EFFECT OF HOUSEHOLD CATASTROPHIC HEALTH
EXPENDITURE ON VULNERABILITY TO POVERTY IN
GHANA

BY
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DECLARATION

I, Hagar Adomah Bandoh, hereby declare that except for the research or studies done by other people which have been duly acknowledged, this work is the result of my own original research, and that this dissertation, either in whole or in part has not been presented elsewhere for another degree.

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Date: ........................................
DEDICATION

In honour of my God and parents, the reason for what I am today, Thank you.
ACKNOWLEDGEMENT

O for a thousand tongues to sing my great Redeemer's praise for his glorious grace that has brought me this far. May His Name forever be praised!

My sincere thanks to my academic supervisor Dr. Genevieve Cecilia Aryeetey for her guidance and contribution to this work. The other lecturers at Department of Health Policy Planning and Management cannot be left out, your insightful comments during our meetings are very much appreciated.

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ABSTRACT

**Background:** Households are exposed to a wide range of shocks on a daily basis which can reduce their consumption pattern and threaten their welfare. Households are also likely to be vulnerable to poverty due to health spending. In seeking health care services, households may face financial hardship termed Catastrophic Health Expenditure (CHE). This may not only lead to poverty but make the household vulnerable to future poverty.

**Objective:** The main objective was to estimate the effect of catastrophic health expenditure on vulnerability to poverty among households in Ghana.

**Methods:** Vulnerability is estimated using Chaudhuri’s Econometric model and for CHE the WHO method is used at thresholds of 5% and 20%. Data was sourced from the sixth round of the Ghana Living Standards Survey, a nationally representative sample of 16,772 households. The effect of CHE on household vulnerability to poverty was estimated using multivariate regression analysis.

**Key findings:** The key findings show that overall, vulnerability to poverty estimates are higher, 34% compared to the current poverty estimate of 24.2%. The incidence of catastrophic health expenditure ranged between 0.45% to 24.96% and 5.24% to 25.55% depending on the method and threshold used. Vulnerability was significantly associated with CHE and some household socioeconomic characteristics.

**Conclusion:** Therefore there’s a need to incorporate vulnerability in healthcare financing strategies and current poverty estimates to ensure financial/social protection of households from future poverty in Ghana.
TABLE OF CONTENTS

DECLARATION ............................................................................................................ i

DEDICATION ............................................................................................................... ii

ACKNOWLEDGEMENT ............................................................................................ iii

ABSTRACT .................................................................................................................. iv

TABLE OF CONTENTS ............................................................................................... v

LIST OF TABLES ........................................................................................................ ix

LIST OF FIGURES ....................................................................................................... x

LIST OF ABBREVIATIONS ....................................................................................... xi

CHAPTER 1 .................................................................................................................. 1

1.0 INTRODUCTION ................................................................................................... 1

1.1 Background .............................................................................................................. 1

1.2 Problem statement .................................................................................................... 3

1.3 Objectives ................................................................................................................. 4

1.3.1 General objective .................................................................................................. 4

1.3.2 Specific objectives ................................................................................................ 4

1.4 Justification of the study ......................................................................................... 5

1.5 Conceptual framework ............................................................................................ 5

CHAPTER TWO ........................................................................................................... 8

2.0 LITERATURE REVIEW ...................................................................................... 8

2.1 Introduction .............................................................................................................. 8

2.2 Definition and causes of vulnerability to poverty .................................................... 8
2.3 Approaches to measuring vulnerability .................................................. 11
2.4 Definition and causes of catastrophic health expenditure .................... 15
2.5 Approaches to estimating catastrophic health expenditure .................... 18
2.6 Effect of catastrophic health expenditure on vulnerability to Poverty .... 21
2.7 Conclusion .......................................................................................... 23

CHAPTER THREE ..................................................................................... 25

3.0 METHODS .......................................................................................... 25
3.1 Study design ....................................................................................... 25
3.2 Country profile ................................................................................... 25
3.2.1 Economic context .......................................................................... 25
3.2.2 Poverty profile ................................................................................ 26
3.2.3 Health system and healthcare financing ......................................... 26
3.3 Data source and description ................................................................ 27
3.4 Data extraction and cleaning ................................................................. 28
3.5 Study variables ................................................................................... 29
3.5.1 Outcome variables ......................................................................... 29
3.5.2 Explanatory variables ..................................................................... 29
3.6 Data analysis ....................................................................................... 31
3.6.1 Description of household characteristics ...................................... 31
3.6.2 Estimation of household catastrophic health expenditure ............ 31
3.6.3 Estimation of vulnerability to poverty .......................................... 32
3.6.4 Regression analysis ........................................................................ 33
3.7 Ethical considerations/ issues................................................................. 33
  3.7.1 Data usage and storage................................................................. 33
  3.7.2 Confidentiality ........................................................................... 33
  3.7.3 Potential Risk /Benefit ................................................................. 34
  3.7.4 Declaration of Conflict of Interest ................................................. 34

CHAPTER FOUR ............................................................................................ 35
  4.0 RESULTS ............................................................................................. 35
    4.1 Descriptive Statistics...................................................................... 35
    4.2 Vulnerability estimates across household head characteristics........ 38
    4.3 Catastrophic health expenditure estimates ...................................... 41
    4.4 Catastrophic estimates across household characteristics ................. 42
    4.5 Regression results estimating the effect of household CHE on vulnerability to
        poverty.................................................................................................. 45

CHAPTER FIVE ............................................................................................. 47
  5.0 DISCUSSION ......................................................................................... 47
    5.1 Vulnerability to poverty .................................................................... 47
    5.2 Catastrophic health expenditure....................................................... 49
    5.3 Effect of CHE on vulnerability to poverty ........................................ 50
    5.4 Limitations of the study .................................................................... 52

CHAPTER SIX ............................................................................................... 53
  6.0 CONCLUSIONS AND RECOMMENDATIONS ................................ 53
    6.1 Conclusion ......................................................................................... 53
6.2 Recommendations ................................................................. 54

REFERENCES .................................................................................. 55
LIST OF TABLES

Table 1: Other explanatory variables (covariates) .......................................................... 30
Table 2: Descriptive summary of household characteristics ........................................... 40
Table 3a: Vulnerability estimates across household characteristics .............................. 42
Table 3b: Vulnerability estimates across expenditure quintiles ..................................... 43
Table 4: CHE estimates ................................................................................................. 44
Table 5a: CHE estimates across household characteristics ........................................... 47
Table 5b: Vulnerability estimates across expenditure quintiles ..................................... 48
Table 6: Regression results ......................................................................................... 49
LIST OF FIGURES

Figure 1 Conceptual Framework ................................................................. 7
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE</td>
<td>Catastrophic Health Expenditure</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
</tr>
<tr>
<td>OOP</td>
<td>Out-of-Pocket</td>
</tr>
<tr>
<td>NHIS</td>
<td>National Health Insurance Scheme</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GLSS</td>
<td>Ghana Living Standards Survey</td>
</tr>
<tr>
<td>GSS</td>
<td>Ghana Statistical Service</td>
</tr>
<tr>
<td>PSU</td>
<td>Primary Sampling Units</td>
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<td>EA</td>
<td>Enumeration Area</td>
</tr>
<tr>
<td>LSMS</td>
<td>Living Standard Measure Survey</td>
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<td>FGLS</td>
<td>Feasible Generalized Least Squares</td>
</tr>
<tr>
<td>OLS</td>
<td>Ordinary Least Squares</td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

1.1 Background

Over the past decades, there has been marked decline in poverty. According to World Bank projections, the share of extreme poverty in Africa decreased from 57 percent in 1990 to 43 percent in 2012. In 2015, the number in extreme poverty was expected to have reduced by 10%. Yet poverty continues to remain a major challenge for many countries globally particularly Africa (Christiaensen, Gaddis, Beegle, & Dabalen, 2015; World Bank, 2015).

According to current estimates by the World Bank, 900 million of the world’s population live on or below the international poverty line of $1.90 a day. In Africa, 43% of the population lived in extreme poverty as at 2012 with 388.7 million in Sub-Saharan Africa (Christiaensen et al., 2015; World Bank, 2015).

Static poverty measures have been the major form of assessment of poverty and a guide for interventions. However this limits the scope of household welfare to measurements of current income and expenditure (Ligon & Schechter, 2003). Economists have proposed that another dimension of wellbeing is vulnerability to poverty, that is, the possibility of individuals or households falling into poverty in future. Poverty in future, which static poverty measures do not capture in welfare assessment (Chaudhuri, Jalan, & Suryahadi, 2002; Ligon & Schechter, 2003, 2004).

Vulnerability is defined as the degree of an individual or household risk exposure to wealth loss or to living standards falling below a certain socially acceptable level (Cao, Xu, Xie, Liu, & Liu, 2016). Therefore a household “is said to be vulnerable if there’s
the risk of becoming poor if currently non-poor or if currently poor, will remain in poverty” (Chaudhuri et al., 2002).

Vulnerability incorporates concepts of future uncertainty into static poverty measures (Celidoni, 2011; Chaudhuri, 2003; Günther & Harttgen, 2009; Kamanou & Morduch, 2002). This considers possible changes and other dimensions of the household’s welfare such as exposure to unanticipated adverse shocks, external factors and the response of the household to economic hardship (Calvo & Dercon, 2007; Ligon & Schechter, 2003; Moser, 1998; Pritchett, Suryahadi, & Sumarto, 2000).

Empirical estimates show that worldwide, vulnerability estimates are always higher comparatively to observed poverty (Chaudhuri et al., 2002; Masood, Mugera, & Schilizzi, 2016; Novignon, Nonvignon, Mussa, & Chiwaula, 2012). In the case of Ghana, the observed poverty level was 29% in comparison to 49% - 56% of the population who were vulnerable to future poverty (Novignon et al., 2012).

Unpredictable adverse shocks are the major cause of vulnerability and undermine the households’ ability to protect itself (Cao et al., 2016; Chaudhuri, 2003; Oduro, 2009). Injury and illness, macroeconomic instability, changes in food price, conflict, crop failure, and death of household head or job loss can predispose a household to poverty. (Günther & Harttgen, 2009; Masood et al., 2016; Oduro, 2009).

Among these shocks, ill-health due to injury and disease and its associated cost is one of major uncertainties leading to vulnerability either in the short or long term. Payments for hospitalization and cost of medicines can have major economic consequences on households. This can have a sizeable impact even for households with health insurance (Lucas & Bloom, 2006; McIntyre et al., 2008b, 2008d, 2008e; Somi, Butler, Vahid, & Njau, 2009; Wagstaff, 2007).
Households or individuals who in accessing healthcare may experience financial hardships mostly from out-of-pocket (OOP) payments which negatively impacts on their welfare. Total health expenditure exceeding 40% of a household’s non-subistence income available after basic needs have been met is classified as Catastrophic Health Expenditure (CHE) (McIntyre et al., 2008d; Misra, Awasthi, Singh, Agarwal, & Kumar, 2013; Xu, 2003).

