

**CLIMATE RELATED RISKS AND ITS IMPLICATIONS ON THE  
INSURANCE INDUSTRY IN GHANA**

**BY**

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## DECLARATION

I, Henry Kingsley Owusu, author of this thesis do hereby declare that apart from the references of other people's work which has duly been acknowledged, the research work presented in this thesis was done entirely by me at the Department of Accounting & Finance, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi.

I do hereby declare that, this work has neither been presented in whole nor in part for any degree at this University or elsewhere.

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## **ABSTRACT**

The effect of Climate related risks on the insurance industry has long being acknowledged. The purpose of the research was to examine the potential effects of climate related risks on the insurance industry and to identify risk management techniques and mitigation measures implemented by the industry to contain the potential implications of Climate related risks. Questionnaires and interviews, tables, pie charts and graphs were used to gather and analyze data respectively. The study revealed that increases in underwriting losses on property insurance, withdrawal of cover from certain geographical areas, Premium increases, insolvencies, International reinsurance cost/capacity are some of the identified implications of Climate related risks. These potential occurrences consequently affect claims outlays, difficulty in obtaining co-insurance, difficulty in obtaining reinsurance, profitability and solvency as well as capacity and ability to absorb large risks. The research further revealed that compulsory risk survey, premium loading, accepting cover but imposing deductibles, warranties and other policy conditions are some of the risk management measures adopted by the insurance industry.

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I wish to extend appreciation to the Chartered Insurance Institute (UK) of which I am a qualified member for the permission to access useful reference material.

## **DEDICATION**

This thesis is entirely dedicated to all Students and Professionals pursuing their Chartered Certificate with the Chartered Insurance Institute (UK), the Insurance fraternity in Ghana and Worldwide. I wish to also dedicate this work to the KNUST School of Business as a reference material and to all who have made this work a reality.

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## LIST OF ABBREVIATIONS

ALB	–	All lines of Businesses
BI	–	Business Interruption
CARE	–	California Alternate Rates for Energy
CC	–	Climate Change
CII	–	Chartered Insurance Institute
D&O	–	Directors and Officers Liability
E & Y	–	Ernst and Young
GTZ	–	Deutsche Gesellschaft für Technische Zusammenarbeit GmbH
IIPACC	–	Innovative Insurance Products for Adaptation to Climate Change
IPCC SRES	–	IPCC Special Report on Emissions Scenarios
IPCC	–	Intergovernmental Panel on Climate Change
LOBs	–	Line of Businesses
MSLP	–	Mean Sea Level Pressure
Munich Re	–	Munich Reinsurance Company
NIC	–	National Insurance Commission
NLCD	–	National Liberation Council Decree
NYCFSI	–	New York centre for the study of financial Innovation
PML	–	Probable Maximum Loss
SRSRC	–	Swiss Re-Swiss Reinsurance Company
UNFCCC	–	United Nations Framework Convention on Climate Change
WII	–	Weather Indexed Insurance

## CHAPTER ONE

### 1.1 Background of the Study

Ghana has liaised with the international partners in unearthing resolutions to the glitches hampering mankind's survival on planet earth. Based on this backdrop, the country endorsed the United Nations Framework convention on Climate Change in June 1992 at the Earth summit held in Rio de Janeiro. After ratification on September 6 1995, the Climate Convention came in to force universally on March 21, 1994 but particularly for the country on 5<sup>th</sup> December, 1995.

Scientific evidence suggests that the probable adverse negative implications of Climate related risks are enormous, and the country is principally gullible due to absence of capacity to embark on adaptive actions to combat socio-economic costs and environmental glitches germane to Climate related risks. These comprises: health complications related to Climate related risks, torrential rainfalls, flooding of the coastline currently experiencing erosion and reduced precipitation intensities.

Over the last decade, the principal factor of global non-life premium could be attributed to growth in developing markets; and currently represent 15.5% of global non-life premium figures. Above half of this is concentrated in the BRICS: Brazil, Russia, India, China and South Africa (Swiss Re, 2011). Real non-life premium incomes improved considerably between 2005 and 2010, with the most improvements noticed in China ( 25% per year) Considering stagnating premium incomes or even on declinature in more advanced economies, the BRICS are considered as significant areas of prospective growth in markets and also permitting improved risk diversification and boost to clients around the globe (Swiss Re 2004).

Numerous works have explored the drivers of development in developing markets at a cumulative level (Zheng et al. 2008). That notwithstanding, the current works have not inquired into how Climate Risks possibly will affect the Insurance Industry in Sub-Saharan-Africa.

Climate related risks is forecasted to change the universal landscape of natural Catastrophic risks (Solomon et al. 2007).The magnitude and intensity of the alterations continuous to be extremely ambiguous.However,it appears certain that, some geographic areas could witness upsurges in weather-linked or climatic risks and others decreases. Mills (2005) conjectures that it may have implications on several lines of businesses (LOBs) such as business interruption, agriculture or crop, Property, Life and health, liability and political risk insurances. The Life insurance Industry is vulnerable to Climate related risks particularly to macroeconomic conditions(Swiss Re, 2004).Consideration of these vulnerabilities are beyond the scope of this research. The implications for the global market has been a topical issue amongst reinsurers for several decades with many reinsurers producing publications to highlight the potential implications and adaptation policies (Munich Re, 1973).Aside globalization, changes to financial markets, global population and growth exposure, it is one of the external factors predicted to shape insurance demands in the next two decades.

Though existing literature have concentrated on the long-term risks and prospects for the universal insurance industry, this project is related to its implications for the insurance industry in Ghana in the near future; a time scope considered futuristic when considering strategic planning in the industry but is comparatively short for analyzing Climate related risks where the implications are forecasted to be most

substantial beyond 2050. Even though the multifarious interfaces and ambiguities imply that it is unfeasible to quantifiably conjecture the impending implications on demand for insurance, representing the influences, their relative scale and directions is of the essence for long-term business planning. It would also be valuable in advising (re)insurers and policymakers on the measures that can be undertaken in the short-term to reduce the conceivable risks and prospects. Insurance is a mechanism of risk transfer or distributing risk, in one form or another and can be traced back several millennia.

Chinese merchants in 2000BC would spread their cargo over many sea-going vessels in order to reduce losses should one of them sink. Marine insurance vaunts as the first ever formal insurance arrangement, dating back to 1370 in Genoa (Swiss Re, 2002). The precipitous expansion of the marine trade in the 1600s led to the development and correspondingly swift growth of marine insurance. Afterwards, Lloyd's of London was formed and from its coffee shop origin has become the world's leading specialist market for marine insurance. Today, the insurance industry is a \$10 trillion industry, covering a multiplicity of risks as varied as weather, death and injuries to pets, wedding interruptions, to injuries of professional athletes. One of the foundations of insurance is managing risk connected with natural hazards and climatic risks, such as droughts, earthquakes and flooding. Providing cover against adverse effects of climate-related risks is an underlying insurance business.

Despite all the global debate on reducing adverse effects of climate-related risks, relatively little has been said about its implications on insurance. Progressively, however, climate-related events are dominating not only the news, but also losses to global non-life insurers and reinsurers.

## **1.2 Statement of Problem**

The insurance industry in Ghana has a market penetration rate of about 1 %.( NIC, Annual Reports 2011).In a country with a population of about 25 million people, a simple calculation puts the proportion of the insured population to a negligible figure. According to the Finscope survey on the financial sector, a negligible five percent (5%) of Ghanaians have an insurance policy excluding those with national health Insurance. Insurance penetration is the contribution of total insurance premiums to GDP. Swiss Re Sigma Report comparisons also indicates that, Nigeria has a GDP input of 0.6%,Malaysia 4.8%,South Africa 14.8%,Kenya and Namibia 2.8% and 7.3% respectively.

More than 300,000 people in Ghana were displaced and affected by floods in 2007 which necessitated in excess of \$25 million for emergency response and \$130 million in respect of direct losses. Recently on June 3, 2015 severe rainstorm and floods affected various insured risks. The immediate cost to the insurance industry is expected to be in excess of \$30m.Under the Africa Adaptation Programme (AAP) the United Nations Development Program (UNDP) assisted the state through long-standing plans to handle Climate Risks. From 2010 to 2013, the AAP was executed across 20 African countries to assist with their resilience to natural disasters and climate change through capacity building for long-term planning at the government level. The programme also contributed to the execution of simple but operative interventions to investigate and demonstrate Climate adaptation. This was an indication of Africa's, specifically, Ghana's unpreparedness for such catastrophic situations. While the State received support the insurance industry suffered to meet its claims obligations.

The short-term nature of insurance means that the topic of potential climate change implications on the insurance industry is met with some skepticism within certain sections of the industry (Salt, 2000). It is therefore prudent that the insurance industry in Ghana begins to focus attention on insurance components that will support occurrences resulting from climatic related risks.

### **1.3 Objectives**

#### **1.3.1 Main objective**

The research is being undertaken to examine the implications of climate related risks on Ghana's Insurance Industry.

#### **1.3.2 Specific Objectives**

- To examine the risk implications of Climate related risks.
- To examine possible effects of Climate related risks on Insurance premiums for policies covering Climate related risks.
- To identify risk management measures adopted by the Insurance Industry(especially by underwriters in accepting climate related insurable risks)
- To examine the non-proactiveness of the Insurance Industry to Climate related risks issues.
- To identify practical steps adopted by the Industry to reduce effects of Climate related risks.

### **1.4 Justification**

Climate related risks rank amongst some of the comparatively recently discovered risks which will have debilitating effects. Like all other risks, it must be mitigated and properly managed. Its relevance is extensively acknowledged:

- Global risks reports issued by the World Economic Forum categorized some risks as being of paramount relevance to our economic system. Beside global governance bankruptcies and chronic fiscal disparities, it underscored Climate related risks and escalating greenhouse gas emissions, notably because of its nexus with unpredictability and volatilities in insurance markets.
- There is the difficulty of measuring the incidence and severity of Climate related risks. The frequency and severity of risk is a common familiar difficulty to the insurance industry due to its degree of uncertainty.
- Again, Climate related risks are long-term projections whereas, Insurance provides short term protection though it's an annual product.
- Around a third of global underwriters suggest that the insuring public is paying critical attention to Climate related risks, though over half suggests that additional efforts are required (Lloyd's 2008).Conversely, majority of insurance observers and practitioners classify Climate related risks as even more crucial (NYCSFI 2007, E & Y 2008).Surveys conducted by insurers and management consultants also rank it prominent.
- Also, Lloyd's rank it fifth next to global financial instability, emerging markets, political risks (terrorism) and the growth of corporate liability.
- Mounting proof suggests that Climate related risks would affect the incidence and intensity of weather-related hazards. Economic costs and losses emanating from these natural disasters are on the ascendancy as more regions become exposed.

In Ghana we are very lucky though: President John Dramani Mahama and some members of his government have spoken about the consequences of Climate related

risks, while former President Kuffuour is a UN Climate Change Envoy. Controlling risks will be key to the success of new products designed to cover climate risks.

The quantum of losses it renders are unfeasible for small developing economies to finance economic recovery. However, the high costs of insurance products are militating against their patronage in developing countries. It is anticipated that this research would help Insurers and Reinsurers in developing countries to become more financially and technically prepared for all natural disasters whether these are as a consequence of Climate related risks or not.

