their environment, reflecting their capacity to live physically, mentally and socially.

Several researchers have measured health status of individuals and populations based on the focus of the study. For instance, Katz *et al.*, (1964) developed an activity for daily living (ADL) scale to classify the level of independent functioning of long term care patients. Nelson and Berwick (1989) provided various measures of health status in clinical practice. Cohen and MacWilliam (1995) measured population health using such indicators as the demographic profile of the population, mortality indicators, hospitalization records and disability and social functions of the population. In more recent researches, health status have been measured as the onset of impairment and disability (Stephens, 2001), change in activities of daily living (Gertler and Gruber, 2000), change in illness status (Riphahn, 1999), changes in BMI (Wagstaff, 2005) and number of days unable to work (Dercon and Krishnan, 2000).

Health status indicators can however be generally grouped into individual level indicators and aggregate level indicators. The aggregate indicators include Quality Adjusted Life Years (QALY), Disability Adjusted Life Years (DALY), mortality, fertility, life expectance and life years gained (Doctor, 2001). The individual measures include BMI, anthropometric measures (such as weight-for-age, height-for-age etc), activities of daily living and self assessed measures. These two measures differ in terms of health outcomes. Aggregate measures consider health outcomes as emerging from a production function relationship between inputs and outputs (Grossman, 2000). Individual measures look at health outcomes as being influenced by perceptions that people have regarding

health which are likely to be related to background, values, beliefs and information (Lynch and Kaplan, 2000).

This study defines health as the absence of a disease and/or an infirmity and is measured as the absence of an illness and/or an injury over a given period of time. This definition is simplified from the general definition given by the WHO. While the definition gives an easy understanding of the term and its measurement, it falls short in the sense that it only considers the physical state of the individual neglecting other incidence such as the mental and social health of the individual. However, the measurement of health as the incidence of an illness is perceived to be objective (Lindelow and Wagstaff, 2005). This is because as an individual level health indicator, it captures the individuals' exact feeling about their health at any point in time. Moreover, such measures are reliable as they are reported by the individuals themselves.

3.2.2 The Health Capital and Demand for Health Model

A rise in individuals' human capital or stock of knowledge gives the ability to produce money earnings in the market sector of the economy and produce commodities in the non-market sector which enters their utility function (Grossman, 2000).

Although several authors have suggested that health can be viewed as one form of human capital, for example Mushkin (1962); Becker (1964); Fuchs (1966), Grossman (1972b) was the first to develop a model for the demand for health capital. Grossman (1972b) argues that health capital differs from other forms of human capital. The argument basically states that an individuals' human capital affects their market and non-market productivity while their stock of health determines the total amount of time they can spend producing money earnings and commodities (Grossman, 1972b).

Grossman's (1972b) model establishes the theoretical relationship between health and the level of utility an individual derives from living thereby creating a link between health

and vulnerability to poverty of individuals and households. Grossman (1972b) assumes in the model that individuals demand health for two reasons which determine their level of welfare at any point in time. First, health is demanded as a consumption commodity which directly enters their preference function. Secondly as an investment commodity, it determines the total amount of time available for market and non-market activities (Grossman, 1972b). In other words an increase in the stock of health reduces the time lost from these activities and the monetary value of this reduction is an index of the returns to an investment in health. This implies that healthy time gained can increase utility directly or indirectly due to higher labour income and thus higher consumption which will likely also affect the level of vulnerability to poverty of any individual. Rational individuals will therefore maximize utility by the optimal management of their stock of health over time.

3.2.2.1 A Simplified Demand for Health Model

The following algebraic equations seek to present a simplified version of Grossman's (1972b) theoretical model for the demand for health capital. In this model individuals are assumed to experience some non-negative amount of sick time (t^s) and they derive utility from consumption of other goods (X) but disutility from sick time. It is assumed again that individuals can substitute between sick time and commodity X at any point in time. In a two period planning horizon where future utility is discounted by a subjective factor $\beta \leq 1$, the discounted utility function that the individual maximizes, υ, can be presented as

$$\upsilon = U(t^s(H_0), X_0) + \beta U(t^s(H_1), X_1) \tag{3.1}$$

where U is utility and H is stock of health capital.

Health capital is assumed to depreciate at a rate, δ. On the other hand the individual can increase health by investing some amount, I (example purchasing medical services, M). This is depicted in (3.2) which serve as a constraint to the individual's utility as presented in (3.1)

$$H_1 = H_0(1-\delta) + I(M_0, t^I) \tag{3.2}$$

Since the health care expenditure (PM) of the individual has to be financed out of labour income (w) and initial wealth (A_0) (assume there are no insurance)[4], the following budget constraint holds after discounting to present values

$$A_0 + w_0(1-t_0^s - t^I) + \frac{1}{R} w_1(1-t_1^s(H_1)) = P_m M + P_x X_0 + \frac{1}{R} P_x X_1 \quad (3.3)$$

Where; p_m = price of medical care

p_x = price of commodity X

R = discount rate

t^I = time invested in favour of health

Using the Lagrange method and manipulating the first order conditions gives a utility maximizing condition as presented below

$$-\beta \frac{\partial t^s}{\partial H_1}\left[\frac{w_1}{P_x}\frac{\partial U}{\partial X_1}\frac{-\partial U}{\partial t^s}\right] = \mu = \lambda \frac{P}{\partial I/\partial M} = \frac{\partial U/\partial X_0}{\partial I/\partial M}\frac{P_m}{P_x} \quad (3.4)$$

where, μ and λ are Lagrangean multipliers.

The condition requires that the marginal utility an individual derives from investing in health (left hand side of equation) should be equal to the marginal cost of doing so (right hand side of equation).

The basis for the model employed in this study is found in the left hand side of the equation which suggest that for the investment in health to have a positive payoff, it must reduce sick time $(-\frac{\partial t^s}{\partial H_1})$. To this end health can be viewed as consumption good and an investment good. As a consumption good, an individual's utility is directly increased by the reduction in sick time (and hence gain of healthy time). This is shown by the negative sign of $(\frac{\partial U}{\partial t^s})$ (discounted marginal benefit of healthy time on utility is given as $\beta \frac{\partial U}{\partial t^s}$).

[4] While this model assumes the absence of insurance and credit markets for the sake of simplicity, it is worth noting that, such variables are crucial for the demand for health

As an investment good, improvement in health impacts on wealth and the real wage $(\frac{w_1}{P_x})$.

This implies that investment in health has a return in terms of added labour income and wealth as more healthy time enables one to have more labour hours. That is, on the one hand, an improvement in the health state of any population will lead to improvement in the state of consumption of the population while on the other hand poor health states will worsen the level of consumption of the population. This relationship is the central focus of this study.

3.2.3 Vulnerability to Poverty and Risk

3.2.3.1 Vulnerability to Poverty

Researchers have defined vulnerability differently depending on the area of focus of their various studies. Some have defined vulnerability in two main contexts; first is in the context of poverty and secondly, the context of adverse shocks (Appiah-Kubi *et al.*, 2005). Research elsewhere has focused on vulnerability to natural hazards such as drought (Christeansen and Boisvert, 2000) and macro-level shocks. For instance, Glewwe and Hall (1998) perceived vulnerability as a dynamic concept involving sequence of events following a macroeconomic shock. These macroeconomic shocks may be policy induced or market induced. But as noted by Naude *et al.*, (2008), the focus of vulnerability is mainly on poverty. Naude *et al.*, (2008) also gave a general definition of vulnerability as "the risk that a system would undergo a negative change due to a perturbation. Duflo (2005) defined vulnerability as "a probability: the risk a household will fall in to poverty at least once in the next few years". This definition establishes some relationship between vulnerability and poverty as the two concepts reinforce each other. Poverty is a source of vulnerability as poor people are more likely to face shocks and repeated exposure to downturns reinforces poverty (Morduch, 1999).

Vulnerability to poverty can be looked at as the failure of a household to smoothen consumption. Consumption smoothening is the ability of a household to shift money or

resources from “good times” to “bad times” (Duflo, 2005). A poor household would derive higher satisfaction from receiving an extra dollar than a better-off household. Poor households that also receive resources in “bad times” will surely have higher marginal utility than richer households. The definition of poverty as income below some threshold leaves a lot to be desired. Such definitions fail to capture a very important component of poverty which is vulnerability. This is because, at any point in time, individuals who have their income below this threshold are described as poor and receive all attention, whereas, individuals who may currently not be poor but are likely to fall into poverty in the near future (or are vulnerable) are neglected.

Sen (2001) places the concept of vulnerability into two perspectives, if vulnerability is defined as the ability to manage risk. These are the “risks-centric and rights-centric views”. The “risks-centric view” refers to the variability in the living standards caused by consumption or income shocks while the “rights-centric view” is caused by the lack of social and political rights. In his view, the risks-centric perspective highlights transient poverty while the rights-centric view focuses on chronic poverty. He therefore argued that both views are important in the consideration of implications of vulnerability for poverty reduction.

Alwang *et al.,* (2002) proposed the following general principles as related to the concept of vulnerability. First, the concept is forward-looking and could be defined as probability of experiencing a future shock relative to some benchmark of welfare. Second, vulnerability is caused by some uncertain events. Thirdly, the degree of vulnerability depends on the characteristics of risks involved and households’ ability to respond to the risks. Fourthly, vulnerability is considered to depend on time horizon. Finally, both the poor and the non-poor could be vulnerable because of their limited access to assets and ability to respond to risks.

Alwang and Siegel (2000) conceptualized vulnerability as having four components. These are risk, exposure, response and outcome. Risk is the probability of an event happening while exposure considers the value of assets at risk if the event occurs or what a household stands to lose if the event occurs. This depends on the action taken by the household, for example choice of employment or asset portfolio. The response component captures efforts made to mitigate or reduce the impact of the shock. This usually depends on the asset base of the household or individual. The ability of a household to sell assets in the event of a shock might reduce the impact of a shock but such households may be vulnerable if the assets are depleted to the extent that they cannot be replaced. The end result of the exposure gives the outcome of the risk. This implies therefore that the degree of vulnerability depends on the characteristics of risk, exposure and the ability to respond.

As noted by Pritchett *et al.,* (2000), many households may not be considered as currently poor but are highly vulnerable and events such as a loss of job, an unexpected expense, an illness, a lull in business, can easily push them in to poverty in the near future. A focus only on current poverty partly misses the point in that the non-poor today may be the poor tomorrow (Christeansen and Boisvert, 2000).