Globally, about 150 million people or almost 44 million households each year incur catastrophic health expenditure. Also, 25 million households out of this number are pushed into extreme poverty from paying for healthcare. Majority of this is found in low-income countries because poverty levels are high and health financing systems too weak or absent to protect households from health shocks in most of these countries (Kawabata, Xu, & Carrin, 2002; Xu, 2003, 2005).

Mettle et al (2013) also estimated that 78% of households in Ghana are likely to incur catastrophic health expenditure based on those who actually spent catastrophically during the survey period of GLSS 5 (Mettle, Asare-Kumi, & Baidoo, 2014).

Many other studies have also linked CHE and poverty. In Kenya for instance, a study found that almost 1.48 million of the population are pushed below the national poverty line (Chuma & Maina, 2012). Wagstaff (2007) and Narayan et al. (2000) argue that CHE significantly reduces the wealth and productive ability of people.

1.2 Problem statement

There’s substantial evidence linking CHE and poverty worldwide. For instance, McIntyre et al. (2006) notes that households may fall into poverty or be pushed deeper into poverty from CHE. Further, Falkingham (2004) shows that in an attempt to meet
their health care needs, households in Tajikistan end up selling their assets or getting into debts that compromises their welfare severely (Falkingham, 2004). Static poverty studies from catastrophic expenditure also dominate in Ghana (Aryeetey, 2012; Nyanator & Kutzin, 1999; Xu et al., 2003). A study of two regions by Aryeetey et al (2012) revealed that between 7% - 8% of insured households, experienced CHE. Overall, between 3 to 5% were pushed into poverty.

Poverty has also been linked with vulnerability to poverty, as it increases exposure to risks such as poor working conditions, environmental contamination, poor nutrition, and lack of preventive health care which leads to ill-health (Ligon & Schechter, 2003; Parker & Bank, 2007; Philip & Rayhan, 2004). In that regard, households may have to spend more on health care, which makes them vulnerable to future poverty.

Though vulnerability to poverty has been studied (Alayande, 2004; Bank, 2005; Chaudhuri, 2003; Naudé, Santos-Paulino, & McGillivray, 2008; Novignon, Nonvignon, Mussa, & Chiwaula, 2012), there is paucity of studies assessing the relationship between CHE and vulnerability to poverty. There is, therefore, the need to investigate how CHE influences the likelihood of future poverty in developing countries in general and Ghana in particular.

1.3 Objectives

1.3.1 General objective

The general objective of this study was to examine the effect of household catastrophic health expenditure on households’ vulnerability to poverty in Ghana.

1.3.2 Specific objectives

The specific objectives of this study were:
1. To estimate household catastrophic expenditure on health.

2. To estimate household vulnerability to poverty.

3. To examine the effect of catastrophic health expenditure on vulnerability to poverty.

1.4 Justification of the study

Ghana like many countries has Universal Health Coverage high on the national agenda. To achieve this, developing good health financing systems that allow people to access needed services but which also protect them against the financial risks of accessing care is very crucial. Catastrophic expenditures have been proven to lead not only to current poverty but future as well in many countries.

The concept of vulnerability is important because provides ex-ante information that can help in designing better protection policies to prevent households and individuals from experiencing severe welfare losses, rather than cure them when they are already poor. It is certainly worth researching further into vulnerability in a developing country in the interest of policy and poverty reduction strategy purposes.

In view of this, the study will, first of all assess the extent to which households are prone to vulnerability as a result of catastrophic health expenditure. Secondly, contribute to the ongoing research and add to the literature.

1.5 Conceptual framework

Health shocks, from diseases and injury which are unpredictable may predispose a household to incur cost detrimental to their welfare or general wellbeing. Household
characteristics and composition such as size and location determines household coping strategies in response to these shocks and whether recovery is possible from these adverse event.

Characteristics of the household head, such as employment, educational status, income as well as age distribution of household members, household size, and location (rural or urban) determine how much will be spent on healthcare. In addition, households with elderly, children, handicapped (disabled), or chronically ill members are prone to spend more on healthcare because of their need for frequent services. For households who have no form of financial security or uninsured, they will have to spend more on healthcare. Health insurance, though not absolute, provides some form of financial protection for the household.

Such costs can lead to catastrophic expenditures and push households into poverty to the extent of forgoing basic essential needs such as food. Though households may employ various coping strategies such as spending from savings, borrowing, asset sales and transfers to sort out medical bills, this may only push them further into poverty.

As a consequence, the poor may become poorer or the rich may become poor in future. This has raised a growing interest on vulnerability, which focuses on destitution of individuals from future shocks and moves static poverty analysis to a dynamic one. The current poverty approach does not seem to promote development because, despite many poverty alleviation strategies that have been running for years, poverty still persists.
Figure 1 Conceptual Framework

Household Characteristics
- Size
- Gender of head
- Education
- Employment status
- Vulnerable groups

Health Shocks (Disease & Injury) → Household Response to Shock
- Seeking treatment
  - OOP
  - Health Insurance

Household Response to Shock → CHE

Vulnerability to Poverty
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter reviewed literature on health financing, particularly household health spending that results in impoverishment or catastrophic health expenditure and also the risk of future poverty. The following broad areas will also be covered; (i) definition and causes of vulnerability to poverty; (ii) approaches to measuring vulnerability to poverty; (iii) definition and causes of catastrophic health expenditure; (iv) approaches to measuring catastrophic health expenditure; (v) effect of catastrophic expenditure on vulnerability to poverty; (vi) conclusion.

2.2 Definition and causes of vulnerability to poverty

Economists have defined poverty as the inability of households or individuals to meet their current basic needs due to lack of resources. Generally, a household is said to be poor if their current expenditure falls below a given poverty line. Categorically, extreme poverty has been defined as living on less than US$1 per day while moderate poverty is less than US$2 or US$5 each day by the World Bank (Dutta, Foster, & Mishra, 2011; Novignon et al., 2012).

A more recent concept that has evolved is vulnerability to poverty which represents an ex ante approach of finding those who will become poor or fall into deeper poverty in future. Whether todays poor will remain poor or the rich will become poor, it is unknown, thus vulnerability provides a way of measuring this (Celidoni, 2011; Zhang & Wan, 2008).

Vulnerability to poverty has been defined as an ex-ante probability of a household or an individual, irrespective of them being poor currently or not, to become poor or poorer in the near future. Generally, unpredictability of future occurrences in life makes everyone vulnerable to unforeseen events and shocks that may be detrimental to welfare. Hence, though some
households may not be poor now, one can never say they will never become poor (Chaudhuri et al., 2002; Ligon & Schechter, 2004; Moser, 1998; Pritchett et al., 2000).

Celidoni (2011) uses three (3) different perceptions of poverty risk exposure have been to define vulnerability; vulnerability as expected poverty (VEP) which is the probability measure of facing poverty in the future; vulnerability as low expected utility (VEU) that is measurements in terms of utility units; and lastly vulnerability as uninsured exposure to risk (VER), the ex post assessment in terms of consumption.

Unlike static poverty or ex-post measurements, vulnerability is forward-looking. However, vulnerability and poverty can be said to be two sides of the same coin, the distinguishing feature is the presence of risk. It incorporates concepts of future uncertainty into static poverty measures (Celidoni, 2011; Chaudhuri, 2003; Gunther & Maier, 2014).

Also unlike static poverty measures, vulnerability considers possible changes and other dimensions of the household’s welfare. In addition to average income and expenditures, it considers exposure to unanticipated adverse shocks, external factors and household response to economic hardship which all contribute significantly to welfare loss especially for poor households (Calvo & Dercon, 2007; Ligon & Schechter, 2003, 2004; Moser, 1998; Pritchett et al., 2000). For welfare estimations, it is desirable to take into account the average expenditures of households and the risk from shocks (Ligon & Schechter, 2004).

Vulnerability to poverty results from adverse shocks which undermine the households’ ability to protect itself. These are unpredictable and uncertain mostly (Cao et al., 2016; Chaudhuri, 2003; Oduro, 2009). Shocks may be covariate or idiosyncratic. Those that may proximate causes of vulnerability include exposure to aggregate or covariate shocks (e.g. generalised; macroeconomic instability, changes in food price, conflict, flood etc.) and/or idiosyncratic
shocks, for e.g. localised, crop failure, illness/ injury/ death of household head, job loss (Chaudhuri, 2003; Günther & Harttgen, 2009; Masood et al., 2016).

Gunther et al. (2009) found in their study that both types of shocks do not differ in increasing the risk of vulnerability of a household. However, idiosyncratic shocks seemed to be higher in the urban areas while covariates were higher in the rural areas. Despite these, the degree of income volatility the household faces and its ability to smooth consumption under these shocks determines the vulnerability of the household (Chaudhuri, 2003; Günther & Harttgen, 2009; Masood et al., 2016).

Looking at vulnerability and shocks in the African context, Oduro (2009) also outlines similar causes; disease or injury, violence, natural disaster, trade fluctuations, labour problems and rainfall pattern variations. Households may be hit by more than one shock and this was the same for poor and non-poor households (Oduro, 2009). The results of studies in Guatemala also reports households being hit by multiple shocks and suffer from similar shocks (Tesliuc and Lindert, 2002).

Poverty itself causes vulnerability often among the poor. It increases exposure to risks such as poor working conditions, environmental contamination, poor nutrition, and lack of preventive health care. The households with meagre income are less likely to manage shocks successfully and recover, thereby pushing them deeper into future poverty (Parker & Bank, 2007). Philip and Rayhan (2004) in their term paper on the causes of vulnerability outlines population growth, ill health, poverty, low educational levels, inequality in gender and lack of resources as causes of vulnerability. They further group these causes under social, economic, environmental and political vulnerability (Philip & Rayhan, 2004).

Employing a two layer linear model in South-West China Cao et al. (2016) also identify; Labourers scale (Number of labourers or persons in household aged 18 - 60 years old),
labourers education (maximum years of education of household labourers in years), house value (current market value of the house(s) that a household owns), house scale (number of family members or persons in household living at home more than 6 months), disease costs (family members’ disease costs in household) and disaster losses (natural disaster, crop diseases and pest, etc.) as critical factors that contribute to the vulnerability to poverty in rural areas.

2.3 Approaches to measuring vulnerability

Many approaches have been used to estimate the risk of falling or remaining in poverty (Celidoni, 2015; Chaudhuri, 2003; Ligon & Schechter, 2003; Pritchett et al., 2000). The method used depends considerably on the variety of definitions of vulnerability, the estimators employed, and type of data (panel or cross-sectional) used in applications (Celidoni, 2011; Ligon & Schechter, 2004). Ligon et al. (2004), groups these methods under two (2) broad headings; predicted consumption (based on consumption expenditure) and measuring vulnerability (based on welfare consequences). In contrast, Celidoni (2011) classify the methods based on the three (3) empirical definitions of vulnerability; vulnerability as expected poverty (VEP), vulnerability as a low expected utility (VEU) and vulnerability as uninsured exposure to risk (VER).

