SOCIO-ECONOMIC EFFECTS OF OIL AND GAS ACTIVITIES ON OGONILAND, RIVERS STATE, NIGERIA

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SEPTEMBER 2016

TITLE PAGE

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A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D) IN ECONOMICS

SEPTEMBER 2016

APPROVAL

THIS THESIS HAS BEEN APPROVED FOR THE DEPARTMENT OF ECONOMICS, UNIVERSITY OF NIGERIA, NSUKKA

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DEDICATION

This thesis is dedicated to my wife, Kelechi Charity Ojide; and my parents, Mr. and Mrs. Emmanuel Ojide.

CERTIFICATION

Ojide, Makuachukwu Gabriel, a postgraduate student in the Department of Economics with registration number PG/Ph.D/08/50240 has satisfactorily completed the requirements for the degree of Doctor of Philosophy (Ph.D) in Economics.

The work embodied in thesis is original and has not been submitted in part or full for any other Diploma or Degree of this or any other University.

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ACKNOWLEDGEMENTS

I am beyond fortunate to have an incredible support network. My family, friends, lecturers and professors have been invaluable throughout this programme. I would like to express my deepest gratitude to Professor N. I. Ikpeze, my supervisor, for helping, guiding and encouraging me to finish this thesis. His prompt response and willingness to assist were my major inspiration. Without his numerous suggestions, guidance, patience, expertise and kindness, this work would have never been completed.

Dr. Ezebuilo Ukwueze , my first degree supervisor, was instrumental in forming my understanding of research in economics. He developed in me confidence to face any research project in economics and other related areas. I am, also, grateful to Professor C. C. Agu, my Masterôs degree supervisor, for his love and encouragement throughout this programme. In addition, I am grateful to Prof. Stella Madueme, Asst. Prof. O. Onyukwu, Dr. Emmanuel Nwosu, Dr. Jude Okechukwu Chukwu, Dr. Innocent Ifelumini, Dr. Tony Orji, Mr. Johnson Nchege, and all the other lecturers and Ph.D candidates in economics department for their immense support and useful contributions towards the quality of this thesis. Thank you all!

Furthermore, I am grateful to Dr. Augustus Legborsi (Ministry of Health, Rivers State, Nigeria) for his love and encouragement. He did not only inspire me to study his community - Ogoniland, but also gave me valuable feedback and continuous support. His family also supported me throughout my time in Rivers State. Without their kindness and assistance, it would have been very difficult to conduct the household survey in the community. My fieldwork assistant, Pastor Sunday Baridilo Promise (a lecturer in a Bible School in Ogoni Community), and his team of fieldworkers, Rev. Mene Kobaa (Tai LGA), Mrs. Beauty Kale Nelson (Eleme LGA), Miss Gift Gbogbara (Gokana LGA), and Miss Lezor (Khana LGA) did a brilliant job during the period of the survey by ensuring that high quality data were collected for this study. I send my thanks and love to all of them. Special thanks, also, to all the members of staff of Centre for Public Policy Alternatives (CPPA) Lagos, and Socio-economics Unit of International Institute of Tropical Agriculture (IITA) Ibadan. Their encouragement, insights and research challenges made me better equipped to complete this thesis. I am particularly indebted to Dr. Tahirou Abdoulaye (IITA, Ibadan) for his inestimable support.

I would like to express my deep gratitude to my parents, Mr. and Mrs. Emmanuel Ojide and my brothers (Dr. Chiedozie Ojide and Mr. Tochukwu Ojide) and sisters (Mrs. Nneka Okenyi and Mrs. Chinyere Nwajei) for their endless love and encouragement throughout the period of this research. Their kind words and expressions of love were a source of strength. Mummy, you taught me to always keep the faith. Daddy, you believed in me even when I was ready to quit education. Indeed, you helped me believe in myself. Thank you all and stay blessed.

Most importantly, I want to thank my darling wife, Kelechi (Kc), for her profound love, patience, understanding, and unconditional support throughout this period. I would not have completed this work without her support. At first, I abandoned the programme; but she insisted that I should resume. She truly made a lot of sacrifices. Indeed, Kc has taught me that human love is capable of something miraculous ï increasing returns to scale.

Finally, I would like to sincerely confess that my success in this programme is from God Almighty who gives wisdom generously to all without finding fault.

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ABSTRACT

Crude oil is one of the major natural resources that have contributed to the development of the Nigerian economy. It, however, poses great environmental and socio-economic challenges. As a result, the effects of oil exploration activities on the socio-economic wellbeing of host communities, like Ogoniland, have been of concern to the Nigerian government. Measurement of such socio-economic effects is an essential requirement for policy formulation and strategic planning for sustainability. This research, therefore, measures the effects of oil exploration on the socio-economic wellbeing of Ogoni community in the Niger Delta Region of Nigeria. Primary data used in this study were collected through a survey of 400 households using a multistage sampling technique. The survey was conducted in December, 2013 and January, 2014. The collected data were presented using descriptive analyses approach. Ordinal logistic models were estimated to test the hypotheses. The descriptive results reveal that about 65% of the households were within the average monthly income of ₦50,000 and below. In addition, about 75% of the surveyed households were involved in agricultural production; out of which only 37% indicated that they lost their produce due to oil spillage within the last two years. The ordinal logistic regression models reveal that oil spill and air pollution do not have significant effect on the health status of Ogoni community. Rather, household income was established as the major determinant of their health status. The result further suggests that households with higher income would suffer little or no environmental-related diseases. It also indicates that oil spill does not significantly influence agricultural productivity in the community. Nevertheless, land degradation and air pollution cause significant reduction in agricultural productivity in the community. In addition, oil spill and land degradation have no significant effect on household income in the community. However, government interventions, in terms of employment creation, have positive effect on household income. On the other hand, willingness to accept pay or not to accept pay from oil companies to tolerate further oil spill, land degradation and air pollution in the community is determined by three key factors namely household income, social capital and perceived level of environmental damages. Likewise, three key socio-economic factors determine Ogoni peopleôs marginal willingness to pay or not to pay for government intervention programmes in the community. These are nationality, household income and social capital. Thus, this study concludes that Ogoni people would be willing to allow further and full-scale exploration of oil in their community if only their socio-economic wellbeing is ensured.

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Economic development, and indeed human survival, is dependent on the exploration of natural resources. Crude oil has had a more profound impact on the world civilization than any other natural resource in recorded history. Oil has become a very decisive element in defining the politics and diplomacy of states. This fact is adumbrated in a public lecture titled ñOil in World Politicsò delivered by a former secretary of the Organization of the Petroleum Exporting Countries (OPEC), the late Chief M. O. Feyide, when he asserted that:

> ñAll over the world, the lives of people are affected and the destinies of nations are determined by the result of oil explorations. Oil keeps the factories of the industrialized countries working and provides the revenues, which enable oil exporters to execute ambitious national and economic development plans. The march of progress would be retarded and life itself would be unbearable if the world is deprived of oil. That is why oil has become the concern of governments, a vital ingredient of their politics and a crucial factor in the political and diplomatic strategies.ò (Pyagbara, 2007)

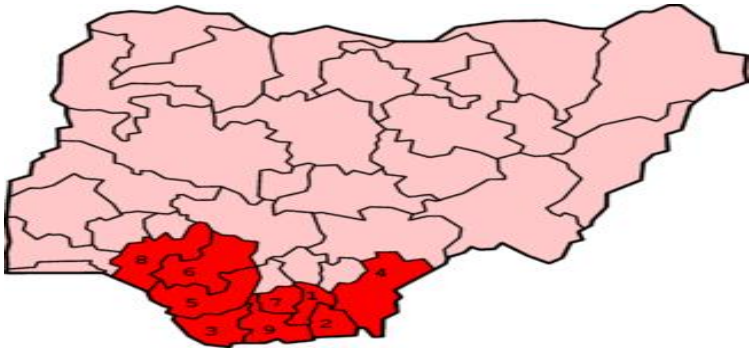
Although Nigeria's oil industry was founded in the 1950s, it was not until the end of the Nigerian civil war (1967-1970) that it came to play a prominent role in the economic life of the country. From a primary-producer country depending for her foreign exchange earnings on a few primary commodities, to a petroleum-producer country depending almost exclusively on crude oil exports for her foreign exchange earnings, aptly describes the country's economic history. Countries with a petroleum-sector driven economy were among the few that rose from the poverty line to relative abundance as a result of the world energy crisis of the 1970s. The oil revenues of the 1970s provided the funds required to provide the basic infrastructure for an industrial take-off and for the development of other sectors of the economy. However, lack of foresight and gross economic mismanagement at various times in the countryôs economic history made Nigeria neglect pursuing an aggressive policy towards developing other sectors of the economy. The cost of that negligence is today's economic crisis. (Kalu, 1994)

The Federal Republic of Nigeria lies on the Atlantic Coast of West Africa. It is Africaôs most populous country with a population of over 160 million people, made up of about 250 different ethnic groups speaking nearly 400 different languages (World Bank, 2014).

Nigeria became independent on October 1, 1960 with a federal system, designed by the colonial rulers, which from the very beginning was at variance with the aspirations of many of the minority groups in the country. Scholars of political development observed that the federal constitution that was produced suffered from two fundamental and destabilizing flaws. The first was the division of the country into three unequal regions, with the population of the size of the northern region alone exceeding that of the two southern regions put together. The second flaw involved, the political and demographic domination of the northern, western, and eastern regions being the majority ethnic nationalities and the attendant marginalization of the minority ethnic nationalities that comprise approximately one-third of the population of each region. The Niger Delta people form the largest group amongst the ethnic minorities spread over the South-South geopolitical zone of the nation.

Political history maintains that the Niger Delta as a region predates Nigeriaôs emergence as a British colony by at least a decade. Britainôs Niger Delta Protectorate and the Niger Delta Coast Protectorate were already well established by the middle of 1880s and the late 1890s before further British interests led to the formation of Southern Nigeria in 1900. In the decades before Second World War, many Niger Delta communities had their own local leaders who distinguished themselves in the service of their people while serving the British. But it was only as a result of the Arthur Richards Reforms of 1946 that regional representation became important in British colonial arrangements (Onduku, 2001).

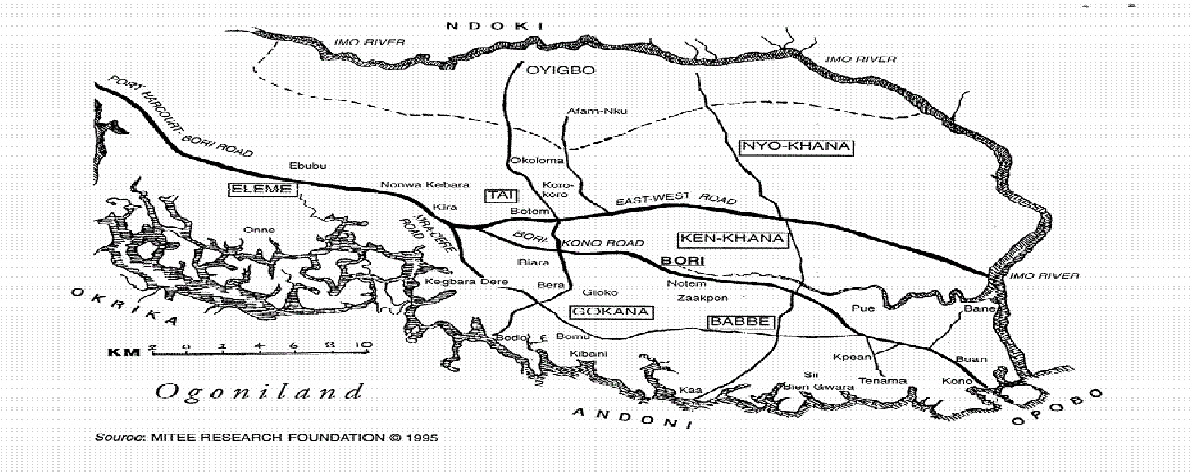
Figure 1: *Map of Nigeria*



The above map of Nigeria (Figure 1) numerically shows states typically considered as part of the Niger Delta region: 1. Abia, 2. Akwa Ibom, 3. Bayelsa, 4. Cross River, 5. Delta, 6. Edo, 7. Imo, 8. Ondo, 9. Rivers. Thus, Rivers State is one of the Niger Delta States. Its capital is Port Harcourt. It is bounded on the South by the Altantic Ocean, to the North by Imo, Abia and Anambra States, to the East by Akwa Ibom State and to the West by Bayelsa and Delta states. Rivers state is predominantly Ikwere clan, an Igbo subgroup and also Ijaw, Ogoni etc in its coastal areas. Linguistic scholars have grouped these communities into six major linguistic groups, namely ljoid, lower Niger (lgboid), Ogoni, Central Delta, Delta Edoid, and Lower Cross. The Ogoni group includes a large number of dialects which can be grouped into four Khana, Gokana, Eleme and Ogoi. These four groups make up Ogoni community (also known as Ogoniland) which is interchangeably called Ogoni people in this work.

Apart from the need for an in-depth and intensive study, the choice of Ogoni is based on the fact that the community was among the first places where oil was found in a commercial quantity in Nigeria ï Shell began drilling in Ogoniland in 1958 (Nest, 1991). Thus, the communityôs historical experience can be considered as a good representation of Niger Delta region vis-à-vis the socio-economic effects of the activities of oil companies. Figure 2 presents the map of Ogoniland.

Figure 2: *Map of Ogoniland*



Nigeria joined the league of oil producing nations on August 3rd, 1956 when oil was discovered in commercial quantities and was ranked in 2013 as the 1st leading oil supplier in Africa, and the 13th largest oil supplier in the world (see table 1.1).