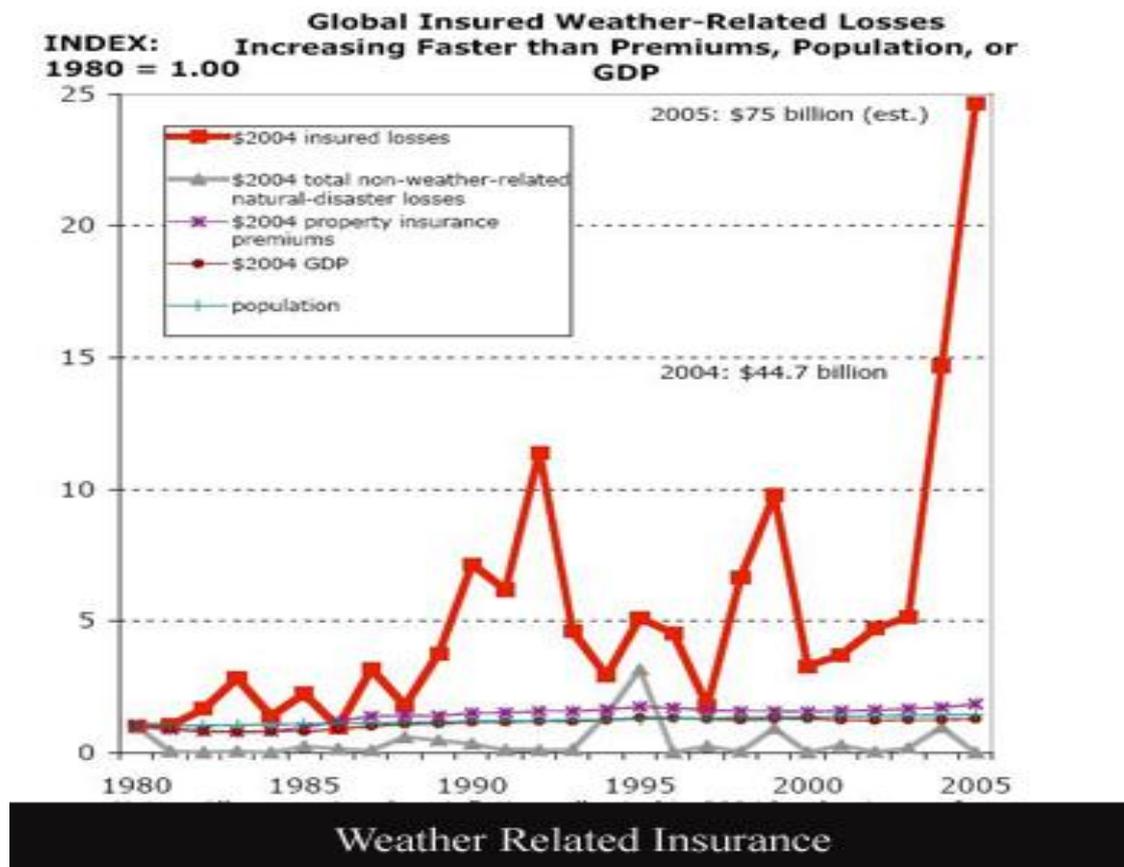
From 2005, adverse weather and climatological events accounted for 85% to 90% Of natural hazards which resulted in property damage claims and personal injury, according to global aggregates. The cost to the global economy was \$160 billion, out of which \$70 billion was covered by Insurance (Munich Re, 2012). Given the high rise in the Ghanaian property market, the effects of a major catastrophe emanating from Climate related risks can cause the Insurance industry astronomical increases in claims outlays. Climate related risks will trigger an inevitable upsurge in property risks. Insurers should endeavour to liaise with vulnerable communities in the provision of education and information, risk mitigation techniques and coverage.

### **1.5 Significance/Relevance of Study**

To provide a valuable reference material as a contribution to broad knowledge in this field of Study. While considering Climate related risks Implications on only General Insurance, it is expected that the findings would be of relevance to the reinsurance and other risk transfer markets as a key indicator. Climate related risks have changed weather patterns and resulted in the severity and frequency of harsh weather conditions such as flooding, drought and hail which can affect insured assets. Thus, it

creates risks to both immovable and movable properties. One of the issues confronting insurers is how to underwrite the extra risks that Climate related risks bring. In figure 1.1, it is evident that Global Weather Insured Losses are increasing faster than Premiums, Population growth and GDP. In other words, the total premiums accruing to an Insurer for assuming a portfolio of stochastic random variables could be thrown into disarray by the occurrence of a single Weather Insured loss.

**Figure 1.1: Graph Exhibiting Global Insured Weather-Related Losses Increasing Faster than Premiums, Population and GDP from 1980-2005**



**Source:** (Global Green House Warming)

Conceivably, the major challenging component of Climate related risks to the industry is the heightened weather unpredictability. Such unpredictability of extremes is what

would prove difficult for Insurers. The heightened unpredictability implies injection of additional capital and potentially expensive premiums. As already indicated, insurance is an annual product that gives short-term protection whereas, Climate related risks are long-term projections.

### **1.6 Scope of Study**

This study shall be limited to the stated specific and broad objectives. Attempting to examine all the conceivable implications of Climate related risks for the Industry would go beyond the available resources and objectives. The focus shall be on the general business (non-life) insurance market in Ghana with some considerations of global developments. Questionnaires were administered and interviews conducted in Accra since most Insurance Companies have their head offices situated in Accra.

### **1.7 Organization of the Study**

The study has been structured into five chapters. Chapter one which is the Introduction comprises: Background of study, Problem Statement, Objectives of study, Significance or relevance of Study, Methodology, Scope of Study and Organisation of the study. Chapter two is the review of relevant literature. The research methodology is captured in the third Chapter. The highlights under this section comprises: Research Scope, Research design and research type, Sampling Technique and Population sample size, Types and data sources, Research Instruments, description of data collection Procedure, Data analysis, Ethical considerations and Limitations. Chapter four comprises: Presentation of data, Analysis and discussions of findings. Chapter five is on summary of findings, conclusions and recommendations.

## **CHAPTER TWO**

### **REVIEW OF LITERATURE**

#### **2.0 Introduction**

This Chapter reviews the literature germane to the research.

#### **2.1 Emissions and Global Warming**

High temperatures, rises in sea levels and warming of the climate would indisputably remain same for many years (CII Climate Change Report 2009). In Ghana, Intense rain spells, and the accompanying floods such as what occurred in Accra in 2011 and June 3, 2015 can trigger massive water flows at hazardous levels. Extreme weather and climate events-including floods, droughts and heat waves-are the aspects most relevant to the Industry. These events are significant now, and the industry urgently needs to act. The concept of business as usual is too dangerous to entertain. Extreme cold, heat waves, Floods, droughts and storm surges are some notable alterations in climate excesses which have occurred in the past 40 years. Major alterations are anticipated in the future. Scientists warn of the threat of a warm Climate System and rank the period 1995-2007 prominently among the worst record of global warm temperatures since 1850. According to its fourth assessment report, the IPCC suggests that, there is 90% probability that activities of humans have impacted global warming, severe glacial retreat and melting of the Arctic sea ice. Formal attribution assessment captured in the report suggests that, it is most probable (> 90% probability) that since the mid-20<sup>th</sup> century, human activities resulted in much of the recorded upsurge in average temperatures globally and contributed to rising sea levels. Due to the thermal inertia of cryosphere and oceans, warming would still continue even if greenhouse

gases and emissions were held constant. Temperatures are projected to be warmer by the end of the 21<sup>st</sup> Century.

## **2.2 Insurance and Climate related risks**

According to the 2007 IPCC report, any changes in Climate over time resulting from human activity or natural variability is referred to as Climate Change. The working definition for purposes of this research is: “Any variations in an area’s long-term weather patterns as a result of variability of nature or human induced activities which have the potential to result in losses emanating from insured risks and also resulting in large uninsurable losses”. Typically, climate is defined by a set of time-mean variables, for example the mean temperature and average total rainfall in a month. There is a distinction between Climate change and Climate variability; it is a trend or pattern in the climate which results in new and, on the scale of human life-span, lasting conditions. It is normally acknowledged that the climate of any place is inherently variable in time (Impact of Changing Weather Patterns on Property Insurance, CII May 1994).

Society is generally susceptible to a swing in the incidence and severity of extreme events, particularly floods, severe storms and tropical cyclones, droughts and heat waves. Even a slight variation (i.e., <10%) in the intensity of an insured event could lead to a major upsurge in property damage claims and related financial losses. This research underscores the clear-cut and critical need for insurers to evaluate and effectually manage these risks. Conceivably, one remarkable example of this up to the present time has been how an upsurge in heavy rainfalls have resulted in high flood risks.

There is growing indication that human-influenced Climate related risks is intensifying the severity and frequency of extreme weather events. The IPCC reports that, it is now probable that human influences have resulted in warming of day-to-day minimum and maximum temperatures. It also reports that, greenhouse gas emissions have added to severity of intense precipitation. It also asserts that, there would be upsurges in the incidence of droughts.

These estimated trends create many threats as well as prospects for all companies but for the insurance industry particularly. Intensifications in the severity and frequency of climatic events could result in claims and major economic losses, thus those risks associated are material issues for insurers. This is particularly evident for casualty and property insurers. Reinsurers are not excluded since they offer cover to direct insurers and could be called upon when there are huge claims. They are currently investing substantially to comprehending the risks associated with Climate change. Munich Re for example, has created the world's most comprehensive database of natural disasters. Private health insurers have also expressed concerns because alterations in the climate can worsen cardiac and respiratory ailments, escalate allergy-linked sicknesses and the occurrence of insect-borne diseases.

Though inspiring, the global response to climate risks is woefully inadequate. The risk of huge insurance claims and losses may compel some insurers to withdraw from certain markets instead of incurring extra costs brought about by Climate related risks. They may likewise price consumers out by been selective in their acceptance of risks, introduction of different exclusions, high policy excesses and high premiums. Consequently, it is vital that insurers embrace detailed policies that tackle Climate related risks and extreme weather events to empower consumers in making prudent

selection about their insurance choices. By so doing, regulators are better able to make projections to ensure access and affordability in the market.

A 2011 climate disclosure survey by CERES analysed responses of 88 insurance companies. The respondents were made up of health and life insurers, multi-line insurers, property and casualty insurers and reinsurance companies. Only 11 out of the 88 companies surveyed reported having formal policies on Climate related risks and above 60% reported having no such formal approach for climate risk assessment. Seven (7) out of 11 who had formal plans were multi-line insurers and one was a global reinsurer, most with annual premiums in excess of \$1billion. It also reported that, none of the 18 property and casualty insurers surveyed had formal policies on Climate related risks or clear executive surveillance of Climate Change related policies.

In 2013, whereas global economic losses from natural events and human-induced disasters totalled US\$140 billion, global insured losses were estimated at US\$45bn, with significant contributions coming from floods and hail events. The sigma contains a dedicated Chapter on Climate related risks which suggests that, increasing global temperatures will result in changes in the incidence (frequency), severity and scope of extreme weather events (Swiss Re Sigma Report 2013).

**Figure 2.1: Graph Showing Global Insured Catastrophe losses**

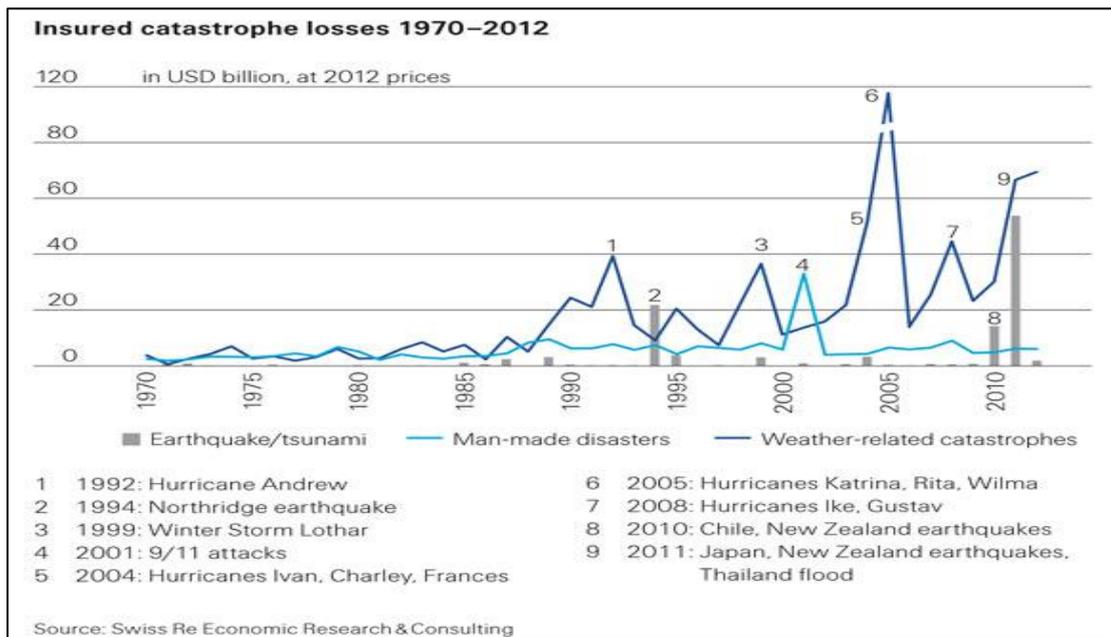


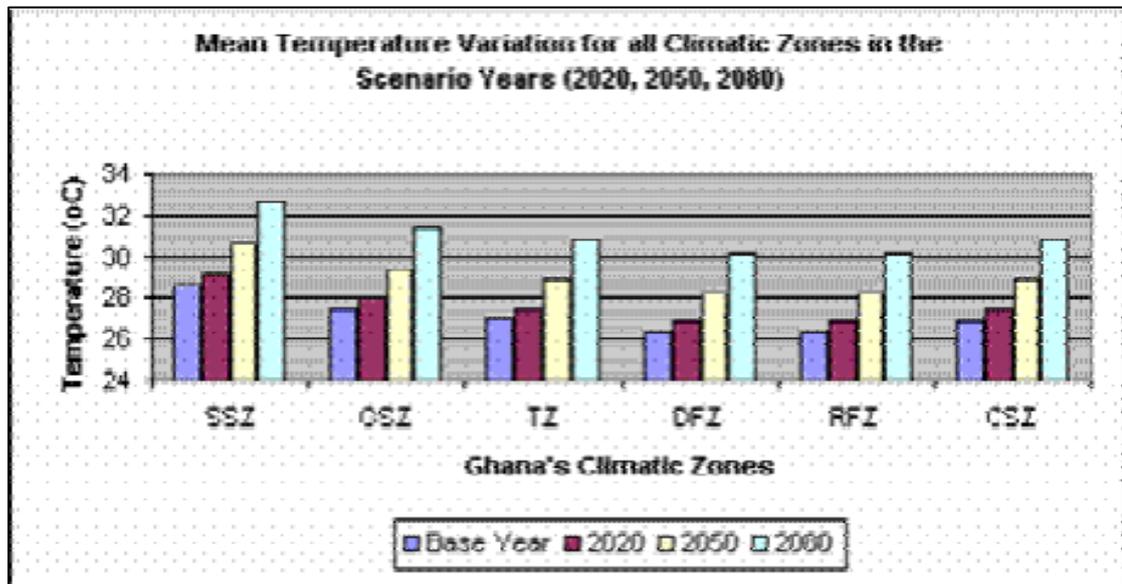
Figure 2.1 shows a rise in global insured catastrophe losses from 1970-2012. Weather-related losses continue to lead the graph. Losses resulting from property insurance which provides cover for catastrophes are classified as catastrophe losses.