The two concepts; poverty and vulnerability, have often been treated as if they are the same but Baulch and Hoddinott (2000) noted that, the poor and the vulnerable are not identical even though the poor are mostly vulnerable. While the concept of vulnerability is forward looking and implicitly also accounts for uncertainties surrounding future events, poverty on the other hand is usually treated in static non-probabilistic terms (Ravallion, 1996). The distinction between transitory poverty[5] and chronic poverty[6] shows that poverty is not always a static concept as perceived by some researchers. Transitory poverty suggests that people usually respond to some stochastic events that

[5] Which is used to describe people who move in and out of poverty
[6] Which is used for people who remain in poverty over some time

push them temporarily into poverty (Morduch, 1994). It is therefore possible that the poor today will not always be the poor tomorrow.

Chaudhuri *et al.,* (2002) noted that what really matters in policies directed towards poverty is the ex-ante risk that a household will, if currently non-poor, fall below the poverty line, or if currently poor, will remain in poverty and that the current poverty status of a household might be a deceptive guide to the household's vulnerability to being poor in the future. This implies that any forward-looking anti-poverty intervention should look beyond the current poor and make an assessment of household's vulnerability to poverty. Chaudhuri *et al.,* (2002) provided two main distinctions between vulnerability assessment and the usual poverty assessment. First, unlike poverty, vulnerability to poverty is a forward-looking concept and at any point in time, given data, vulnerability to poverty of a household is unobservable to the policy maker. Secondly, vulnerability assessments are rooted in explicit models of inter-temporal household behavior.

3.2.3.2 Measuring Vulnerability

Vulnerability has been measured by different researchers based on the focus of study and available data. However, vulnerability measurement has some general perspectives which include the time horizon and the welfare measure. The time horizon in vulnerability measurement could be the next day, a year later or old age but welfare is mostly in terms of consumption[7]. There are three main approaches that have been discussed generally in the literature in measuring vulnerability. These include first, the measurement of Vulnerability as Expected Poverty (VEP), second is Vulnerability as Low Expected Utility (VEU) and finally Vulnerability as Uninsured Exposure to Risk (VER) (Hoddinott and Quisumbing, 2003; Christiaensen, 2004).

The VEP approach to vulnerability measurement has been used by Chaudhuri *et al.*, (2002) and Christiaensen and Subbarao (2005). This approach defines a household's (h)

[7] Welfare measures could be diverse eg. Likelihood of a child growing slowly

vulnerability to poverty at time (t) as the probability that the household's consumption (C) at time (t+1) will fall below some benchmark (consumption poverty line, Z). That is

$$V_{ht} = \Pr(C_{h,t+1} < Z) \tag{3.5}$$

Pritchett *et al.*, (2000) extended the time horizon noting that since the future is uncertain, the degree of vulnerability rises with the length of the time horizon. According to them, vulnerability of household (h) for n periods (denoted as R (.) for risk) is the probability of observing at least one spell of poverty for n periods, which is one minus the probability of no episodes of poverty[8]:

$$R_h(n, Z) = 1 - \left[(1 - \left[\mathrm{P}(C_{h,t+1}) < Z \right]), \ldots, (1 - \left[\mathrm{P}(C_{h,t+n}) < Z \right]) \right] \tag{3.6}$$

Denoting I(.) as an indicator equal to 1 if the condition in equation (3.6) is true and zero otherwise, households are considered as vulnerable if the risk in period n is greater than a threshold probability p:

$$V_{ht}(P, n, Z) = I\left\{ R_h(n, Z) > p \right\} \tag{3.7}$$

This approach has been criticized on the point that it does not take into account the depth of expected poverty. However, one advantage of this measure is that it can be implemented using a single cross section data. Also, although the approach is defined for individual households, it can be aggregated over a number of households (Hoddinott and Quisumbing, 2003).

The second approach which is VEU defines vulnerability with reference to the difference between the utility derived from some level of certainty-equivalent consumption, Z_{CE} (analogous to the poverty line) at and above which the household would not be considered vulnerable and expected utility of consumption. Vulnerability is therefore measured as;

[8] It is worth noting that equation (3.6) does not specify whether an individual will be vulnerable once in the next period or continuously over a given period. However, the conceptual framework adopted by this study defines vulnerability as the probability of becoming poor in time t+1 (see Christiaensen and Subbarao, 2005)

$$V_h = U_i(Z_{CE}) - EU_h(C_h) \quad (3.8)$$

where U_h is a weak concave, strictly increasing utility function.

Ligon and Schechter (2002) employed this approach in their study. This approach is advantageous in the sense that vulnerability estimates reflect low asset levels, unfavourable setting or poor returns to assets and also shocks and inability to cope with shocks (both idiosyncratic and covariate). The approach is, however, criticized on the following grounds; first, specification of a particular functional form of the utility function will affect the magnitude of the vulnerability estimates calculated. Secondly, since utility is the main focus of this approach, the unit of measurement is likely to be units of utility, for example utils, which may be difficult to understand by many policy makers (Hoddinott and Quisumbing, 2003).

The third approach of measuring vulnerability is the VER approach. This approach seeks to capture the welfare loss a household suffers due to lack of effective risk management tools. This approach is similar to VEP and VEU in that it is concerned with assessing welfare and welfare losses in a world where some risks are at best partially insured. The differences between VER and the other approaches are that unlike VEP, it is backward looking: ex-post measure of welfare loss rather than an ex-ante welfare loss due to a negative shock. Secondly unlike the other two, it does not attempt an aggregate measure of vulnerability. There are three major drawbacks to this approach. First is the fact that it is not necessarily the case that household with a higher variance in income (income growth) or a higher variance of consumption (consumption growth) is less vulnerable. Variance of income growth could reflect inter-temporal changes in leisure. Secondly, vulnerability to shocks does not depend directly on the household's level of consumption. Unlike the VEP, no welfare weights are attached to changes to consumption among different households. For instance, a 10% reduction in income of a millionaire and a destitute are treated equally (Ligon and Schechter, 2003). Finally, positive and negative shocks do not have asymmetric effect as assumed by this approach. There are different ways of dealing with these shocks between households.

A comparison of these approaches shows that the VEP and VEU make reference to a benchmark for welfare indicator, Z, and enumerate a probability of falling below this benchmark, P. They also measure vulnerability at the individual level and summing over all individuals and households give a measure of aggregate vulnerability to poverty. The VER approach do not measure vulnerability because they do not construct probabilities; instead they assess whether observed shocks generate welfare loss. This is to say that, they are ex-post assessment of the extent to which a negative shock causes a household to deviate from expected welfare (Hoddinott and Quisumbing, 2003).

Calvo and Dercon (2005) also proposed a modification of the VEP approach of measuring vulnerability. They define vulnerability as the magnitude of the threat of poverty, measured ex-ante, before the veil of uncertainty has been lifted. Some classifications of the definition are as follows; first, it considers the magnitude of a threat which includes the probability of becoming poor and the severity of this poverty when it occurs. Secondly, the measure takes note of ex-ante uncertainties which compound the distress of the poor. This is an important factor which is overlooked by poverty concepts and measures that focus on observed states of deprivation. Also, while the definition refers to vulnerability to poverty, this vulnerability to poverty occurs through threats like illness, or crime, or loneliness etc. Finally, this measure is mainly at the individual or household level as opposed to aggregate vulnerability. That is, the measure does not allow comparison of vulnerability among a group of households or countries. In comparison to the welfare-based measure, this measure of vulnerability argues that if vulnerability depends on expected utility in general, it will be necessarily sensitive to the likelihood and the magnitude of 'good' outcomes. They argued that a household need not be seen as vulnerable, provided other scenarios are promising enough to compensate for the fear of starvation. With respect to the measure of vulnerability as expected poverty, Calvo and Dercon (2005) argued that the measurement of vulnerability as probability of

being poor and expected shortfall does not pay attention to the probability distribution of outcomes below the poverty line. In other word, it assumes risk neutrality.

A rather emerging measure of vulnerability is the asset based approach which introduces risk to poverty measure based on assets through the variance of income. The approach also permits distinction between different expected poverty types. It basically assumes that a household asset base represents its expected income so that a household is considered to be vulnerable to poverty if its expected income falls below the asset poverty line. The classification of different expected poverty groups depend on vulnerability estimate of a household (V_h). If $V_h=1$, the household is considered to be structural-chronic poor. If $0.5 \leq V_h < 1$, the household is structural-transient poor. If $0 < V_h < 0.5$, the household is stochastic-transient poor. Finally if $V_h=0$, the household is never poor. A detailed description of this approach and empirical evidence could be seen from Chiwaula *et al.,* (forthcoming). While this approach is significant in taking a better consideration of household asset base in vulnerability estimates, valuing these assets become difficult in terms of precision.

3.2.3.3 Risk

The difference between poverty and vulnerability to poverty stems from the existence of risk and uncertainties (Zhang and Wu, 2008). This implies that households and individuals are vulnerable because of the possibility of an event happening that might change their state of well-being; the concept of vulnerability therefore becomes significant if the concept of risk is given attention.

Risk can be classified as being “good” or “bad” (Appiah-Kubi *et al.,* 2005). Good risks are those that lead to the improvement of the well-being of households and individuals. Bad risk is however, the type of risk that worsens the well-being of households and individuals.

Risks may also be classified on the basis of whether they are idiosyncratic or covariate. Idiosyncratic risks are those kinds of risk that affects households or individuals while covariate risks affect an entire community. It is worth noting that both covariate and idiosyncratic risks can have very significant influence on the level of vulnerability to poverty of any household or individual. For instance, although such risks as heavy rain falls and earthquakes affects an entire community and illness and disability is at the individual level, both group of risks affects the welfare of the individual and therefore the need for them to be considered in vulnerability to poverty analysis (Ligon and Schechter, 2003). An earthquake, for example, will destroy roads and other facilities of the community but also hinder productive activities of the individual.

The risks that household are exposed to may also be classified according to their frequency of occurrence. These may be seasonal (cyclical) or random. The occurrence of some risks may be predicted with certainty; such risks are seasonal since the household knows well when the risk will occur. This does not however give the guarantee that the household will escape such risk especially if the household does not have what it takes to mitigate the risk. An example of this is the climate changes in most African countries where the wet and dry seasons are clearly distinguished. Random shocks on the other hand are shocks whose occurrence cannot be predicted with certainty; an example of this is illness. Table 3.1 provides some classification of risk and their examples.

Table 3.1 Classification of Risk

Categories of risks	**Examples of risks**
Natural Risks	heavy rainfall, landslides, volcanic eruptions, earthquakes, floods, hurricanes, droughts, strong winds, etc.
Health Risks	illness, injury, accidents, disability, epidemics (e.g., malaria), famines, etc.
Life-cycle	birth, maternity, old-age, family break-up, death, etc.