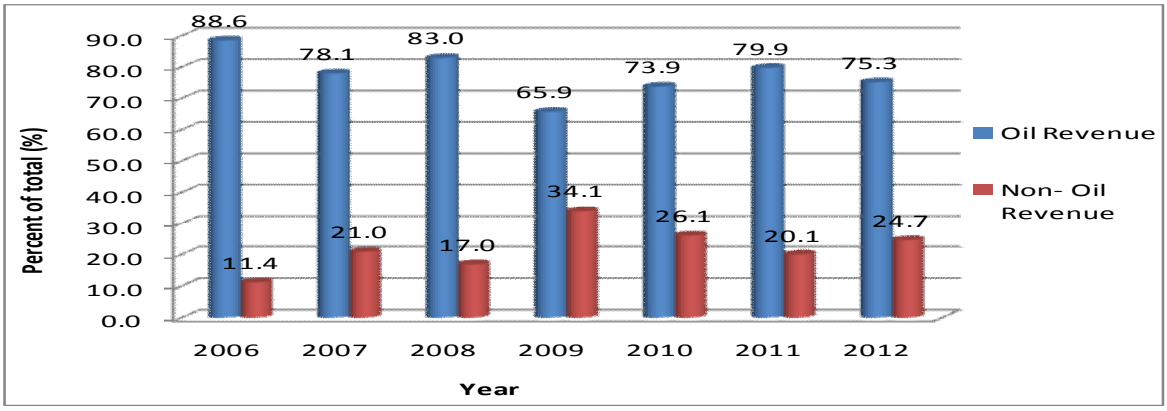
Table 1.1: Top World Oil Suppliers, 2013 (thousand barrels per day)

Country	Oil Supply	Rank
United States	12304.51	1
Saudi Arabia	11591.86	2
Russia	10533.74	3
China	4459.413	4
Canada	4073.019	5
United Arab Emirates	3229.588	6
Iran	3192.370	7
Iraq	3057.692	8
Mexico	2907.834	9
Kuwait	2811.842	10
Brazil	2710.379	11
Venezuela	2489.242	12
Nigeria*	2371.513	13
Qatar	2067.299	14
Angola*	1889.416	15
Norway	1826.096	16
Algeria*	1798.308	17
Kazakhstan	1658.275	18
Colombia	1028.474	19
Libya*	983.6167	20

Source: *U.S. Energy Information Administration (http://www.eia.gov/cfapps/ipdbproject/iedindex3.cf)*
*African country

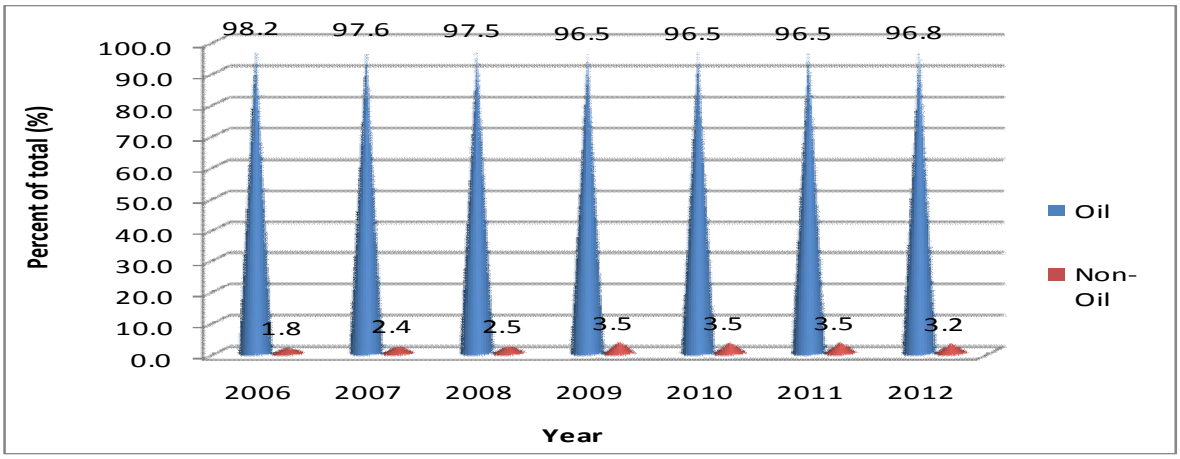
As oil was struck in commercial quantities in Nigeria, it also signaled the beginning of a profound transformation of Nigeriaôs political and economic landscape. Since the 1980s, oil has accounted for about 76% of the Nigerian governmentôs revenue and more than 95% of the countryôs export earnings (see figures 3 and 4).

Figure 3: *Federally Collected Revenue in Nigeria*



Source: Annual Bulletin, Central Bank of Nigeria, 2012

Figure 4: *Nigerian Export*



Source: Annual Bulletin, Central Bank of Nigeria, 2012

Interestingly, almost all of Nigeriaôs oil and gas resources come from its Niger delta region which is occupied by a variety of indigenous nationalities. The Niger delta sustains the largest wetland in Africa and one of the largest wetlands in the world (Human Rights Watch, January 1999). The Niger delta consists of a total landmass of approximately 75,000 square kilometers with the third largest mangrove forest in the world, extensive fresh water swamp, coastal ridges, fertile dry land forest and tropical rainforest characterized by great biodiversity. Seasonal flooding and sediment deposits over thousands of years made the land fertile. The immeasurable creeks and streams have in the past, provided habitat for an abundance of fish and marine wildlife. The Niger delta region is home to approximately 34.4 million (2010 estimate) people grouped into several distinct nations and ethnic groups, amongst which is the Ogoni (Okaba, 2005; and World Bank, 2010).

The Ogoni people are a distinct indigenous minority nationality living in an area of 1,000 square kilometers on the south eastern fringe of the Niger Delta River in what is geo-politically referred today as the South-south of Nigeria. Using an average population growth rate of 2.50 (2007 ï 2010) and 831,726 population published by the National Bureau of Statistics (2006), the 2010 population of Ogoni people is estimated to be around 914,899 (Saro-Wiwa, 1995; UNPO, 2009; and World Bank, 2010). Ogoniland is made up of four local government areas (LGA) namely Eleme, Gokana, Khana, and Tai. The population of each of the LGAs is as shown in table 1.2 below.

Table 1.2: Number of inhabitants by LGA (2010 estimate)

LGA	Inhabitants
Eleme	209,972
Gokana	251,711
Khana	323,639
Tai	129,577
Total	**914,899**

Source: National Bureau of Statistics (2006) and World Bank (2010)

As an indigenous people, the Ogoni had a well-established social system that placed great value on their socio-economic wellbeing before the advent of British colonial rule. Living on a fertile alluvial soil and blessed with a necklace of rivers and creeks, the Ogoni people seized the opportunity of having these resources to become great fisher folks and farmers, producing not only for their own subsistence but also for their neighbours in the Niger Delta and was appropriately referred to as the óFood Basket of the Niger Deltaô. They created a system of agriculture; their traditional means of livelihood ensured the sustainable management and sustainable exploration of natural resources. Socio-culturally, the Ogoni people live in closely knit communities.

The Ogoni people have a tradition and custom that is deeply rooted in nature and this helped them to protect and preserve their environment for generations. Rivers and streams, apart from their being the source of water for life, are also intricately bound up with the life of the community and are not to be desecrated. Thus, Ogoni people believe that there is a dynamic interaction that exists between men and women, animals, plants and so on. These were the natural rights that Ogoni people understood over the years and there is a belief in the system that every person has to take action to protect those natural rights ï rights to lands, rights to nature, etc. Grave consequences follow any erring human conduct or action polluting the environment. The pre-colonial social system therefore ensured sustainable exploration of natural resource and protection of biodiversity. Most of these practices still exist to this day and this explains why the Ogoni people are unanimous when it comes to taking decisions that border on their environment as well as their wellbeing. To them, their lives are inextricably bound with the survival of the environment. This also explains why the Movement for the Survival of the Ogoni People (MOSOP) recorded a phenomenal success in mobilizing the Ogoni people to stand up against the degradation of their environment in the early 1990s

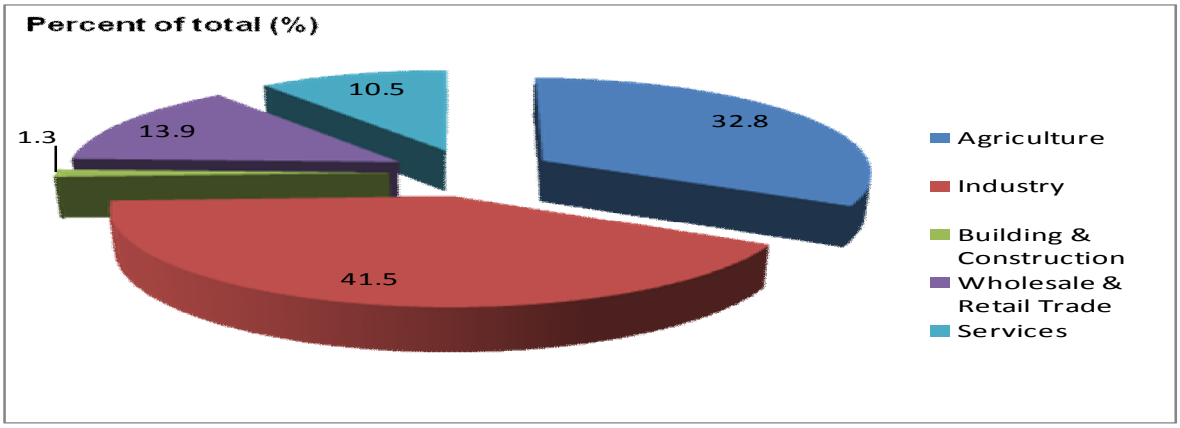
(Pyagbara, 2007). In 1957, Shell Oil Company struck oil in Ogoniland, which set in motion a process that dramatically affected Ogoni community. At the last count, Ogoni has five major oil fields with 110 oil wells, hooked up to five flow stations at Bomu, Korokoro, Yorla, Bodo West and Ebubu by a ribbon of interconnecting pipelines which cross through Ogoni villages (Pyagbara, 2007).

1.2 Statement of the Problem

Ogoni community, which is the subject of this study, has more than 100 oil wells and a number of flow lines, manifolds and flow stations. In addition to these production facilities, a number of oil export trunk lines pass through the community. Ogoni community and other communities in the Niger Delta area have generated massive wealth for the nation. It is nationally acknowledged, that the natural blessings (especially, crude oil and natural gas) of these communities have contributed most to the economic growth of the entire country.

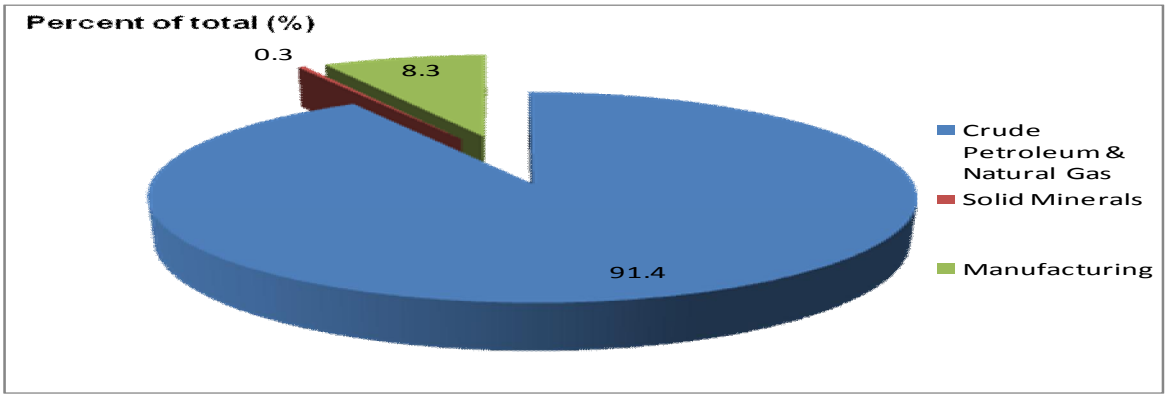
For instance, figure 5 shows that the industrial sector contributed 41.5 percent of Nigeriaôs GDP for period 1990 to 2012. While figure 6 shows that crude petroleum and natural gas actually contributed about 91 percent of the industry sector GDP during this period (1990 ï 2012).

Figure 5: *Nigerian Total GDP 1990 - 2012*



Source: Annual Bulletin, Central Bank of Nigeria, 2012

Figure 6: *Nigerian Industry Output 1990 - 2012*



Source: Annual Bulletin, Central Bank of Nigeria, 2012

However, behind this glossy facade of financial benefits, UNEP (2007) asserts that activities related to oil exploration and production (such as seismic survey, drilling, production and transport) have a range of environmental and social effects on Ogoni community. Pictures of some of the degraded environment are depicted in Figures 7 to 12. The major causes of oil spills in Ogoniland or elsewhere in the Niger Delta include blowout, pipeline corrosion, equipment failure and sabotage. Other minor causes include accidental spills, overflow of tanks, valve failure, over pressure, sand cut through erosion, and engineering error. These oil spills are believed to be having devastating effects on the socio-economic wellbeing of Ogoni community (Human Right Watch, 1999; Raji and Abejide, 2013).