### 2.2.1 Climate Change Scenarios for Ghana

Climatic change scenarios for Ghana predict further trends towards increasing temperature and reduced rainfall over the 21st Century. A CARE International 2007 study on Climate related risks and poverty in Ghana is applied in this section. Over the past 30 years, Ghana has experienced an average increase of approximately 1° C and by 2100 it is anticipated that average daily temperatures will rise by 2.5°C to 3.2°C across all ecological zones of Ghana. The last 30 years witnessed a decrease in rainfall by 20% and run-off or excess by 30% in much of Ghana. Annual rainfall projections were expected to decrease by 9%-27% across ecological zones by the year 2010(Further information on climate change scenarios for Ghana by ecological zone up to 2020, 2050 and 2080 are presented in Figure 2.2).The ecological zone is an area

defined by its environmental conditions, especially climate, landforms and soil characteristics.

**Figure 2.2: Ghana: Climate Change Scenarios by Ecological Zone to 2080**



**Source:** Ghana Ecological Zone Climatic data

### 2.2.2 Climate related risks and Its Implications on Insurance Demand

Ranger and Williamson (2011), enumerated the influence Climate related Risks have on Insurance demand mediated through income. By adopting a similar approach, Zheng et al. (2009) developed a simple regression model for a country's insurance penetration rate based on its per-capita income. They used this in forecasting penetration rates to 2030 by applying economic growth forecasts. These baseline forecasts are subsequently adjusted to include the two sets of Climate related risks projections from Mercer (2010). The fine details are beyond the scope of this research.

### 2.2.3 Climate related risks and its Implications on Insurability

Herweijer et al. (2009) and Mills (2005) underscore that, all things being equal, Climate related risks have the tendency to challenge the insurability of risk, lowering insurance availability, through intensifying technical uncertainty and volatility of risk,

diminishing the time between loss events and intensifying correlation of losses (e.g. connected with concurrent geographical events and several correlated implications from single insured events).Such constraints to the availability of insurance can lessen aggregate premium incomes.

According to the CII Climate Change report 2009, such restrictions could also influence insurers to pull out from particular LOBs and regions or, result in intensified incidence of insolvency. The corresponding pressure of rising concentrations of high-worth insured assets in vulnerable locations (such as in Ghana's coastal cities) may possibly intensify its implications on insurability.

However, it remains somewhat ambiguous how this would influence or impact aggregate demand for insurance. The reason being that, if insurers effectively preempt and react to the fluctuating risk environment (for e.g., by progressive premium adjustments and developing new products); then the impact or influence on insurance demand may be negligible, limited to only the highest LOBs and risk regions. The changeover however must be properly managed. A poorly managed transition (for e.g., resulting in sudden changes in premiums, cancellations of policies or insolvencies) may possibly have spillover influences on aggregate demand for other LOBs and regions.

Dilley et al. (2005) underscore that, regions and LOBS which have high exposures to Climate risks are more likely to have their insurance demands heavily impacted. Mercer (2010) and Parry et al.(2007) also conclude that, countries where Climate – sensitive industries(such as agriculture) is the mainstay of the economy and which lie in low-latitude regions are more probable to be negatively affected by physical changes in climate.

#### **2.2.4 Climate related risks and its Implications on Investment or Solvency**

Insurers invest a hefty portion of their investments in direct and indirect real estate investments. Much of the indirect investments are for generation of income; whereas much of direct investments are held by life Insurers. Insurers are exposed to greater investment risks if these properties are situated in areas prone to climate-change-influenced weather risks such as flooding, excessive rainfall and windstorms. In recent times, Ghana has seen a boom in the real estate sector with companies such as State Insurance Company, GLICO, Enterprise Insurance Company and Vanguard Assurance all investing in real estates.

Dlugolecki et al. (2009) identify that solvency related risks remain a crucial issue to the industry. As the financial stability of insurers is dependent on its investment portfolio, it has thus become important to examine what implications Climate related risks have on insurers' investments and also assist in establishing regulatory standards for best investments practices. Its implications however, vary by lines of business and investments.

#### **2.2.5 Climate related risks and the Ghana Agriculture Insurance Pool (GAIP)**

Much has been written about Climate related risks and Agriculture. Agricultural Risk management, Insurance and Reinsurance Consultant, Stutley (2010) for example, points out that:

In Ghana, agriculture is the dominant sector with a contribution to GDP of around 39% and provides employment opportunities to about some 4.2m people or 51% of the active labour force. It is also the largest foreign exchange earner. Agriculture in Ghana is prone to a range of climatic hazards notably drought and excess rainfall, natural hazards such as bushfires, flood, biological perils such as pests and diseases.

Ghana is extremely susceptible to the effects of Climate related risks. It is forecasted that by 2100, agriculture will suffer as a result of rises in average daily temperature. This will lead to loss of soil fertility, reduced crop yield, floods, prolong drought and other harsh weather events. This poses financial risks and jeopardises livelihoods and the national economy. A report prepared by the Crop Insurance Feasibility Studies (2010) disclosed that, on the average 5.5% of the national value of production of principle food crops are lost each year as a result of natural, climatic and biological perils.

An International Climate (ICI) project implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), researched adaptive insurance schemes which protected against the associated financial risks emanating from bad weather events in the agriculture sector. It worked in collaboration with the NIC and adopted a multilevel approach, factoring into account, current level of knowledge on Climate risks and proposed solutions, meteorological infrastructure as well as economic and political frameworks. The project “*Innovative Insurance Products for adaptation to Climate Change*” focused on the socio-economic costs connected to Climate related risks. IIPACC worked in conjunction with financial institutions, insurers and reinsurers and assessed which value chains generated Insurance demand (NIC Report, 2010). In June 2012, claims were paid out to crop farmers who incurred losses as a result of poor rainfall.

#### **2.2.6 Climate related risks and the Emerging Energy Insurance Market**

The discovery of oil and gas has generated the industry’s interest in that sector with players recapitalizing to take part in the opportunities it presents.

Dlugolecki et al.(2009, p. 2) observes that this class of business is one of the most volatile.Traditionally,insurers have focused on oil and gas even though it comprises both upstream onshore and offshore operations. This includes refineries, power generation, distribution and storage. In recent times, greener energy systems such as solar, wind and hydro power have also emerged. Offshore operations are more exposed to the elemental forces of nature and thus require the participation of industry pools, insurers and reinsurers with huge capacities. Lloyd's of London prides itself as the largest energy insurance market in the world.

Due to the Capital intensive nature of this market, insurance on Ghana's FPSO Kwame Nkrumah was placed on the Lloyd's market as the consortium of all insurers on the Ghanaian market could absorb only 5% of the material damage risks. Power distribution systems are extremely receptive to floods, storm, lightning, material damage and business interruption. According to the Climate Change Report (May 2009), Solar panels and wind turbines are becoming more vulnerable to wind storms thus resulting in massive property losses and business interruptions.

### **2.2.7 Climate related risks and Insurance Market Failure**

Climate related risks undoubtedly has the potential to result in wide scale market failure. Worldwide, underwriters made healthy profits in 2005-2006 as a result of increases in premiums (Climate Change Research Report, 2009).The scenario is different for most developing markets such as Ghana; the penetration rate as already indicated is very low. However, weather related exposures have become more severe and alarming in these countries thus increasing the potential for Market Failure.

Two major ways in which the market can fail are through Shock losses and Lack of Capital.

### ***2.2.7.1 Shock Losses***

In Ghana the frequent losses associated with drought, flood and pest infestation led to the formation of a weather-index insurance through the GAIP.

Dlugolecki et al.(2009, p.3) explains that, Lloyd's of London as a specialist reinsurance facility gained expansion due to the San Francisco earthquake in 1906. In 1992, Hurricane Andrew provoked the industry to innovate and introduce catastrophe Risk models. These losses are often extreme, severe, fortuitous and unprecedented. The occurrence of shock losses provoke innovative response from the market and has the tendency to result in huge capital outflows from the market in large claims. Rates in reinsurance markets tends to be higher and in turn attracts more capital from new entrants as profitability surges. The market resilience depends on the underwriting cycle and market conditions. The prices on the market become more reflective of the scarcity of capacity and inadequate capital.

### ***2.2.7.2 Lack of Capital***

Risk Based Capital was introduced as a threshold for insurance regulation in Ghana by the NIC in 2011(NIC report, 2011).

Dlugolecki et al.(2009, p.3) identifies that though weather catastrophes have driven a few individual insurers into liquidation; there has not been any documented evidence of a collective collapse due to insolvency. Collectively, insurers withdraw cover from highly volatile markets when they assess risks as being uninsurable. Climatic risks have the tendency to both hinder economic growth and trigger recession. However, the market has been able to service contracts and meet claims outlays. Also, a critical review of the market does not put climate risks as the sole cause of market insolvencies (AM Best 1999; EU study).

### ***2.2.7.3 Additional Capital***

In the light of the low market penetration vis-à-vis, the rise in Climate related risks, the need for an improved capital management cannot be over-emphasised. There are plans to raise the minimum Capital requirement for General business from the current GHS5m. At the same time rating agencies are requiring reinsurers and insurers to improve their security.

Guy 2006, published a review of recent changes in rating methodologies. Following global floods and Hurricane Katrina, rating agencies Standard and Poor(S&P) and AM Best have phased out its rating criteria for reinsurers by requiring that reinsurers maintain 10%-15% additional Capital to maintain their old ratings. In recent times, most Insurance Companies in the Ghanaian Market have been rated by International rating agencies. They are GLICO General (A- by the Global Credit Rating, SA),GLICO Group(B+ by S&P) and Enterprise Insurance Company(AA+ by S&P).It has now become a requirement by some corporate clients to demand the rating standards of insurers before placing businesses with them.

Dlugolecki et al. (2009) argues that, Primary insurance cover is more affordable because of the advantage of the law of large numbers that reduce the variability around the average. Lower premiums are thus charged due to the variability in a pool of similar climate risks. Insurers for that matter, make reinsurance arrangements for extra capacity and stabilization of underwriting results.

‘Shock losses’ affect global catastrophe reinsurance markets. Covers are granted on an occurrence, annual basis with limited reinstatements thus rendering insurers unable to calculate effectively what their catastrophe ‘hedge’ costs are. Besides, they are unable to specifically determine variations in pricing according to the characteristics

of risk presented. Some other vehicles are alternative risk transfer (ART), through instruments like injection of additional shareholder Capital, catastrophe bonds or Catastrophe Reserves.

### **2.2.8 Climate related risks Implications for Personal Lines Property Business**

The typical property Insurance policy on the Ghanaian Market covers; loss of or damage caused by flood, earthquake, tempest, windstorm, hurricanes, tornadoes, subsidence, ground heave, damage from fallen trees and such other convulsions of nature. The areas of concern are mainly the allied perils of flood and storm. However, Climate related risks have other implications on the property account of most insurers. It has the tendency to result in relatively small cover such as insect infestation or mould, other damage to buildings through hostile bush fires, frequent and severe storms. With a boom in the property market and improved construction methods, wind-resistant construction will become a standard as there is a surge in storminess.