Risks	
Social Risks.	crime, domestic violence, terrorism, gangs, war, social upheaval, etc
Economic Risks	unemployment, harvest failure, business failure, resettlement, output collapse, balance of payments shock, financial crisis, currency crisis, technological or trade-induced terms of trade shocks, etc.
Political Risks	Discrimination, riots, political unrest, coup d'état, etc.
Environmental Risks	pollution, deforestation, land degradation, nuclear disaster, etc.

Source: Holzmann and Jorgensen, 2000

Handley *et al.,* (2009) named four main types of risk prevalent in Sub-Sahara Africa (SSA). First is the risk of harvest failure which is classified as a key risk for rural households. This type of risk affects household's future well-being since they have to sell assets to cope and national budget is destabilized since governments have to import more to offset the harvest failure and export less due to the harvest failure. Second is the risk of market failure and market volatility. Market failure leads to information asymmetry and hence inhibits productivity while market volatility leads to fluctuations in prices which raise the standard of living of households. Third, are risks that emerge from conflicts. Such risk destroys assets and displaces several households and also leads to the death of most bread winners. This implies that the resultant high dependency ratios will have direct and long term poverty impacts. Finally and most importantly, sudden and prolonged ill heath often result in a downward spiral of asset loss and impoverishment as people are forced to abandon productive activities.

As noted earlier, one of the events that can push households into poverty is illness (or health shocks). Such shocks affect households through lost wages and high spending on care giving to the sick, medical or otherwise. Gertler and Gruber (1997) identified health

shocks as one of the most sizeable and unpredictable shocks. This implies that health shocks are likely to have very significant impact on household vulnerability levels.

Different authors have measured the relationship and impact of different sources of shocks on household vulnerability. For instance, Christeansen and Boisvert (2000) examined the impact of drought and poor harvest on vulnerability of households in Mali. The impact of drought and poor harvest can however be mitigated by the use of irrigation facilities making the impact of weather, even though unpredictable, somehow minimal. This is however not the case with health shocks, which are therefore likely to make households more vulnerable to poverty than other kinds of shocks (Gertler – Gruber, 1997). Fafchamp and Lunds (2003) show indeed households are less able to cope with health shocks than with other shocks.

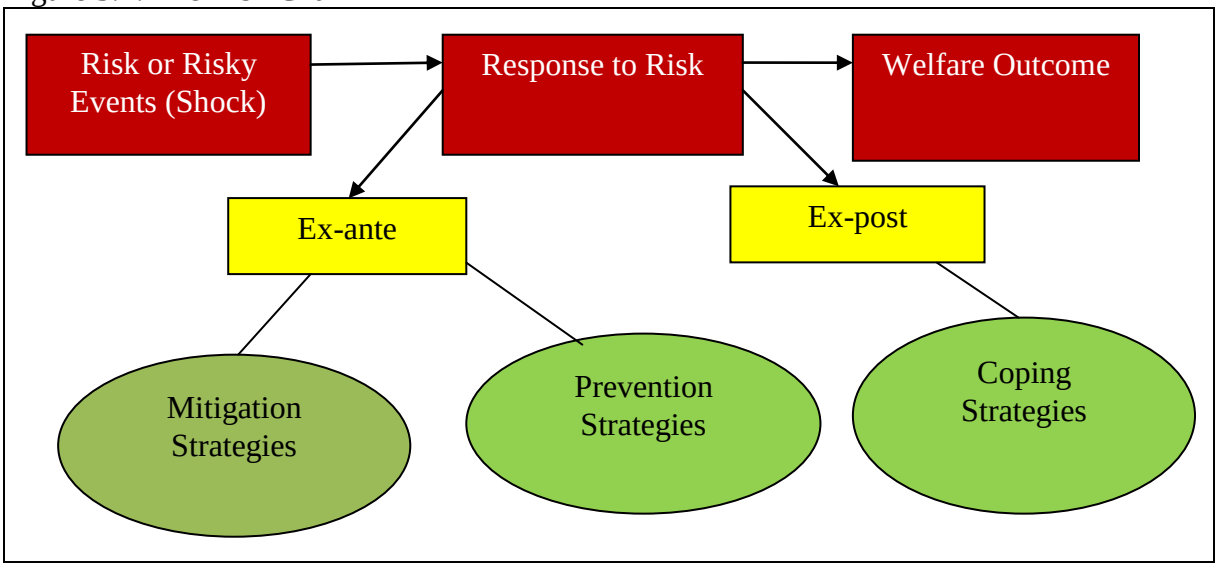
Hoogeveen *et al.*, (2004) suggested some strategies used by individuals and society to deal with risk. These include first, prevention strategies which are mostly implemented before risk occurs. Reducing the probability of an adverse risk has intrinsic welfare benefits and increases expected income and reduces income variation. Second is the mitigation strategy which aims at addressing risk before occurring. It is worth noting that preventive strategies reduce the probability of occurrence but mitigation strategies reduce the impact of a risk when it occurs. Third is the coping strategy designed to relieve the impact of a risk when it has occurred. The main forms of coping strategies include; individual dissaving, borrowing, relying on public and private transfers. The fourth strategy is informal arrangements made by households and individuals in the market institutions or public support. Market based arrangements which include products offered by insurance companies and banks are also used to deal with risks in many societies. This strategy is however mostly challenged by the presence of market failures. Finally public arrangements made up of government programmes such as insurance for unemployment, old age, work injury, disability, widowhood and sickness are also employed by societies and individuals in the face of risk occurrence. The challenge in most African countries

however is that these coping strategies are not sustainable due to financial and other constraints making households in such communities even more likely to be vulnerable to poverty.

According to Alwang *et al.*, (2002) the logic of the relationship that exists between vulnerability and risk can be explained as; "…households are vulnerable to suffering an undesirable outcome and this vulnerability comes from risk". They presented possible ways by which households manage the risk they are faced with at any point in time. These instruments may be either formal or informal. Risk management may also involve ex-ante and ex-post actions. Ex-ante actions are actions taken before a risky event takes place while ex-post actions are taken after the event has occurred. Ex-ante actions can reduce risk or lower exposure or provide composition if the event occurs. Examples of such actions include self insurance, building social net works and formal insurance based on expansion of the risk pool. Ex-post actions involve activities to deal with realized loses such as selling assets, removing children from school, migration of selected family members and seeking temporal employment. Some governments provide safety nets such as public works programme and food aid that will help households cope with risk.

In summary, Dercon (2001) represents the whole idea of risk and vulnerability in the concept of a risk chain as shown in figure 3.1. The first component of the chain shows the extent to which both covariate and idiosyncratic shocks affect household vulnerability to poverty. The second component depicts the households' ability to respond in the case of an occurrence of a shock. Finally whether or not a household will be vulnerable, after the shock and response, is depicted in the last component which is the welfare outcome. It is worth noting that all components of the risk chain are discussed earlier in this section.

Figure 3.1: The Risk Chain



Source: Dercon (2001)

3.3 Empirical Literature

This section reviews findings of different researchers on the relationship between vulnerability to poverty and health including other household characteristics. Empirical evidence in the area of vulnerability is diverse depending on the type of data, the definition of vulnerability adopted and the welfare measure employed in the measure of vulnerability. However, existing literature shows that no matter how diverse the measure, similar conclusions are drawn in some key areas.

Vulnerability is perceived as a very unique concept and differs from poverty which is perceived to be a more static measure of welfare. Most studies have shown that observed poverty at every point in time underestimates the level of vulnerability to poverty. For instance, Azam and Imai (2009) using cross section data from Bangladesh and measuring vulnerability as expected poverty, found that estimated vulnerability is higher than observed poverty by about 9.17%. Also Chaudhuri *et al.,* (2002), using the same approach but with data from Indonesia found that vulnerability is higher by about 22% among households in Indonesia. These results suggest that the observed poor and the vulnerable are two different groups of people and therefore different policies should be

implemented for these groups. Moreover sustainable poverty reduction requires that the vulnerable to poverty should also be given attention in terms of policy interventions.

There also seem to be concerns in the literature that both poverty and vulnerability to poverty has always been a rural phenomenon. This is to say that, empirical findings have mostly shown rural households to be more vulnerable to poverty than urban households. Alayande and Alayande (2004) found in the case of Nigeria that while mean vulnerability to poverty is about 70.2% in rural areas it is lower in urban areas with mean vulnerability of about 65.7%. Similar findings from Pakistan shows that while about 57% of the rural population were vulnerable, 41% of the urban population were vulnerable (Jamal, 2009). Using cross section data, Appiah-Kubi *et al.,* (2005) also provided evidence from Ghana to show that rural vulnerability was higher at 78.4% than urban vulnerability at only 21.6%. These findings provide little reason for doubt as rural households usually have fewer welfare-improving opportunities than urban households.

While little evidence exist on the effect of health shocks on vulnerability to poverty, most of the existing evidence seem to point to the fact that health shocks worsen the welfare of households and are likely to render them poor in the future. Both Christiansen and Subbarao (2005) and Makoka (2008) used pseudo panel data and found that exposure of households to health shocks negatively affect their level of welfare both in the present and the future. Christiansen and Subbarao (2005), in the case of rural Kenya, showed that exposure to malaria emerges as the major risk factor for households in non-arid zones and affects average consumption. An increase in the incidence of malaria leads to a 0.016 reduction in expected consumption. In the case of Malawi, Makoka (2008) found that illness was one of the most important risks households have to face and that households that reported some incidence of illness had mean vulnerability of about 0.46%. Chiwaula (2009) also found in the case of small scale fishing communities in Nigeria that the marginal impact of the household head illness on vulnerability to poverty is about -0.1093. These findings confirm theories that propose that poor health status

worsens both current welfare and future welfare (Grossman, 1972a). Although these evidence may be true for the respective countries, a generalization over all countries may be erroneous hence the need for evidence from other countries. This study seeks to provide evidence from Ghana.

Other determinants of vulnerability discussed in the literature include households' head education attainment and family size. Generally, there seem to be a consensus that higher education attainments lead to lower levels of vulnerability to poverty while higher family sizes lead to higher levels of vulnerability to poverty. (Chiwaula (2009); Jamal (2009); Chaudhuri *et al.*, (2002); Ligon and Schechter (2003); Azam and Imai (2009)). Despite the different methodologies and data employed by these researchers, they all seem to show that the impact of education and household size on vulnerability cannot be underestimated. For instance Ligon and Schechter (2003) took a utilitarian approach to estimate vulnerability and using panel data from Bulgaria. They found that households headed by people with college education were 16% less vulnerable than household heads without any formal education. Moreover they also found that households with smaller family sizes were less vulnerable to poverty. On the other hand, Azam and Imai (2009), using cross section data from Bangladesh and measuring vulnerability as expected poverty, found that vulnerability got lower and lower as the education level of households got higher and higher. These findings come with little surprise as education attainment has been recognised as a major catalyst to development. For example the second MDG seeks to ensure that by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary education.