Figure 7: *A view of an illegal crude oil refinery site in the creeks of an Ogoni community in Nigeria's Niger Delta, on July 7, 2010 (Reuters/Akintunde Akinleye)*

Figure 8: *Canoes used for siphoning crude oil to illegal oil refinery are scattered on a creek in Ogoniland outside Port Harcourt in Nigeria's Delta region, on March 24, 2011. (Reuters/Akintunde Akinleye)*

Figure 9: *An aerial view of an oil spill site in the creeks of an Ogoni community in Nigeria's Niger Delta, on July 7, 2010 (Reuters/Akintunde Akinleye)*

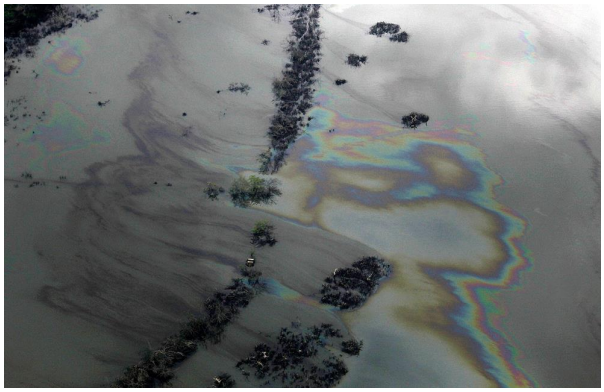


Figure 10: *An aerial view of a village on an island near an oil spill site in a creek in the Ogoni region of the Niger Delta, on July 7, 2010 (Reuters/Akintunde Akinleye)*

Figure 11: *A boy standing in a canoe holds a hose to siphon oil from a spillage site on a river in Bodo community in Ogoni region of the Niger Delta, on June 10, 2010. (Reuters/Akintunde Akinleye)*

Figure 12: *Children sail past an oil pipeline near their home at Andoni settlement, Bonny waterways in Rivers State, Nigeria, on April 12, 2011. (Pius Utomi Ekpei/AFP/Getty Images)*

The environmental impact of oil extraction activities in the Niger Delta has made it the most endangered delta in the world. A poorly managed system of above ground pipes has led to several spills of crude oil, usually to farmlands and water sources. In other countries, Shell buries its oil pipelines but in Ogoniland its pipelines run across farmlands and directly in front of homes. Many of those pipelines are in poor condition and date back to the 1960s (when they were originally installed) making them more likely to crack or buckle and cause oil spills (Cayford, 1996; and Okonta and Oronto, 2001 as cited in Willis, 2013).

According to Willis (2013):

> õThe first major environmental pollution disaster during Shellôs operations in Ogoniland occurred in the Bori oil field in 1970. This affected the town of Kegbara Dere. For three weeks, oil spilled from the well into the surrounding water sources, impacting farmland as well as drinking water. Shell claimed that the spill was caused when Biafran soldiers sabotaged an oil trunk-line while retreating in 1969, a statement that has been called into question by the World Council of Churches 1996 report on Shellôs operations in Ogoniland. Shell took little *or* no action to clean up the spill and the Nigerian Court of Appeal dismissed Shellôs claim that it had sufficiently cleaned up the Kegbara Dere spill in 1995. On June 12, 1993, a pipeline at the Shell flow station started to leak in Korokoro, Ogoni and poured into farmlands and water sources for forty days. Shell officials did not address or remedy the pollution, claiming that the company engineers did not attempt to fix the pipeline for fear of being attacked by the community. In total, Ogoniland ñsuffered from 111 spills between 1985 and 1994òô

Shell, in 1995, admitted that 75 percent of its spills in the Niger Delta of Nigeria were as a result of its old or corroded pipes. Nevertheless, it maintained that 69 percent of the oil spills in Ogoni between 1985 and 1993 were caused by sabotage. Thus, Shell denied responsibility for oil spills in Ogoniland. In addition, during its operations in Ogoniland, Shell employed less than 2 percent of the Ogoni population despite the huge profit it made from the community. Shell also argued that the Nigerian government failed to deliver basic development infrastructure and other human rights to Ogoni people, and that it therefore ñ*went beyond what was necessary"* by providing some benefits to the Ogoni community because of the governmentôs failure. As a result of Shellôs disposition towards the wellbeing of the community, most of its efforts towards community development have often been a source of tension in the community. This is because Ogoni people do not feel that Shell has adequately

addressed the deeper human rights problems that still exist (Okonta and Oronto, 2001; and Boele, Fabig and Wheeler, 2001 as cited in Willis, 2013).

On the other hand, although the Nigerian Constitution of 1999, Chapter II, Section 17 (2) (d), demands for the prevention of any *"exploitation of human or natural resources in any form whatsoever for reasons, other than the good of the community",* the Nigerian government has failed to fully adhere to this principle in the case of Ogoniland. As a result, leakages from oil pipelines and the construction of roads and canals together with deforestation have harshly disrupted the wetlands in the community. Consequently, fishing business is on the decline and the quality of drinking water and soil has drastically declined. This development poses a great threat to the livelihood of the Ogoni people. Burning wells are sometimes extinguished only after months. Despite these problems there seems to be no clear governmental policy of environmental rehabilitation or sincere efforts to enforce environmental laws (UNPO, 2008).

According to Boele, Fabig and Wheeler (2001), the advent of oil, oil workers and oil installations led to societal alterations including the migration of oil workers into Ogoni community. These increased importance of money economy and raised food prices. Temporary employment given to few members of the community was destructive as young men were relatively highly paid for short periods of time. This changed their spending habits, which caused division separating them from their communities (Frynas, 2000). In addition, the main farm workers seem to be affected more by the environmental and social consequences of the oil exploration. Their farm lands were appropriated for oil extraction, and they received neither adequate compensation nor secure jobs in return. The advent of oil also brought major industrial development projects in Ogoni community ï two oil refineries, one petrochemical plant, a fertilizer plant, a cement factory and a power plant. However, to the Ogoni people, instead of reaping the benefits of such interventions, these factories seem to have become curses despite Federal government regulations on employment and corporate social responsibility act.

Ogoni leaders have long recognized the detrimental effect of oil extraction to their community. Letters were sent in 1970 stating that oil extraction activities were ñseriously threatening the wellbeing, and even the very lives, of the Ogoniò (Okonta and Oronto, 2001 as

cited in Willis, 2013). In acknowledgement of these negative effects, government and oil companies have responded in several ways. These include the establishment of corporate social responsibility units by the oil firms as well as the implementation of livelihood support programmes, enactment of environmental and other related laws, establishment of government monitoring and enforcement agencies, and so on. For instance, both the government and oil firms have made efforts to provide social infrastructures like pipe borne water, electricity, motorable roads, school buildings, scholarship programmes and job opportunities among other things in Ogoniland.

However, Chukwuemeka and Aghara (2010) argue that such facilities are not commensurate with the devastating effects of oil exploration on the wellbeing of the Ogoni people. Of course, no commensurate effort can be made by the Nigerian government or oil companies towards meliorating the adverse effects of oil exploration on the wellbeing of Ogoni people without proper estimation of these socio-economic effects. Previous researchers have made attempts to reveal the effects of oil exploration on the host communities. Yet, most of these previous studies were either conducted outside Niger Delta region of Nigeria or covered the entire Niger Delta region (Agbogidi, Okonta, and Dolor, 2005; Idumah and Okunmadewa, 2010; Aghalino and Eyinla, 2009; Kingston, 2011; and Asawo, 2011). These regional studies do not provide for in-depth and intensive study of Ogoniland which is the focus of this study. UNEP (2011) which focused on Ogoniland was rather an environmental impacts assessment. Modibbo, Aliyu, Medugu and Macjoe (2014) appraised the impacts of oil production activities on the environment and socio-economic wellbeing of Ogoniland. They, however, studied only Eleme which is just one of the four local government areas (LGA) in Ogoniland. In addition, in their attempt to cover both environment and socio-economic impacts in the community, little attention was given to the measurement of the socio-economic effects.

The effect of oil exploration on the socio-economic wellbeing of the host community seems to have been crowded out by the enormous interest in the environmental impacts. Nevertheless, measurement of such socio-economic effects is an essential requirement for policy formulation and strategic planning for sustainable development. As a result, it becomes expedient and motivational to estimate the effects of oil exploration on the socio-economic wellbeing of Ogoni community situated in the Niger Delta region.

1.3 Research Questions

This research work addressed the following questions:

1. What is the effect of oil exploration on the socio-economic wellbeing of Ogoni people as a host community?
2. What is the effect of governmentôs intervention efforts in Ogoniland on the socio-economic wellbeing of the community?
3. What is the effect of oil companiesô intervention efforts in Ogoniland on the socio-economic wellbeing of the community?
4. What socio-economic factors influence Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate negative externalities resulting from the companiesôactivities?
5. What socio-economic factors influence Ogoni peopleôs marginal willingness to pay or not to pay for government intervention programmes in the community?

1.4 Objectives of the Study

The overall goal of this research is to measure the socio-economic effects of oil exploration in Ogoniland. This study aims at raising public and political awareness and to assist the Nigerian government, stakeholders in the oil sector and the oil producing communities to implement the principles of ñliving with nature, living with risksò within the context of sustainable development. Thus, this research provides evidence around the socio-economic effects of oil exploration on the host communities.

The specific objectives of this research work, therefore, are as follows:

1. To estimate the effect of oil exploration on the socio-economic wellbeing of Ogoni people as host community

2. To evaluate the effect of the governmentôs interventions towards mitigating negative externalities of oil exploration in Ogoniland on the socio-economic wellbeing of the community
3. To analyse the effect of oil companiesô efforts towards mitigating negative externalities of oil exploration in Ogoniland on the socio-economic wellbeing of the community
4. To determine the socio-economic factors influencing Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate negative externalities resulting from the companiesô activities
5. To ascertain the socio-economic factors influencing Ogoni peopleôs marginal willingness to pay or not to pay for government intervention programmes in the community

1.5 Hypotheses of the Study

Given the above objectives, this research evaluates the following hypotheses:

1. H_0: Oil exploration in Ogoniland has no significant effect on the socio-economic wellbeing of the host community.

   H_1: Oil exploration in Ogoniland has significant effect on the socio-economic wellbeing of the host community.

2. $H_{0:}$ Government interventions towards mitigating the negative externalities of oil exploration in Ogoniland do not have significant effect on the socio-economic wellbeing of the community.

   $H_{1:}$ Government interventions towards mitigating the negative externalities of oil exploration in Ogoniland have significant effect on the socio-economic wellbeing of the community.

3. H_0: Corporate social responsibility activities of the oil companies towards mitigating the negative externalities of oil exploration in Ogoniland do not have significant effect on the socio-economic wellbeing of the community.

   H_1: Corporate social responsibility activities of the oil companies towards mitigating the negative externalities of oil exploration in Ogoniland have significant effect on the socio-economic wellbeing of the community.

4. H_0: Socio-economic factors are not significant determinants of Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate negative externalities resulting from the companiesô activities in the community.

   H_1: Socio-economic factors are significant determinants of Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate negative externalities resulting from the companiesôactivities in the community.

5. H_0: Socio-economic factors do not have significant influence on Ogoni peopleôs marginal willingness to pay or not to pay for government intervention programmes in the community.

   H_0: Socio-economic factors have significant influence on Ogoni peopleôs marginal willingness to pay or not to pay for government intervention programmes in the community.

1.6 Significance of the study

Environmental Impact Assessment (EIA) is a regulatory requirement in Nigeria. Proper application of Environmental Impact Assessment studies will ensure that adverse impacts are minimized and positive impacts are enhanced during oil exploration activities. This study which focuses on Socio-Economic Impact Assessment (SEIA) is a major aspect of Environmental Impact Assessment (EIA) which identifies and evaluates the socio-economic

and cultural impacts of an industrial development project on the lives and circumstances of people, their families and their communities.

Crude oil which is mainly produced in the Niger Delta region contributes about 75 percent to Nigeriaôs total government revenue and over 96 percent of the countryôs total export earnings (CBN, 2012). It therefore, implies that cautious policies must always be in place to justify the extraction, exploitation and exploration of such natural resources from these few states. In the light of the above, it is justifiable to undertake a study that focuses on proffering policy solutions to the socio-economic effects of the activities of oil multinationals in any of the oil producing areas such as Ogoniland. The results from this research will, therefore, be resourceful for policy formulation towards sustainable socio-economic development of Ogoniland.

Moreover, the findings from this research will help policy makers working towards sustainable development in Ogoni community to be aware, in measurable terms, of the socio-economic consequences of oil exploration in the community. Thus, apart from being very useful to different units of government and her agencies, the following, though not exhaustive, will benefit from the findings of this research:

i. Sociologists will use it as basis for informing local communities about changes in their wellbeing as they encourage the communities to participate in the decision-making;
ii. Members of the local community, particularly the council leaders and developers, will find the research output useful in justifying proposed development projects within their community;
iii. Political scientists will find it useful in their attempt in persuading bureaucracies to recognize and respond to concerns about socio-economic changes;
iv. Economists and other researchers will equally appreciate the output of this research in their process of trying to identify externalities associated with any industrial development proposal and assign monetary values to such externalities for proper costing.

The findings of this research will also contribute significantly to some policy debates. These will include economic, employment, social, environment, education, health, and housing

policies. In addition, the result of this research will serve a baseline study for further studies in the community.

1.7 Scope of Study

This work focuses on the socio-economic effects of upstream sector of oil and gas industry in Niger Delta region of Nigeria. Though there are several communities that are affected by natural resources exploration in the Niger Delta region of Nigeria, this research concentrates on Ogoni community in Rivers State. It identifies socio-economic effects associated with oil and gas exploration and oil firmsô installations within the community ï how they affect households in the community as well as the role of the government and the oil companies towards providing for the associated negative externalities. The socio-economic effects examined in this study are based on the householdsôperception. The findings of this study are based on the data collected from Ogoniland during a survey conducted (as part of this study) within the community in December, 2013 and January, 2014.