Crichton 2007, argues that given the principle of indemnity, insurers should indemnify policyholders against unexpected and severe conditions and not damage due to lighter winds or poor property maintenance.

Trees are susceptible to wind throw and precipitation thus resulting in damage to insured property and human lives. Technical difficulties often arise when a claim for a falling tree during a storm arises. Under a homeowner's insurance, insurers will indemnify the insured for damage caused by the falling if it can be proven that, the tree exhibited characteristics of plant decay or if it was unstable before the occurrence of the storm peril. Under the debris removal extension, reasonable cost of removal is covered if the tree falls onto a wall or building. Damage to fences are an excluded peril under storm perils.

Dlugolecki et al. (2009, p. 27) suggested that, due to the issues which arise out of a claim related to falling trees, the market should as a matter of prudence consider paying for cost of tree removal whether it fell on a property insured or not.

### **2.2.9 Commercial Clients and Climate related risks**

The consequences of Climate related risks for insuring commercial clients is analysed in this section. The exposures to which commercial clients are prone will be considered first and then, a short description of climatic risks which are directly germane. The dynamics of the underwriting considerations will be examined briefly.

In summary, for a volatile commercial portfolio, Climatic risk has the possibility to violate the law of large numbers and of uncorrelated risks. By the law of large numbers, as the number of risks increases, the number of claims experience will approach the expected value and the company will earn a contribution equal to the margin. For this reason, adverse risk selection should be adopted as a complement to any accumulation controls chosen. Adverse risk selection is a strategy where underwriters identify and select risks that have lower than average loss propensities within a particular rating class, thus increasing profits. Thorough comprehension of the sensitive implications of the extreme macro environmental factors on a commercial portfolio remains a challenge for insurers (CII Climate Change Report, 2009).

#### ***2.2.9.1 Specifics of Major Commercial Clients: Vulnerability and Individuality***

A recent study on Climate Change opportunities and threats for insurers (Dlugolecki et al. 2009, p. 2) identifies that, commercial clients are sophisticated in their business processes, adopts modern technology in their production and service delivery. They often employ state of the art and expensive machinery which are prone to natural

perils such as temperature volatilities and moisture. For that reason, they require cover for frequent business interruptions and continuity.

#### ***2.2.9.2 Exposure and Internationality***

Commercial risks are globally located with factories, warehouses and marketing outlets dotted across the world. For example, many multi-nationals have their regional companies located in Ghana. Section 36 of the Insurance Law, 2006(Act 724) requires all risks located in Ghana to be insured on-shore with a local insurer. However, it does not preclude placing the excess of capacity with an off shore reinsurer. With a global reach, clients depend on outsourcing some of their supplies. They have a global market with sophisticated customers. There is additional exposure to dry contingencies such as storms, drought, typhoons and tornadoes. This could be as a direct result of plant or manufacturing location and indirectly via supply chain.

#### **2.2.10 Linkages between Underwriting Property risks and Climate related risks**

Climate related risks has the ability to break two basic insurance principles: the law of large numbers and on the other hand, selective underwriting. These two principles form the basis for a conventional two-pronged strategy and also possess mathematical and instinctive underpinnings.

The first approach involves underwriting uncorrelated risks at a premium equal to the estimated loss for the class plus an allowance or margin to cover expenses (including the cost of capital) and profit. As there is an increase in the risks in portfolio, the claims experience will approach the estimated value and the company will earn a contribution equal to the margin-that is the advantage of the Law of Large numbers.

The second approach involves identifying and selecting risks that present a lesser than average loss propensities within a rating class, thus additionally boosting profits. This strategy is jeopardised by a mixture of the attributes of natural perils and rising incidence and intensity due to Climate related risks. The benefit of individual risk selection is diminished by a trigger such as global warming or climatic risks since there is a significant difference between future event cycles and past experience.

Up to now, contemporary risk quality assessment methods are incapable of assisting underwriters to differentiate well from poor natural perils and also distinguishing exposure by geographical zoning. Accordingly, novel strategies on accumulation control and risk selection of natural perils must be invented. With regard to pricing, innovative loss patterns could materialise that possibly will contravene historical relativities and lead to insufficient premium level for individual risk aside from a portfolio of risks.

#### **2.2.11 Business interruption implications of Climate related risks**

The gravity of Climatic Risks can prolong BI interruption period. BI policies are arranged as an addition to commercial fire policies and rated according to the indemnity or interruption periods and the kind of business activity. A single climatic event far exceeds the potential loss of profits by fire due its global spread.

Post-loss events could range from interruption in communications, transportation, and lack of access to suppliers and customers. Other probable outcomes include; failure of contingency and business continuity plans, difficulties in reconstruction and post-loss collaboration with local authorities and governments. This prolongs the interruption time and thus maximise the exposure.

Dlugolecki et al.(2009, p. 9) concludes that, using previous claims history as a reference point tends to be less useful. BI losses following Climate related events are sporadic and extremely difficult to assess. In furtherance of this conclusion, they suggest that commercial portfolio underwriters must develop BI scenarios and stress-tests to measure the degree of interruption time and brace themselves up for any such eventualities.

Again, the CII Climate Change Report, 2009 concludes that, insurance penetration to natural perils is increasing and thus implies greater accumulations. The greatest threat is flood coverage in developing economies. It also reports however, that in developed countries, the penetration rate for flood insurance is around 20%.

#### **2.2.12 Climate related risks links with Liability Insurance**

Key issues germane to the working of liability insurance covers comprise: foreseeability, cause, contribution, duty of care, public policy, period and date of loss occurrence, location of occurrence and contractual obligation. However, focus shall be on implications for liability products on the market. The typical liability products on our markets comprises: Product Liability, Public Liability, Professional Indemnity and Directors and Officers (D&O) Liability insurances.

A study by the (Chartered Insurance Institute [CII] 2009) highlighted that Climate related risks appear minimal on the indicators of liability insurances as compared to other LOBs. However, because of the long-tail nature of liability risks, we cannot rule out any such possibilities.

### **2.2.13 Professional Indemnity Insurances and Climate related risks**

PI policies are designed to provide cover for accidental professional negligence or misconduct by professionals. The work of professionals engaged in development and construction such as architects, surveyors, planners and engineers will be a source of potential litigations. This will arise if buildings and infrastructure are not properly constructed thus making them prone to extreme weather conditions. As Climate related risks result in insured losses, it is anticipated that a wide range of professionals and technical advisors will come under scrutiny with repercussions for litigations.

### **2.2.14 Climate related risks Implications on Public Liability Insurance**

Sections 183 and 184 of the Insurance law, 2006(Act 724) makes it compulsory for the owner(s) of any property used by the public for ingress and egress to have a form of Insurance to cover the hazards of Fire, Collapse and Public Liability. Legally, individual home owners are liable for maintaining domestic water service pipe on their land, from the water company valve to the internal stop tap. They have a comparable duty to minimise leakage. Under the “accidental damage to burst and underground” perils section of a policy, insurers are liable. It is prudent, in that regard, that any leakage is dealt with promptly to minimise risk to adjoining or adjacent property.

### **2.2.15 Climate related risks Implications on Employers liability Insurance**

In Ghana, the workmen Compensation Act (NLCD 1983) makes it compulsory for employers to have a form of insurance to protect workmen from accidental bodily injury, permanent disability, temporal disablement and death during the course of their work. Employers have a high level of responsibility for the health and safety of their employees in the course of their work. Climate related risks have the tendency to

induce and exacerbate the incidence of heat-related injuries, respiratory attacks and illnesses such as Salmonellosis and Legionnaire's disease. Extreme temperatures can also impair concentration thus, exacerbating the incidence of accidents. Employees who work in the open may be prone to the risk of developing skin cancer as a result of intense exposure to UV radiation, whereas those working in enclosed environments may be gullible to air conditioning failure either due to loss of power supply or breakdown. The overriding responsibility remains on employers to ensure a safe working environment for their employees

#### **2.2.16 Climate related risks Implications on Product liability Insurance**

Conventional techniques of making, packaging and using products become susceptible to unexpected weather effects when climatic conditions alter. Food products are particularly at risk due to its perishability. Extreme weather conditions such as high temperatures could result in product failures. These failures could generate claims over fitness for purpose, recommended usage and compliance with specification. Past claims experience points out that, in a progressively global supply chain, claims can occur from unforeseen events practically anywhere in the world. One claim may trigger additional claims. For example, at present there are product recalls and product liability claims emanating from quality control requirements due to transitory working after the floods of Europe. In a specific example, in an effort to meet demand, there was speedy arrangement at a substitute location and the use of raw materials thought to be wholesome deprived of satisfactory controls. This led to the supply of defective product and successive claims (Climate Change Report, 2009). An upsurge in weather extremes and conditions in developing/emerging countries where systems are less effective, could correspondingly lead to a rise in product liability claims.

### **2.2.17 The Ghanaian Insurance Market Overview**

The Insurance Industry in Ghana is regulated by Insurance Act 2006, (Act 724).

In the 2011 Annual report, The National Insurance Commission [NIC] 2011) observes that, excluding those on the national health insurance scheme, an abysmal 5% of Ghanaians are insured; with insurance input to GDP at 1%. Swiss Re Sigma Report comparisons also indicates that, Nigeria has a GDP input of 0.6%, Malaysia 4.8%, South Africa 14.8%, Kenya and Namibia 2.8% and 7.3% respectively. Accordingly, the commission identified and endorsed the crafting of Micro Insurance policies targeted at the informal sector with a view to improve permeation. Regulations have also been enacted to assist in implementation.

It has also directed every life and general insurance company to have a minimum of US\$1m in core capital. It has also directed all general insurance companies desirous of underwriting policies in the oil and gas industry to raise their core capital further to a minimum of US\$5m by December, 2014 (NIC Annual Report, 2011). The NIC as at 2011 had licensed two (2) Reinsurers, Fifty-three (51) Brokers, Twenty-four (24) General and Eighteen (18) Life Insurers. It also licensed one (1) Reinsurance Broker and one (1) Loss Adjuster.

#### ***2.2.17.1 Performance by the Industry***

There was an upsurge in premiums generated by general and Life businesses. In 2011, the sector produced GH¢628.5million in market premium. The table 2.1 summarises the performance.

**Table 2.1: Increase in Premium Incomes (General Business) 2007-2011**

<b>Year</b>	<b>Premium Generated(GHC)</b>	<b>Rate of Growth</b>
2007	142,020,077	-
2008	187,010,274	31.6
2009	220,704,263	18.0
2010	270,773,967	22.6
2011	358,352,702	32.3

**Source:** NIC Annual Report, 2011

### **2.2.17.2 Premium Income generated by Reinsurers**

Reinsurers reported an upsurge in their premium production as the main stream insurers. However, there were variants in growth rate which were significantly felt by reinsurers. Between 2010 and 2011, life insurers reported a tumble of 9% in premiums generated, whereas reinsurers reported a high tumble of 42.1%.

**Table 2.2: Gross Premium Income by Non-Life Reinsurers 2007-2011**

<b>Year</b>	<b>Premium Income (GH¢)</b>	<b>Rate of Growth</b>
2007	38,399,239	-
2008	53,383,694	-39.0
2009	56,780,084	6.3
2010	52,768,054	-7.0
2011	56,114,292	6.3

**Source:** NIC Annual Report, 2011

Subsequent to the abolishment of the legal cession, cutthroat market rivalry has deepened.

### ***2.2.17.3 General and Life Premium Incomes by business Class (2007-2011)***

In the non-life class, the highest contributor in terms of gross premiums has been Motor Insurance. In 2011, the market premium for this line of business was GHC162.4 million representing 25.8% of total premiums. Even though the figures points to an increase of GHC38.9 million over the previous year's earning of GHC123.5 million, there was a tumble in market share of 1.2%. Since 2007, the trend has been likewise (NIC Report, 2011).

The report ranks accident business second highest in terms of market premium. The gross premium for 2011 was GHC78.9 million with a market share of 12.6% constituting the lowest within the five year period. There has been some variability in terms of growth between 12.6% and 17.7%. With a market share of 12.4%, Fire insurance raked in an annual income of GHC77.7 million (NIC Report 2011). It is germane to note that, generic Fire Insurance products on the market provide cover for wet contingencies and climate-related risks such as floods, storms, tempest, hurricanes etc. Similar to accident, there were variations between 11% and 14% over the period. Implementation of the compulsory fire insurance for all commercial buildings has begun and it is anticipated that this will help bolster the premium income for this line of business. The report also indicates that, the share of market premium for Marine Insurance more than doubled between 2010 and 2011 from GHC13.7 million to GHC28.8 million respectively. This indicated a growth of 1.6% in market share. Although not the focus of this research, there was an increased growth during the period for the Life sector, rising from 30% in 2007 to 43% in 2011. In 2007, gross life market premiums was GHC67 million and GHC270 million in 2011. With the development of innovative products and enhancements in

distribution channels, there is a high growth potential. It is anticipated that Ghana's oil find will reflect in the industry as a whole.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.0 Introduction**

This section of the research highlights the methods, types, sources and research instruments adopted in conducting this research.