One of the approaches proposed is the probability theory; Chaudhuri’s econometric model and the predicted consumption by Prichett. These adapt the standard poverty measure (that is income and consumption) to a non-deterministic setting and through that estimate an expected value for vulnerability (Chaudhuri et al., 2002; Pritchett et al., 2000).

Chaudhuri proposes calculating expected headcount from the mean and variance in consumption using the Feasible Generalised Least squares (FGLS) on cross-sectional or short
panel data. It considers the changes in consumption to be normal, independent and identically distributed (Chaudhuri et al., 2002).

Application of this method to cross-sectional data from household surveys in Indonesia and Nigeria both showed a higher proportion of the population vulnerable to poverty than those currently poor. For Indonesia, 45% of the population faced a non-negligible risk of poverty as compared to the observed poverty of 22% as at December 1998 and the distribution of vulnerability was significantly different from that of poverty. In Nigeria, 68.5% were vulnerable to poverty as compared to 61% (Alayande, 2004; Chaudhuri et al., 2002). A study on health and vulnerability in Ghana also using the Chaudhuri model estimated 56% of households being vulnerable to poverty, much higher than the 29% observed to be poor (Novignon et al., 2012).

Ward (2013) also used this method to analyze the effect of China’s economic reforms on poverty change and reduction of vulnerability to poverty using panel data from household survey 1991–2006. He quantifies vulnerability to income poverty. Results show a shift from chronic to transient poverty with a gradual decline in vulnerability with reforms.

Though some experts agree Chaudhuri’s approach is straightforward, Damien (2013) believes that it does not take into account variability of parameters when applied to a single cross-section and a sufficient panel data, the assumptions made are restrictive. Also, there appears to be some limitations such as lack of information on risk exposure and coping mechanisms which create measurement errors (Damien, 2013; Günther & Harttgen, 2009). In view of this, in estimating vulnerability to idiosyncratic and covariate shocks using the Madagascar cross-sectional survey, Gunther et al., (2009) extends the Chaudhuri’s model using a multi-level analysis to correct these limitations. Results show t 66% of households in Madagascar were vulnerable to
poverty and that in the next year 66.32% of households had a higher risk of falling below the poverty line.

Pritchett et al., (2000) expands static poverty measures to include vulnerability for calculating the poverty headcount. Using a four-step approach in estimation of vulnerability, it further differentiates vulnerability of households amongst the same household and allows comparison between groups such as urban or rural. Applying this method to the Indonesian population, results proved vulnerability was 30% to 50% and across groups variations were significant (Pritchett et al., 2000).

Another approach, Predicted Consumption or the Exposure Observed Risks method measures vulnerability through the response of households’ consumption expenditures to various observable shocks, such as illness and disease, changes in income, environmental changes, and not their consumption directly. The degree of vulnerability is dependent on what the risk-averse household lacks to smooth or insure away these shocks to its expenditures. Nonetheless, this method does not separate vulnerability from poverty (Ligon & Schechter, 2004).

The Utilitarian Approach which also assesses quality of welfare by “measuring the difference between the utility a household would derive from consuming some particular bundle with certainty and the household’s expected utility of consumption”. Unlike the other methods, the effects of risk on household welfare are captured. Applied to the Bulgarian population, household’s welfare on the average was 11% less than it would be if there was no inequality, and an additional 3% less than it would be in if there was no aggregate risk (Ligon & Schechter, 2003).

However, each of these methods has some form of limitations in measuring vulnerability or measurement errors or in assumptions (Chaudhuri, 2003; Gallardo, 2013; Kamanou & Morduch, 2002; Ligon & Schechter, 2004). It seems that a combination of methods would give
a more accurate estimate of vulnerability. In an attempt to evaluate the different approaches and accuracy, one study concludes that there is still no consensus on which methods should be used in practice. Though each has strengths, none of them solves more than one problem at a time. Therefore they recommend for these methods to be applied to various datasets to allow comparison and generalization (Ligon & Schechter, 2004).

According to economists, finding an appropriate poverty measure to consider as an acceptable level of standard of living is also quite difficult. This is because various methods focus on different components of risk, response to risk and outcomes. Notwithstanding, a threshold or cut-off of 50% has being used in most studies to estimate vulnerability (Alwang, Siegel, Jørgensen, & Tech, 2001; Chaudhuri et al., 2002; Pritchett et al., 2000).

Data also poses quite a number of difficulties in measuring vulnerability. Vulnerability analysis requires panel data on income and consumption but in most countries, data available are cross-sectional surveys. These provide little or no information on shocks, impact on income or consumption and coping strategies of households which is essential for assessing the dynamic aspects of poverty or vulnerability. Panel data allows time to measure the changes in household consumption over time giving a true reflection of the reality because current consumption may not be a good proxy for future consumption. In spite of this, other studies have come up with models that use cross-sectional data since panel data are hard to come by, especially in developing countries (Chaudhuri et al., 2002; Gunther & Maier, 2014; Ligon & Schechter, 2003, 2004; Ward, 2016).

In contrast to the above approaches which are solely quantitative, some studies have used mixed methods in estimating vulnerability. This is believed to enhance in-depth understanding of key issues and factors that may influence vulnerability (Alayande, 2004; Parker & Bank, 2007; Tesliuc and Lindert, 2002).
For instance, the Q-squared approach utilized both quantitative survey-based methods and Participatory Rural Appraisal (PRA) methods for the qualitative aspect to assess poverty and vulnerability dimensions and risk in rural India. The qualitative-quantitative sequence was used to first identify baseline information to formulate a hypothesis as well as aid in designing the quantitative instrument to ensure all specific key issues of concern were addressed to reflect local settings. After applying both qualitative PRA and the quantitative field survey instrument to a total sample of 2,252 households drawn from over thirty (30) villages, the results revealed three broad poverty syndromes and highlighted the significance of both shocks and structural poverty with the social structure. The results also showed chronic debt obligations, expensive health shocks were among factors that trapped households in poverty or vulnerability (Parker & Bank, 2007).

A similar model was used in Guatemala to identify sources of vulnerability, correlation between household characteristics and vulnerability to consumption poverty. In addition to the Living Standards Measurement Survey in 2000, a qualitative poverty and exclusion field study was used to compliment the quantitative information (Tesliuc and Lindert, 2002). In Nigeria, Ayalande (2004) also used qualitative methods in estimating vulnerability and concludes that weak government structures, political ineffectiveness, and inefficiency contributed significantly to vulnerability.

### 2.4 Definition and causes of catastrophic health expenditure

In low-income countries out of pocket payments still dominates health financing approaches despite reforms in financial risk pooling mechanisms (Eddy van Doorslaer et al., 2007). Catastrophic health expenditure is said to occur when out-of-pocket health expenditure exceeds a certain threshold of non-food consumption expenditure in a given period (McIntyre et al.,
2008c; Misra et al., 2013; Xu et al., 2010). The World Health organization (WHO) defines CHE as total health expenditure exceeding 40% of non-subsistence income available after basic necessities of the household has been satisfied.

Consumption of other goods and services can be affected to a large extent if a greater portion of the households budget goes into healthcare (Ke Xu et al., 2007). Mostly less than 15% of the budget has been considered as safe not to compromise the welfare of households (Ke Xu et al., 2005). Catastrophic health expenditure cannot always be equated to high-cost of medical procedures or treatment, though huge hospital bills may obviously have detrimental effects on the household’s welfare. In some instances, a relatively small cost may cause individuals or household especially poor ones to reduce their basic necessities such as housing, food, or even the children’s education (Ke Xu, 2003; 2005).

Xu et al. (2005) states that for catastrophic health expenditure to occur, a triad of factors should be present; availability of health services requiring out-of-pocket payments; low household capacity to pay; and lack of prepayment mechanisms for risk.

Empirical results from studies generally support a positive relation between catastrophic expenditures and out of pocket payments (OOP). A strong correlation has been found between the proportion of households with catastrophic expenditure and the share of out-of-pocket payments in total health expenditure (Eddy Van Doorslaer et al., 2005; Wagstaff & Doorslaer, 2003; Xu et al., 2003). Payments for consultations, medications and diagnostic investigation constitute direct payments while indirect cost includes transportation (McIntyre et al., 2008a).

Krutilova et al. (2012) and Arsenijevic et al. (2015) both differentiate OOP into; direct (payment for healthcare services), top-up payments (official co-payments), and informal (payments for other healthcare products such as bandages, thermometer) as well as indirect
cost to emphasize the various forms of payments and its impact on health expenditure (Arsenijevic, Pavlova, & Groot, 2015; Krutilova & Yaya, 2012).

Studies on the determinants of catastrophic health expenditure have also concluded that, some household characteristics contribute to decrease in the household’s capacity to pay for health care services. These include income, education, and employment status of the household head, health status, size and composition, the presence of elderly and vulnerable groups (Buigut, Ettarh, & Amendah, 2015; Krutilova & Yaya, 2012; McIntyre et al., 2008b).

For instance, the larger the size of household or the more vulnerable groups within the household, the more likely it is to spend on health and incur catastrophic expenditures. Some studies have proven that based on location, rural households which have higher poverty are more likely spend catastrophically in relation to the proportion of their income. Also, lack of access to health services encourages reliance on pharmaceutical shops and outlets increasing out of pocket payments (Kawabata et al., 2002; Ke Xu, David B Evans, Juliet Nabyonga, Peter Ogwang Ogwal, & Aguilar, 2005; Mondal, Kanjilal, Peters, & Lucas, 2010).

Another key determinant of CHE is whether the household is insured or not. A study in Bogota on the expenditure of the uninsured in the face of health shocks show that the uninsured households experience more CHE than the insured as this has been the case in many other studies. Previous research in Ghana have also documented same, there’s less incidence of catastrophic health expenditure among insured households as compared to uninsured ones (Aryeetey, 2012; Kawabata et al., 2002; Liliana, Lara, Ruiz, Url, & Linked, 2015; McIntyre et al., 2008b; Su, Kouyaté, & Flessa, 2006).

There’s substantial evidence of CHE all over the world, this is no different for even developed countries where health financing systems are more robust and offer significant risk-protection from health expenses (Xu, 2003). Despite the progress made in developing health care systems
across most of the low and middle-income countries, risk protection mechanisms has lagged behind or is virtually absent which accounts for the higher incidence in these countries. Though variations existed among countries, a study of 59 and 89 countries respectively showed catastrophic payments were much common in several of the low-income ones (Ke Xu et al., 2005; 2003).

Quite a number of household welfare surveys and living standard measure surveys (LSMS) have been used to assess CHE and its impact on the welfare of populations in many countries, these have all come up to the same conclusion. This has resulted in various health system reforms in relation to financial protection and impoverishment (McIntyre et al., 2008a, 2008e).