1.8 Limitations of the Study

Greater part of the challenges faced in the course of this research was during the household survey conducted in Ogoniland. Among these challenges were security constraints and access restrictions. Due to the political dimension of the community and sentiments about oil pollution problems, their political and traditional leaders would require that foreign researchers (that is, non-indigenes) consult with them before and after survey to agree on information to be made public. This could lead to biased results. To avoid introducing such bias, the survey used in this study was conducted using local researchers under close supervision. Thus, there was no form of consultation with their political or traditional leaders ï pre and post the survey. However, due to non-availability or restricted access to comprehensive baseline data of Ogoni community, this research could not measure impacts of interventions (from government and oil firms) or oil exploration activities in terms of pre and post such interventions or activities.

To provide for quantitative analyses, the interview scheduled used was mainly closed-ended questions. This, however, restricted the respondents from raising relevant issues that would add to proper policy formation. Also, to minimized bias, information on sensitive issues, such as household income, were obtained using indirect questions. For instance, information on householdôs income was obtained by asking each respondent to indicate his/her household expenditure including savings. In addition, supervision notwithstanding, enumerators could have introduced bias or error during data collection. Thus, more accurate data collection and more extensive checking of the enumerators could be helpful. Regrettably, these limitations seem to be real due to researcherôs access restrictions.

CHAPTER TWO

LITERATURE REVIEW

This chapter discusses the conceptual framework, and reviews different relevant theoretical and empirical literature. It also identifies the limitations of quantitative studies with regard to socio-economic effects of oil exploration.

2.1 Conceptual Framework: Measurement of Socio-Economic Effect

Socio-Economic Impact Assessment (SEIA) is the systematic analysis used during Environmental Impact Assessment (EIA) to identify and evaluate the potential (or actual) socio-economic and cultural impacts of a proposed (or implemented) development project on the lives and circumstances of people, their families and their communities. If such potential impacts are significant and adverse, SEIA can assist the developer, and other parties to the EIA process, find ways to reduce, remove or prevent these impacts from happening.

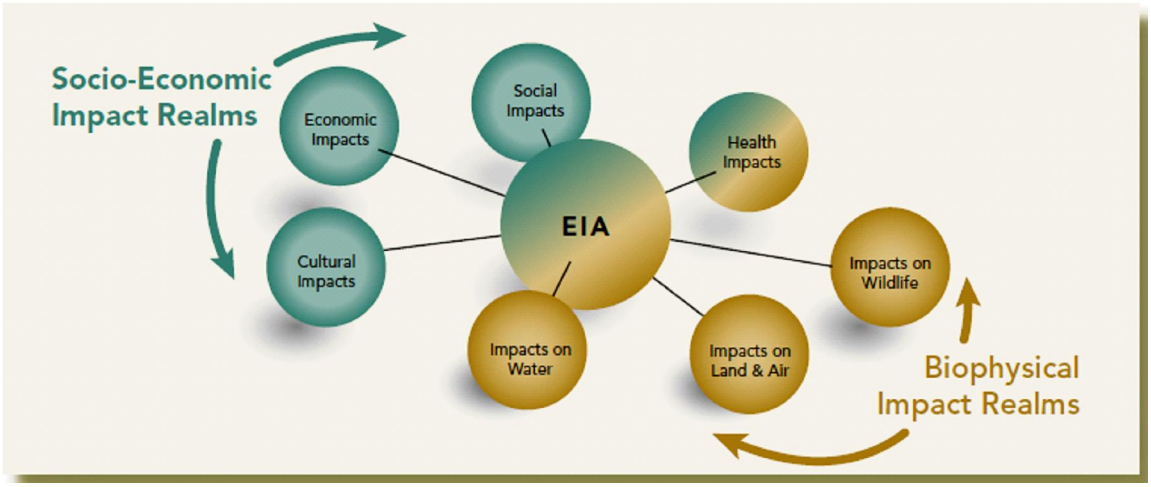
In the past, EIA focused on direct and indirect biophysical impacts of proposed developments (i.e. impacts of development activities on water, air, land, flora and fauna). In recent years, the impacts of industrial development on society, culture and different forms of economic activity have gained equal importance in EIA.

Socio-Economic Impact Assessment (SEIA) can identify and distinguish numerous measurable impacts of a proposed (or implemented) industrial development but not every impact may be significant. The people who are impacted, directly or indirectly, have a say in whether impacts on valued socio-economic components are significant. While SEIA tends to focus on the avoidance of adverse impacts, it also evaluates beneficial impacts of an industrial development.

The Mackenzie Valley Environmental Impact Review Board (March 2007) definition of SEIA recognizes the importance of relationships between people, culture, economic activities and

the biophysical environment. These relationships as captured in EIA are pictorially shown in the figure 13 below.

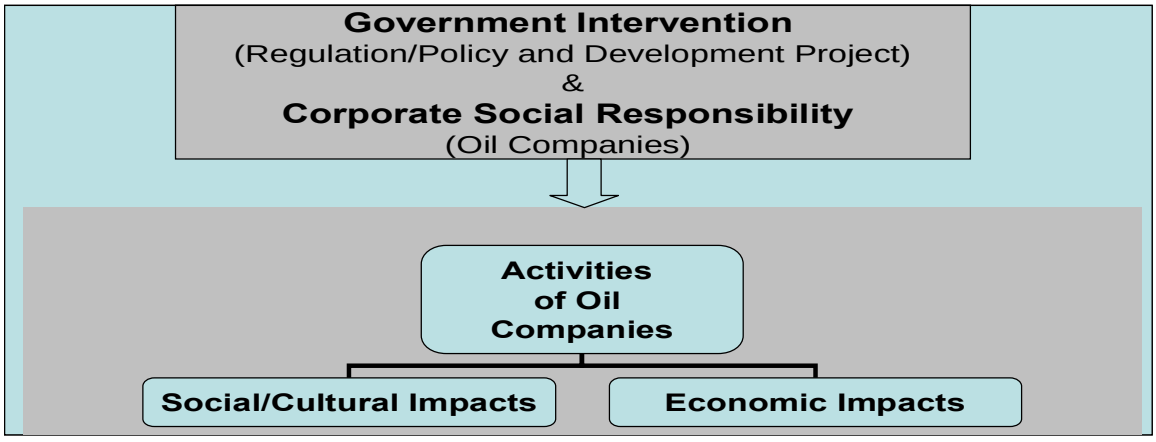
Figure 13: *Environmental Impact Assessment (EIA)*



Source: *Mackenzie Valley Environmental Impact Review Board (March 2007)*

The socio-economic impact realms in figure 13 are the focus area of this study. We examined the activities of the companies that are engaged in oil and gas exploration in Ogoniland in the light of social and economic wellbeing of the host community. These effects could be positive or negative. However, the government through its regulatory roles and intervention development projects is expected to stabilize the system. In addition, the oil companies through their corporate social responsibility activities are expected to improve the beneficial impacts on the host community. Note that cultural impacts are not captured in this study. The conceptual framework for this study is represented pictorially in figure 14.

Figure 14: *The Conceptual Framework for Socio-economic Effect Measurement of Oil Exploration in Ogoniland, Niger Delta Region of Nigeria*



Source: Designed by the researcher

According to Gleave (2012), the definition and prediction of impacts and effects are two different aspects in the EIA process. However, these two concepts have a clear relationship with each other. He points out that EIA practitioners often use the terms ñimpactò and ñeffectò interchangeably. In most cases, this is a reflection of the author trying to avoid using the same term repeatedly rather than a conscious attempt to use the concepts in their correct context. In any case, he agrees that definitions of both terms vary depending on which literary source is referenced. However, the general consensus is that impacts are defined as the changes resulting from an action (intervention), whereas effects are defined as the consequences of impacts (Gleave, 2012).

For instance, if oil spillage occurs during oil exploration activities, the impact (the change arising from the oil exploration activities) could be drastic loss of soil fertility or contamination of sources of drinking water or aquatic ecosystem. An effect (the consequence of such impact), on household could be reduction in crop yield, diseases resulting from drinking contaminated water or reduction in income from fishery.

Another difference between the two terms ñimpactò and ñeffectò is on the research approach or methodology. To conduct impact assessment, the use of baseline data or counterfactual becomes a necessity. However, examination of effects could be done without baseline data or counterfactual. For instance, in impact assessment aims at establishing the change before and after an action (intervention). On the other hand, examination of effect could aim at establishing if household socio-economic status is influenced by an environmental change (Bamberger, 2010; and Ogola, 2007). Given the above-stated distinction between ñimpactò and ñeffectò, it is important to state that this study focuses on the measurement of the effects of oil exploration on households in Ogoniland.

2.2 Theoretical Literature

The section presents a review of the following theories:

i. Economic development theory
ii. Sustainable development theory
iii. Externality theory
iv. Resource curse theory
v. Sustainable livelihoods theory

2.2.1 Economic Development

According to the International Economic Development Council (IEDC), no single definition incorporates all of the different strands of economic development. However, economics development is can be defined as a process that impacts growth and restructuring of an economy to improve the living standard of a society. Put differently, economic development is a process that enhances an economyôs real national income as well as per capital income over a long period of time (Nafziger, 2006).

In recent years, development programming has been focused on the overriding issues of equity and equality in the distribution of the gains from development efforts. A lot of concern has been expressed about the predicament of the rural poor and the imperatives of several baseline requirements for human development. These include access to land and water resources, agricultural inputs and services, including extension and research facilities, and participatory development strategies to tackle rural poverty, with social equity and civil participation viewed as essential to well-rounded socio-economic development (UNDP, 2006). This relatively new orientation has produced concepts such as ópeople-oriented developmentô, óparticipatory developmentôand ósustainable human developmentô.

The concept of people-centred development states that meaningful development must be people-based or human-centred, since development entails the full utilization of a nationôs

human and material resources for the satisfaction of various (human) needs. In more specific terms, a development programme that is people-centred is expected to achieve the following objectives (Chinsman, 1995):

- Enable people to realize their potential, build self-confidence and lead lives of dignity and fulfillment,
- Free people from poverty, ignorance, filth, squalor, deprivation and exploitation, recognizing that underdevelopment has wider social consequences, and
- Correct existing economic, social or political injustices and oppression.

The notion of ópartici patory developmentô bridges the interrelated goals of development and the empowerment of people. Here, development has to be designed to capture what the people themselves perceive to be their interest and needs. Participatory development, sometimes interchangeably called popular participation, is a process ñby which people take an active and influential part in shaping decisions that affect their livesò (OECD, 1995). According to UNDP (2006), people or communities that enjoy active participation in decision-making over issues that concern their livelihood and interests should be able to realize their potential, self-confidence, and lead lives of dignity and fulfillment. Participatory development builds civil society and the economy by empowering social groups, communities and organizations to influence public policy and demand accountability. The process links democratic institutions with human development motivations (OECD, 1995).

More recently, the United Nations has popularized the multidimensional term ósustainable human development.ô This is described as development that not only generates economic growth but distributes its benefits equitably; that regenerates the environment rather than destroys it; that empowers people rather than marginalizing them. It gives priority to the poor, enlarging their choices and opportunities, and provides for their participation in decisions affecting them (UNDP, 2006). Sustainable human development is development that is pro-poor, pro-nature, pro-jobs, and pro-women. It stresses growth, but growth with employment, growth with environmental friendliness, growth with empowerment, and growth with equity (Dickson, 2010).

McEachern (1997) identified keys to development to include level of labour productivity, technology and education, level of efficiency in the use of labour, presence of capital, infrastructure, and availability of economic natural resources among other things. These components of development target productivity which if not properly managed (especially the available natural resources) will lead to a degenerated environment which could cause several adverse socio-economic effects in the society. This situation brings into focus the consciousness that development can no more be sustained without conserving the environment. This led to the concept of sustainable development operational framework (Olujimi, Adewunmi, and Odunwole, 2011).

2.2.2 Sustainable Development

The concept of sustainability, according to Russell (1995), was first used in relation to natural resources. Some theorists like Thomas Malthus, Charles Darwin and Alfred Wallace believe that natural resources are finite and cannot support the worldôs population in future at current levels of resource utilization and population growth rate (Gímenez, 1973). Other theorists like Karl Marx argued that Malthus failed to recognize the potential of human population to increase food supply (Gímenez, 1973). These critics of Malthusô theory, also, argue that resources should be defined more broadly to include stocks of technology and know-how. Therefore, as knowledge and human capability have increased over time, resources have actually increased (Taylor 1993). Following the later theorists, Russell (1995), asserts that sustainability involves sustaining free markets and human knowledge capacities. In the view of the former theorists, threats to sustainability come basically from overpopulation and consumption, while in the later theorists believe that threats to sustainability come from poor policies.

The role of technology development and transfer in sustainable resource use has been a subject of debate among theorists. According to a World Bank study: "Technological optimism may or may not be appropriate: it is certainly contested in the discourse on sustainability" (Norgaard, 1992). However, most of these theorists agree that sustainable development process is actually beyond technology transfer; it revolves around efficient utilization of local resources, whether for research, technology design, or development implementation (Sharif 1992 as cited in Russell, 1995).

As a result, sustainability has been viewed as "the ability to maintain a given flow over time from the base upon which that flow depends," and as "primarily an issue of intergenerational equity" (Norgaard 1992). It involves calculation of the balance between present and future use of a resource, as well as debate about the valuation of resources in relation to different uses (Russell, 1995).

Following the need to address the problem of conflicts between environment and development goals, in 1987 the World Commission on Environment and Development formulated a definition of sustainable development. The Commission states that sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs (Harris, 2003).