#### **3.1 Research Scope (Population and Research Area)**

The study was conducted within the geographical boundaries of Ghana and specifically the City of Accra because the headquarters of General Insurance Companies, Insurance Brokers and Reinsurance companies are located. It is a coastal City to which most of Climate related risks such as floods, extreme heat and precipitation are rampant. Precipitation refers to any form of solid or liquid water particles that fall from the atmosphere and reach the earth's surface. Depending on the season and geographical location, it may vary in quantity and severity. Rainfall over Accra –similar to that in most of the semi-arid climate zones of the globe –is subject to extreme variations.

This is also the city where many of the technical experts in the field of underwriting, insuring and reinsuring complex insurable risks practice their profession. The targeted population for this study consisted of technical underwriters from General Insurance Companies, Special Risks managers, Insurance Brokers and Reinsurance Companies.

#### **3.2 Research Design and Research Type**

Qualitative Data acquired for this project was primarily through interviews and administration of questionnaires. Data which were retrieved provided information related to the potential implications Climate related risks has on the industry as well

as identifying their consciousness about it. In measuring the extent to which it affected the Industry, quantitative analysis of data was utilized. In the case of this particular study, the topic is a fairly new phenomenon somewhat remotely detached from the issues that confront the Insurance Industry such as low market penetration, low contribution to GDP, low capitalization and premium undercutting. For that reason, there existed limited information, statistics and knowledge regarding the topic. As an ideal approach, exploratory research proved helpful and enabled the topic to be explored though there was little knowledge (Hubpages 2003).It also provided information that was featured in the recommendations.

### **3.3 Population Sample Size and Sampling Technique**

Purposive Sampling was applied to this research. It refers to a sampling method where researchers purposely select respondents which in their consideration are germane to the subject matter (Sarantakos 2005).The method proved useful in acquiring immediate information from specialists involved with the administration of flood claims for instance. As a result, selected experts were spoken to. It was also important as a researcher to speak with the very few technical underwriters and brokers in order to gain accurate information concerning the issues surrounding Climate related risks, its implications, industry resilient techniques and solutions for the Insurance Industry.

In order to do this, ten (10) Insurance Companies, four (4) Brokerage Firms and one (1) reinsurer were chosen. Only technical persons with expert knowledge in underwriting, claims administration and operations were interviewed. Subsequent to interviewing the technical persons, information regarding their knowledge of the subject matter, whether it had any implications on the industry and measures to build resilience were obtained.After interviewing experts from the reinsurance industry,

more insight was gained into the complex issues involved in placing climate related risks with Lloyd's or retrocessionnaires on the global market. Finally, through the use of questionnaires, data with respect to Insurer, Broker or reinsurer awareness on the subject matter was derived. Questionnaires were administered to only those in technical functions of these reputable companies because the research topic is a technical one.

### **3.4 Types and Sources of Data**

Data from primary and secondary sources were employed. However, the emphasis was on secondary sources because it provided some existing data on the topic as a global phenomenon, the Insurance perspective and other relevant issues germane to the research topic. Secondary data provided information concerning existing literature on Climate related issues both in Ghana and global, adaptation techniques, socio-economic impacts but none specific on implications for the Insurance Industry in Ghana. The information derived from secondary sources were obtained from journal articles, magazines, newspaper articles-books and online (internet) from trusted sources. The bulk of the secondary data came from materials and knowledge resources available to qualified members of the CII. Other primary sources were derived from short interviews and administration of questionnaires.

### **3.5 Research Instruments**

To make the process interactive and easy to obtain relevant information, questionnaires containing open and close ended questions were administered. The process could be described as a survey since information was gathered either through written or oral questioning (Sarantakos 2005). Respondents who occupied technical

roles in insurance, brokerage and reinsurance firms answered questionnaires and were also interviewed.

### **3.6 Description of Data Collection Procedure**

Direct interviews with relevant respondents were conducted. As indicated above, respondents consisted of technical underwriters, claims managers, reinsurers and brokers. Throughout the period, short interviews were conducted with the respondents in order to obtain information regarding the implications of Climate related risks on the insurance industry in Ghana. Additionally, questionnaires were administered. To do this, some 15 companies were chosen. Overall, 15 companies were visited and a questionnaire was administered per company.

### **3.7 Data Analysis Techniques**

Contents of the data retrieved were analyzed and represented through Pie charts, Bar Charts and tables. These were the dominant statistical methods employed for the presentation and interpretation of data. In analysing information under each objective, tables indicating percentages of respondents' answers were constructed using Microsoft Excel 2007 and also pictorially represented through Pie Charts and Bar Charts. Pictorial presentation of the results employed the use of Microsoft Excel 2007, spreadsheet software. Due to the quantitative nature of the data received descriptive analysis was applied as an additional method in analyzing the data. That is simply describing what the data shows.

### **3.8 Ethical Issues**

The respondent's identity were not disclosed throughout this research.

### **3.9 Limitations**

There was the challenge of getting respondents with knowledge on the subject matter. Not all companies in the industry were selected. Limited Funding did not permit an industry wide survey. Out of 15 questionnaires distributed to 15 companies, only 10 responded on time. Out of the initial 10 questionnaires for mainstream insurers, only 7 were received on time. Two (2) out of four for Brokers and One (1) from a reinsurer were received respectively on time.

## **CHAPTER FOUR**

### **DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS**

#### **4.0 Introduction**

This Chapter presents, analyses and discusses the findings from the data retrieved.

#### **4.1 Presentation of Data Collected**

A total of 10 responses were received out of 15 questionnaires. This indicates a 67% response rate which is usual for this kind of research. The survey started with some of the questionnaires being e-mailed to some respondents. Some of the questionnaires were hand delivered. Out of the initial 10 questionnaires for mainstream insurers, only 7 were received on time. Two (2) out of four for Brokers and One (1) from a reinsurer were received respectively on time.

Below are pictorial representations in the form of Tables, Bar Charts and Pie Charts that shows responses from respondents.

##### **4.1.1. Risk Implications of Climate related risks**

The direct effects of Climate related risks on Insurance Business activities could also be referred to as the Risk Implications. Climate related risks undoubtedly has a lot of implications on risk. The research has identified the following as the likely implications of Climate related risks. These areas of insurance that could be affected by Climate related risks include claims outlays, insurance premium, difficulty in obtaining co-insurance, difficulty in obtaining reinsurance placement, Profitability and solvency, capacity and ability to absorb large risk. The Table 4.1 exhibits the level of Risk Implications of Climate related risks. Averagely, 53.3% of the respondents indicated that Climate related risks has high risk implication on above

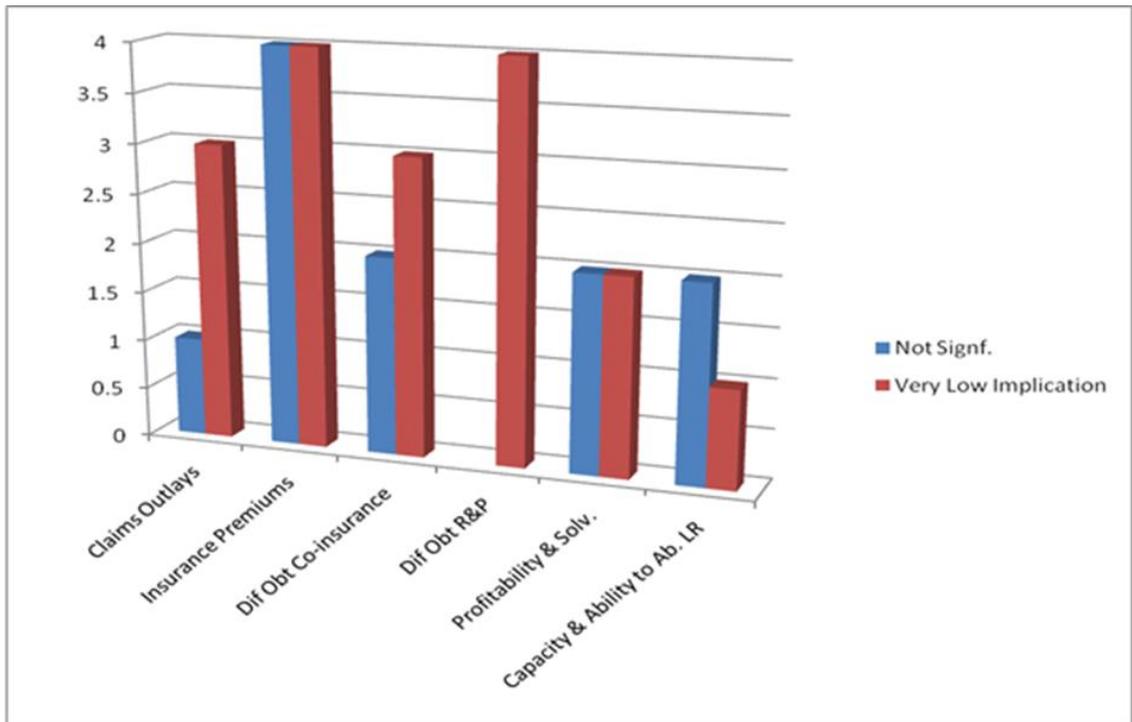
areas of insurance such as claim outlays, insurance premiums, etc. On the other hand 28.3% of the respondents also indicated Climate related risks have very low risk implication and yet still 18.3% said Climate related risks does not have any significant implication on risk. 53.3% of respondents ranked Climate related risks as having very high Implications on the Insurance Industry; while only 28.3% of respondents ranked Climate related risks as having very low implications on the Industry.18.3% ranked CC as having no significant implication on the Industry.

**Table 4.1: Risk Implications of Climate related risks**

<b>Implication</b>	<b>No Implication 18.3%</b>	<b>Significant Implication 28.3%</b>	<b>Very Low Implication 28.3%</b>	<b>High Implication 53.3%</b>	<b>Risk</b>
Claims Outlays	1		3		6
Insurance Premiums	4		4		2
Difficulty in Obtaining Co-insurance	2		3		5
Difficulty in Obtaining Reinsurance Placement			4		6
Profitability & Solvency	2		3		5
Capacity & Ability to Absorb Large Risk	2		1		7
Researcher's own construct					

The figure 4.1 shows the relative level of risk implication on the various aspect of insurance. From the figure, it can be seen that insurance premium and difficulty in obtaining reinsurance placement has the highest level of no significance and low risk implication. This was followed by claims outlays and difficulty in obtaining co-insurance where respondents indicated has very low risk implication from Climate related risks. A few of the respondents also indicated that Climate related risks have no implications on capacity and ability to absorb large risks.

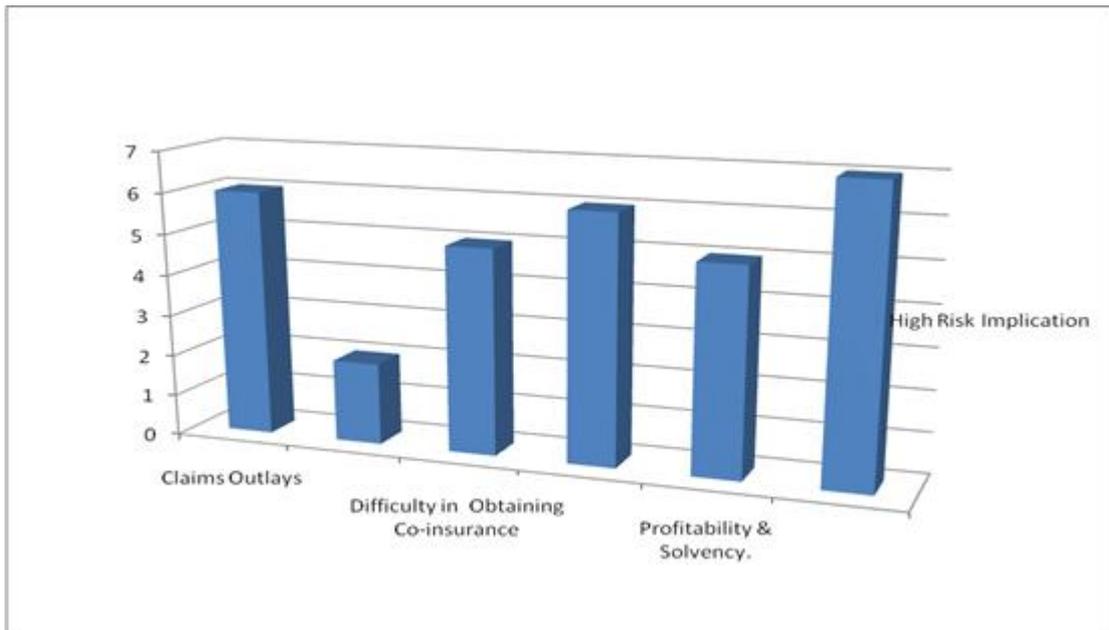
**Figure 4.1: Risk Implications of Climate related risks**



Researcher's own construct

Consequently, figure 4.2 shows that capacity and ability to absorb large risk has the highest risk implication from Climate related risks. This was closely followed by claim outlays and difficulty in obtaining re-insurance. Profitability and solvency and difficulty in obtaining co-insurance also followed closely.