2.5 Approaches to estimating catastrophic health expenditure

There is little or no consensus regarding thresholds used for estimating CHE. As a result, many studies estimate catastrophic expenditure using various thresholds but the most reported in literature ranges from 5–20% (Lu, Chin, Li, & Murray, 2009; Onwujekwe et al., 2012). Nonetheless, the WHO estimates a cut off of 40%, which is the household’s capacity to pay (Buigut et al., 2015; Flores, Krishnakumar, O’Donnell, & Van Doorslaer, 2008; Krutilova & Yaya, 2012; Onwujekwe et al., 2012; Xu, 2003).

The first approach by WHO which is mostly used in empirical studies, estimates catastrophic expenditure based on the effective income remaining after basic subsistence needs have been met. This method considers OOP in terms of a measure of ability to pay (y), such that (OOP/y) where y = X-Sexp. The Sexp is subsistence deductions, defined as the average food expenditure of households whose food expenditure share is in the 45th to 55th range, while X is income or consumption expenditure. Hence y = X-Sexp, 45th/55th (Xu, 2005).
The food share-based poverty line is used in estimating subsistence expenditure of the household. “This poverty line is defined as the food expenditure of the household whose food expenditure share of total household expenditure is at the 50th percentile in the country” (Xu, 2005). This is because non-essential food may be included in food expenditure from households of higher income. The share of total food expenditure is also calculated based on the poverty lines of different countries because of different consumption patterns and prices. This gives a more accurate reflection of consumption expenditure than income reported in household surveys since household food expenditure might not really show the actual subsistence expenditure (Buigut et al., 2015; Galárraga, Sosa-Rubí, Salinas-Rodríguez, & Sesma-Vázquez, 2010; Xu, 2003, 2005).

A variation in this approach, uses the non-food expenditure as an alternate measure for the household’s capacity to pay. With a dichotomous choice model it predicts the probability of catastrophic health expenditure in households in Burkina Faso. Approximately 6–15% of households in Nouna District experienced catastrophic health expenditure at different thresholds (Su et al., 2006).

The second approach sets the threshold in terms of proportionality of income and considers the OOP as a proportion of income (X). That is (OOP/X) based on various thresholds. However for the purpose of equity, the use of the same threshold for the poor and rich is not a good measure as comparatively well-off households are more likely to exceed the given threshold. In view of this limitation, researchers mostly use the first method (Bredenkamp, Mendola, & Gragnolati, 2011; McIntyre et al., 2008b; Wagstaff & Doorslaer, 2003).

Depending on the methods and thresholds used, estimations differed. Results from studies in Kenya support this assertion of variation. Catastrophic expenditure ranged between 1.5% and 28.4% for different methods and the threshold used. The WHO method yielded lower incidence...
with a range of 1.5% to 6.2% corresponding to thresholds 30% and 10%. The 40% threshold yielded an incidence lower than 1.5%, i.e. almost no household in the slum experienced catastrophic health expenditures. However, the proportionality of income approach yielded the highest incidence, which ranged from 18.5% to 28.4% with thresholds of 30% and 10% (McIntyre et al., 2008b). Other studies have noted, setting just one threshold to estimate catastrophic health expenditure may result in inaccuracy of estimation or even the misinterpretation of factors that might influence the phenomenon (Arsenijevic et al., 2015; Buigut et al., 2015; McIntyre et al., 2008b; Su et al., 2006).

In contrast to the aforementioned approaches, some researchers have argued that measurements based on the ratio of health care payments to total household expenditure, may overestimate the risk of consumption from health care payments, thereby exaggerating the scale of catastrophic estimates (Flores et al., 2008). Depending on the type of instrument used, questionnaires on expenditure may differ, thus affecting estimates generated (Raban & Dandona, 2013).

An investigation into the effect of survey design, particularly the number of items and recall period, OOP and CHE showed higher estimates with data aggregation and a shorter recall period separately. This could not be verified when combined together but concluded the choice of design was crucial for reliable and valid information (Lu, Chin, Li, & Murray, 2009).

In addition, cross-sectional data from household and living standard measure surveys (LSMS) have been mostly used for estimations though ideally longitudinal data would have been best. Lack of completeness of information or details in utilization of healthcare has been a major limitations to estimating CHE, especially in developing countries (Arsenijevic, Pavlova, & Groot, 2013; Arsenijevic et al., 2015; Bredenkamp et al., 2011; Buigut et al., 2015; Galárraga
et al., 2010; Liliana et al., 2015; Wagstaff, 2007). Recall bias and the length of recall period of these surveys has made researchers question the accuracy of estimations of CHE.

Furthermore, this estimations does not take into account the actual reaction or response of households to health shocks over the period, as in the case of those with chronic diseases (Flores et al., 2008; Knaul et al., 2006; Liliana et al., 2015; McIntyre et al., 2008c).

Due to some of these limitations, a recent article by Mettle et al. (2013) proposed using the Catalogistico Discriminant analysis methodology in analysing catastrophic spending on health in under-developed countries. This method allows basing estimations of catastrophic expenditure on all households whether they spent on healthcare or not within the recall period for the survey. An application of this methodology was used on the Ghana living Standards survey (round V), and estimates showed at least 78% of households were likely to spend catastrophically on health care.

2.6 Effect of catastrophic health expenditure on vulnerability to Poverty

Effect of CHE on welfare and poverty has been a major concern for countries. The impact of health services payments on the welfare of individuals and households cannot be over emphasized. Healthcare is essential for economic growth as ill-health and poor access to health services are increasingly seen as major components of poverty.

There seems to be an association between poverty and ill-health, reflecting a causality relationship in both directions; ill-health breeds poverty and poverty breeds ill-health. Catastrophic payments due to ill-health can cause households to be caught in a vicious cycle of impoverishment and indebtedness (Acharya & Ranson, 2005; Wagstaff, 2002).
Among various shocks that affect households, health shock is one of the most unpredictable. Households facing such shocks are predisposed to poverty from health costs and loss of income due to inability to (Leive & Xu, 2008).

Undoubtedly health expenditure can contribute substantially to household impoverishment, increasing the incidence of poverty and pushing poor households into deeper poverty. Looking at current poverty analysis, income and expenditure play an important role in determining welfare in the developing world given the uncertainty of health shocks. In the absence of formal risk-pooling mechanisms, households cope with these payments through informal means, such as cutting down on basic necessities, falling on savings, assets, and transfers to smooth consumption (Flores et al., 2008; Ke Xu, 2003).

The coping mechanisms that may protect household consumption initially from health shocks, in the long-term have its own consequences. For instance, indebtedness, reduction in productive assets due to payments can impact future earnings dramatically. Krishna, (2006), Krishna et al. (2005), as cited in an article on India, showed interest rates charged by money lenders were extraordinarily high which lead to an increase in degree of poverty and indebtedness of the households.

Results from a study in the Czech Republic showed that implementation of user fees led to the increase in the burden of household budgets, these expenditures might lead to poverty or make the household vulnerable to poverty (Krutilova & Yaya, 2012; McIntyre et al., 2008).

In assessing the economic consequence of health shocks, it effects on income and expenditure, various factors should be considered. Even for insured households, medical spending can have a sizeable and significant effect on the household’s welfare. For some households, this increases their risk of vulnerability to poverty (Masood et al., 2016; McIntyre et al., 2008e; Shahrawat & Rao, 2011; Wagstaff, 2007).
To this end, many countries in Africa such as Ghana, Tanzania, and South Africa are finding ways to curb poverty through various healthcare financing approaches. For example increasing health insurance coverage, user fee exemptions mechanisms and budgetary allocations to health care (Macha et al., 2012).

2.7 Conclusion

The empirical studies reviewed prove catastrophic health expenditure is not rare and households in an effort to cope with this could end up in poverty. Closely linked to poverty is also vulnerability. The risk of vulnerability increases in the face of health shocks. For vulnerability to poverty, the theoretical literature supports the argument that a greater number are vulnerable than those currently poor.

In estimating both catastrophic health expenditures and vulnerability effects panel data is suited for this purpose than cross-sectional data. This allows exploration into the long-term effects and variations across wellbeing indicators, as well as examining the impact of mechanisms to protect households from this mechanism. Due to unavailability of this in most countries particularly undeveloped ones, most studies used living standard survey data. Even for the living standard surveys, there may be the lack of or incompleteness of information or details on the utilization of healthcare which can influence estimations.

Most methods used in estimations of catastrophic health expenditure have shown to be efficient particularly the WHO approach. Though this corrects concerns on equity, there are still some gaps. For example, the short recall period of surveys may not reflect all the household spending catastrophically in reality.

In addition, thresholds between 15 – 40% were used in most empirical studies, it has been proven that at lower thresholds, households were likely to suffer from CHE. Setting only one
threshold to determine catastrophic health expenditure may result in inaccurate estimation and misinterpretation of important factors.

In view of the gaps discussed above, though the study used the Living Standard Survey, it uses two (2) methods to crosscheck the robustness of results for CHE. Also the two (2) thresholds allows division of socio-economic quintiles in two to analyse CHE among the poor and non–poor.

Furthermore few of these studies have actually linked catastrophic health expenditure and vulnerability to poverty, the focus has been on current poverty. The study sought to link these and find the effect of CHE on vulnerability to poverty.
CHAPTER THREE

3.0 METHODS

This chapter provides a detailed description of methodology that was employed in this study.

3.1 Study design

This study used cross sectional design. Data from the Ghana Living Standard Survey, Round six (GLSS 6) was used to estimate the effect of catastrophic health expenditure on vulnerability to poverty.

3.2 Country profile

Ghana, is a West African state with a population of about 27.41 million, according to the latest estimates of the World Bank (2015). A greater number of this population are in the rural areas. The country has ten (10) administrative regions with each having its capital and one hundred and ten (110) district assemblies.

3.2.1 Economic context

Ghana gained the status of a lower-middle income country (LMIC) in 2011. The economic growth rate is one of highest in West Africa with an annual Gross Domestic Product growth of 3.7%, with per capita GDP US$37.86 Billion (World Bank, 2015).

With respect to inflation, rates have been high, rising to 17.1% in 2015. This is attributed to the high mean non-food inflation rate of 14.9% which has been consistently higher than the mean annual food inflation rate of 9.5% per annum.
3.2.2 Poverty profile

Recent surveys have reported a significant reduction in monetary poverty, the country met the first Millennium Development Goal target. Currently, the national poverty average is 24.2% with 78% concentrated in the rural areas (GLSS 6 Report, 2013).

Despite these achievements, about a quarter of Ghanaians still remain poor while a tenth of the population live in extreme poverty under the extreme poverty line of GH¢792.05 per adult equivalent per year. This is not evenly distributed across the regions and localities.

Among the administrative regions, the three (3) northern regions have the highest poverty rates with Upper West topping the list. Greater Accra has the least poor population.

3.2.3 Health system and healthcare financing

Ghana’s health system consist of providers which are administrated by Ministry of Health, Ghana Health Service, Quasi government organizations Religious and Private Organisations. Three (3) main levels of care; primary, secondary, and tertiary. Funding for these is largely by government except for the religious and private organizations.