Sequel to the above definition, two schools of thoughts emerged among theorists ï ñstrongò and ñweakò sustainable development approaches. ñStrong sustainabilityò theorists give priority to the preservation of ecological goods such as the existence of species or the functioning of particular ecosystems (Dobson, 1998; and Dryzek, 1997). On the other hand, ñweak sustainabilityò theorists disregard specific obligations to sustain any particular good, advocating for only a general principle to leave future generations no worse off than present state (Neumayer, 2003; Khan, 1995; and Barr, 2008). For instance, in terms of protecting old-growth forests, a strong theorist might argue for protection, even if it requires foregoing development that would increase opportunities for future generations. Unlike the strong theorist, a weak theorist view would take into account the various benefits old-growth forests provide, and would then attempt to measure the future value of those benefits against the values created by development (Barry, 1997).

Since the World Commission on Environment and Development popularized this concept in 1987, the under-listed three aspects of sustainable development have been generally recognized (Holmberg, 1992; Reed, 1997; and Harris, 2000).

i. **Environmental:** An environmentally sustainable system must maintain a stable resource base, avoiding over-exploitation of renewable resource systems, and

depleting non-renewable resources only to the extent that investment is made in adequate substitutes for the interest of current and future generations. This includes maintenance of biodiversity, atmospheric stability, and other ecosystem functions not ordinarily classified as economic resources.

ii. **Economic:** An economically sustainable system must be able to produce goods and services on a continuing basis, to maintain manageable levels of government revenue and external debt, and to avoid extreme ósectoralô imbalances which damage agricultural or industrial production. According to Harris (2000), from the point of view of neo-classical economic theory, sustainability can be defined in terms of the maximization of welfare over time. In a simplified form, economic sustainability can also be defined as identifying the maximization of welfare with the maximization of utility derived from consumption. While this may be criticized as an oversimplification, it certainly includes many important elements of human welfare (food, clothing, housing, transportation, health and education services, etc.) and it has the analytical advantage of reducing the problem to a measurable single-dimensional indicator.

iii. **Social:** A socially sustainable system must achieve distributional equity, adequate provision of social services including health, housing and education, gender equity, social capital, and political accountability and participation.

Clearly, these three elements of sustainability introduced many potential complications to the original simple description. The goals expressed or implied are multidimensional, raising the issue of how to balance objectives and how to judge success or failure and the challenges of trade-off. In the real world, we can rarely avoid trade-offs, and as Norgaard (1994) points out, in most cases, we can ñmaximizeò only one objective at a time. Norgaard concludes that ñit is impossible to define sustainable development in an operational manner in the detail and with the level of control presumed in the logic of modernity.ò The strongly normative nature of the sustainable development concept makes it difficult to pin down analytically. Two of these measurements of sustainable development (economic and social) are the bases on which this research evaluates oil exploration in Ogoniland. It may be easier to identify óunsustainabilityô than sustainability ï and the identification of óunsustainabilityô can be a pointer necessary for policy actions towards achieving sustainability.

2.2.3 Externality Theories

Interest in socio-economic effects of exploration of natural resources can be traced back to the works of Scitovsky (1954) and Meade (1973). These studies established the theory of externalities. However, for many years before these studies, the concept of externality had played a central role in the economic theory of resource allocation. For instance, according to Odette (2008), this concept was first introduced by Marshall (1890) and later refined by Pigou (1920) who introduced welfare economics into the scope of economic analysis.

Since then, many writers have provided economic and political analyses of externality theory. Among these writers are Mises (1966), Rothbard (1970), Coase (1960), Demsetz (1967), Posner (1972), Franzini (2006) and Simpson (2007). Some of them have argued in support of externality theory; while others argued against it.

For instance, Simpson (2007) insists that the concept ñexternalityò should be discarded. It should not even be used in intellectual discourse or debate. He argued that the concept does not provide a critique of the market because it is contradictory, cognitively harmful, and invalid. He believes that such a concept does not help one gain a better understanding of some aspect of reality; it only leads to greater confusion because of the absurd implications of the concept and because it leads people to ignore (or, at least, not to recognize the importance of) fundamental political distinctions, like the distinction between the government acting to violate rights and protect rights. He explained that discarding the term ñexternalityò does not mean denying the existence of what the term attempts to categorize. Of course, the actions of people can have effects on others. However, his argument is that the use of such a term is unnecessary and harmful to anyone who wants to understand the reality of the world.

Simpson asserts that after the term ñexternalityò is discarded; all the effects of peopleôs actions on others should still be recognized. However, this should be done while giving them a proper consideration of the facts involved, particularly the fundamental requirements of human life. The proper consideration should be whether a personôs actions respect or violate rights. If an agentôs actions violate someoneôs rights, it should be suitable for government to act to protect

the individual whose rights have been violated. If no oneôs rights have been violated, then the government should not take any action.

Similarly, Franzini (2006) argues that externalities is contrary to traditional economics and may weakening its appalling thesis on the efficiency of free markets. He believes that one important effect of externality thesis has been to induce most economists to believe that a decent society requires little more than competitive markets and effective protection of property rights. He, however, insists that externalities have been metabolized by mainstream economics and there have been no significant changes either in the body of that theory or in the recommendations flowing from it. He, therefore, concludes that basically, externalities are like exceptions which prove the rule.

On their part, Vatn and Bromley (1997) insist that externalities do not actually represent market failure. They argue that *given the market*, the presence of externalities can be interpreted as a rational result and thus cannot properly be called a ófailureô of the market. Supporting this view, they cited Randall (1983) who clarifies that it has long been confirmed that the non-existence of certain markets is a rational market response to transaction costs in excess of potential gains from trade.

This thesis agrees with Simpson (2007) that proper consideration should be given to whether a personôs actions respect or violate rights. Again, that there should be government intervention in the event that an agentôs actions violate someoneôs rights. However, it does not agree that understanding the violation of someoneôs right as negative externality, would be harmful to anyone who actually wants to understand the reality of the world. Understanding that sometimes, for economic or other reasons, someoneôs right can be violated is in itself part of the reality of the world. So, its denial defeats the argument of Simpson. Thus, such occasional interventions from government should rather be integrated into *the free market theory* ï if need be, it could be termed *the augmented-free market theory*.

2.2.4 Resource Curse

Before the late 1980s, it was generally believed that natural resource abundance was an advantage to developing economies. For instance, in the 1950s, geographer Norton Ginsburg argued that ôthe possession of a sizable and diversified natural resource endowment is a major advantage to any country embarking upon a period of rapid economic growthô (Karl, 2005). Mainstream economists such as Jacob Viner and Arthur Lewis also expressed the same view about natural resource abundance (Karl, 1999). Similarly, in the 1960s, the development theorist Walter Rostow argued that abundance of natural resources would enable developing countries in their transition from underdevelopment to industrial ôtake-offô, just as such resources had done for countries like Australia, United States and Britain (Cramsey, 2008). In support of the same view, in the 1970s and 1980s, neoliberal economists such as Bela Balassa, Anne Krueger, and P. J. Drake argued that natural resources could facilitate a countryôs ôindustrial development by providing domestic markets and investible fundsô (Karl, 2005). During the 1950s and 1960s, few radical and structuralist economists challenged this common view about natural resources abundance and economic growth (Alexeev and Conrad, 2008). However, they were in a minority. Nevertheless, from the late 1980s, many theorists have presented evidence to suggest that natural resource abundance ï or at least an abundance of particular types of natural resources ï is in fact a curse for developing countries. Many of them have argued that natural resource abundance increases the chances that developing countries will experience poor economic growth, high levels of poverty, authoritarian rule and civil war. The overall weight of evidence so far is clearly in favour of the resource curse hypothesis (Rosser, 2006).

The emergence of this argument has led to considerable debate about the causes of the resource curse. Specifically, some of the theorists argued that countries exporting natural resource suffered from declining terms of trade, volatile export earnings, an enclave economic structure as well as the so-called ôDutch diseaseô. ôDutch diseaseô refers to a condition whereby a resource boom leads to appreciation of the real exchange rate and in turn damages manufacturing and other tradable sectors (Michael, 1999). According to Cramsey (2008), there appears to be strong evidence supporting the resource curse hypothesis or what scholars have referred to as the *paradox of plenty*, which is used to explain why countries rich in a

particular natural resource are among ñthe most economically troubled, the most authoritarian, and the most conflict-ridden in the worldò(Karl, 2005).

Yet despite this trend, some theorists have challenged the assumptions and predictions of the resource curse hypothesis made by Sachs and Warner and numerous others. These oppositions are from different scholars, but most of them maintain the same message. Basically, opponents of the resource curse hypothesis disagree with the proxy measures used by the proponents of the resource curse including ñconceptual disagreements over the correct measure of resource abundance, as well as appropriate statistical technique for measuring its impactò (Lederman and Maloney, 2007).

The opponents of the resource curse hypothesis assert that the hypothesis should not be considered as fact, despite the evidence and empirical studies that have surfaced, arguing in its favour. According to Madrick (2004), Gavin Wright, an economic historian, argues that ñif exploited wisely, resource abundance can be turned into a growth industry that provides a solid and even long-term foundation for economic growth.ò Lederman and Maloney (2007) argue that this perspective is also crucial when looking at the economic and social development of oil-abundant states, because it potentially changes the paradigm under which development strategies and policies will be implemented. Another major opposition to the resource curse hypothesis came from the neo-Malthusian theorists who argue that resource scarcity, rather than abundance fuels conflict in underdeveloped countries (De Soysa 2000).

On the other hand, other theorists argue that whether resource abundance might result in a blessing or a curse depends on what kinds of institutions are in place: good or bad. For instance, Mehlum, Moene and Torvik (2006a, 2006b), Eric-Ng (2006), and (Smit, 2008) theoretically and empirically argue that natural resource abundant countries include both growth losers and growth winners, and that the major difference between the successful cases and the cases of failure lies in the quality of their institutions. This research agrees with these later theorists that institutional differences, rather than existence or non-existence of natural resource abundance, largely determine the growth or development level of any economy.

2.2.5 Sustainable Livelihoods Theory

Common to all societies is the need for the inhabitants to meet their livelihood needs for food, clothing, shelter and income. Until recently, mainstream development literature and data collection efforts tended to conceive of economic activity as limited to agricultural activity for rural areas and employment for urban areas, and to view income from employment or involvement in agricultural production as the main source of wellbeing. Whilst employment can provide a livelihood, most livelihoods of the poor are based on multiple activities and sources of food, income and security. In both rural and urban contexts, the vast majority of the poor have individual, household and community survival strategies that may include employment. Beyond employment are a range of other economic activities that include informal sector work, exploitation of common property resources, share-rearing of livestock and reliance on social networks for mutual support as well as a number of other mechanisms for coping in times of crisis (Chambers, 1995; SIDA, 1995; Chambers and Conway, 1992; Davies, 1996; Grown and Sebstad, 1989). All people will find ways to meet their survival needs like members of Ogoni communities have been doing since the advent of oil companies in the communities. The crucial considerations, however, are not only to what extent these strategies meet the immediate needs of the population, but whether these activities are sustainable to ensure that future needs are also met (Carney,1998).

In contrast to prevailing approaches on employment, the sustainable livelihoods framework incorporates several dimensions of work that reveal the dynamics of poverty (Grown and Sebstad, 1989). The literature on sustainable livelihoods has evolved mainly within three domains namely:

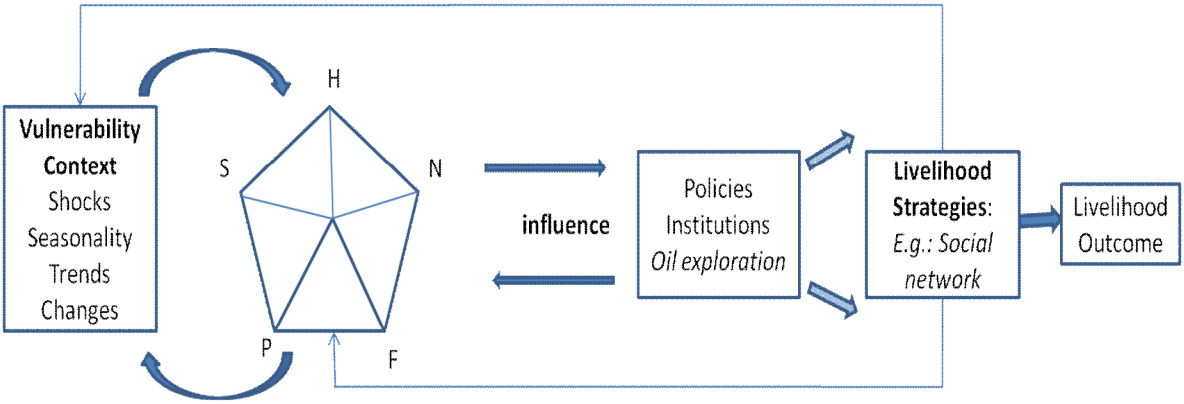
- Agriculture centered perspectives
- Environmental analysis and natural resources management perspectives
- Food security and coping strategies perspectives

Livelihood is, therefore, different from job which is a specific piece of work or activity performed in exchange for payment. Thus, while people work to obtain money, they engage in a livelihood to support life and as such livelihood may or may not involve money. The concept of livelihood according to Olujide (2000) focuses on how individuals, households or groups use their resources to make their living. It reveals the activities people undertake to meet basic

needs to generate income. The concept embraces not only the present availability of the means to make a living but also the security against unexpected shocks and crises that threaten livelihoods. In many societies, like Nigeria and Ogoniland in particular, people combine a variety of activities that yield both monetary and material returns to support livelihoods and their wellbeing (Manu, 2011).