**Figure 4.2: High Risk Implications**

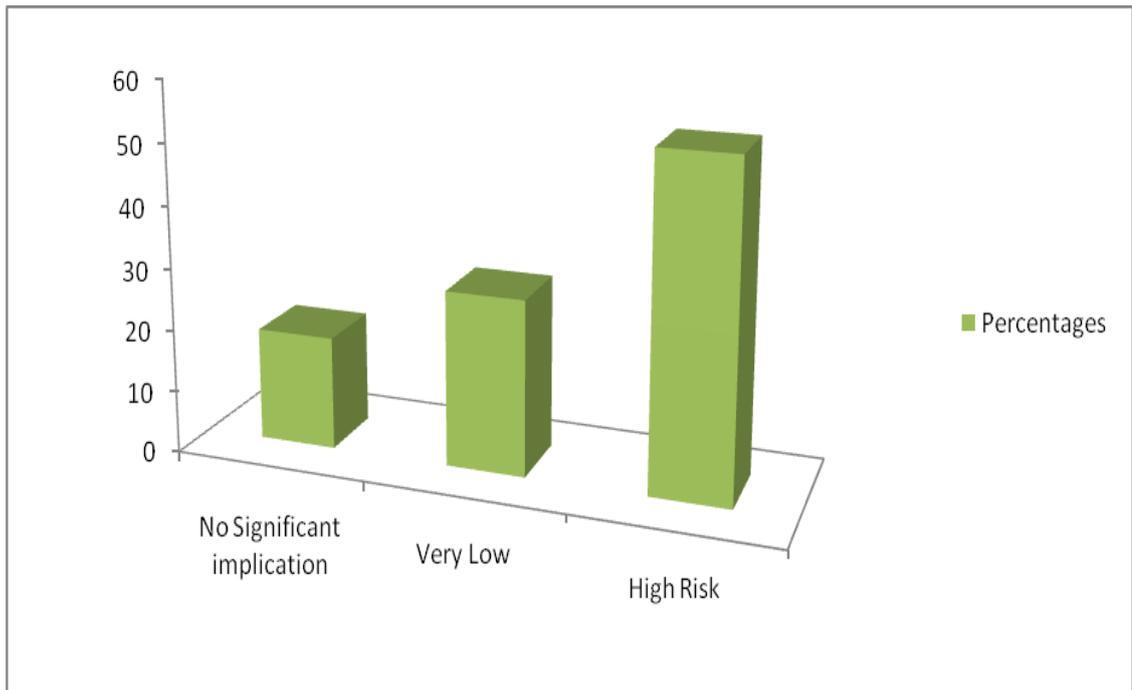


Researcher's own construct

The overall proportionate level of risk implication is represented by the figure 4.3.

From figure 4.3, it can be seen that high risk implication stands in dominance over other levels of risk implication. This means that to a remarkable extent, Climate related risks have a high risk implication. The relatively high risk implication indicated by respondents is followed by low risk implication while on the other hand, a lower proportion of respondents indicated that Climate related risks have no significant risk implications.

**Figure 4.3: Overall Risk Implications of Climate related risks**



Researcher's own construct

A very high proportion of respondents(53.3%) ranked CC as having very high implications specifically on Claims Outlays, Difficulty in Obtaining Co-insurance, Difficulty in Obtaining Reinsurance Placement, Profitability & Solvency and Capacity & Ability to Absorb Large Risks. Respondents representing 28.3% ranked CC as having very low implications on Insurance Premiums. The reasons given from field interviews were that, the market in Ghana is a soft one. Under this market, insurance companies quote lower prices and use liberal underwriting approach when they expect their investment performance to be too strong to overcome underwriting losses. The market is bedevilled with premium undercutting in the wake of cutthroat competition in a very small market with a low market penetration rate of just about 5% and 1% contribution to GDP. There is no significant enforcement of guidelines on risk pricing.

#### **4.1.2 The Possible effects of Climate related risks on insurance premiums for policies covering climate related risks**

It is widely believed that increases in Climate Change issues such as flood damage or climate risks results in higher premiums being charged for policies which cover flood or climate related risks. In affirming the validity of this assertion, 80% of respondents indicated that Climate related risks have an effect on insurance premium on policies covering climate related risk while comparatively lower proportion of 20% of respondents indicated otherwise (Ref. Table 4.2)

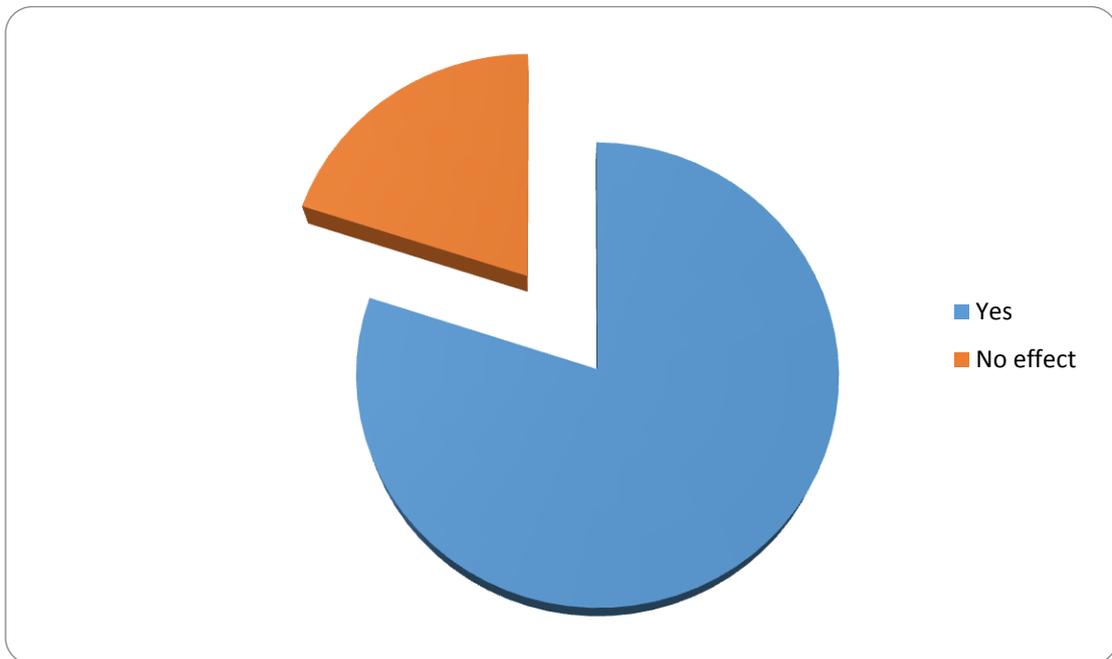
**Table 4.2: The Possible Effect of Climate related risks on Insurance Premiums for Policies Covering Climate related risks**

<b>Effect</b>	<b>Responses</b>
Yes	8
No Effect	2

Researcher's own construct

The effect of climate change on insurance premium is further made clear using the figure on the next page.

**Figure 4.4: The Possible Effect of Climate related risks on Insurance Premiums for Policies Covering Climate related risk**



Researcher's own construct

The figure 4.4 clearly shows that Climate related risks have a great effect on the insurance premiums for policies covering climate change related risks. A high proportion of respondents(8 out of 10) believe that increases in CC related issues such as flood damage or any such other Climate risks would have an effect on premiums charged for such risks.

#### **4.1.3 Risk Management Measures adopted by Insurance Industry (especially underwriters in accepting Climate related insurable risks)**

In assessing the measures adopted by underwriters in accepting climate change related insurable risk, options such as Compulsory Risk Survey, Load premium, Decline Cover , accept cover but impose deductibles, warranties and other policy conditions. The table below shows respondents' preferred choice of measures.

**Table 4.3: Measures adopted by Industry especially underwriters in accepting CC related insurable risks**

<b>Measures</b>	<b>Frequency (out of 10)</b>	<b>Percentages</b>
Compulsory Risk Survey	<b>8</b>	<b>80%</b>
Load Premium	<b>5</b>	<b>50%</b>
Decline Cover	<b>1</b>	<b>10%</b>
Accept but Imp. Conditions.	<b>9</b>	<b>90%</b>
<b>Total</b>	<b>23</b>	

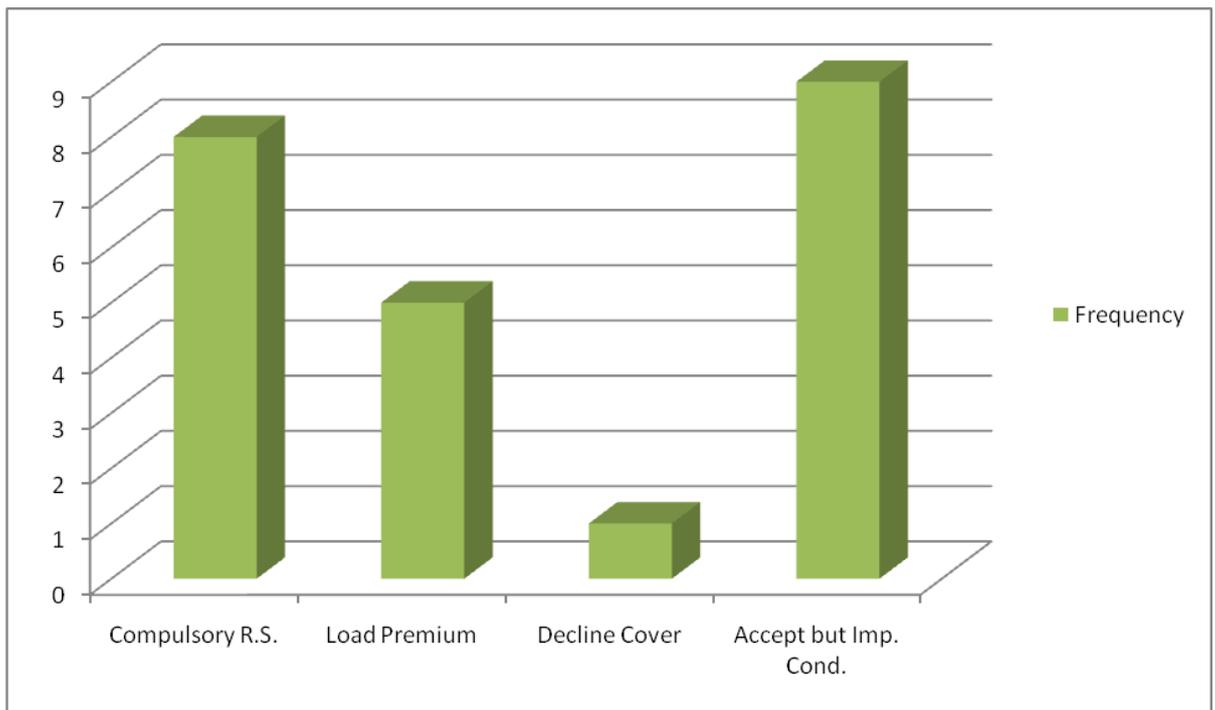
Researcher's own construct

Accepting but Imposing policy condition received 90% endorsement from respondents. This means that underwriters should accept climate related risks but also impose policy conditions. The imposition of policy conditions would help mitigate the insurer's exposure under any climate related risks insured and thus achieve a balance of the risks in portfolio. 80% of the respondents are also of the view that underwriters should always require a compulsory risk survey as a measure prior to accepting Climate related risks. Brokers as intermediaries are expected to and must conduct risk surveys and assessment before they process any business for quotation. The risk survey will reveal the risk characteristics to inform a prudent underwriter in deciding whether to cover the risk. 50% of respondents hold the view that underwriters should accept CC related Risks but must load the premium. In other words, they should rate such risks as high risks and charge high premiums. Put simply, insurers should adopt the Principle of equivalence - that is, more risky contingencies should attract higher premiums.