Households' demographic characteristics have received little interest from researches in terms of their impact on vulnerability. Such characteristics have been considered to be generally insignificant in determining vulnerability to poverty. For example both Ligon and Schechter (2009) and Chaudhuri *et al.*, (2002) have shown that households' demographic characteristics have no significant effect on vulnerability to poverty.

However, researchers who have controlled for such variables in their studies have shown some direction of impact that needs to be mentioned. Both Alayande and Alayande (2004) and Appiah-Kubi *et al.*, (2005) have found that male headed households are more vulnerable than female headed households. In the case of age of household head, there exist mixed results as some researchers found older household heads to be more vulnerable to poverty (Jamal, 2009) while others found younger household heads to be more vulnerable relative to older heads (Azam and Imai, 2009). This suggests that, the relationship between household demographic characteristics and vulnerability deserve further evidence to enable a reliable conclusion.

One source of conflict in the literature is about the precision in vulnerability estimates and what factors should be considered for an accurate vulnerability to poverty estimate. Zhang and Wan (2008) sought to find the extent to which vulnerability to poverty can be measured accurately. Using panel data from the Chaina Health and Nutrition Survey, they found that the choice of vulnerability threshold determines the precision of prediction. A vulnerability threshold of 50% was found to provide improved prediction. Also for precision in prediction of vulnerability, past weighted income as an estimate of permanent income, assuming log-normal distribution of income, is preferred. Finally, more accurate measurement of vulnerability to poverty is obtained with a higher poverty line of US$2 instead of US$1.

However, while a vulnerability threshold of 0.5 is adopted in this study, households' consumption expenditure rather than income is used as the measure of welfare, assuming log-normal distribution. Also, a country specific estimated higher poverty line is used in the measurement of vulnerability to poverty. A lower poverty line is used to enable sensitivity analysis.

3.4 Conclusion

Even though different methods were employed by different researchers in the empirical findings, almost all of the findings show that vulnerability levels are always higher than observed poverty levels. Rural households were also found to be more vulnerable than urban households. However household demographic and economic characteristics have showed mixed results. It is also worth noting that not much has been done as far as household health status and vulnerability to poverty is concerned. This situation is not different in Ghana and this study therefore seeks to add up to the existing literature with prime focus on household health status. Moreover, theory seems to support a possible relationship between the health status of individuals and welfare levels at any point in time and that there is need to distinguish between current and future welfare of individuals.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter presents the methodology of the study. It shows the source of data to be used in the study as well as the analytical framework of the study. The chapter also presents the econometric model, the variables of interest and the appropriate technique of estimation and analysis.

4.2 Data

The data used for this study is taken from the fifth round of the Ghana Living Standards Survey (GLSS 5) conducted by the Ghana Statistical Service (GSS) with technical assistance from the World Bank (WB) and the European Union (EU), from 4th September, 2005 to 3rd September, 2006.

The GLSS 5 is a nation-wide survey which collected detailed information of topics including demographic characteristics of the population, education, health, employment and time use, migration, housing conditions and household agriculture. It also introduced a special module on non-farm household enterprises which provides diverse aspects of household activities mainly in terms of consumption and expenditure.

Nationally representative sample of 8,687 households in 580 enumeration areas, containing 37,128 household members were covered in GLSS 5. The GLSS 5 focuses on the household as a key socio-economic unit and provides valuable insights into living conditions in Ghana. Also the detailed information on household income and expenditure make the data very vital for a vulnerability study like this. A household is defined as a person or a group of persons, who live together in the same dwelling, share the same house-keeping arrangements and are catered for as one unit (GSS, 2008).

4.3 Measuring Vulnerability to Poverty

4.3.1Conceptual Framework

Economists have not reached certain agreement on the definition of vulnerability to poverty (Azam and Imai, 2009). Vulnerability to poverty is however defined in this study as the probability that a poor household will remain in poverty in the future or a non-poor household will fall below the poverty line in the future. This definition is preferred because it distinguishes between the concept of poverty and vulnerability to poverty. It portrays the intrinsic aspect of well-being of households. The observed well-being of a household does not necessarily make the household poor or rich in the future. Any evaluation of current well-being must therefore account for prospects of well-being in the future.

Following Christiaensen and Subbarao (2005), we let P_{ht} (z, C_{ht}) be an index of poverty for a household h at time t, defined over their consumption (C_{ht}) and the poverty line z. Relative to the future consumption ($C_{h,\,t+j}$) of a household h, the level of vulnerability of this household at time t can be expressed as;

$$V_{ht} = E\left[P_{ht+j}(z, C_{ht+j}) \mid F(C_{ht+j}) \right]$$

$$V_{ht} = \int_{\varsigma_{t+j}}^{z} P_{ht+j}(z, C_{ht+j}) dF(C_{ht+j})$$

$$V_{ht} = F(z) \int_{\varsigma_{t+j}}^{z} P_{ht+j}(z, C_{ht+j}) \frac{f(C_{h,t+j})}{F(z)} dC_{ht+j} \qquad (4.1)$$

where ς_{t+j} is the lower bound of future consumption C_{t+j} and F(.) is the cumulative distribution function associated with density function f(.). This implies that a household's vulnerability to poverty is measured as the current probability of being poor (F(z)), multiplied by the conditional expected poverty.

However, if the poverty index $P_{ht}(z, C_{ht})$ is made to be equal to $\left[\max(0, \frac{z - C_{ht}}{z})\right]^{\gamma}$, as in the Foster, Greer and Thorbecke (FGT) family of poverty measures (where γ reflects poverty aversion and larger values of γ put higher weight on the poverty gaps of the poorest people), then equation (4.1) can be written as;

$$V_{ht\gamma} = F(z) \int_{C_{t+j}}^{z} \left[\frac{z, C_{ht+j}}{z}\right]^{\gamma} \frac{f(C_{h,t+j})}{F(z)} dC_{ht+j} \qquad (4.2)$$

This shows that the product of the probability that consumption will be less than the poverty line (z) and the probability-weighted function of relative consumption shortfall give a household's level of vulnerability to poverty.

As noted by Christiaensen and Boisvert (2000), different vulnerability measures could be derived from the expression in equation (4.2) based on γ. If γ is assumed to be 0, then equation (4.2) reduces to F(z), which gives vulnerability ($V_{t,0}$) as a probability that a household's consumption falls below the poverty line. If γ =1, vulnerability ($V_{t,1}$) becomes the product of probability of shortfall and the conditional expected gap. Assuming γ>1 means that the measure of vulnerability accounts for the spread and distribution of consumption shortfalls.

Given the definition of vulnerability adopted by this study and the scope of the study, we base our estimation of vulnerability on the assumption that γ=0. That is, vulnerability to poverty will be measured as $V_{t,0}$.

As noted by Chaudhuri *et al.,* (2002), the difference between the measurement of vulnerability and poverty is that the former determines future consumption expenditure at time t+j while the later focuses on current consumption expenditure. Vulnerability to poverty is seen as forward-looking (ex-ante) while poverty is mostly an ex-post measure of well-being (Azam and Imai, 2009). This implies that it is possible only to observe the

current level of poverty among households and individuals but the level of vulnerability to poverty in the future is not currently observable and can therefore only be estimated.

According to Chaudhuri (2003) at the conceptual level, vulnerability to poverty can be measured by making inferences into the future consumption prospects of the households. This implies that there is need to identify the determinants of consumption patterns at the household level. Deaton (1992); Browning and Lusardi (1995) suggest that household consumption in any period depends on a number of factors. These include, wealth, current income, expectation of future income, uncertainties regarding future income and ability to smoothen consumption in the face of various shocks. Each of these will in turn depend on a variety of household characteristics (observable and unobservable) such as household size, age of household head, education attainment of household head, economic activities of household head, gender of household head, health status of the household as well as a number of features of the aggregate environment.

Similar to Chaudhuri (2000), Christiaensen and Subbarao (2005) proposed the following reduced-form expression for household consumption generation;

$$C_{hit+j} = (X_{hit}, S_{hit+j}, \phi_{t+j}, \theta_{hi}, \mu_{hit}) \quad (4.3)$$

where X_{hit} is a bundle of observed household and locality characteristics of household h in locality i at time t. S_{hit+j} represent observed locally covariate and idiosyncratic shocks experienced by the household between t and t+j. ϕ_{t+j} is a vector of parameters describing the returns to the locality and household endowments and the effects of the shocks S_{hit}. ϕ_{t+j} can however be said to be constant if a stable state of the economy is assumed. θ_{hi} and μ_{hit} are unobservable time invariant household and locality effects, and unobserved idiosyncratic shocks respectively, that contribute to differential welfare outcomes for households who are otherwise observationally equivalent.

Equation (4.3) suggests that, whether or not a household will have a good stream of future consumption is determined by the nature of risk, the extent or exposure of the household to that risk and the response ability (coping capacity) of the household. All these factors would affect future consumption through income flows. The equation is also conducive in the case of panel data where information on household characteristics overtime is available. A simple specification for cross section data, as used in this study, is presented in equation (4.5) below.

4.3.2 Econometric Specification

Most studies on vulnerability have used panel data collected over a long period due to the forward-looking nature of the concept. For instance Christiaensen and Boisvert (2000); Ligon and Schechter (2003) and others used panel data to estimate household vulnerability in their various studies. Chaudhuri (2000) however argued that even though panel data has been the preferred data in the estimation of household vulnerability, it is possible to estimate vulnerability from cross-sectional data. Empirical evidence from such researchers as Chaudhuri (2003); Chaudhuri *et al.,* (2002); Suryahadi and Sumarto (2003); Azam and Imai (2009); Jamal (2009); Appiah-Kubi *et al.,* (2005) have shown that vulnerability estimations from cross-section data can give reliable results for policy interventions. Due to the lack of panel data, this study follows methodology developed by Chauhduri (2000) and employs cross-section data from GLSS 5 in estimating vulnerability to poverty levels among households in Ghana.

The probability of household h, finding itself to be consumption poor at time t+j can be expressed as;

$$V_{ht} = p_r(\ln C_{h,t+j} < \ln z) \qquad (4.4)$$

where V_{ht} represents vulnerability of household h at time t, $C_{h,t+j}$ is consumption of household h at time t+j and z shows poverty line of household consumption, ln is natural log.

The probability that a household will find itself to be consumption poor does not only depend on its expected (mean) consumption but the volatility (variance) of its consumption stream. Therefore both estimates (household expected consumption and the variance of its consumption stream) are required in estimating the level of vulnerability of the household and to identify the various determinants of vulnerability.