Basically, a livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain its capabilities and assets both now and in the future, while not undermining the natural resource base. The livelihoods framework demonstrates the interaction between household livelihood systems on the one hand, and the outside environment such as the natural environment, policies and institutions. One of the instruments used by members of a society for livelihood sustainability is social capital based on social network. Therefore, this thesis has introduced social network as an example of the livelihood strategies in the sustainable livelihood framework by DFID (1999). This is illustrated in figure 15.

Figure 15: *Sustainable livelihoods framework*

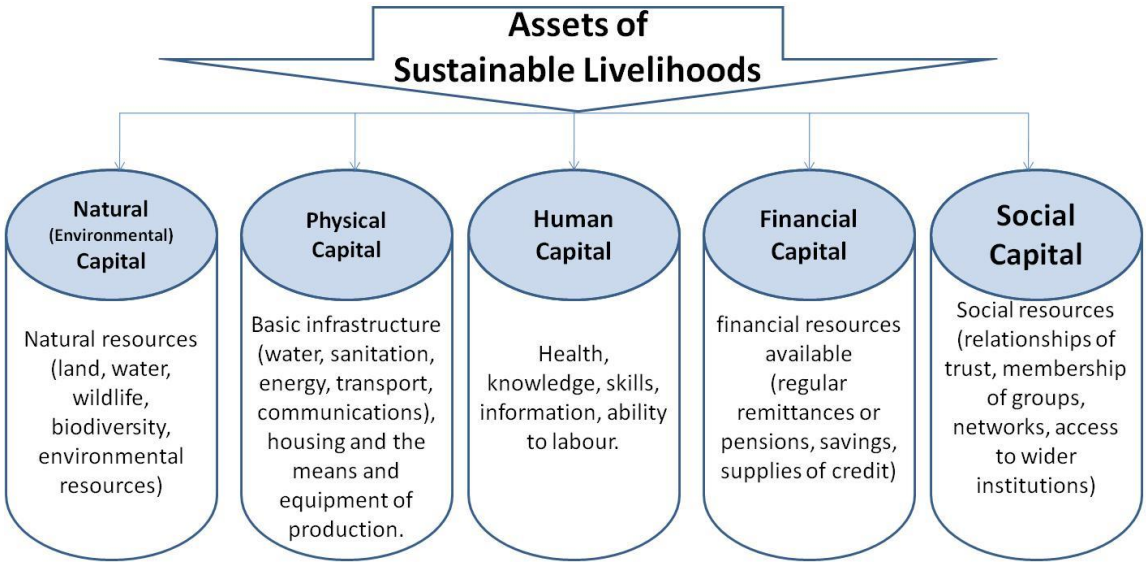


Source: Adapted by FAO from the original flow diagram prepared by DFID in 1999.

Key
H = Human Capital
N = Natural Capital
P = Physical Capital
F = Financial Capital
S = Social Capital

The assets that are generally recognized within sustainable livelihoods theory, as summarized by McLeod (2001) and cited by Majale (2002), are presented graphically in figure 16.

Figure 16: *Assets of Sustainable Livelihoods*



Among the five assets, social capital is the least emphasized in socio-economic analysis ï though recognized theoretically. The concept of social capital is further discussed below.

Social Capital: A Conceptual Overview

There is much debate about what exactly is meant by the term ósocial capitalô In the context of the sustainable livelihoods framework, it is taken to mean the social resources upon which people draw in pursuit of their livelihood objectives. However, in the contemporary academic literature, social capital is discussed in two (but clearly different) ways. The first, primarily associated with sociologists Ronald Burt, Nan Lin, and Alejandro Portes, refers to the resources (such as information, ideas, support) that individuals are able to procure by virtue of their relationships with other people. These resources (ñcapitalò) are ñsocialò in that they are only accessible in and through these relationships, unlike physical (tools, technology) or human (education, skills) capital, for example, which are essentially the property of individuals. The structure of a given network ï who interacts with whom, how frequently, and on what terms ï thus has a major bearing on the flow of resources through that network. Those who occupy key strategic positions in the network, especially those whose ties span important groups, can be said to have more social capital than their peers, precisely because their network position gives them heightened access to more and better resources (Burt 2001).

The second (and more common) approach to social capital, one most closely associated with political scientist Robert Putnam, refers to the nature and extent of oneôs involvement in various informal networks and formal civic organizations. From chatting with neighbors or engaging in recreational activities to joining environmental organizations and political parties, social capital in this sense is used as a conceptual term to characterize the many and varied ways in which a given communityôs members interact. Following this definition, it is possible to conduct a map of a communityôs associational life, and thus with it a sense of the state of its civic health. A range of social problems such as crime, health, poverty, and unemployment have been linked empirically to a communityôs endowment of social capital (or lack thereof), and with them a sense of concern among citizens and policymakers alike.

Scholars working in both conceptual traditions agree that it is important to recognize that social capital is not a single entity, but is rather multi-dimensional in nature. Therefore, social capital is most frequently defined in terms of the groups, networks, norms, and trust that people have available to them for productive purposes (World Bank, 2003).

2.3 Empirical Literature

This section presents a critical review of previous empirical studies. The objective of this section is to establish the gap on knowledge which this study tends fill.

Ofuoku, Emuh, and Agbogidi (2008) studied the social impact of oil production on small holder farmers in oil-producing communities of the Central zone of Delta State, Nigeria. However, they were rather interested in environmental problems experienced in the communities. Using data collected from a sample of 120 respondents with the use of questionnaires, they identified soil erosion, noise pollution, bush burning, land degradation/pollution, water pollution, air pollution, massive deforestation and acid rain as the major environmental problems experienced in the study area. Descriptive statistics such as frequency distribution and percentages were used to analyze the variables of the study while Chi-square was employed to test the hypothesis.

Amadi and Tamuno (1999) examined the socio-economic impact of oil exploration and production in Nigeria with special focus on the Niger Delta region. Nine (9) multinational oil companies and their host communities formed the sample. Their findings revealed that host communities have a wrong perception of the socio-economic responsibilities and development initiatives of the multinational oil companies operating in their areas. They also found a negative relationship between the scale of production / exploitation activities and the level of development of the oil-bearing communities.

In his study on environmental degradation and its impact on the Niger-Delta region, Aluko (2004) used primary data sourced from thirteen communities in the area. Employing descriptive analysis, he concluded that oil exploration activities in the region leads to environmental degradation and are responsible for the high degree of poverty in the area.

Opukri and Ibaba (2008) studied oil induced environmental degradation in the Niger Delta region and conclude that it results into internal population displacement. They adopted descriptive statistics method of analysis using secondary data. Their study, however, reflected only on one of the social effects of oil exploration activities on the people of Niger-Delta ï internal population displacement.

Apata (2010) studied livelihood diversification strategies of farming households in crude oil-polluted areas of Nigeria ï Ondo State. He employed the Multi-stage random sampling procedure. Thus, he identified 150 polluted communities with 600 farming households. He collected data from a total of 590-sample sizes which he subjected to descriptive statistical analysis, regression and Foster-Greer-Thorbecke (FGT) poverty analyses. The livelihood diversification analysis shows that majority of the household heads undertook one form of livelihood diversification strategy or another. Eighty-nine percent of the respondents diversified into non-farm activities. Livelihood diversification was found to have significant effect on household income as 1% increase in livelihood diversification leads to 1.4% increase in income. The poverty status shows that 85.2% of the household heads that relied only on farm income were unable to meet household basic needs compared with 32.3% for those that diversified into non-farm activities. Farming activities related livelihood strategies have low

net income compared with non-farm activities. Livelihood diversification strategy is related to improved household income and reduced poverty status.

Evaluating the comprehensive effect of oil spillage and air pollution can be very difficult because such pollution can affect people and environment far from the spot of its occurrence. For instance, Nwilo and Badejo (2005) and Ewa-Oboho and Oladimeji (1998) found that the oil spilling from broken pipes at the Shell facility in the Qua Iboe oil installation in Ibeno clan was conveyed by tidal waves from Akwa Ibom State to as far as Lagos and to Bakassi in Cameroon, polluting hundreds of kilometres of the ecosystem.

Ndubuisi and Asia (2007) conducted an empirical assessment of the trend and rural communityôs perception of the impact of oil exploration. Using trend equation, they found that the quantity of oil spill is declining, while the number of incidence is on the increase. They also used a survey approach and found polarized views of the project among the affected communities. About 56 per cent wished that on-shore oil exploration and production activities will cease, while the remaining 44 per cent did not. Majority of the respondents (51.63%) believed that the major cause of conflict between the host communities, and the oil exploration and production companies is environmental pollution, while about 24 believed it is caused by youth unemployment.

Okoye, Akenbor and Enaini (2010) examined the impact of oil and gas production on the socio-economic development of the Niger-Delta Region of Nigeria with focus on the role of oil industry operation and government. They used the chiefs and title-holders in Ogba community in Rivers State as their survey sample, questionnaire as the major instrument for data collection, and chi-square as statistical tool. They found that the impacts of the operators and the government towards the socio-economic development of the region were not significant.

Orime (2010) studied socio-economic impacts and stresses suffered by Agba-Ndele people, during the uncompensated 2009 oil spillage incidence within the Sombrero Tidal stream in Rivers State using a simple random sampling method in the affected neigbourhood - the Mgbu-Odokne and the Mgbu-Eze. The observation was tested using the chi-square (X^2) test

statistic. The direct and indirect impacts to those who use the river daily as fishing occupation, local sharp sand excavators, in locally made carpentering boats, were observed to be significant. This was substantiated using the coefficients of chi-squared residuals (R).

Wagner and Timmins (2008) examined agglomeration effects in foreign direct investment (FDI) and the pollution haven hypothesis with the aim to ascertain if environmental regulations impair international competitiveness of pollution-intensive industries to the extent that they relocate to countries with less stringent regulation, turning those countries into ñpollution havens.ò They tested this hypothesis using panel data on outward foreign direct investment (FDI) flows of various industries in the German manufacturing sector. They demonstrated that externalities associated with FDI agglomeration can bias estimates away from finding a pollution haven effect if omitted from the analysis. Thus, they included that the stock of inward FDI is a proxy for agglomeration and employed a GMM estimator to control for endogenous time-varying determinants of FDI flows. Furthermore, they propose a difference estimator based on the least polluting industry to break the possible correlation between environmental regulatory stringency and unobservable attributes of FDI recipients in the cross-section. After accounted for these issues, they found robust evidence of a pollution haven effect for the chemical industry.

Bwõobuya (2002) studied the socio-economic and environmental impact of geothermal energy on the rural poor in Kenya using focus group discussions and field survey. He compared descriptive analyses of the responses from the focused group discussions and field survey with a set of baseline data to ascertain the effects during geothermal exploration, project construction or operation.

Agbogidi, Okonta, and Dolor (2005), examined the socio-economic and environmental impact of oil exploration on agriculture with particular reference to Edjeba and Kokori communities of Delta State, Nigeria. Both communities are oil-producing and agriculture constitutes the primary income generating activities of the indigenes. They administered questionnaires to a sample of 100 animal, crop and fish farmers. This sample was made up of 55 and 45 farmers randomly drawn from Edjeba and Kokori communities respectively. Their results shows that oil exploration and production activities have caused damage to farmlands and water bodies as

a result of oil spillage leading to a decrease in agricultural output and hence the income earning capacity of the people has declined appreciably. The results also showed an increase in the occurrence of health hazard, air/noise pollution and heightened deforestation in these communities.

Using a sample of 262 crop farmers drawn randomly from 10 communities and 5 LGAs in the oil producing agro-ecological zones of Delta State, Inoni, Omotor and Adun (2006) found that oil spill reduces crop yield, land productivity and greatly depressed farm income. Ten percentage increase in oil spill reduced crop yield by 1.3 percent while farm income plummeted by 5 percent.

Idumah and Okunmadewa (2010) studied land degradation and sustainable agricultural productivity in the Niger Delta Area of Nigeria using a sample of 270 respondents. They compared farmers in areas with oil spillage and areas without oil spillage. They found out that farmers in affected areas reap, in most cases, lower yields from food production than farmers in areas where soil is not affected.

Lin (2010) used spatial econometrics to analyze air pollution externalities in United Sates of America. She employed state-by-state source-receptor to transfer coefficients that were used as a basis for a location-differentiated permit system which she estimated. The results affirmed the importance of regional transport in determining local ozone air quality; although due to non-monotonicities in ozone production the externality was not always negative. This result further confirms the concept of externality discussed in the theoretical section of this review.

Gabriel (2007) studied environmental issues and challenges in the Niger-Delta with focus on its impact on women economic activities in the area. He employed a theoretical approach to highlight the emerging effects of the environmental hazards on the region and concluded that it had adverse effects on women activities.

Kingston (2011) investigated empirically the causal relationship between mineral exploration and environmental pollution in Nigeria with specific focus on natural gas and crude oil in Niger Delta region. The model of Granger causality tests was used. Quarterly data covering

2008 and 2009 were used in accordance with the Akaike (1976) minimum lag length for time-series analysis. Using ordinary least square regression analysis, he found that the impact of oil and natural gas exploration on the Nigerian environment is persistent in the long-run. The Granger-causality test showed that there is one-way causality flowing from the flaring of gas by the oil companies to the environmental pollution in Nigeria.

Kretzmann and Wright (1997) examined the impact of oil spillage in Nigeria by obtaining soil samples from Luawii Ogoni and Ukpeleide Ikwerre. They found that the sample from Luawii ñcontained 18 ppm of hydrocarbons in the waterò which is ñ360 times higher than the level allowed in drinking water in the European Unionò and the sample from ñUkpeleide, Ikwerre, contained 34 ppmò which is 680 times more than the 0.05 ppm permitted by the European Union.