Declining insurance cover received only 10% approval from respondents. They are of the view that the view that prudent underwriters should decline cover. The role of the

underwriter is to assess the risk based on the relevant material information provided by the proposer and take a decision to accept or decline cover. If the decision is to accept, then at what price and if it is to decline cover, then what are the reasons? The responses are further presented pictorially below:

**Figure 4.5: Measures adopted by the industry especially underwriters in accepting CC related insurable risks**



Researcher's own construct

The figure 4.6 above shows that imposing conditions receive the highest backing from respondents, followed by compulsory risk survey and then Loading Premium. Declining insurance cover does not seem appealing to about 90% of the respondents which demonstrate the extent to which insurers are eager to get client to sign policies.

#### **4.1.4 The Industry's Non-Proactiveness to Climate related risks Issues**

Since Climate related risks are unavoidable, it demands a proactive response of all the stakeholders in the insurances industry. The researcher sought to find out how

proactive the industry is to matters germane to Climatic Risks. Table 4.5 shows the view of respondents on how prepared the insurance industry is to the issue of Climate related risks.

**Table 4.4: Non-Proactiveness of the Insurance Industry to Climate related risks**

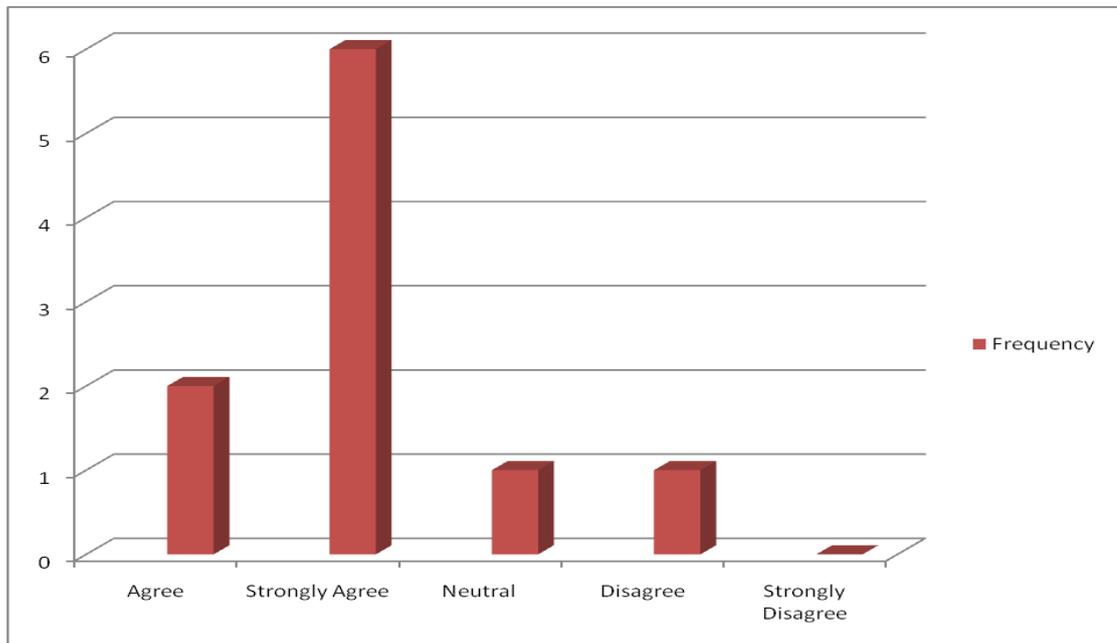
<b>Reaction</b>	<b>Frequency</b>	<b>Percentages</b>
Agree	<b>2</b>	<b>20%</b>
Strongly Agree	<b>6</b>	<b>60%</b>
Disagree	<b>1</b>	<b>10%</b>
Strongly Disagree	<b>0</b>	<b>0%</b>
Neutral	<b>1</b>	<b>10%</b>

Researcher's own construct

From table 4.5 above, it can be seen that 60% of the respondents strongly agree that the insurance industry in Ghana is not proactive to the issues regarding Climate related risks. This implies that, the Industry is not strongly involved in pushing the Climate related risks agenda. 20% of respondent also agree that the insurance industry is not proactively responding to the issues of Climate related risks while a lower proportion of 10% indicated the insurance industry is neutral to the issues of Climate related risks. Only 10% of the respondent to some extent disagree that industry is not proactive to the issues of Climate related risks. The general deduction that can be made from this statistics is that the insurance industry is not proactively responding to the Climate related risks that engulf the country. This could be due to the level of understanding of Climate related risks and its risk implication.

The proactiveness of the insurance industry is further made clear by the figure on the next page.

**Figure 4.6: Non-Proactiveness of the Insurance Industry to Climate related risks Issues**



Researcher's own construct

#### **4.1.5 Practical steps adopted by the Insurance Industry to reduce Climate related risks Effects**

Since Climate related risks are unavoidable, various attempts have been made by the insurance industry to lessen its effects. Investigations or research on cycles of the Weather, researches on susceptible areas, Education/PR on Climatic hazards, State assisted or funded catastrophe consortiums or pools such as the Ghana Agricultural Insurance Pool. Closer collaboration with relevant authorities which plan and enforce standards of construction, improved claims control, Tax exemptions on reserves of catastrophe consortiums. Tax allowance on catastrophe reserves, Limitations on acceptance of risks, giving prominence to/emphasising risk management and the use of ART are some of the attempts made by the insurance industry aimed at reducing its effects.

**Table 4.5: Practical steps adopted by the Insurance Industry to reduce Climate related risks effects**

<b>Suggested Steps</b>	<b>Responses</b>
Studies on Vulnerable Areas	7
Research on Weather Patterns/Cycles	7
Government funded Catastrophe consortiums/pools	5
Education/PR on natural/climatic hazards	6
Improved Claim Control	3
Tax Allowance on Catastrophic Reserves	0
Emphasis on /Prominence to risk management	5
Limitations/restriction on Risk Acceptance	3
Emphasis on Risk Management	5
Alternative Risk Transfer	4
Closer collaboration with relevant authorities	4
<hr/>	
Researcher's own construct	

The table above shows that 70% of respondents suggested that the Industry should adopt Research on weather Patterns as a step to reduce the effects of CC. Another 70% of respondents suggested that the Industry should adopt studies of vulnerable areas as a step to reduce the effects of CC. 60% of respondents also suggested that the Industry should adopt Education on natural hazards as a step to inform the insuring the public in order to reduce the effects of CC. 50% of respondents suggested that the Industry should set up a government backed Catastrophe Pool such as the GAIP while 30% of respondents indicated that the industry should pursue improved claims control and restriction on risk acceptance to reduce the effects of CC. There was zero response from respondents for the industry to pursue tax

allowance on catastrophe reserves. 50% of respondents again suggested that the industry should pursue emphasis on risk management to reduce the effects of CC while 40% of respondents on the other hand suggested that the industry should pursue alternative risk transfer and Closer co-operation with Authorities to reduce the effects of CC. The closer co-operation with authorities was to enhance effective planning and construction standards.

#### **4.1.6 Possible effects of Climate related risks in the next 5 years**

Though not part of the objectives the possible effect of climate related risks in the next 5 years is being considered. The industry acknowledges and has documented possible effects on its operational activities and the general economy. Some of these effects include upsurges in losses originating from underwriting property risks, Secession of insurance cover from certain locations, Premium increments, off-shore reinsurance costs/capacity and Insolvencies. The table below shows the responses of respondents on possible effect of Climate related risks.

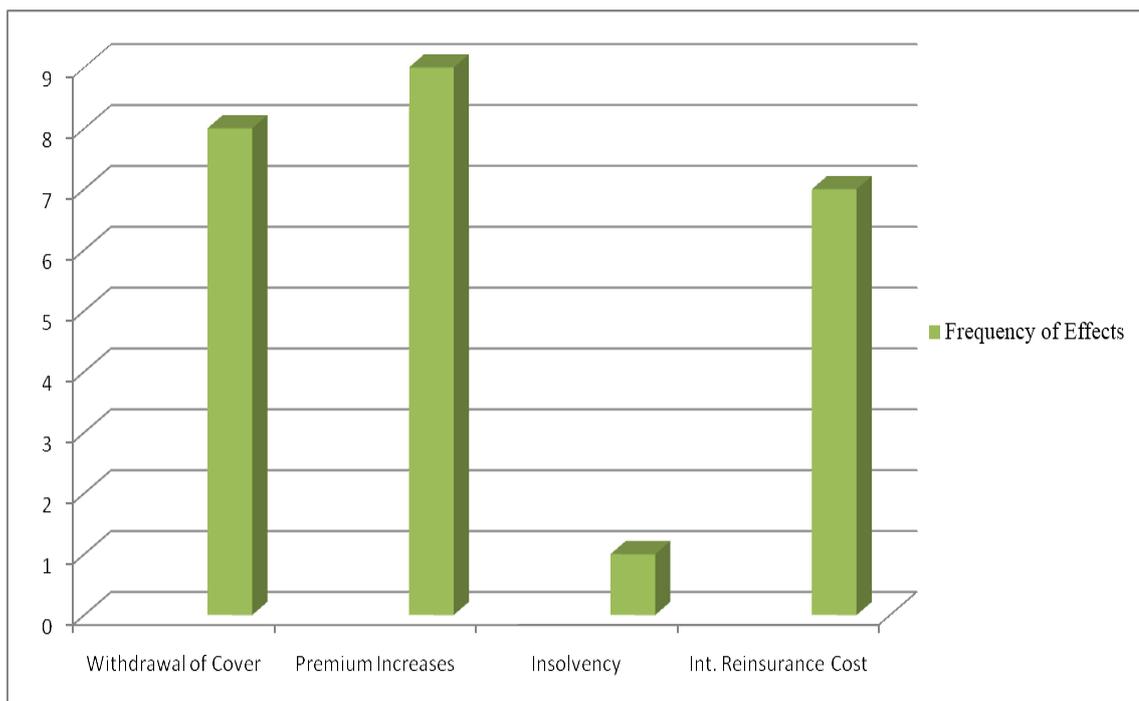
**Table 4.7: Possible effects of CC on the Industry in the next 5 years**

<b>Effect</b>	<b>Frequency</b>
Increase Underwriting losses	6
Withdrawal of Cover	8
Premium Increases	9
Insolvency	1
Int. Reinsurance Cost	7
Researcher's own construct	

90% of respondents suggested that in the next five years, CC will result in premium increases for the industry. 80% of respondents suggested that in the next five years,

CC will result in possible withdrawal of cover by insurers while 70% of respondents suggested that in the next five years, CC will result in increases in underwriting results. 70% of respondents suggested that in the next five years, CC will affect International reinsurance cost and the capacity of reinsurers to absorb such high risks. Reinsurance is an arrangement whereby one insurance company (the ceding company) agrees to cede a proportion or part of its risks to a reinsurance company after it has exceeded its retention. The reinsurer will in turn cede any risks beyond its retention to retrocessionnaires.

**Figure 4.8: Possible effects of Climate related risks on the Industry in the next 5 years**



Researcher's own construct

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS**

#### **5.0 Introduction**

The chapter summarises the findings, concludes the research and offer some recommendations. Climate related risks will likely continue to put financial stress on the Insurance Industry. Climate related risks are emerging risks in the Ghanaian market.

#### **5.1 Summary of Findings**

In keeping coherently with the research objectives, the findings are encapsulated below.

##### **5.1.1 Risk Implications of Climate related risks**

The findings of the research clearly shows that about 54% of the respondents indicated that Climate related risks has high risk implications on the insurance industry. The most areas to be hit by the potential implications of Climate related risks are claims outlays, difficulty in obtaining co-insurance, difficulty in obtaining reinsurance placement, Profitability and solvency, capacity and ability to absorb large risk but with little impact on insurance premiums or risk pricing. This means that there is no significant or very low risk implication of Climate related risks on insurance premiums.

However, 80% of respondents indicated that Climate related risks has an effect on insurance premium on only policies covering climate related risks, while comparatively, a lower proportion of 20% of respondents indicated otherwise (Ref. Table 2). The development of Insurance products covering climate change related

risks is perceived to result in increases in claims from climate change related risks. This is likely to affect the Volume of claims outlays in the insurance industry. On the other hand, it is generally acknowledged that Africans and for that matter Ghanaians are not so much interested in insurance and might not be interested in insuring against climate change related risks. On the contrary, 60% of the respondents indicated that increases in climate change related claims will have an effect on the volume of claim outlays (Ref. Table 4). This means that the high proportion of respondents (60%) believe that increases in claims from Climate related risks will affect the volume of claim outlays for the industry.