Over the years health care financing has undergone many reforms from full government financing (free healthcare) post-independence to out of pocket payments termed “cash and carry system” in the early 80’s to 90’s. This was due to stagnation of Ghana’s economy, free healthcare could not be sustained by government.

This led to a decline and in the country’s health sector with widespread shortages of essential medicines, supplies and equipment, and poor quality of services. The introduction of out of pocket payments resulted in improvement of service in health but with it came inequities in financial access to basic healthcare service which could not be overlooked.

In the mid 90’s, many other alternatives to the “cash and carry system” were piloted to find an equitable means of healthcare financing through community-based and social health insurance.
programmes. The national health insurance scheme (NHIS) was introduced in 2003. Currently, health care is financed mainly through this scheme in Ghana. Others means of health financing are through employers, private or voluntary health insurance and out-of-pocket payments.

According to the Ghana living Standards Survey Round 6 (GLSS 6), almost 55% of direct cost for health services such as consultation fee, drugs, diagnostics, and admissions were paid mainly by household members. The urban areas had 47.6% - 58.0% of cost borne by the household members. Comparatively, in the rural areas percentage paid by household members were much higher than the urban areas 55.8% - 68.8% (GLSS 6, 2013).

3.3 Data source and description

The sixth round of the GLSS conducted by the Ghana Statistical service (GSS) was used in this study. The survey was spread over a twelve month period (from October 2013 to October 2013) to enable continuous recording of household consumption and expenditure of households. This dataset offers sample representative of national and regional living conditions and well-being of households in Ghana.

From the report, a total sample of 18,000 households was obtained. Using a two-stage stratified sampling procedure 1,200 enumeration areas (EAs) were first selected from primary sampling units (PSU). This was based on the 2010 population and housing census factoring in regional distribution. Distribution by locality also included rural forest, rural savannah and rural coastal. Then fifteen (15) households were selected systematically from each enumeration area for the interview. For the purposes of this survey, a household was defined as a person or group of related or unrelated persons who live together in the same housing unit, sharing the same housekeeping and cooking arrangements and are considered as one unit, who acknowledge an
adult male or female as the head of the household. Out of the total sample, 16,772 persons from households were interviewed successfully.

According to the report, in addition to the questionnaires used in round 5, the Labour Force, Household Access to Financial Services and Governance, Peace and Security modules were introduced.

Information obtained included; demographic characteristics of households, education, health, employment, migration and tourism, housing conditions, household agriculture, household expenditure, income and their components and access to financial services, credit and Assets. For health, the information gathered was to be used in measuring the cost of medical care and the use made of the different kinds of health services and facilities.

Questions administered to all household members or members of various age groups on health covered visits to medical facilities as well as expenses on medical services and medicines. Health status referred to a household member being either sick or injured or both during the reference period, 1 - 28 days before the day of the interview. Other parts elicited information on health insurance status of members of households, immunization, fertility, contraceptive use, nutrition and health-related indicators (GLSS6 Report, 2013).

3.4 Data extraction and cleaning

Data for this study were extracted from the Ghana Living Standard Survey, Round 6 dataset using Stata version 13. To familiarize with the dataset the technical manuals and reports including questionnaires, handling of missing data and adjustments were reviewed. A codebook of the dataset was created to examine and describe all the variables. A subset of variables of interest with labels was then extracted, saved to a new file and relabelled. To ensure data quality and completeness, simple descriptions and frequencies such as mean, standard
deviation as well as cross-tabulations were done to check for logical errors in data. This was weighted to alleviate biases and cleaned to remove incomplete recordings.

3.5 Study variables

3.5.1 Outcome variables

Household vulnerability to poverty (Vp) was used as the outcome variable. For the purpose of this study, Vp was defined as an ex-ante probability of a household, irrespective of them being poor currently or not, to become poor in the near future.

3.5.2 Explanatory variables

Catastrophic Health Expenditure, the main explanatory variable, was defined as total health expenditure exceeding 5% and 20% of a household’s non-subsistence income available after basic needs have been met and the WHO method is used in estimating this.

3.5.3 Other Variables

Other socio-demographic characteristics that may influence Vp are listed and described in the Table 1.
<table>
<thead>
<tr>
<th>Variable name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household size</td>
<td>Total number of residents in the household excluding household help.</td>
</tr>
<tr>
<td>Age</td>
<td>Age of household head</td>
</tr>
<tr>
<td>Gender</td>
<td>Gender of household head: Female or male</td>
</tr>
<tr>
<td>Educational level</td>
<td>Household head level of formal schooling received; None, primary, secondary and tertiary.</td>
</tr>
<tr>
<td>Health insurance status</td>
<td>Dummy variable showing whether the household head have health insurance: NHIS, private or company.</td>
</tr>
<tr>
<td>Employment Status</td>
<td>Dummy variable showing head working and earning income or not; Unemployed or employed.</td>
</tr>
<tr>
<td>Disability Status</td>
<td>Dummy variable showing whether the head is disabled or not; physical, sight, hearing, emotional, etc.</td>
</tr>
<tr>
<td>Income of household head</td>
<td>Income refers to payments received from employment, economic activities and enterprises of the head.</td>
</tr>
</tbody>
</table>
3.6 Data analysis

Analysis was done using STATA, version 13. This section consists of four (4) parts; description of household characteristics, estimation of household catastrophic health expenditure, estimation of vulnerability to poverty using the observed poverty lines and regression analysis to examine socio-economic factors associated with vulnerability poverty.

3.6.1 Description of household characteristics

A descriptive analysis of the dataset was undertaken to understand the burden of household health expenditure and some socio-economic factors that can influence this. Household non-food expenditure was used as a proxy measure for a household’s capacity to pay.

Dummy variables were created for some demographic characteristics. Household consumption expenditure comprised both monetary and in-kind payment on all goods and services, and the money value of the consumption of home-made products.

3.6.2 Estimation of household catastrophic health expenditure

Two approaches were used in estimating CHE. The main one was the WHO method and the proportionality of income approach to cross-check the robustness of the results obtained from the former.

The steps in the WHO approach used are described in detail in a paper by Ke Xu (2005) and summarized below.

All expenditure variables were converted to monthly figures. Health expenditure was computed for only payments made to providers such as consultation fees, hospital admissions, diagnostic and medications cost. It must be noted this does not consider indirect cost such as transportation and cost from traditional healers. The food expenditure share in the 45th and 55th percentile was used to estimate the subsistence expenditure for each household.
This was used to calculate the household’s capacity to pay, defined as non-subsistence spending, that is the effective income remaining after subsistence expenditure. Out of pocket payment was defined as payments made for health services at the point of delivery. This was then divided by the capacity to pay. Estimated household expenditure above or equal to 5% and 20%, were considered as catastrophic.

The proportionality of income approach considers OOP or healthcare payments greater than a pre-specified fraction of the households’ income as catastrophic. This is estimated by dividing the health expenditure by the total income.

3.6.3 Estimation of vulnerability to poverty

Vulnerability to poverty was estimated using the econometric model proposed by Chaudhuri et al. (2002). This approach allows the use of cross-sectional data in the absence of panel data. Panel data would have been the most appropriate in tracking household expenditure over time. This is not available and hence the choice of model suitable for cross section data as the GLSS 6.

For any given household $h$, with characteristics $X_h$, vulnerability is computed using the formula below.

$$
\hat{V}_h = \Phi \left( \frac{\ln z - X_h \hat{\beta}_{FGLS}}{\sqrt{X_h \hat{\theta}_{FGLS}}} \right)
$$

Where $\hat{V}_h$ estimated vulnerability to poverty (i.e. the probability that a household will be poor in the near future conditional on its observable characteristics), $\Phi$ is the cumulative density of the standard normal distribution, and $z$ represents the poverty line. $\hat{\beta}_{FGLS}$ and $\hat{\theta}_{FGLS}$ will be estimated using the Feasible Generalized Least Squares (FGLS) procedure.
Households with estimated vulnerability to poverty above or equal to 50% (generally acceptable threshold) were considered to be vulnerable to poverty. The lower poverty line of GHC 792.05 and an upper poverty line of GHC 1,314.00 per adult per year according to the GLSS 6 report were used as poverty lines for the estimation.

3.6.4 Regression analysis

A multivariate logistic regression was used to estimate the relationship between vulnerability to poverty and catastrophic health expenditure other explanatory variables previously outlined in (Table 1).

\[ \text{Vuln}_h = \beta_0 + \beta_1 \text{CHE} + \beta_2 \text{hhsize} + \beta_3 \text{hhage} + \beta_4 \text{hhsex} + \beta_5 \text{hemstat} + \beta_6 \text{hedlvl} + \beta_7 \text{insurance} + \beta_8 \text{disability} + E_h \]

3.7 Ethical considerations/ issues

Ethical clearance to undertake the study was given by the Ghana Health Service Ethical Review Committee.

3.7.1 Data usage and storage

Though this study used secondary data from the Ghana Statistical Service, the soft copy of the data set, including the analysis files were encrypted and password-protected with access strictly limited to the researcher and supervisor.

3.7.2 Confidentiality

The use, processing, and analysis of the dataset was done with assuring confidentiality. Personal information in the data was number coded for anonymity.
3.7.3 Potential Risk /Benefit

The use of this data in no way posed harm to the individuals or households from which the information was collected during the survey.

This study is of benefit to society in general as the results and findings will provide a scientific basis for recommending policy interventions for future poverty alleviation from catastrophic health expenditures and improvement in health financing mechanisms to ensure financial protection of households in Ghana.

3.7.4 Declaration of Conflict of Interest

The Principal Investigator declares no conflict of interest.
CHAPTER FOUR

4.0 RESULTS

This chapter presents findings drawn from the quantitative analysis that was carried out during the study.

4.1 Descriptive Statistics

This section presents the descriptive summary of household head characteristics, income and consumption variables included in the study (Table 4.2). Among the 16,772 households surveyed, the mean age of household head was approximately 45 years with an age range of 15 – 98 years.

Households who were in rural residence constituted 57% of the population compared to 43% for those in urban areas. Overall 27.4% of the sampled households were headed by women. Household size ranged between 1 – 29 members, with a mean of 4.3.

With regard to education, 50% of household heads had at least primary education, 3.4% had tertiary education and 28.3% had no formal schooling. A higher proportion were employed (99.6%) while only 0.4% were not in any form of employment.

As depicted in Table 2, the mean household income and expenditure was GHS7439.30 and approximately GHS8155.00 respectively. Income represented payments received from employment while expenditure was the estimated from all goods and services, food and non-food that the household spent its income on. The minimum income was –GHS423640.30 indicating that there were some households that were indebted, making their share of income negative.
On the whole, 9,395 households (56%) reported incurring some healthcare expenditure during the recall period of the survey. On the average, households spent about GHS75.00 on healthcare services within this period. Payments included the cost of consultations, hospital admission, diagnostics, as well as medicines and medical supplies. Approximately 37% of households had health insurance. Out of the number insured 99.3% were registered with the NHIS. The remainder belonged to private or company insurance. There were also some household heads registered with the NHIS but were not covered as at the time of the survey.