Aghalino and Eyinla (2009) examined two cases of oil spillages and their concomitant impact on the flora and fauna of the Niger Delta region of Nigeria. They studied the responses of the oil firms and the federal government to the despoliation of the environment occasioned by the Texaco/Funiwa oil blow out and the Qua Iboe oil spillage. They made use of both primary and secondary sources of information and data for the analyses. The findings of the study show that neither Texaco nor Mobil made genuine efforts to combat the oil spilled from their various platforms until much harm had been done to the environment. Also, the study revealed that Nigerian environmental laws are lax and inadequate.

Babatunde (2010) studied the effect of oil exploitation on the socio-economic life of the Ilaje-Ugbo people of Ondo State, Nigeria. Primary data were obtained through in-depth interviews, Focus Group Discussions (FGD), and a questionnaire. The analysis was done using the Pearson chi-square statistic. His findings indicated that oil exploitation has negative impact the economic life of Ilaje-Ugbo people of Ondo.

The most recent published research on Ogoniland was the environmental assessment conducted by United Nations Environment Programme (UNEP, 2011) which covered level of contaminated land, groundwater, surface water, sediment, vegetation, air pollution, public health, industry practices and institutional issues. The study was conducted using field

observations and scientific investigations (laboratory analysis) methodology to examine soil contamination, groundwater contamination, naturally occurring radioactive materials, surface water and sediment contamination, fish contamination, oil contaminants on vegetation, damage to mangroves, and air pollution and public health. For instance, the objective of soil contamination assessment was to identify whether Ogoni soil was contaminated; and if so, whether the contamination had migrated laterally and vertically. Likewise, the primary intent of groundwater contamination assessment was to verify if there was indeed groundwater contamination; and if so, to identify the farthest reach of the pollutant plume.

The study established that oil contamination in Ogoniland is widespread and severely impacting many components of the environment. It was observed that even though oil exploration activities have drastically reduced in Ogoniland since Shell left the community, oil spills continue to occur with alarming regularity. The Ogoni people live with this pollution every day. Given that Ogoniland has high rainfall, the study suggests that any delay in cleaning up an oil spill leads to oil being washed away, traversing farmland and almost always ending up in the creeks. According to the report, when oil reaches the root zone, crops and other plants begin to experience stress and can die, and this is a routine observation in Ogoniland. At one site, Ejama-Ebubu in Eleme local government area (LGA), UNEP found heavy contamination present 40 years after an oil spill occurred, despite repeated clean-up attempts.

In terms of institutional infrastructure, the UNEP assessment found that overlapping authorities and responsibilities between ministries and a lack of resources within key agencies has serious implications for environmental management in Ogoniland, including enforcement. Remote assessment revealed the rapid proliferation in the past two years of artisanal refining, whereby crude oil is distilled in makeshift facilities. UNEP also found that this illegal activity is endangering lives and causing pockets of environmental devastation in Ogoniland and neighbouring areas.

UNEP (2011) also observed that over the years, only little effort has been made to record information on the effects of oil and gas exploration on households within Niger Delta region of Nigeria, especially in Ogoniland. However, different individual researchers and research

organizations have made several attempts to record baseline data for Ogoniland in Niger Delta region. One of such research organizations is Amnesty International (2009). Amnesty International (2009) is a literature study that compiled baseline analyses of different researchers in addition to the result of its survey. However, it was observed that most of these studies rather highlighted the major socio-economic problems such as lack of political representation and participation, pipe-borne water, electricity, job opportunities and federal development projects. Other socio-economic problems identified are poor health status among the community members, poor agricultural productivity, and destruction of crops and fish ponds, inadequate or lack of compensation system. Nevertheless, it did not provide comprehensive data about the household. However, from this UNEP (2011) report, the statistics about Ogoniland in table 2.1 were extracted.

Table 2.1: Socio-economic Baseline Data of Ogoniland compiled by UNEP

Indicator	**Ogoniland**
Local Government Areas	4
Unemployment Rate (% of working age adults) (2009)	27.90
Poverty incidence (% total population) (2004)	29.09
Safe sanitation (% total population with access to)	19.7
Health care (% total population with access to)	42.3
Access to electricity	<50%
Access to running water or clean drinking water	<50%
Farming (main income source)	>44%
Trading	18%
Services (e.g. transport, tailoring, carpentry, and other artisan work)	10%
Miscellaneous	11%

Sources: UNEP (2011)

According to Ojakorotu (2010), a baseline study in Ogoni community indicates that one of the oil giantsô annual reports of 2003 highlighted the projects and activities of the company vis-à-vis social responsibility components to include:

- 2,500 secondary and 840 university scholarships were awarded to deserving students
- Provision of leadership skills training for approximately 70 school perfects from 15 schools
- Building and renovation of classroom blocks at 20 schools
- Completion of 9 agro-processing micro-projects in various communities under the Agricultural Extension Services Scheme
- Provision of support for 14 micro-credit schemes

- Provision of 7 hand-pump equipped boreholes and deep-water reticulated systems in 13 communities
- Completion of Otuabagi concrete bridge

On the other hand, Living Earth Nigeria Foundation (May 2009) conducted a baseline study in Gokana Local Government Area, Rivers State between 12th and 14th May 2009. However, the study was carried out to map issues of governance in Gokana Local Government Area so as to implement piloted Governance and Transparency Fund project to desired objectives. The study captured data in the LGA prior to commencement of the implementation of a 5-year DFID-assisted Governance and Transparency Fund (GTF) project titled ñStrengthening Local Government Capacity for Effective Service Delivery.ò Thus, the study concentrated on issues around governance in the local government area. It probed topical issues on good governance covering development planning and policy formulation, communication and information dissemination, partnership, budget and fiscal issues among others.

Modibbo, Aliyu, Medugu and Macjoe (2014) appraised the impact of oil production activities on the environment of Ogoniland and also examined the socio-economic impact on the people. However, among the four local government areas (LGA) in Ogoniland, only Eleme was studied. A stratified random sampling technique was used to select a sample size of 120 respondents. Only simple descriptive statistics (frequencies and percentages) were employed for data analyses. Their findings revealed that the externalities of oil production have resulted in profound adverse impacts on traditional lifestyles and livelihood patterns in Eleme LGA. Thus, they suggested the use of abatement procedures and environmentally sound and cleaner technologies for oil exploration and exploitation in order to mitigate/minimize these negative impacts and enhance the positive impacts to achieve a sustainable healthy environment.

2.4 Limitations of Previous Studies

Previous empirical studies reviewed above can be categorized based on area of concentration, namely environmental impacts, socio-economic impacts or both.

Environmental: Those who studied the environmental effects of oil exploration include Kretzmann and Wright (1997), Ewa-Oboho and Oladimeji (1998), Aluko (2004), Nwilo and Badejo (2005), and Inoni, Omotor and Adun (2006). Others are Gabriel (2007), Opukri and Ibaba (2008), Wagner and Timmins (2008), Aghalino and Eyinla (2009), Idumah and Okunmadewa (2010), Kingston (2011), and Lin (2010).

Socio-economic: Those who studied the socio-economic effects are Amadi and Tamuno (1999), Ndubuisi and Asia (2007), Ofuoku, Emuh, and Agbogidi (2008), Apata (2010), Okoye, Akenbor and Enaini (2010), and Babatunde (2010).

Both: Orubu, Omotor, and Awopegba (2009), and BwôObuya (2002) studied both socio-economic and environmental degradation in some selected African countries, while Agbogidi, Okonta, and Dolor (2005) studied both socio-economic and environmental effects of oil exploration in Edjeba and Kokori communities of Delta State, and Idumah and Okunmadewa (2010) also studied both socio-economic and environmental effects of oil exploration in the entire Niger Delta Area. Modibbo, Aliyu, Medugu and Macjoe (2014) appraised the impact of oil production activities on the environment of Ogoniland and also examined the socioeconomic impact on the people.

Most of the previous studies were either outside Niger Delta region of Nigeria or covered the entire Niger Delta region. The regional studies of the Niger Delta (Agbogidi, Okonta, and Dolor, 2005; Idumah and Okunmadewa, 2010; Aghalino and Eyinla, 2009; Kingston, 2011; and Asawo, 2011) do not provide for in-depth and intensive study of Ogoniland which this research tends to achieve. The study identified as comparable to this current research is the environmental assessment conducted by United Nations Environment Programme (UNEP, 2011) and the work of Modibbo, Aliyu, Medugu and Macjoe (2014). Nevertheless, Modibbo, Aliyu, Medugu and Macjoe (2014) restricted their study to only one of the LGAs (Eleme) that make up Ogoniland; also, only descriptive analyses were used. On the other hand, UNEP (2011) was rather an environmental assessment which focused on contaminated land, groundwater, surface water, sediment, vegetation, air pollution, public health, industry practices and institutional issues. This is unlike this current study which is a measurement of socio-economic effects based on the concept of óparticipatory developmentô. As noted in the theoretical literature review, participatory development is concerned about what the people

themselves perceive to be their challenges, interests and needs (UNDP, 2006; and OECD, 1995). In addition, UNEP study employed desk review, field observations and laboratory scientific examination of samples collected from the field. On the other hand, this current research adopts econometric methodology in the estimation of the socio-economic effects of oil exploration in Ogoniland. Of course, the capability of econometrics to characterize relationship between variables and to predict the values of such variables is crucial in economic policy-making and planning. Thus, estimation of the socio-economic effects of oil exploration activities and installed oil facilities on Ogoni community using participatory development conception is the major gap, in research, which this study intends to fill.

In addition, it was observed that none of the studies reviewed presented comprehensive household socio-economic baseline data sufficient for a comparative (pre and post intervention) study. Efforts were made to source such comprehensive household socio-economic baseline data on Ogoniland from research institutes that indicated that they have such information ï among them is Rivers State Ministry of Environment. However, they all insisted that such data are classified information meant for internal usage only and would not be given out to any person or research firm. This constraint of comprehensive household socio-economic baseline data is another gap, in research, this current study intends to fill. Beyond demographic statistics, the baseline data focuses on how households in Ogoniland perceive their socio-economic challenges.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Theoretical Framework

A number of models have been proposed for estimating indicators and illustrating the links between environmental and socio-economic factors especially with regard to oil exploration and production. The best known of these is the "pressure-state-response" model developed originally by the Organization for Economic Cooperation and Development (OECD). This is also the basis of the United Nations Commission for Sustainable Development (UNCSD) framework of sustainable development indicators. It has been adapted by the European Environmental Agency into the "DPSIR" model - driving forces, pressures, state, impact, responses (Turner, Perrings, and Folke, 1997; ECDI, 2011; Jesinghaus, 1999).

The ñ**D**riving forces ï **P**ressure ï **S**tate ï **I**mpact - **R**esponse modelò defines five indicator categories explained below. The link among these categories is illustrated in figure 17.

D: Driving forces are underlying factors influencing a variety of relevant variables. Examples in the oil exploration and production industry include the need for increase in the volume of oil reserve and production, and increase in oil revenue.

P: Pressure indicators describe the variables (caused by the activities of oil companies) which directly cause environmental problems. Examples include toxic emissions, carbon dioxide (CO_2) emissions, land degradation, noise etc. caused by the activities of oil exploration and production companies.

S: State indicators show the current condition of the environment. Examples include the concentration of toxic emissions in air and water; and land fertility level.

I: Impact indicators describe the ultimate effects of changes of state. Examples include the percentage of the members of the host communities suffering from negative externalities resulting from the oil exploration. These externalities include water and air pollution, starvation due to oil spillage induced crop losses, high cost of housing due to increase in demand for house and so on.

R: Response indicators demonstrate the efforts of society (i.e. government, decision-makers, oil companies) to mitigate or stop these negative externalities on the host community.

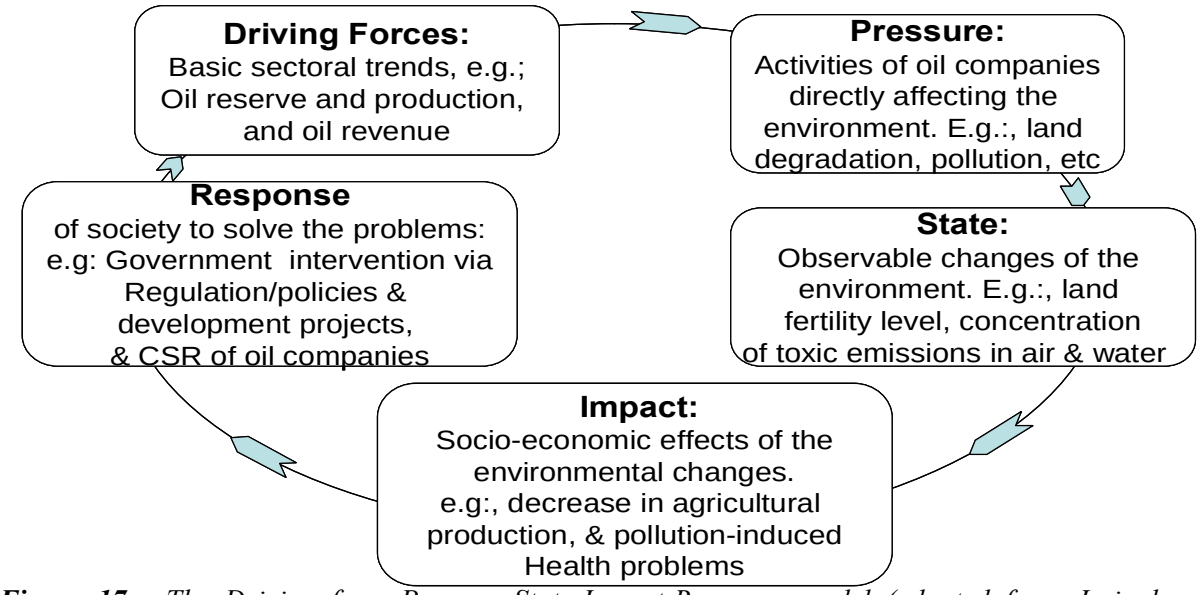


Figure 17: *The Driving force-Pressure-State-Impact-Response model (adapted from Jesinghaus, 1999).*

This Driving force-Pressure-State-Impact-Response (DPSIR) is the theoretical framework adopted for this research. However, this research assumes that the ódriving forceô factor is exogenously determined. Hence, it was not considered in this study. In addition, following the distinction drawn by Greave (2012) between óimpactô and óeffectô in EIA, the actual theoretical framework used in this study is: ódriving force-Pressure-State-Effect-Response (DPSER).