#### **5.1.2 Possible Effects of Climate related risks on insurance premiums for policies covering Climate related risks**

Effects of Climate related risks on the general economy and the insurance industry have well been acknowledged and documented. Some of these effects include increased underwriting losses on property business, Withdrawal of cover from certain geographical areas, Premium increases, Insolvencies and International reinsurance cost/capacity. It is widely believed that increases in Climate Change issues such as flood damage or climate risks result in higher premiums being charged for policies which cover flood or climate related risks. In affirming the validity of this assertion, 80% of respondents indicated that Climate related risks have an effect on insurance premium on policies covering climate related risk while comparatively lower proportion of 20% of respondents indicated otherwise.

#### **5.1.3 Risk Management Measures Adopted by the Insurance Industry**

In assessing the measures adopted by underwriters in accepting climate change related insurable risk, it emerged that: Compulsory Risk Survey, Premium Loading,

Declination of Cover, Accept cover but impose deductibles, warranties and other policy conditions were identified as the main risk management techniques adopted by the Industry.

The imposition of policy condition received 90% endorsement from respondents. This means that underwriters should accept climate related risks but also impose policy conditions. The imposition of policy conditions would help mitigate the insurer's exposure under any climate related risks insured and thus achieve a balance of the risks in portfolio. 80% of the respondents are also of the view that underwriters should always require a compulsory risk survey as a measure prior to accepting Climate related risks. Brokers as intermediaries are expected to and must conduct risk surveys and assessment before they process any business for quotation. The survey is meant to reveal the risk characteristics of a particular peril to inform a prudent underwriter in deciding whether to cover the risk. 50% of respondents hold the view that underwriters should accept CC related Risks but must load the premium. In other words, they should rate such risks as high risks and charge high premiums. Simply put, insurers should adopt the Principle of equivalence - that is, more risky contingencies should attract higher premiums. Declining insurance cover receive only 10% approval from respondents. They are of the view that the view that prudent underwriters should decline cover. The role of the underwriter is to assess the risk based on the relevant material information provided by the proposer and take a decision to accept or decline cover.

#### **5.1.4 The Industry's Non-proactiveness to Climate related risks Issues**

The insurance industry is not strongly involved in pushing the Climate related risks agenda. This can be inferred from the 60% of the respondents who strongly agree that

the insurance industry in Ghana is not proactive to the issues regarding Climate related risks while 20% agree that the insurance industry is not proactively responding to the issues of Climate related risks. A lower proportion of 10% indicated that the industry is neutral to matters germane to Climate related risks. Only 10% of the respondents to some extent disagree that the industry is not proactive to matters germane to Climate related risks. The general deduction that can be made from this statistics is that the insurance industry is not proactively responding to the emerging Climate related risks that engulf the Industry. This could be due to the level of understanding of Climate related risks and its risk implications.

#### **5.1.5 Practical Steps Adopted by the Insurance Industries to Reduce Effects of Climate related risks**

Various attempts have been made by the stakeholders in the insurance industry to lessen the effect of Climate related risks. Investigations or research on cycles of the Weather, researches on susceptible areas, Education on Climatic hazards, State assisted or funded catastrophe consortiums or pools such as the Ghana Agricultural Insurance Pool. Closer collaboration with relevant authorities which plan and enforce standards of construction, improved claims control, tax exemptions on reserves of catastrophe consortiums, tax allowance on catastrophe reserves, limitations on acceptance of risks, giving prominence to risk management and the use of ART are some of the attempts made by the insurance industry aimed at reducing Climate related risks.

## 5.2 Recommendations

The writer recommends the following measures for action:

- Industry should invest in mitigating losses and impose loss mitigation measures in policies.
- Liaison with Meteorological Services to undertake study of vulnerable areas and research on weather patterns.
- During inception and currency of cover, insurers and brokers must require full disclosure of all relevant material facts to the underwriter. Full disclosure of the Climatic risk characteristics is important in fulfilling the doctrine of utmost good faith.
- In risk assessment, commensurate risk premiums should be charged by underwriters. They should apply adverse risk selection and differentiate risks premiums by categorizing poor risks from those with improved risk features.
- Research on the subject matter and allied topics must be funded by the Industry. They should also consult the best research materials and incorporate such knowledge in their business processes and training sessions.
- **Risk Imagination:** If the industry players can pre-empt the future and imagine the industry in the next 5 years and how Climate related risks can have an adverse impact, then the industry should be selectively engaged to optimize risk management and risk transfer.
- **Catastrophe Risk Reserve:** With the formation of a reserve akin to the GAIP, Climatic risks can be put in one pool from which all outlays are paid from.
- **The use of Catastrophe Risk Modeling:** Climatic risks are not inexplicably random but deterministically complex. There is little information available to the industry about extreme events, thus hampering the commitment of adequate

capital by insurers. By using the Catastrophe Risk Modeling, the event probabilities can be quantified for easy analysis. This model is useful in the transformation of risk uncertainty into usable information involving better predictive mechanisms.

- **The use of Alternative risk Transfers (ART):** The ART is a range of risk-financing techniques adopted after exhaustion of the reinsurance capacity. Through securitization, the excess risks are converted into tradable securities through the issuance of weather derivatives and Bonds. Derivatives can be described as financial instruments that are derived from some other asset or event. This is because pools of Capital are too small and the industry will have to consider placing such climatic risks on the international ART markets which has the capacity to absorb high risks.

### **5.3 Conclusion**

The implications of Climate related risks on the general economy cannot be overemphasised. Insured property risks will continue to increase. The cost of insurance will also increase thus incentivizing risk retention. In a soft market like ours, when premiums rise, it would result in industry players undercutting premiums in order to stay competitive in the market. Some of the implications identified by this study includes: Losses emanating from underwriting property insurance, Increases in risk pricing or Premiums, Possible Insolvencies of insurance companies and insurers withdrawing cover from certain landmarks or areas. These potential occurrences consequently affect claims outlays, difficulty in obtaining co-insurance, difficulty in obtaining reinsurance placement, Profitability and solvency, capacity and ability to absorb large risks. Measures adopted by underwriters to manage these risks have

been: Compulsory Risk Surveys, premium loadings, acceptance of cover but imposition of deductibles, warranties and other policy conditions.

Some attempts made by the industry at reducing climate change related risks include: The use of Alternative Risk transfer, the formation of state funded risk pool such as the Ghana Agricultural Insurance Pool, Improved claims control, the setting of catastrophe reserves by insurers, proactive management of risk and funding research on patterns of the weather. Notwithstanding the above measures and steps aimed at mitigating climate change related risk, the general perception is that the insurance industry is not proactive to Climate related risks as has been affirmed by the respondents. Currently, with a market penetration of about just 5%, compounded by low premiums as a result of premium undercutting, the impact of any catastrophic loss would greatly affect the fortunes of most general insurance businesses.

The insurance industry needs therefore to be more proactive at identifying and developing insurance products to accommodate climate change related risks.

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**APPENDICES**

**APPENDIX A**

**Questionnaire for Research**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE & TECHNOLOGY**

**(KNUST)**

**SCHOOL OF BUSINESS**

**DEPARTMENT OF ACCOUNTING & FINANCE**

A QUESTIONNAIRE DESIGNED SOLELY FOR ACADEMIC PURPOSES IN SOLICITING INFORMATION ON RESEARCH TOPIC '**CLIMATE RELATED RISKS AND ITS IMPLICATIONS ON THE INSURANCE INDUSTRY IN GHANA**'. RESPONDENTS ARE ASSURED THAT THE DATA COLLECTED ARE PURELY FOR ACADEMIC PURPOSES. ALL RESPONSES PROVIDED WILL, THEREFORE, BE TREATED WITH STRICT CONFIDENTIALITY. KINDLY ANSWER WITH A TICK (✓) OR PROVIDE A WRITTEN ANSWER TO THE QUESTION WHERE APPROPRIATE.

1. May I please know how you understand Climate Change related risks?

.....  
.....

2. On a Scale of 1-3, please rank Climate related risks (emphasis on flood risks) according to extent of risk implications on the Insurance Industry in Ghana.

*1= Not significant risk implications 2=Very low risk implications 3=High risk implications*

	<b>Risk implications of Climate related risks</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>A</b>	Claims outlays			
<b>B</b>	Insurance premiums			
<b>C</b>	Difficulty in obtaining co-insurance			
<b>D</b>	Difficulty in obtaining reinsurance placement			
<b>E</b>	On profitability or solvency of insurance companies			
<b>F</b>	On capacity and ability to absorb large risks			

3. Will increases in Climate related risks issues such as flood damage or climate risks result in higher premiums being charged for policies which cover flood or climate related risks?

a) Yes [ ]

b) No [ ]

4. Will an increase in claims resulting from climate related risks affect the Volume of claims outlay for the insurance industry?

a) Yes [ ]

b) No [ ]

5. If yes please state how such claims can affect the volume of claims outlays for the insurance industry

.....  
 .....

If No, please give reasons why such claims does not affect the volume of claims outlays for the insurance industry

.....  
.....

6. Which of the under mentioned measures should be adopted by underwriters in accepting Climate Change related insurable risks? Please tick as appropriate

- a) Require compulsory risk survey [ ]
- b) Load premium [ ]
- c) Decline Cover [ ]
- d) Accept cover but impose deductibles, warranties and other policy conditions [ ]

7. Do you agree that the Insurance Industry is NOT proactively involved in the issue of Climate?

- a) I Agree [ ]
- b) Strongly Agree [ ]
- c) Neutral [ ]
- d) Disagree [ ]
- e) Strongly disagree [ ]

8. What practical steps do you think the Insurance Industry in Ghana should pursue to reduce the effects of Climate related risks? Please tick as many as are appropriate

- a) Research on weather patterns [ ]
- b) Studies of vulnerable areas [ ]
- c) Education/PR about natural hazards [ ]

- d) Government backed Industry catastrophe pool such as the Ghana Agricultural Insurance Pool [ ]
- e) Improved claims control [ ]
- f) Tax allowance on catastrophe reserves [ ]
- g) Restriction on risk acceptance [ ]
- h) Emphasis on risk management [ ]
- i) Alternative risk transfer [ ]
- j) Closer co-operation with authorities for planning and construction standards [ ]

9. Do you believe changes in weather patterns have resulted in increases in more insured weather losses?

- a) Yes [ ]
- b) No [ ]

10. In the insurance market, which of these do you think will result from possible effects of Climate related risks in the next 5 years? Please tick as appropriate

- a) Increased underwriting losses on property business [ ]
- b) Withdrawal of cover from certain geographical areas [ ]
- c) Premium increases [ ]
- d) Insolvencies [ ]
- e) International reinsurance cost/ capacity [ ]

11. Has your organisation adopted any of the following strategies to manage the implications of Climate related risks on its lines of businesses? Please tick as appropriate

- a) Monitor/join in the debate on Climate related risks [ ]
- b) Risk Surveys [ ]
- c) Better maps or liaison with the Meteorological Services [ ]
- d) Reinsurance/alternative risk financing [ ]
- e) Differential rates or excesses [ ]

12. Do you believe changes in weather patterns have resulted in increases in more insured weather losses?

Yes [ ]

No [ ]

## **APPENDIX B**

### **Interview guide for research**

**Date of the interview.....**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE & TECHNOLOGY**

**(KNUST)**

**SCHOOL OF BUSINESS**

**DEPARTMENT OF ACCOUNTING & FINANCE**

AN INTERVIEW GUIDE DESIGNED SOLELY FOR ACADEMIC PURPOSES IN SOLICITING INFORMATION ON RESEARCH TOPIC '**CLIMATE RELATED RISKS AND ITS IMPLICATIONS ON THE INSURANCE INDUSTRY IN GHANA**'. RESPONDENTS ARE ASSURED THAT THE DATA COLLECTED ARE PURELY FOR ACADEMIC PURPOSES. ALL RESPONSES PROVIDED WILL, THEREFORE, BE TREATED WITH STRICT CONFIDENTIALITY. KINDLY TAKE NOTE THAT YOUR RESPONSES SHALL BE RECORDED IN WRITING.

#### **Questions:**

1. Please what technical role do you play in your Organisation?
2. How would you describe climate change and climate related risks?
3. i. Does the Ghanaian insurance industry insure any climate related risks?  
ii. Kindly list some of the policies which cover Climate related risks.
4. What underwriting considerations do you factor before granting cover to climate related risks?
5. Which areas of your operations as an insurer/broker/reinsurer has climate related risks had implications?

6. What has been the claims experience since you started granting cover for climate related risks.
7.
  - i. Was your organization liable in claim payment following the 2011 and 2015 floods?
  - ii. Can you conjecture the quantum of claim outlays emanating from damage caused by the floods?
8. What risk management techniques have you adopted to mitigate your exposure under such risks.
9. What recommendation(s) can you give to the industry in reducing the implications of climate related risks?