The consumption generating process can be specified as;

$$\ln C_h = X_h \beta + \varepsilon_h \qquad (4.5)$$

where C_h is the per capita consumption expenditure for household h, X_h is observable household characteristics, β is a vector of parameters and ε_h is a zero-mean disturbance term that captures household's idiosyncratic factors contributing to differential level of per capita consumption for households that share the same characteristics.

The use of cross section data makes it necessary for some assumptions to be made. First is to assume that the disturbance term, ε_h is log-normally distributed which implies that consumption expenditure, C_h is also log-normally distributed. Secondly it is important to also assume that the structure of the economy is stable over time, ruling out the possibility of aggregate shocks (that is unanticipated structural changes in the economy). This implies that uncertainties about future consumption stems solely from uncertainty about idiosyncratic shock that the household will experience in the future.

Any given household h, with characteristics X_h can then have vulnerability to poverty level calculated using the estimated coefficients of equation (4.5) such that

$$V_h = p_r(\ln C_{h,t+1} < \ln z \mid X_h) = \Phi\left(\frac{\ln z - X_h \beta}{\sigma}\right) \qquad (4.6)$$

where V_h is estimated vulnerability to poverty: the probability that per capita consumption level will be lower than the poverty line conditional on some household characteristics, $\Phi(.)$ is the cumulative density of the standard normal distribution and σ is the standard error of equation (4.5).

4.3.3 Allowing for Heteroscedasticity

Some studies that explore household consumption behaviour treats the disturbance term as stemming from measurement error and thus is usually assumed that the variance of the disturbance term is the same for all households. This assumption, as noted by Chaudhuri (2003) leads to inefficient estimates not only of the main parameters of interest but also the vulnerability estimates. This problem can be addressed by a simple functional form which relates variance of the consumption function to household characteristics as follows;

$$\sigma^2_{\varepsilon,h} = X_h\theta + \eta_h \tag{4.7}$$

A three-stage Feasible Generalized Least Squares (FGLS) suggested by Amemiya (1977) is used to estimate β and θ[9]. Equation (4.5) is first estimated using the Ordinary Least Squares (OLS) procedure. The estimated residuals from equation (4.5) are then used to estimate the following equation by OLS

$$\sigma^2_{ols,h} = X_h\theta + \eta_h \tag{4.8}$$

The predicted values from this auxiliary regression are used to transform equation (4.8).

$$\frac{\sigma^2_{ols,h}}{X_h\theta} = \frac{X_h}{X_h\theta}\theta + \frac{\eta_h}{X_h\theta} \tag{4.9}$$

Estimating equation (4.9) by OLS gives an asymptotically efficient FGLS estimate, θ_{FGLS} . It can be shown that $X_h\theta_{FGLS}$ is an efficient estimate of $\sigma^2_{e,h}$ which is the variance of the idiosyncratic component of household consumption. Equation (4.5) is also transformed with the standard error of θ_{FGLS} as follows;

$$\sigma_{\varepsilon,h} = \sqrt{X_h\theta_{FGLS}} \tag{4.10}$$

$$\frac{\ln C_h}{\sigma_{\varepsilon,h}} = \left(\frac{X_h}{\sigma_{\varepsilon,h}}\right)\beta + \frac{\varepsilon_h}{\sigma_{\varepsilon,h}} \tag{4.11}$$

OLS estimation of (4.11) yields an asymptotically efficient estimate of β. The estimated β_{FGLS} and θ_{FGLS} enable a direct estimation of expected log consumption (shown in

[9] A special case of the FGLS, which is the Weighted Least Squares (WLS), is used

equation 4.12) and expected variance of log consumption (shown in equation 4.13) respectively.

$$E\left[\left(\ln C_h \mid X_h\right)\right] = X_h\beta \tag{4.12}$$

$$Var\left[\left(\ln C_h \mid X_h\right)\right] = \sigma_h^2 = X_h\theta \tag{4.13}$$

Finally, assuming that consumption is log normally distributed, vulnerability to poverty can be estimated as

$$V_h = \Phi\left(\frac{\ln z - X_h\beta_{FGLS}}{\sqrt{X_h\theta_{FGLS}}}\right) \tag{4.14}$$

This implies that, estimation of vulnerability to poverty depends on such elements as the distributional assumption of normality of log consumption, the choice of poverty line, the expected level of log consumption and the expected variability of log consumption. The level of vulnerability to poverty reduces as expected consumption and expected consumption variability increases.

Azam and Imai (2009) noted that a merit of this measure of vulnerability is that it can be estimated with a cross-section data. However, the measure correctly reflects a household's vulnerability to poverty only if the distribution of consumption across households, given the household characteristics at time t, represents time-series variation of household consumption. Hence this measure requires a large sample in which some households experience good times and others suffer from some kind of negative shocks. Also the measure is unlikely to reflect large unexpected shocks, if the data used is cross-section for a normal year.

4.4 Poverty Line

There are two poverty lines estimated by the GSS from the GLSS 5 data; the lower (food) poverty line of 2,884,700 Cedis and the upper (both food and non-food) poverty line of 3,708,900 Cedis per adult per year (GSS, 2008). The lower line focuses on what is

needed to meet the nutritional requirements of household members. Individuals whose total expenditure fall below this line are considered to be in extreme poverty since if they allocate their entire budget to food, they would not be able to meet their minimum nutritional requirements. Upper poverty line on the other hand incorporates both essential food and non-food consumption. Individuals above this line can be considered to be able to purchase enough food and also non-food items.

The upper poverty line was therefore used in the estimation of vulnerability to poverty since both household food and non-food consumption expenditure is used in the estimation. However, a robust check was also done, using the lower poverty line, to find out how sensitive the vulnerability to poverty estimates are to changes in poverty lines.

4.5 Determinants of vulnerability to poverty: Does health status matter?

To make any effective poverty prevention policy, there is need to focus on the main determinants of vulnerability to poverty. Most studies have provided empirical evidence on how socio-economic and demographic factors influence vulnerability to poverty levels of households (Appiah-Kubi *et al.*, 2005; Jamal, 2009) but very few of these studies have directed attention to the influence of household health status on vulnerability to poverty (Azam and Imai, 2009).

The following model is used to examine the impact of household health status on vulnerability to poverty in Ghana.

$$\psi_h = \beta_0 + \beta_1 X_h + \beta_2 H_h + \mu_h \qquad (4.15)$$

where ψ_h is a dummy of household vulnerability to poverty which takes on the value of 1 if the household is vulnerable (estimated vulnerability to poverty above or equal to 0.5) and 0 otherwise, X_h is a vector of household socio-economic, demographic and geographical characteristics, H_h is household health status, β is vector of coefficients, μ_h is the error term. The model specified in equation (4.15) is estimated using a Binary Logit

model since the dependent variable (vulnerability to poverty) is a dummy variable. Although the direction of the relationship that exist between health and vulnerability can be estimated from the expected mean of consumption and expected variance of consumption, as presented in (4.12) and (4.13) respectively, equation (4.15) provides the marginal changes through the marginal effects.

It is important to note that equation (4.15) portrays some potential simultaneity problems in that, whilst health status is expected to affect vulnerability, a reverse causality where vulnerability affects health status cannot be ruled out. This possible problem may lead to biased and inconsistent estimates. A simple solution in the literature is to introduce an instrumental variable which will nullify this bias and inconsistency. A good instrumental variable is one that affects the dependent variable (vulnerability to poverty) indirectly through the independent variable (health status) and is not related to the error term. However the absence of good instruments in the data limits the application of this solution. The estimates may therefore be expected to be biased upwards which implies that the effects of health on vulnerability may be a little overstated.

4.6 Selection and Definition of Variables and Expected Results

The following variables are employed for the various econometric estimations in the study.

Household consumption expenditure is made up of both food and non-food consumption expenditure and is measured in Cedis. The variable is used as a dependent variable in the vulnerability estimation process.

Health status is measured by the number of sick members in the household. The inability of a household to work and earn some income is likely to make the household vulnerable to poverty as they would have to spend more resources (both human and financial) in

dealing with their poor health. This variable is expected to have a positive relationship with vulnerability to poverty (Makoka, 2008).

The size of the family is also considered as one of the independent variables in the model. The family size, which is measured as the number of individuals in the household, is expected to determine the level of vulnerability to poverty positively such that a large household is expected to be more vulnerability than a smaller household. A large family is likely to have higher expenditure on both food and non-food items. Such large families are therefore likely to rely on their assets today hence making them vulnerable to poverty in the future (Jamal, 2009).

Age of the household head is also believed to determine the level of vulnerability to poverty. The age of the household head, which is measured in years, is expected to be positively related to the level of vulnerability to poverty of the household. While younger households are usually more active in enhancing the welfare of the household, older household heads mostly tend to be less active (Jamal, 2009).

The location of the household is another possible determinant of vulnerability to poverty of the household. Households located in rural areas are expected to be more vulnerable to poverty than those in the urban areas due to the differences in employment conditions and income sources. This variable is treated as a dummy which takes on the value of 1 if the household is urban and 0 if it is rural (Chaudhuri *et al.*, 2002).

The marital status of the household head is also considered as a determinant and treated as a dummy variable that takes on the value of 1 if the household head is married and 0 if the household head is not married. Married household heads are expected to offer support to each other in times of difficulties hence making them relatively better off than unmarried household heads. The variable is therefore expected to have a negative sign.

Sex of the household head is also treated as a dummy variable that takes on the values of 1 if the household head is male and 0 if the household head is female. Male household heads are naturally seen to be in a better position to deal with shocks than female household heads. The variable is therefore expected to have a negative sign (Ligon and Schechter, 2003).

Employment status of household heads also determines vulnerability to poverty. Employment status is expected to have a negative relationship with vulnerability to poverty. That is, employed HH heads are likely to be less vulnerable than those not employed. This is because employed household heads could at least fall on their salaries and wages in times of short falls (Appiah-Kubi *et al.*, 2005).

Household head education attainment is expected to influence the household's vulnerability to poverty negatively. Household heads with higher education attainments are more capable of coping with risks since education in itself is considered as a dependable asset in times of impoverishment (Azam and Imai, 2009).

The household hygienic condition dummy takes the value of 1, if the household has access to improved drinking water and sanitary latrine, and 0 otherwise. This variable is vital in determining household welfare as only 10% of the population of Ghana are reported to have access to improved sanitation (WHO, 2009). The variable is expected to have a negative relationship with vulnerability to poverty. Moreover, good hygiene conditions are expected to lead to good health.