Household heads with disability constituted 3% of the population. This ranged from physical to emotional disability with the highest being physical at 43.8%. The percentage of households who fell under the lower poverty line was 9.81% (extreme poverty) and those under the upper poverty line were 14.1%. Those classified as non-poor were 76.1%.
Table 2: Descriptive summary of household characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residence (%)</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>56.6</td>
</tr>
<tr>
<td>Urban</td>
<td>43.4</td>
</tr>
<tr>
<td>Gender (%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>27.4</td>
</tr>
<tr>
<td>Male</td>
<td>72.6</td>
</tr>
<tr>
<td>Education (%)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>28.4</td>
</tr>
<tr>
<td>Primary</td>
<td>50.2</td>
</tr>
<tr>
<td>Secondary</td>
<td>18.0</td>
</tr>
<tr>
<td>Tertiary</td>
<td>3.4</td>
</tr>
<tr>
<td>Employment (%)</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>0.4</td>
</tr>
<tr>
<td>Employed</td>
<td>99.6</td>
</tr>
<tr>
<td>Health Insurance (%)</td>
<td></td>
</tr>
<tr>
<td>Uninsured</td>
<td>62.8</td>
</tr>
<tr>
<td>Insured</td>
<td>37.2</td>
</tr>
<tr>
<td>Disability (%)</td>
<td></td>
</tr>
<tr>
<td>Non-disabled</td>
<td>96.7</td>
</tr>
<tr>
<td>Disabled</td>
<td>3.3</td>
</tr>
<tr>
<td>Poverty status (%)</td>
<td></td>
</tr>
<tr>
<td>Very Poor</td>
<td>9.8</td>
</tr>
<tr>
<td>Poor</td>
<td>14.1</td>
</tr>
<tr>
<td>Non-poor</td>
<td>76.1</td>
</tr>
<tr>
<td>Age of HH head</td>
<td>45.5 (15.5)</td>
</tr>
<tr>
<td>HH Size</td>
<td>4.3 (2.7)</td>
</tr>
<tr>
<td>Total HH Income (GĦ)</td>
<td>7,439.3 (23,040.1)</td>
</tr>
<tr>
<td>Min</td>
<td>-423,640.3</td>
</tr>
<tr>
<td>Max</td>
<td>1,232,713</td>
</tr>
<tr>
<td>Total HH Expenditure (GĦ)</td>
<td>8,155.8 (7,613.8)</td>
</tr>
<tr>
<td>Min</td>
<td>135.7</td>
</tr>
<tr>
<td>Max</td>
<td>14,6345.4</td>
</tr>
<tr>
<td>Total HH Health Expenditure (GĦ)</td>
<td>75.6 (201.7)</td>
</tr>
<tr>
<td>Min</td>
<td>0</td>
</tr>
<tr>
<td>Max</td>
<td>5,461.8</td>
</tr>
<tr>
<td>Total Food Expenditure (GĦ)</td>
<td>4,091.8 (3,901.5)</td>
</tr>
<tr>
<td>Min</td>
<td>14.6</td>
</tr>
<tr>
<td>Max</td>
<td>135,233.0</td>
</tr>
</tbody>
</table>
4.2 Vulnerability estimates across household head characteristics

Table 3 presents vulnerability estimates across household head socio-economic characteristics. The vulnerability headcount in Ghana was 34%.

Regarding area of residence, rural households’ showed higher vulnerability to poverty. This was 98.8% whereas the proportion in the urban areas was 1.0%. Furthermore, female-headed households were less vulnerable (20.1%) to poverty compared to male headed households (79.9%). Vulnerability across age groups, showed increase in vulnerability with age. Those above 60 years showed higher vulnerability compared to those around 18 years.

The size of the household significantly increased the risk of vulnerability. Larger households, with four or more members excluding house-help, were more vulnerable by a proportion of 92.3%. Households with one and two relatively had no risk of vulnerability compared to those with three members.

The results also significantly showed education influences vulnerability. Estimates showed 51.2% of household heads with no education were more likely to be vulnerable to future poverty. This decreased as households move up on the educational ladder. Households with secondary education had the least share of vulnerability whiles those with tertiary education had no risk at all (0.0%). Household heads who were unemployed had relatively lower incidence of vulnerability to poverty (0.1%). Vulnerability was significantly higher among households who were not on any health insurance (67.9%) while that of insured households was approximately 32%.

Among the ten (10) administrative regions, variations ranged between 1.7% and 15.6%. The three (3) Northern regions were found to have the highest rates of vulnerability; 13.3%, 15.1% and 15.6% for Upper East, Upper West, and Northern respectively. This was followed by the Eastern region. The least vulnerability was recorded in the Greater Accra region.
### Table 3a: Vulnerability estimates across household characteristics

<table>
<thead>
<tr>
<th></th>
<th>Vulnerability to Poverty</th>
<th>50% Threshold</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall estimate</td>
<td>34.03%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of HH head</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-40</td>
<td>2,060 (37.2)</td>
<td></td>
<td>182.9***</td>
</tr>
<tr>
<td>41-59</td>
<td>2,201 (39.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60+</td>
<td>1,269 (22.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household Size</td>
<td></td>
<td>4.5e+03***</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>402 (7.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4+</td>
<td>5,130 (92.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td>227.5***</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1,110 (20.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>4,422 (79.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td>3.3e+03***</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>2,833 (51.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>2,695 (48.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>4 (0.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td>15.0***</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>6 (0.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>5,526 (99.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Insurance</td>
<td></td>
<td>82.3***</td>
<td></td>
</tr>
<tr>
<td>Uninsured</td>
<td>3,747 (67.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insured</td>
<td>1,771 (32.1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3a continued: Vulnerability estimates across household characteristics

<table>
<thead>
<tr>
<th>Vulnerability to Poverty</th>
<th>50% Threshold</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Disability Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Disabled</td>
<td>5,327 (96.7)</td>
<td></td>
</tr>
<tr>
<td>Disabled</td>
<td>180 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western</td>
<td>501 (9.1)</td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td>471 (8.5)</td>
<td></td>
</tr>
<tr>
<td>Greater Accra</td>
<td>93 (1.7)</td>
<td></td>
</tr>
<tr>
<td>Volta</td>
<td>538 (9.7)</td>
<td></td>
</tr>
<tr>
<td>Eastern</td>
<td>550 (9.9)</td>
<td></td>
</tr>
<tr>
<td>Ashanti</td>
<td>422 (7.6)</td>
<td></td>
</tr>
<tr>
<td>Brong Ahafo</td>
<td>524 (9.5)</td>
<td></td>
</tr>
<tr>
<td>Northern</td>
<td>863 (15.6)</td>
<td></td>
</tr>
<tr>
<td>Upper East</td>
<td>736 (13.3)</td>
<td></td>
</tr>
<tr>
<td>Upper West</td>
<td>834 (15.1)</td>
<td></td>
</tr>
</tbody>
</table>

Notes: * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 3b: Vulnerability estimates across expenditure quintiles

<table>
<thead>
<tr>
<th>Quintile Group</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Poorest)</td>
<td>2,553</td>
<td>46.15</td>
</tr>
<tr>
<td>2</td>
<td>1,416</td>
<td>25.60</td>
</tr>
<tr>
<td>3</td>
<td>903</td>
<td>16.32</td>
</tr>
<tr>
<td>4</td>
<td>488</td>
<td>8.82</td>
</tr>
<tr>
<td>5 (Richest)</td>
<td>172</td>
<td>3.11</td>
</tr>
</tbody>
</table>

Notes: Pearson Chi$^2$ = $4.0 \times 10^3$***; (* $p<0.05$; ** $p<0.01$; *** $p<0.001$)
4.3 Catastrophic health expenditure estimates

The proportion of households who incurred catastrophic health expenditure varied significantly depending on the method and threshold used as shown below (Table 4). The headcount represents the percentage of households who spent catastrophically, expressed as out of pocket payment equal to or exceeding a certain threshold; of the household’s capacity to pay or non-subsistence expenditure in the case of the WHO approach and household’s income in the other approach.

Overall the incidence of catastrophic health expenditure ranged between approximately 0.5% to 25.0% and 5.2% to 25.6% with the WHO method and Income method respectively. The highest incidence was at a threshold of 5% and the lowest at 20%. The result further showed an increase in threshold resulted in a drop in incidence of catastrophic health expenditure. For instance, approximately 25% of households exceeded the 5% cut-off of its non-subsistence expenditure. This number dropped significantly to 10.18% with an increase in the threshold to 10%.

Relative to the WHO estimates, the income approach yielded a slightly higher incidence in catastrophic health expenditure with a similar trend in threshold variations.

<table>
<thead>
<tr>
<th>Thresholds (%)</th>
<th>WHO capacity to pay approach</th>
<th>Proportionality of income approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2,347 (24.96)</td>
<td>2,525 (25.55)</td>
</tr>
<tr>
<td>10</td>
<td>958 (10.18)</td>
<td>1,566 (15.34)</td>
</tr>
<tr>
<td>20</td>
<td>272 (2.87)</td>
<td>956 (8.84)</td>
</tr>
<tr>
<td>40</td>
<td>44 (0.45)</td>
<td>617 (5.24)</td>
</tr>
</tbody>
</table>

Notes: () represents percentages of households incurring catastrophic health expenditure.
4.4 Catastrophic estimates across household characteristics

This section compares estimates of catastrophic health expenditure across household socio-economic characteristics as presented in (Table 5a & 5b).

Of all the households studied, on the average male headed households seemed to have catastrophic health expenditure estimates compared to their female counterparts for both 5% and 20% thresholds. This was between 56.6% – 66.8% for males and 33.3% - 43.4% for female heads. Of significance was also the age of the household head. Above 60 years and at a 20% threshold, heads spent more catastrophically (43.4%) compared to those in the other age groups. The incidence among heads less than 18 years of age was zero (0) at the aforementioned threshold. This differed in the same group at 5% by 0.3%. Heads between the ages 19 and 40 years incurred the highest catastrophic expenditure at 5% but this was also different at 20%.

There were also significant differences in incidence between household heads with some form of disability and those who had no disability. At 20%, the disabled had a higher incidence (11.1%) compared to 6.1% for incidence threshold of 5%.

In terms of catastrophic estimates by location or residence, rural households had a higher share of incidence for the two thresholds than urban areas for both. Notwithstanding, the proportion was a little higher for the 20% threshold (72.8%) than for 5% (69.6%). A similar trend was seen also among urban households.

Households with larger size incurred catastrophic health expenditure; the highest being approximately 54.0% and 43.4% by households with more than four (4) residents at 5% and 20%. The percentage of households with the minimum number was 17.8% and 25.0% at 5% and 20% thresholds respectively.