Household housing condition is another important control variable as it commands a high percentage of household expenditure especially in the rural areas (GSS, 2008). The variable is represented as a dummy which takes on the value of 1 if the housing condition is good (brick, tiles and iron sheet houses) and 0 if it is poor (mud, hey and bamboo houses). Households with poorer housing conditions are expected to be more vulnerable (Azam and Imai, 2009).

Use of communication facilities is perceived to have an influence on household welfare as it facilitates household income generating activities and is thus expected to have a negative relationship with vulnerability to poverty. The variable is used as a dummy which is 1 if the household uses any form of communication facility and 0 otherwise.

4.7 Some Assumptions

The following assumptions are necessary in the estimation of vulnerability to poverty. It is worth noting that these propositions are views and suggestions adopted in this study for a better understanding of the results.

Firstly, any appreciative vulnerability study needs to make assumptions about the time horizon when a household or individual is expected to be poor. While Chaudhuri *et al.,* (2002), Christiaensen and Subbarao (2005) among others used a one period ahead time horizon in their studies, this study argues that the certainty of the probability that a household or an individual will become poor exactly one period ahead is impractical and that the time horizon should be any period in the future. That is, the time horizon is specified in this study as t+j instead of t+1, where $j \geq 1$.

Second but very important assumption is about the vulnerability threshold to be used in this study. Vulnerability threshold of 0.5 is used to define the vulnerable and the non-vulnerable in the study. The choice of this threshold is based on the suggestion by Chaudhuri *et al.,* (2002). The following reasons justify the choice of the vulnerability threshold of 0.5. First, it makes intuitive sense to say that a household with a 50% probability of falling into poverty in the next period is vulnerable to poverty. Secondly, when a household, whose current level of consumption is equal to the poverty line, faces a zero mean shock; it has a one period ahead vulnerability of 0.5. In the limit, as the time horizon approaches zero then being currently poor and being vulnerable to poverty coincides (Pritchett *et al.,* 2000). Also Zhang and Wan (2008) found that a vulnerability line of 0.5 provides a more improved prediction. This implies that households with

estimated vulnerability to poverty above or equal to 0.5 are considered to be vulnerable to poverty.

Finally, an upper poverty line of 3,708,900 Cedis estimated by the GSS from the GLSS 5 data is used in the study[10]. However a lower poverty line of 2,884,700 is also used to find out how sensitive the vulnerability estimates are to changes in poverty lines.

4.8 Analysis

Analysis of results is done by first presenting a descriptive statistics of all the variables used in the study and secondly the econometric results. All analyses are conducted in a STATA 10.1 software environment.

To allow for further credibility and dependability of the results, variables are selected in a way to deal with multicollinearity. Heteroscedasticity is also catered for as explained earlier in the chapter.

4.9 Conclusion

The chapter has provided a detailed description of the methodology to be employed in the estimation of various relationships in the study and the conceptual framework behind the methodology adopted in the study. Vulnerability to poverty is estimated by the procedure proposed by Chaudhuri (2000). The effect of health on vulnerability to poverty is estimated from the expected mean of consumption and expected variance of consumption. Moreover, the marginal impact of the relationship is shown from the marginal effects estimated from the logit model. The chapter has also explained the variables and data used in the study.

[10] See section 4.3.3 for an explanation on the poverty line

CHAPTER FIVE

RESULTS

5.1 Introduction

This chapter presents the results of the study. Section 5.2 provides the descriptive statistics of all the variables used in the study. Section 5.3 on the other hand gives the findings on the effect of household health status on vulnerability to poverty. Sections 5.4 and 5.6 present a profile of vulnerability to poverty among households for various characteristics in Ghana and conclusion respectively.

5.2 Descriptive Statistics

The section includes all variables used in the study and presents their mean, standard deviation, minimum and maximum values. A summary of the descriptive statistics are shown in table 5.1.

Table 5.1 Summary of Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Household characteristics				
Number sick	3.425317	2.704521	0	26
Good Hygiene	.394165	.488699	0	1
Size	4.281181	2.870709	1	29
Head Education (no education)	.323235	.496899	0	1
Head Education (Primary)	.455696	.457010	0	1
Head Education (Secondary)	.158674	.304566	0	1
Head Education (Tertiary)	.062399	.488138	0	1
Male Head	.720911	.448577	0	1
Age of head	45.35476	15.627830	15	99
Married Head	.904684	.293667	0	1

Variable	Mean	Std. Dev.	Min	Max
Employed Head	.850750	.356356	0	1
Urban	.415204	.492786	0	1
Good Housing	.447170	.497230	0	1
Use Communication Facility	.130303	.336657	0	1
Consumption expenditure	11.9	142.0	8000	8010.0
Region				
Western	.096362	.295104	0	1
Central	.079275	.270183	0	1
Greater Accra	.142508	.349591	0	1
Volta	.083111	.276065	0	1
Eastern	.104731	.306224	0	1
Ashanti	.181448	.385412	0	1
Brong Ahafo	.092177	.289293	0	1
Northern	.091596	.288472	0	1
Upper East	.069627	.254532	0	1
Upper West	.059165	.235948	0	1
Ecological Zone				
Coastal	.294083	.455656	0	1
Forest	.409625	.491793	0	1
Savannah	.296292	.456648	0	1

Source: Own computation

Note: Mean, standard deviation and maximum values of consumption expenditure are in million Cedis.

The main variable of interest in this study which is the number of sick household members has a mean value of about 3.4 which implies that on the average, there are approximately 3 sick members in a household. This suggests the level of impact this

variable could have on the welfare of households and therefore the need for its consideration in the study. The variable also has a standard deviation of approximately 2.70. Another variable of interest is the household hygienic condition dummy which also has an effect on the heath status of households. The variable has a mean of about 0.39 and a standard deviation of 0.49. The household consumption expenditure variable is also crucial in the estimation of vulnerability to poverty as it is used as the measure of household welfare. The descriptive statistic shows that, on average, households consume an annual amount of about 11.9 million Cedis on both food and non-food items. The minimum and maximum values of this variable shows the diverse nature of consumption in that, while some households have annual consumption expenditure as low as 8000 Cedis, others have annual consumption expenditure as high as 8,010 million Cedis.

The statistics show that the age variable followed by the size of households and the number of people sick in a household variables have the highest standard deviation. This implies that, there is higher variability in these variables relative to the rest of the variables. Furthermore, the age variable exhibits a mean of about 45.35. The minimum and maximum ages for household heads are 15 and 99 respectively. This suggests that while some households are headed by very young individuals, others are headed by very old individuals. The household size variable has a standard deviation of approximately 2.87 and an average household size of approximately 4 with a minimum and a maximum of 1 and 29 respectively. The high family size could be attributed to believe in more children than few in some communities and the support for extended families than nuclear families in most typical Ghanaian societies.

5.3 Econometric Results

As explained earlier, the estimation of vulnerability is based on the ex-ante mean and ex-ante variance of a household's consumption expenditure which implies that the higher the level of expected average consumption and expected consumption variability, the lower the level of vulnerability to poverty (Azam and Imai, 2009). It is therefore easy to

appreciate that an analysis of the determinants of vulnerability to poverty can be done through a regression with the expected mean consumption and expected consumption variability as dependent variables so that any variable that raises expected mean consumption but reduces expected consumption variability automatically reduces vulnerability to poverty levels (Christiaensen and Subbarao (2005); Makoka (2008); Chiwaula (2009)).

5.3.1 Vulnerability and Health Status

The results of the expected mean consumption and expected variance of consumption estimations are reported in Table 5.2. The model is estimated as specified earlier with household health status as the explanatory variable, including other control variables[11]. However, the main focus here is to determine the effect of health status on vulnerability to poverty. It is prudent to know that the FGLS estimation results are reported in Table 5.2 due to the efficient nature of the estimates. Marginal effects from the binary logit model specified in equation (4.15) are also reported in table 5.2. These marginal effects help in the appreciation of the marginal impact of health on vulnerability. As stated earlier, it is important to note that, these results may overstate the effect of health on vulnerability due to the possibility of a reverse causality between the two variables.

Table 5.2: Determinants of Vulnerability to Poverty

	Ex-ante Mean Consumption	Ex-ante Variance Consumption	Marginal Effects
Household Characteristics			
Number Sick	-0.05979***	0.03127	0.03375***
	(0.01082)	(0.03025)	(0.01156)
Good Hygiene	0.16392***	0.09645	-0.13350***
	(0.02349)	(0.06303)	(0.02724)
Size	-0.08166***	-0.05454*	0.03736***
	(0.01052)	(0.02952)	(0.01090)
Male Head	0.08315***	0.16654**	-0.04756*
	(0.02636)	(0.07198)	(0.02581)

[11] See chapter four for consumption model specifications and detailed discussion of variables

	Ex-ante Mean Consumption	Ex-ante Variance Consumption	Marginal Effects
Head Age	0.02169***	0.01844	-0.00953**
	(0.00539)	(0.01425)	(0.00481)
Head Age Squared	-0.00022***	-0.00013	0.00006
	(0.00006)	(0.00015)	(0.00005)
Head Married	-0.19583***	-0.07615	0.56420***
	(0.03975)	(0.10540)	(0.03054)
Head Education (Primary)	0.20835***	-0.16446**	-0.56668***
	(0.02649)	(0.07120)	(0.06052)
Head Education (Secondary)	0.49199***	-0.09041	-0.76265***
	(0.03736)	(0.09741)	(0.02941)
Head Education (Tertiary)	1.03125***	-0.00640	-0.99603***
	(0.05476)	(0.13540)	(0.00095)
Head Employed	0.11416***	-0.11189	-0.11422***
	(0.03877)	(0.09783)	(0.02655)
Urban	0.30650***	0.09768	-0.25300***
	(0.02865)	(0.07717)	(0.03822)
Good housing	0.21758***	-0.00895	-0.05526*
	(0.02782)	(0.07513)	(0.03355)
Use Communication Facility	0.16492***	0.09847	-0.13797***
	(0.03272)	(0.08425)	(0.03497)
Administrative Region			
Central	-0.03581	-0.08761	-0.02195
	(0.04995)	(0.13661)	(0.07236)
Greater Accra	0.04723	0.08923	-0.24630***
	(0.04854)	(0.12843)	(0.06983)
Volta	-0.34805***	0.01774	0.21977***
	(0.05060)	(0.13454)	(0.03603)
Eastern	-0.16944***	-0.05501	0.19248***
	(0.04647)	(0.12550)	(0.04055)
Ashanti	0.13590***	-0.11635	-0.48960***
	(0.04413)	(0.11851)	(0.06089)
Brong Ahafo	-0.20803***	0.01148	0.11767**
	(0.05544)	(0.14741)	(0.05919)
Northern	-0.53820***	0.11144	0.08103
	(0.08278)	(0.22665)	(0.07577)
Upper East	-0.61294***	-0.03274	0.03489
	(0.08327)	(0.23587)	(0.09086)

Upper West	-0.80698*** (0.14081)	1.15071*** (0.26710)	-0.05644 (0.10744)
Ecological Zone			
Coastal	-0.00053 (0.05677)	0.04830 (0.16016)	0.09399 (0.07264)
Forest	0.00897 (0.04849)	0.19193 (0.13656)	0.16728*** (0.06161)
Constant	13.87075*** (0.12152)	-2.31557*** (0.32787)	
No of Observations	8603	8603	8603
R^2	0.48	0.13	
Adjusted R^2	0.47	0.10	
Pseudo R^2			0.80
F-Value	316.79^{***}	4.57^{***}	
LR Chi2			9485.44^{***}

Source: Own computation

Note: 1. The dependent variable for the first estimation is the ex-ante mean of consumption.

2. The dependent variable for the second estimation is ex-ante variance of consumption.

3. Values of standard errors are reported in parenthesis.

4. ***significant at 1%; **significant at 5%; *significant at 10%.

The results show that vulnerability is lower for households with less sick members. This can be seen from the highly significant negative relationship that exists between the number of sick household members' variable and the average future consumption of households, with a 1% significance level. This result is supported by the positive relationship between the number of sick household members and the expected variance of consumption, even though this relationship is not significant. This implies that households with sick members are expected to have larger variability in future consumption hence making them vulnerable to poverty. This result agrees with

Grossman's (1972a) theory of health capital which suggests that good health in itself is a resource which helps individuals to improve their welfare as they spend much more time working and less in sickness. There also seem to be a confirmation of this relationship from the household hygienic condition dummy variable which exhibits a negative and significant (at 1%) relationship with expected mean of consumption. This relationship makes intuitive sense as more hygienic households are likely to have good health thereby improving their welfare today and in the future. Similar result was found by Azam and Imai (2009) in Bangladesh. They found that health status, which is measured by a dummy of illness of head of household, has a positive relationship with vulnerability to poverty. They also found a negative relationship between household hygienic condition and vulnerability to poverty. The marginal effect of 0.03375 suggest that as the number of sick household members reduce by one, the level of vulnerability to poverty as well reduces by approximately 0.03 or 3%. That is, households who are relatively less healthy are 3% more vulnerable than more healthy households. Also, households with good hygienic conditions are about 13% less vulnerable compared to households with poor hygienic conditions.

As expected, the size of the household variable exhibits a negative and highly significant relationship with expected average consumption. This implies that households with more members are expected to consume significantly less in the future than those with fewer members therefore making them more vulnerable to consumption poverty in the future. Interestingly, the result shows that future consumption become less volatile, the larger the family size. This is seen from the negative relationship with expected consumption variability. This may be explained by the fact that large households tend to have larger labour force since even children may be used as a source of labour in times of difficulty (Makoka, 2008). Moreover, households with more members usually have better social networks as each member of the household establishes relationships with others in the community. Such networks also work as a form of insurance in times of difficulties. However, the impact on expected mean consumption is more significant (1%) than the

impact on expected variance of consumption (10%) so that the overall effect can be said to be an increase in vulnerability to poverty.

The age and age-squared terms confirm the non-linear relationship with consumption as their coefficients are significant. While the age of household head is positively related with expected average consumption, the square of age indicates a negative relationship with expected average of consumption. Both relationships are significant at 1% significance level. This implies that household vulnerability to poverty tend to increase as the age of the household head increases. That is, relatively younger household heads are less vulnerable to poverty than older household heads. This relationship is confirmed by Jamal (2009) in his findings that households in Pakistan become more vulnerable to poverty as the age of the head increases. Their results show that the least vulnerable age group of head of household is less than 25 years after which an increase in vulnerability is occurs.

In comparison with the base category, female headed households, male headed households have higher average future consumption with a significance level of 1%. This implies that relative to female headed households, male headed households are less vulnerable.

Just as there has been no or very little disagreement on, or underestimation of, the impact of education on poverty and vulnerability to poverty, this study shows that there is a highly significant negative relationship between education attainment and vulnerability to poverty. Relative to the base category, no education attainment, all the other education dummies tend to have a positive relationship with expected average consumption with significance level of 1%. Moreover, the variables show negative relationship with the expected variance of consumption even though only the primary education dummy was found to be significant at 5%. These results prove that education is a very important factor in considering both poverty and vulnerability to poverty. Moreover, while all levels

of education significantly reduce vulnerability to poverty, the significant impact of the primary education dummy on both expected mean and variance of consumption implies that even primary education attainment could make a difference in the level of vulnerability to poverty. This explains the significance of the second MDG of achieving universal primary education. In sum, it is obvious that households headed by educated heads are less vulnerable to poverty. These results agree with Ligon and Schechter (2003) who used panel data set from Bulgaria to show that households with more educated heads are less vulnerable with college educated heads being on average 16% less vulnerable than households with uneducated heads. This may be attributed to the fact that educated household heads are expected to have higher consumption expenditure.

One interesting finding of the study suggests that ever married household heads are associated with decreasing ex-ante mean of consumption which implies that such households are more vulnerable to poverty compared to households with never married heads. This relationship is significant at 1%. However, the results show that ever married heads have smaller variability in expected consumption although this relationship is not significant. The final impact on vulnerability to poverty can be said to be an increase since the relationship with the ex-ante mean of consumption is significant.

With regards to household head employment, the results show an expected outcome such that household heads who are employed are less likely to be vulnerable relative to heads without any employment. This is seen from the highly significant positive relationship that exists between the variable and expected future consumption. The relationship is significant at 1%. Moreover, households with employed heads have smaller variability in future consumption although this relationship is not significant. This relationship is quite convincing as, relative to unemployed household heads, employed household heads are likely to rely on their income to smooth consumption in times of shortfalls.

Not surprisingly, variables such as housing conditions, use of communication facilities and household location dummies all have sizeable positive effects on expected mean consumption expenditure with highly significant coefficients. Households with good housing condition are associated with a decrease in vulnerability with a significance level of 1%. Good housing condition also reduces the variability of expected variance of consumption though the relationship is not significant. Similarly households that use communication facilities are associated with lower vulnerability levels compared to those who do not use such facilities with significance level of 1%. These relationships meet expectations as use of communication facilities enhance resource generating activities and hence improve household welfare. Also, households with good housing conditions tend to spend less on maintenance and therefore channel resources to other welfare improving expenditures. Moreover, similar result by Azam and Imai (2009) show that household housing condition and use of communication facilities, which is measured by a dummy of having telephone line, both exhibit a negative relationship with vulnerability to poverty with coefficients of -0.187 and -0.019 respectively.

5.4 Vulnerability to Poverty in Ghana

Using a high nutrition based poverty line of 3,708,900 Cedis as estimated by the Ghana Statistical Service (GSS), vulnerability to poverty estimates for various households are obtained as specified in equation (4.14). The results indicate that about 56% of the population of Ghana are vulnerable to poverty and are therefore likely to face at least an incidence of poverty in the near future. In comparison with the estimated poverty incidence of 28.5%, the estimated vulnerability to poverty level is seen to be substantially higher than the poverty level. This confirms the results of Chaudhuri *et al.*, (2002) that the point in time estimate of poverty underestimates the level of vulnerability to poverty of the population. The estimate of vulnerability to poverty, however, reduces to 49.47% when the lower poverty line is used[12]. It is important to note that, although there is a reduction in vulnerability estimates for various household characteristics when the lower

[12] See Appendix1 for vulnerability to poverty profile using the lower poverty line of 2,884,700 Cedis

poverty line is used, the differences between the estimates for the two poverty lines are not very substantial.

Table 5.3 below presents the vulnerability to poverty profile for various population characteristics. Such characteristics as administrative regions, geographical location of households, gender of household head and ecological zones are considered in the profile for a clearer comprehension of the incidence of vulnerability to poverty among household in Ghana. The table includes mean vulnerability (proportion of population with future poverty above the 0.5 threshold) and the vulnerability to population ratio (proportion of population vulnerable by the share of the population).

Table 5.3 Vulnerability to Poverty Profile for Various Population Characteristics

	Population Share	Mean Vulnerability	Vulnerability to Population Ratio
Total	100	56	100
Region			
Western	9.64	69.96	12.04
Central	7.93	64.37	9.11
Greater Accra	14.25	59.79	15.21
Volta	8.31	68.53	10.16
Eastern	10.47	73.47	13.73
Ashanti	18.14	61.63	19.96
Brong Ahafo	9.22	60.15	9.91
North	9.16	24.87	4.07
Upper East	6.96	28.38	3.54
Upper West	5.92	21.41	2.27
Location			
Urban	41.52	61.06	45.27
Rural	58.48	52.42	54.75

	Population Share	Mean Vulnerability	Vulnerability to Population Ratio
Gender of Household Head			
Male	72.09	57.88	74.52
Female	27.91	51.15	25.00
Ecological Zones			
Coastal	29.41	63.32	33.25
Forest	40.96	67.62	49.46
Savannah	29.63	32.68	17.29

Source: Own Computation

Note: Upper Poverty Line of 3,708,900 Cedis is used for the profiles above

The results show that, while the Eastern region was found to have the highest average vulnerability of approximately 73%, the Upper West region had the least with about 21% average vulnerability to poverty. Other regions with relatively high incidence of vulnerability to poverty include the Western region (70%) and the Volta region (69%). It can be seen from the table above that there is marked variations among the various administrative regions in as much as the incidence vulnerability is concerned. However, the vulnerability to population ratios show that the Ashanti region contribute the highest to the national vulnerability level (19.96%) while the Upper West region contribute the lowest.

The results show that urban households have a higher average vulnerability to poverty than rural households. While vulnerability to poverty is about 61% among urban households, rural households have an average vulnerability to poverty of about 52%. This result differs from most researches that find vulnerability to be higher in rural areas than in urban areas (Appiah-Kubi *et al.*, 2005; Azam and Imai, 2009). One reason that could be speculated for this result is that, high numbers of the population move from rural to urban areas in search of scarce jobs. The GLSS report shows that about 4 in every 10

residents in urban areas (Greater Accra) are in-migrants (GLSS, 2008). Such in-migrants are therefore likely to be poor in the future as the high standard of living and lack of jobs worsen their welfare in the urban areas. However, this result changes when the lower poverty line is used. In this case rural households were found to have higher average vulnerability of 0.51 compared to urban households with average vulnerability of 0.47. Moreover, the vulnerability to population ratio indicates that rural households contribute more to vulnerability than urban areas.