Regarding education, the tertiary level had the least incidence, (4.41%) at 20% threshold and 4.86% when the threshold was decreased to 5%. Incidence among those with no formal
education was also lower (38.36) (40.07%) for all thresholds in comparison to those with primary education with approximately same percentages (47.83%) (47.79) in both cases.

Furthermore, for the two thresholds used in the study, unemployed household heads who were few (0.2%) suffered lower rates of catastrophic health expenditure between 0% - 22%. In the case of the employed, this was 99.9% - 100% for 20% and 5% thresholds respectively.

Among households with health insurance, the incidence of this phenomenon was significantly lower than that of uninsured households at 5% (Chi2 27.8706, Pr 0.000) comparable to that of 20% (Chi2 0.6093, Pr 0.435). For the uninsured, the highest health expenditure was approximately 65.0% at 20% and 68.0% at 5% threshold.

Table 5a further shows differences in incidence in the administrative regions. Regional variations ranged between 4.4% – 16.5% at 5% and 3.9% – 18.0% for 20% threshold respectively. This was particularly highest in the Northern region at 16.5% for 5% and 18.0% for Eastern Region at 20%. The lowest proportion recorded corresponding to 5% cut-off was 4.6% in the Upper West and that of 20% was 3.7% in Upper East Region.

Classification of catastrophic health expenditure by quintiles shows higher levels of incidence particularly among the poorest quintiles; that is 1 and 2. The 5th quintile experienced the lowest level of catastrophe at 5% threshold of non-food expenditure (12.95%) but slightly differed at 20% threshold (13.1%).
Table 5a: Catastrophic health expenditure across household characteristics

<table>
<thead>
<tr>
<th>Household Characteristics</th>
<th>5% Threshold N (%)</th>
<th>20% Threshold N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of HH head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-40</td>
<td>939 (40.0)</td>
<td>78 (28.7)</td>
</tr>
<tr>
<td>41-59</td>
<td>762 (32.5)</td>
<td>76 (27.9)</td>
</tr>
<tr>
<td>60+</td>
<td>644 (27.4)</td>
<td>118 (43.4)</td>
</tr>
<tr>
<td>Household Size</td>
<td>11.5***</td>
<td>21.5***</td>
</tr>
<tr>
<td>1</td>
<td>408 (17.4)</td>
<td>68 (25.0)</td>
</tr>
<tr>
<td>2</td>
<td>319 (13.6)</td>
<td>46 (16.9)</td>
</tr>
<tr>
<td>3</td>
<td>353 (15.0)</td>
<td>40 (14.7)</td>
</tr>
<tr>
<td>4+</td>
<td>1,267 (54.0)</td>
<td>118 (43.4)</td>
</tr>
<tr>
<td>Gender</td>
<td>34.2***</td>
<td>31.5***</td>
</tr>
<tr>
<td>Female</td>
<td>780 (33.2)</td>
<td>118 (43.4)</td>
</tr>
<tr>
<td>Male</td>
<td>1,567 (66.8)</td>
<td>154 (56.6)</td>
</tr>
<tr>
<td>Education Level</td>
<td>248.7***</td>
<td>31.6***</td>
</tr>
<tr>
<td>None</td>
<td>900 (38.4)</td>
<td>109 (40.1)</td>
</tr>
<tr>
<td>Primary</td>
<td>1,122 (47.8)</td>
<td>130 (47.8)</td>
</tr>
<tr>
<td>Secondary</td>
<td>210 (8.9)</td>
<td>21 (7.7)</td>
</tr>
<tr>
<td>Tertiary</td>
<td>114 (4.9)</td>
<td>12 (4.4)</td>
</tr>
<tr>
<td>Employment</td>
<td>1.4*</td>
<td>0.9*</td>
</tr>
<tr>
<td>Unemployed</td>
<td>5 (0.2)</td>
<td>0</td>
</tr>
<tr>
<td>Employed</td>
<td>2,239 (99.8)</td>
<td>244 (100.0)</td>
</tr>
<tr>
<td>Insurance</td>
<td>27.9***</td>
<td>0.6*</td>
</tr>
<tr>
<td>Uninsured</td>
<td>1,588 (67.7)</td>
<td>177 (65.1)</td>
</tr>
<tr>
<td>Insured</td>
<td>758 (32.3)</td>
<td>95 (34.9)</td>
</tr>
<tr>
<td>Disability Status</td>
<td>69.3***</td>
<td>53.6***</td>
</tr>
<tr>
<td>Non-Disabled</td>
<td>2,193 (93.9)</td>
<td>241 (88.9)</td>
</tr>
<tr>
<td>Disabled</td>
<td>142 (6.1)</td>
<td>30 (11.1)</td>
</tr>
<tr>
<td>Region</td>
<td>241.0***</td>
<td>37.9***</td>
</tr>
<tr>
<td>Western</td>
<td>239 (10.2)</td>
<td>25 (9.2)</td>
</tr>
<tr>
<td>Central</td>
<td>243 (10.4)</td>
<td>30 (11.0)</td>
</tr>
<tr>
<td>Greater Accra</td>
<td>161 (6.9)</td>
<td>16 (5.9)</td>
</tr>
<tr>
<td>Volta</td>
<td>269 (11.5)</td>
<td>36 (13.2)</td>
</tr>
<tr>
<td>Eastern</td>
<td>238 (10.1)</td>
<td>49 (18.0)</td>
</tr>
<tr>
<td>Ashanti</td>
<td>291 (12.4)</td>
<td>33 (12.1)</td>
</tr>
<tr>
<td>Brong Ahafo</td>
<td>258 (11.0)</td>
<td>20 (7.4)</td>
</tr>
<tr>
<td>Northern</td>
<td>386 (16.5)</td>
<td>34 (12.5)</td>
</tr>
<tr>
<td>Upper East</td>
<td>160 (6.8)</td>
<td>10 (3.7)</td>
</tr>
<tr>
<td>Upper West</td>
<td>102 (4.4)</td>
<td>19 (7.0)</td>
</tr>
</tbody>
</table>

Notes: *p<0.05, ** p<0.01, *** p<0.001
Table 5b: Catastrophic health expenditure across expenditure quintiles

<table>
<thead>
<tr>
<th>Quintile Group</th>
<th>5% Threshold</th>
<th>20% Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>1 (Poorest)</td>
<td>634</td>
<td>28.27</td>
</tr>
<tr>
<td>2</td>
<td>516</td>
<td>23.00</td>
</tr>
<tr>
<td>3</td>
<td>454</td>
<td>20.24</td>
</tr>
<tr>
<td>4</td>
<td>365</td>
<td>16.27</td>
</tr>
<tr>
<td>5 (Richest)</td>
<td>274</td>
<td>12.95</td>
</tr>
</tbody>
</table>

Notes: Pearson Chi2 = 190.87*** and 26.63*** at 5% and 20% respectively; *p<0.05, ** p<0.01, *** p<0.001

4.5 Regression results estimating the effect of household CHE on vulnerability to poverty.

Table 6 provides the probabilities for covariates of CHE and vulnerability. CHE was significantly related to vulnerability at 5% (P<0.000) threshold but was insignificant at 20% (P<0.235). The probability of future poverty among households with catastrophic health expenditure increased by 0.2 and 0.1 compared to the reference group for 5% and 20% respectively.

The estimated probabilities of vulnerability according to the sex of household head was found to be positive and significantly higher for male headed households than that of females. For the age of household head, the estimates of vulnerability were negative and not significant.

Across all thresholds, the level of formal education was significant in vulnerability to poverty. The probability of falling into future poverty decreased by -3.82 (P<0.000) as one moved from primary to the secondary education level. Of equal importance in explaining vulnerability is the household size. With an addition of another member, the risk of vulnerability increased significantly by 0.3 (P<0.000). The table further showed variation in the administrative regions which were all significant.
<table>
<thead>
<tr>
<th>Vulnerability</th>
<th>5% threshold</th>
<th>20% threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient (95% CI) P-value</td>
<td>Coefficient (95% CI) P-value</td>
</tr>
<tr>
<td>CHE_5%</td>
<td>0.234 (0.161, 0.306) &lt;0.001</td>
<td>0.121 (-0.078, 0.319) 0.235</td>
</tr>
<tr>
<td>CHE_20%</td>
<td>-0.001 (-0.003, 0.000) 0.100</td>
<td>-0.001 (-0.003, 0.000) 0.127</td>
</tr>
<tr>
<td>Household Size</td>
<td>0.307 (0.295, 0.319) &lt;0.001</td>
<td>0.305 (0.293, 0.317) &lt;0.001</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Male</td>
<td>0.225 (0.164, 0.285)</td>
<td>0.222 (0.161, 0.283)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Primary</td>
<td>-0.550 (-0.613, -0.488)</td>
<td>-0.560 (-0.622, -0.498)</td>
</tr>
<tr>
<td>Tertiary</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Employment</td>
<td>0.835</td>
<td>0.841</td>
</tr>
<tr>
<td>Unemployed</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Employed</td>
<td>-0.059 (-0.614, 0.496)</td>
<td>-0.560 (-0.609, 0.497)</td>
</tr>
<tr>
<td>Health Insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninsured</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Insured</td>
<td>-0.167 (-0.223, -0.111)</td>
<td>-0.176 (-0.231, -0.119)</td>
</tr>
<tr>
<td>Disability</td>
<td>0.132</td>
<td>0.211</td>
</tr>
<tr>
<td>Not disabled</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Disabled</td>
<td>-0.115 (-0.264, 0.035)</td>
<td>-0.095 (-0.244, 0.054)</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater Accra</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Western Region</td>
<td>1.182 (1.034, 1.329)</td>
<td>1.191 (1.044, 1.338)</td>
</tr>
<tr>
<td>Central Region</td>
<td>1.136 (0.988, 1.283)</td>
<td>1.143 (0.995, 1.290)</td>
</tr>
<tr>
<td>Volta Region</td>
<td>1.349 (1.199, 1.498)</td>
<td>1.360 (1.210, 1.509)</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>1.219 (1.074, 1.364)</td>
<td>1.222 (1.078, 1.367)</td>
</tr>
<tr>
<td>Ashanti Region</td>
<td>0.909 (0.763, 1.057)</td>
<td>0.919 (0.773, 1.065)</td>
</tr>
<tr>
<td>Brong Ahafo Region</td>
<td>1.096 (0.948, 1.244)</td>
<td>1.107 (0.959, 1.255)</td>
</tr>
<tr>
<td>Northern Region</td>
<td>1.136 (0.987, 1.285)</td>
<td>1.159 (1.010, 1.308)</td>
</tr>
<tr>
<td>Upper East Region</td>
<td>1.549 (1.398, 1.700)</td>
<td>1.544 (1.392, 1.695)</td>
</tr>
<tr>
<td>Upper West Region</td>
<td>1.714 (1.557, 1.871)</td>
<td>1.700 (1.543, 1.857)</td>
</tr>
</tbody>
</table>
CHAPTER FIVE

5.0 DISCUSSION

This study assessed the effect of catastrophic health expenditure on vulnerability to poverty using two thresholds. Out of the total sample of 16,772 households, 9,395 (56%) households made healthcare payments. Approximately 25% out of this number suffered CHE at the lowest threshold (5%).

5.1 Vulnerability to poverty

The study demonstrated that vulnerability to poverty (i.e. the probability of becoming poor in the future) is higher than the estimated headcount poverty incidence. The vulnerability to poverty estimated was 34% while the headcount poverty was 24%. These findings compare closely with many studies which reported widespread vulnerability than static poverty. For example Alayande, (2004) in a Study in Nigeria found vulnerability to poverty of 68.5% against static poverty of 68%. A study in Ghana by Novignon et al., (2012) estimate Vp of 56% compared to the static poverty headcount of 29% (Alayande, 2004; Chaudhuri et al., 2002; Haughton & Khandker, 2009; Novignon et al., 2012). Ligon and Schechter (2003), in their article on measuring vulnerability, concludes that poverty itself accounts for the largest share of vulnerability. This means the poor were more predisposed to vulnerability due to poverty.

Other studies that have also linked poverty and vulnerability shows income falls due to poverty resulted in an increase in vulnerability to poverty .This explains how the socio-economic status of the household to a larger extent influences its vulnerability. This was evident as the poorest quintile was more predisposed to poverty in the findings across socio-economic quintiles (Masood et al., 2016; Ward, 2016). This was consistent with findings from the study as the poorest quintiles had the highest estimates of vulnerability.
Regarding gender, vulnerability estimates contrasted to what most studies had found, that female headed households had higher vulnerability to poverty compared to their male counterparts (Horrell & Krishnan, 2007; Klasen et al., 2015; Mukhopadhyay & Ghatak, 2003; Snyder, McLaughlin, & Findeis, 2006). Gender bias in society, puts female heads at a disadvantage, for instance in earnings and economic opportunities. These notwithstanding, the low vulnerability estimates among females could result from the increase female empowerment activities in the country. The increased educational and employment opportunities for women in the country in recent times could account for these findings. In addition, the type of poverty measure and indices used, influences whether the females have higher vulnerability or not than the males (Chant, 1997; Irving & Kingdon, 2009; Klasen et al., 2015; Ramaprasad, 2009).

Household heads with higher level of education were not or less vulnerable in comparison to those without any formal education. This was not surprising because many authors reported same. Ligon et al., (2003) relates it to educated households having a higher expected consumption expenditures with significantly less exposure to both covariate and idiosyncratic shocks.

Generally the larger the household size, the more vulnerable they are (Buigut et al., 2015; Celidoni, 2015; Liliana et al., 2015). This was significant, an increase in the number of members of the household will result in an increase in consumption expenditure and the more likely they are to be vulnerable to poverty.

Finally, the study explored vulnerability across the administrative regions. The results showed significant variations and an uneven distribution which was consistent with many other studies and similar to estimates of static poverty. The reason for this may be inter-regional variations in cost of living across the regions.
5.2 Catastrophic health expenditure

Findings revealed variations in the incidence of CHE depending on the threshold used. An increase in threshold resulted in a decrease in CHE. This was consistent with existing literature which predicts differences in estimates according to different thresholds (Buigut et al., 2015; Onoka, Onwujekwe, Hanson, & Uzochukwu, 2011; Raban & Dandona, 2013; Su et al., 2006; Xu et al., 2010).

As suggested by some authors, this study used a combination of thresholds based on the socio-economic quintiles and inequality in income and expenditure among the households in Ghana (Onwujekwe et al., 2012; Su et al., 2006). The variations detected in health expenditures across socio-economic quintiles significantly revealed that, the richest households were less likely to incur catastrophic health expenditure.

Health expenditure by quintile showed higher health expenditure among the 5th quintile yet the poorest quintile suffered more from CHE irrespective of the threshold used. Studies elsewhere have also found that relatively well-off households even with high health expenditure may not come anywhere near the poverty line, while for other households even small amounts can be catastrophic (Bredenkamp et al., 2011; Liliana et al., 2015; Onwujekwe et al., 2012; Xu et al., 2007).

The high expenditures in the 5th quintile or the rich could result from them patronizing private facilities in the urban areas. With this also comes high cost of services (Chuma & Maina, 2012; Falkingham, 2004). The data shows various healthcare providers visited during the survey, this ranged from hospitals (38.4%) to traditional healers (3.5%). It is also likely that because the poor cannot afford to pay for healthcare services it may prevent them from seeking needed care as indicated in some studies (Falkingham, 2004; Xu et al., 2006, 2007). Similarly, a study at the Nouna District in Burkina Faso reported lower income households having a higher
incidence of CHE, though at various thresholds the proportion health spending among richer households were more (Su, Kouyaté, & Flessa, 2006). Increase in user fees at even public hospitals and co-payment with insurance can also account for some of the financial burden households (McIntyre et al., 2008).

The regression analysis also showed enrolment on health insurance provided significant protection for insured households. Uninsured households were more vulnerable to future poverty than their counterparts with insurance. These findings have also been documented in other studies (Aryeetey, 2012; Liliana et al., 2015; Shahrawat & Rao, 2011). The results proves the NHIS may have some protective effect as reported by some studies in Ghana.

5.3 Effect of CHE on vulnerability to poverty

The findings from the study indicated CHE was significantly associated with vulnerability to poverty though at higher thresholds this decreased.

There’s substantial evidence that CHE can lead to poverty. In Kenya for instance, a study found that CHE from OOP payments accounted for 54.9% of the poverty headcount. Almost 1.48 million of the population are pushed below the national poverty line (Chuma & Maina, 2012). Another study in fourteen Asian countries and territories showed that poverty was higher among those with a higher prevalence of CHE; Bangladesh, China, India and Vietnam (Eddy Van Doorslaer et al., 2005). Wagstaff (2007) and Narayan et al. (2000) argue that CHE significantly reduces the wealth and productive ability of people.

Poverty itself is a major cause of vulnerability to poverty as it increases exposure to risks such as poor working conditions, environmental contamination, poor nutrition, and lack of preventive health care which leads to ill-health (Ligon & Schechter, 2003; Parker & Bank, 2007; Philip & Rayhan, 2004). Also, poor households are less likely to manage shocks
successfully and recover, thereby pushing them deeper into future poverty (Parker & Bank, 2007).

Another important factor for consideration is the response or coping mechanisms of the household to health spending. How the household copes with this can have major implications on poverty and can thus influence their vulnerability to poverty (Flores et al., 2008). A study in 15 Africa countries conclude that borrowing and selling of assets to finance healthcare are major coping mechanisms (Leive & Xu, 2008). While coping mechanisms may protect household consumption initially from health shocks, long-term consequences could be substantial. For instance, it can cause indebtedness, reduction in productive assets and impact future earnings dramatically leading to vulnerability (Flores et al., 2008; Shahrawat & Rao, 2011; Eddy van Doorslaer et al., 2006).

The household response to health spending is also dependent on its socioeconomic characteristics thus increasing their risk of vulnerability to poverty (Cao et al., 2016; Masood et al., 2016). Cao et al. (2016) identified Labourers scale (Number of labourers or persons in household aged 18 - 60 years old), labourers education (maximum years of education of household labourers in years), house scale (number of family members or persons in household living at home more than 6 months), as critical factors that contribute to vulnerability to poverty. This is consistent with the findings of the study as household size, education, and age influences vulnerability.

The results also showed that socio-economic status influenced vulnerability to poverty differently. Across the quintiles, the richest households were less likely to be vulnerable to future poverty unlike the poorest quintile. It also seems that richer households had a higher ability to cope and recover from adverse shocks hence the lower incidence of the phenomena within that group (Celidoni, 2015). Furthermore, the type and duration of illness can also
influence CHE and lead to future poverty. The presence of vulnerable groups such as elderly who mostly have chronic conditions and the disabled can increase cost of care. The longer the duration the more likely the household will spend and hence fall on their reserves and increase their risk of future poverty.

5.4 Limitations of the study

A number of issues are important in the interpretation of the study findings. First, the data used was cross-sectional due to unavailability of panel data. Panel data has been documented in literature to be best suited for capturing both catastrophic health expenditure and vulnerability. Thus use of cross-sectional data may not allow one to view changes over time in poverty and vulnerability levels of households.

Second, the method used in estimating vulnerability also has its own limitations, a combination of methods and data has been suggested in literature to resolve these but was not considered in this study.

Lastly, in estimating CHE, the short recall period, i.e. within one month, does not allow consideration of all households who may have spent catastrophically before the reference period stated. This can underestimate the incidence or proportion who actually spend catastrophically. It is also based on the assumption that healthcare spending is evenly spread over the year.
CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

The study estimated vulnerability headcount as 34% compared to the estimated observed poverty rate of 24%. This suggests that the proportion of the population facing a non-negligible risk of future poverty is significantly greater than those currently poor. This varied markedly and unevenly distributed across the administrative regions.

It is clear from the findings that, catastrophic health expenditure was significantly associated with vulnerability though an increase in threshold resulted in some decrease in significance of CHE. The Greater Accra region had the least vulnerability rate while the highest was in the Upper East Region.

The study also showed that the socioeconomic status or wealth of a household impacts on their vulnerability. Richer households may build coping mechanisms and recover fast from shock but poorer households may not. The poorest quintile was most vulnerable compared to the upper quintiles.

Some socio-economic characteristics of households had a significant influence on vulnerability. With regard to gender, vulnerability estimates were remarkably less in female-headed households compared to their male counterparts. Male headed households were more vulnerable to poverty.

Generally, larger households had an increased risk of future poverty compared to smaller-sized households. In addition, education made a significant difference in vulnerability. As one climbed the educational ladder, vulnerability decreased significantly even to the point zero. Household security in the form of insurance made quiet on the risk of future poverty. In contrast to households with insurance, those without insurance were more likely to be vulnerable to
future poverty. However, unemployment, disability and age had very little significance on the vulnerability in Ghana compared to the other aforementioned characteristics.

6.2 Recommendations

From the findings presented in this study, the following recommendations are made:

1. Compared to static poverty measures, vulnerability allows assessment of future risk before it happens. It is therefore, exigent to incorporate this into poverty alleviation measures in all sectors including healthcare.

2. Incorporating vulnerability into current poverty estimates to determine who is eligible to social protection. This can reduce the population from risk of future poverty by providing safety nets and social insurance.

3. There’s a need for deeper research into vulnerability. Areas of focus can be vulnerable groups, risk or shocks across various geographical locations to provide in-depth information on the situation for developing poverty alleviation strategies. To do this requires adequate data on risks, shocks and coping mechanisms of households.

4. Increased government funding for the health sector and instituting complementary policies can help improve healthcare delivery and reduce social inequalities. This can significantly reduce catastrophic health expenditure and decrease the risk of vulnerability to poverty.
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