Another interesting result is seen in the household gender variable which shows that male headed households are more vulnerable to poverty than female headed households with mean vulnerability estimates of 0.58 and 0.51 respectively. This implies that, on average, 58% of male headed households are vulnerable compared to female headed households with an estimate of about 51%. This result conforms to that of Appiah-Kubi *et al.*, (2005) who found a lower vulnerability estimate of 36.3% for female headed households compared to male headed households with estimated vulnerability of 54.4%. Male household heads also have a higher share of vulnerability (75%) than female household heads (25%) as shown by the vulnerability to population ratio.

Vulnerability to poverty classified over ecological zone shows that households located in the forest zones are more vulnerable to poverty with mean vulnerability of approximately 68%. These households also contribute the highest to the national vulnerability level with a vulnerability to population ratio of about 49%. Households in the savannah zones have the lowest average vulnerability and vulnerability to population share of about 33% and 9% respectively. One possible reason that can be speculated for this finding is that, households in forest zones rely mostly on rain-fed agriculture (forestry and plantation) while households in savannah and coastal zones also engage in livestock agriculture and fishing respectively to augment their income from rain-fed agriculture.

5.5 Relationship between Vulnerability and Poverty

Table 5.4 presents a classification of the movement of households in and out of poverty between now and the future. Such classification also helps to test the hypothesis that vulnerability to poverty and poverty are two independent concepts and that there is no relationship between them. Accepting this hypothesis implies that the concept of vulnerability to poverty is just as important as the concept of poverty and therefore both concepts should be given equal attention by policy makers.

Table 5.4: The Vulnerable and the Poor (percent)

	Vulnerable	Non-Vulnerable	Total
Poor	55.69	44.31	100
Non-Poor	57.64	42.36	100
Total	56.00	44.00	100

Pearson Chi2 (1): 1.8233

Probability: 0.177

Source: Own Computation

The Table suggests that, vulnerability and poverty are two mutually exclusive concepts that need to be considered separately. This is seen from the Pearson chi-square test which accepts (with p-value of 0.177) the null hypothesis that poverty (the row variable) and vulnerability (the column variable) are independent. Also, while 56.7% of the current poor are likely to still remain in poverty in the future, about 57.6% of the population who are currently non-poor are likely to fall into poverty in the future. This result reveals that, if poverty reduction strategies take only the current poor into consideration, 57.6% of the population who are currently non-poor (but are likely to be poor) will be neglected. This therefore confirms the assertion that policies directed towards poverty reduction today may not necessarily include the vulnerable and therefore the need for exclusive policy intervention that take vulnerability into account.

5.6 Conclusion

The chapter presented the findings of the study. A summary of the descriptive statistics of all variables included in the model was given in section 5.2. From section 5.3, almost all of the variables follow expected results .The main variable of interest in this study showed that healthier households have better vulnerability to poverty stance compared to less healthier households. The estimate of vulnerability to poverty as presented in section 5.4 showed that about 56% of households are vulnerable to poverty which is significantly higher than the estimated level of observed poverty (about 28%). Vulnerability to poverty and poverty were found to be two independent concepts.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND IMPLICATIONS FOR POLICY

6.1 Introduction

Improvement in the health status of individuals and households has been a major concern of the government of Ghana over the years due to the poor state of health in the country. Although efforts have been made to measure its impact on household welfare and formulate policies that will reduce this impact, it has mainly been static and not dynamic. That is, the impact of this poor health on future welfare has received very little or no attention.

It is based on this motivation that this study aimed at comprehending the effect of health status on vulnerability to poverty among households in Ghana. Using cross-section data from GLSS 5 and measuring vulnerability as expected poverty, following methodology proposed by Chaudhuri (2000), the study has determined the significance of the effect of health status on vulnerability to poverty. Also, a vulnerability to poverty profile based on household characteristics was assessed. This chapter is therefore divided into three-fold. It begins by summarizing the main findings of the study and make conclusions based on the summary. Secondly, we suggest some major policy recommendations based on the findings. Finally, we outline the limitations faced during the research process and suggest directions for future research.

6.2 Summary and Conclusions

In accordance to the first specific objective of determining the significance of poor health status on vulnerability to poverty, we found that household health status is an important determinant of vulnerability to poverty. That is, the study found a significant negative relationship between expected average consumption and the number of sick household members which implies that, as the household health declines, future consumption is

expected to reduce hence making the household vulnerable to poverty. Moreover, there was a significant positive relationship between expected variance of consumption and household health status. That is poor health status tend to increase variations in households' future consumption making the household vulnerable to poverty. A complement of this finding was seen in the household hygiene condition variable which shows a significant negative relationship with vulnerability. This implies that, households with good hygienic conditions, all things equal, have good health hence improved welfare. Also, the logit model suggests that there are significant marginal impacts of these health variables on vulnerability to poverty. It can be concluded that, good health status is an important vulnerability improving variable and should therefore be given special attention in policy interventions. That is, the fact that poor health worsens welfare (both present and future) should not be overlooked and neither should its impact be underestimated. Other household characteristics such as education attainment of head and size of household were found to be important in determining vulnerability but these are not the central focus of this study.

With Respect to our second specific objective, about 56% of the Ghanaian population were estimated to be vulnerable to poverty which is significantly higher than the observed poverty level of about 28%. The estimate, however, reduces to about 49% if the lower poverty line is used. One interesting result found was that rural households have lower average vulnerability to poverty than urban localities. But the relationship changes if the lower poverty line is used with rural households becoming more vulnerable than urban households. Again vulnerability to poverty was found to be higher among male headed households than in female headed households. The eastern region was found to be the most vulnerable to poverty. Also, the hypothesis that vulnerability and poverty are independent concepts was tested and accepted. It can therefore be concluded that, there are more vulnerable people in Ghana than poor and also the current poor may not be the same as the vulnerable. Vulnerability to poverty also differs for various household characteristics.

6.3 Implications for Policy

The results from this study suggest that there is much more room for improvement if vulnerability to poverty is to be reduced among households in Ghana. The following recommendations are therefore given based on the findings from this study. First, policies directed only towards observed poverty are not enough and should not concentrate only on the poor but the vulnerable. That is, if poverty reduction programmes focus only on the current poor, the other part of the population who are currently not poor but are likely to be poor in the future are neglected at the time of implementation of the programme hence making it difficult to eradicate poverty among the population. A classification of the poor and the vulnerable (see Table 5.4) suggests that the group of people who are not currently observed to be poor but are susceptible to poverty also need special attention in poverty reduction programmes.

Secondly, the study recommends that policies and programmes formulated to reduce poverty and vulnerability to poverty should tackle some specific household characteristics which have significant influence on expected mean of household consumption. We found that an improvement in health status leads to improvement in current welfare and also future welfare by reducing future prospects of poverty. This shows that health is really a consumption and investment commodity. It is therefore recommended that while efforts should be made, at the national level, to improve access, equity, efficiency and effectiveness of health services, which will in turn improve health status, good hygiene practices should also be encouraged at the household level. This recommendation is supported by findings from researchers such as Nonvignon and Aglobitse (2008) that access to health services (in terms of cost and time) and efficiency of health service deliveries are crucial to health improvement. Improvement in the health state of the population creates more “healthy time” that could be used in productive activities, hence reducing vulnerability to poverty.

These recommendations seem practically impossible due to the challenges facing the health sector. These challenges include; inadequate coverage of priority interventions, inadequate financing and delays in the disbursement of funds, lack of commitment and little accountability for performance (GHS, 2008). We however suggest that, the government should establish partnership with more foreign organizations who donate directly to the health sector and such funds should be used to, solely and efficiently, acquire equipments and build more health facilities in areas where these facilities are currently scarce. Such funds should also be spent having in mind the most pressing health needs of the population. Furthermore, while the introduction of the NHIS is a significant step, we recommend that annual premiums should be reduced in favour of the poor and publicity should be improved to encourage participation. Also, frequent increment in salaries of health workers and extra motivation (such as awards to deserving workers and flexible loans to workers) will go a long way to improve upon the commitment and accountability of workers. This implies that access to health care services will improve and individuals will not lose their lives or several productive hours due to ill health. Such situations mean more productive human capital hence an improvement in both current and future welfare.

As suggested by Osei and Quartey (2001), direction of resources towards integrated programmes for the education and health sectors as a whole is important for development in Ghana through human capital improvement. Devereux *et al.*, (2007) also suggested that improved health services reduce illness and raise labour productivity and are vital for household vulnerability reduction.

6.4 Study Limitations and Areas for Future Research

One major limitation of this study was the lack of panel data. Although the study used cross section data, panel data of sufficient length and richness is preferred for effective household vulnerability assessments. Secondly, the lack of quality information on household and community shocks limited the extent to which vulnerability to poverty

could be assessed. Finally, the study is limited by its inability to control for the existence of a possible simultaneity problem due to the lack of a good instrument in the data.
A possible extension of this study is to explore the health and vulnerability relationship using panel data to ascertain if there will be any significantly different results from such data sets. Furthermore an estimation of vulnerability using other measures apart from vulnerability as expected poverty[13] will be an important extension to this study.

Moreover, the impact of the recently introduced health insurance scheme in Ghana on vulnerability to poverty will also be an interesting area of study. The main rationale behind the introduction of the scheme was to improve individual welfare through access to good health but no study has yet assessed its impact on future welfare. Since about 42% of the population is reported to have registered with the programme as at 2007, it is possible to examine the extent to which the programme is influencing vulnerability to poverty.

[13] See discussion on measurement of vulnerability in chapter three

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APPENDICES

Appendix 1: Vulnerability to Poverty Profile for Lower Poverty Line

Table 5.4 Vulnerability to Poverty Profile for Various Population Characteristics Using the Lower Poverty Line (2,884,700 Cedis)

	Population Share	Mean Vulnerability	Vulnerability to Population Ratio
Total	100	49	100
Region			
Western	9.64	63	12.39
Central	7.93	57	9.22
Greater Accra	14.25	43	12.51
Volta	8.31	66	11.18
Eastern	10.47	69	14.73
Ashanti	18.14	50	18.51
Brong Ahafo	9.22	57	10.73
North	9.16	24	4.49
Upper East	6.96	28	3.98
Upper West	5.92	21	2.53
Location			
Urban	41.52	47	39.82
Rural	58.48	51	60.86

	Population Share	Mean Vulnerability	Vulnerability to Population Ratio
Gender of Household Head			
Male	72.09	51	75.04
Female	27.91	44	25.06
Coastal	29.41	51.46	30.88
Forest	40.96	60.7	50.73
Savannah	29.63	31.97	19.33

Source: Own Computation