Figure 17 depicts that the need for increase in oil reserve and level of production drive the oil sector. The oil sectorôs activities, in turn, impact the environment leading to observable changes in the community such as changes in fertility level, concentration of toxic emissions in water and air. The model shows that these observable changes affect the socio-economic life of the members of the host community. Measurement of these effects on the socio-economic wellbeing of Ogoni people is the major focus of this study. This research, therefore, estimates the socio-economic effects of the changes in the environment resulting from oil exploration activities. On the other hand, Government (through its intervention programmes) and the oil companies (through Corporate Social Responsibility activities) respond to mitigate or stop these adverse effects on the socio-economic life of the host community. Government

responds in the form of policy changes and implementation of development projects; while the oil companies implement different development projects under their Corporate Social Responsibility programmes. This research, also, estimates the socio-economic effect of these governments and the oil companiesô activities in Ogoniland. These socio-economic effects in the host community, which is considered as externalities, can be either positive or negative.

Economic valuation of socio-economic externalities of oil exploration and production is often controversial and challenging as the externalities are traditionally not expressed in monetary terms. With regard to oil exploration and production externalities in Ogoniland, there is still lack of adequate knowledge about the actual effects caused by activities and installed facilities of oil companies in the community. Some effects are actually certain such as clearing a cultivated farmland for oil exploration; while other possible effects are often not taken into account due to lack of adequate information and statistics on the relationship between activities of oil companies and these effects (Deuber, 2008). As a result of many uncertainties associated with economic valuation of socio-economic effects from oil exploration and the challenges in obtaining a comprehensive baseline data or suitable counterfactuals, socio-economic effects of oil exploration in Ogoniland was measured by estimating the probabilities that the effects of oil exploration activities influence the socio-economic wellbeing of the community. This was carried out using logit model. However, to avoid the possible oversimplification of Bernoulli distribution of responses such as ñ*(effect or no effect), (success or failure), (yes or no), (true or false)*ò, ordinal logit (ologit) model also known as the cumulative logistic model was used. Ordinal logit model provides for the estimation of ordered responses such as ñ(none, mild, severe)ò, ñ(strongly agree, agree, disagree, strongly disagree)ò, and so on (Agresti, 1990; and Torres-Reyna, 2009). Note that ó ordered probit modelô was discarded because of a comprehensive set of simulations conducted by Kropoko (2008) as cited in Brenton (2010) which shows that the probit generally results in significantly more biased estimates than the logit.

3.2 Model Specification

DPSIR framework has been extensively applied in socio-economic and environmental studies (Amajirionwu, Connaughton, McCann, Moles, Bartlett, and O'Reaan, 2008; Fistanic, 2006; Odermatt, 2004; Walmsley, 2002). Despite its extensive use in socio-economic and environmental researches, the DPSIR framework has not been widely used in empirical studies (Bell and Etherington, 2009). Nonetheless, to date, the DPSIR framework is globally recognized as a means of identifying meaningful indicators of cause-and-effect relationships (Bell and Etherington, 2009; Walmsley, 2002; Smeets and Weterings, 1999).

This study, therefore, evaluates indicators from the DPSIR framework using specification model set up by Brenton (2010). According to him, ordinal logit is related to the latent class model. An unobserved (latent) dependent variable is a function of observed and unobserved variables:

$$y^* = \sum \beta_k x_k + \varepsilon_k \ldots\ldots\ldots \ldots 3.1$$

where y* is an unobserved, continuous, underlying tendency behind the observed ordinal response (rating). The X_k represent the independent variables, while the β_k represent the associated parameters. The error term (ε_k) captures stochastic (unobserved) variation. It is assumed to be distributed logistically.

Relating the unobserved y* to Y through a series of ñcut pointsò, is as represented in equation 3.2:

$$\left.\begin{array}{l} Y = 1 \text{ if } y^* \leq \mu_1 \\ Y = 2 \text{ if } \mu_1 < y^* \leq \mu_2 \\ \ldots \\ Y = j \text{ if } \mu_{j-1} < y^* \end{array}\right\} \ldots\ldots\ldots 3.2$$

where Y is the rating and the μôs represent thresholds of y* that delineate the categories of the ordered response variable. These threshold parameters are restricted to be positive where each one is greater than the previous. The first parameter μ_1 is normalized to 0 so that one less parameter has to be estimated. That is not a problem because the scale of the latent variable is arbitrary (Borooah, 2001).

Thus the cumulative probability of choosing a particular rating or lower is found using the logistic cumulative density function (ordinal logit model) as stated in equation 3.3 below:

$$P(Y \leq j) = \frac{\exp(\mu_j - \sum \beta_k X_k)}{1 + \exp(\mu_j - \sum \beta_k X_k)} \ldots\ldots\ldots\ldots\ldots 3.3$$

which can be expressed more simply as:

$$P(Y \leq j) = \frac{1}{1 + \exp\left(-(\mu_j - \sum \beta_k X_k)\right)} \ldots\ldots\ldots\ldots\ldots 3.4$$

To avoid confusion and misinterpretation of estimates, we restricted Y to a five-point Likert item or less ï measuring effects of oil companiesô activities and installed facilities as well as government intervention projects on socio-economic development of Ogoni community.

Probabilities of lower ratings are subtracted from the cumulative probability of the rating of interest to find its probability of occurrence. This is shown in equation 3.5 for the specific rating values (Liao 1994).

$$\left.\begin{aligned}
P(Y = 1) &= \mathrm{F}(\mu_1 - \sum \beta_k x_k) \\
P(Y = 2) &= \mathrm{F}(\mu_2 - \sum \beta_k x_k) - \mathrm{F}(\mu_1 - \sum \beta_k x_k) \\
P(Y = 3) &= \mathrm{F}(\mu_3 - \sum \beta_k x_k) - \mathrm{F}(\mu_2 - \sum \beta_k x_k) \\
P(Y = 4) &= \mathrm{F}(\mu_4 - \sum \beta_k x_k) - \mathrm{F}(\mu 3 - \sum \beta_k x_k) \\
P(Y = 5) &= 1 - \mathrm{F}(\mu_4 - \sum \beta_k x_k)
\end{aligned}\right\} \ldots\ldots 3.5$$

Note that *F( )* is the logistic cumulative density function, defined in equation 3.3. The parameters in equation 3.4 were estimated as a linear model for the log-odds ratio using the ordered logit link specified in equation 3.6:

$$Log \left[\frac{P(Y \leq j)}{P(Y > j)}\right] = \mu_j - \sum \beta_k x_k \ldots\ldots\ldots \ldots\ldots .. 3.6$$

where j = 1, 2, 3, 4, 5

Ordinality in *Y* is preserved, subject to the constraint $\mu_1 \leq \mu_2 \leq \ldots \mu_{j-1}$ (Ananth and Kleinbaum 1997). According to Brenton (2010), the derivation of this model is usually credited to Walker

and Duncan (1967), Williams and Grizzle (1972), Simon (1974) and especially McCullagh (1984) who referred to this model as the ñproportional oddsò model.

Specific Models and Test of Hypotheses

A. Hypotheses I, II and III: Socio-economic Effects

i. H_o: Oil exploration in Ogoniland has no significant effect on the socio-economic wellbeing of the host community.
ii. H_o: Government interventions towards mitigating the negative externalities of oil exploration in Ogoniland do not have significant effect on the socio-economic wellbeing of the community.
iii. H_o: Corporate social responsibility activities of the oil companies towards mitigating the negative externalities of oil exploration in Ogoniland do not have significant effect on the socio-economic wellbeing of the community.

Using equation 3.1 as expanded in equation 3.6, equations 3.7 and 3.8 were estimated to evaluate the hypotheses I, I and III.

Social

$$\left.\begin{aligned} Education &= \mathrm{f}(GIsb, GIsch, CSRsb, CSRsch, Income) \\ Health &= \mathrm{f}(GIhe, CSRhe, OS, AP, income) \\ Hou\sin g &= \mathrm{f}(GIho, CSRho, DDH) \\ SocialCap &= \mathrm{f}(ET, Leadership, Nigeria, CCGG, CCGO) \end{aligned}\right\} \quad \text{.....3.7}$$

Economic

$$\left.\begin{aligned} Income &= \mathrm{f}(GIe, CS\ \mathrm{Re}, OS, LD, ET, genderh, agric, socialcap) \\ Road &= \mathrm{f}(GIrd, CSRrd, LD) \\ water &= \mathrm{f}(GIw, CSRw, OS, income) \\ Electricity &= \mathrm{f}(GIel, CS\ \mathrm{Re}\, l) \\ Agric &= \mathrm{f}(GIcl, CSRcl, OS, LD, Income, AP, ET) \end{aligned}\right\} \quad \text{.....3.8}$$

Note: See the variables definition (table 3.1).

These hypotheses were tested using p-values of the predictors where alpha-level (Ŭ) = 5%

Decision rule: Reject Ho if p-value < Ŭ(0.05); accept if otherwise.

B. Hypothesis IV: Marginal Willingness To Accept pay (MWTA)

iv. H_o: Socio-economic factors are not significant determinants of Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate negative externalities resulting from the companiesô activities in the community.

Oil spill, land degradation and air pollution are negative externalities resulting from the oil companiesô activities which were considered in this study. Using equation 3.1 as expanded in equation 3.6, equations 3.9 ï 3.11 were estimated to evaluate this hypothesis (iv).

$$MWTAo = f(nationality, income, socialcap, gender, OS) \text{....3.9}$$
$$MWTAd = f(nationality, income, socialcap, gender, LD) \text{....3.10}$$
$$MWTAa = f(nationality, income, socialcap, gender, AP) \text{....3.11}$$

This hypothesis was tested using p-values of the predictors where alpha-level (Ŭ) = 5%
Decision rule: Reject Ho if p-value < Ŭ(0.05); accept if otherwise.

D. Hypothesis V: Marginal Willingness To Pay (MWTP)

v. H_o: Socio-economic factors do not have significant influence on Ogoni peopleôs marginal willingness to pay or not to pay for government intervention programmes in the community.

Government intervention programmes considered in this study are healthcare services and housing. Using equation 3.1 as expanded in equation 3.6, equations 3.12 and 3.13 were estimated to evaluate this hypothesis (v).

$$MWTPhe = f(nationality, income, socialcap, gender) \text{.....3.12}$$
$$MWTPho = f(nationality, income, socialcap, DDH) \text{.....3.13}$$

This hypothesis was tested using p-values of the predictors where alpha-level (Ŭ) = 5%
Decision rule: Reject Ho if p-value < Ŭ(0.05); accept if otherwise.

Equations 3.7 ï 3.10 were kept as simple as possible in conformity to Occamôs razor principle of parsimony. This principle states that if we can explain the behavior of *Y* ñsubstantiallyò with two or three explanatory variables and if our theory is not strong enough to suggest what other variables might be included, why introduce more variables? Let u_i represent all other variables (Morrison, 1983 as cited in Gujarati, 2004).

The variables used in the above models are as defined in table 3.1. The table also indicates the codes used to quantify the responses from the survey.

Table 3.1: Definition of Variables

Variable Code	Description
Agric	Household agricultural productivity (very low=1, low=2, mild=3, high=4, very high=5)
AP	Air pollution (very low=1, low=2, mild=3, high=4, very high=5)
DDH	Demand for housing (very low=1, low=2, average=3, high=4, very high=5)
Education	School completion by household members (primary and secondary schools): 1 = No school dropout, 0 = a household member dropped out of school
Electricity	Electricity supply (very low=1, low=2, mild=3, high=4, very high=5)
Genderh	Gender of the household head (male=1, female=0)
Genderr	Gender of the respondent (male=1, female=0)
LD	Land Degradation (very low=1, low=2, mild=3, high=4, very high=5)
Leadership	Political/community/organizational leader (leadership position=1, no leadership position=0)
Nationality	Indigene or non-indigene of the community (Indigene=1, non-indigene=0)
OS	Oil Spillage (very low=1, low=2, mild=3, high=4, very high=5)
Road	Accessible roads (very low=1, low=2, mild=3, high=4, very high=5)
SocialCap	Household social capital measured by level of trust (very low=1, low=2, é very high=5)
Water	Portable water (very low=1, low=2, mild=3, high=4, very high=5)
Health	Predominance of diseases in household (not too often=3, somewhat often=2, very often=1)
Housing	Cost of housing (<₦1000=1, ₦ 1000-₦ 3999=2, ₦ 4000- ₦ 6,000=3, > ₦ 6000=4)
Income	Household income (18000 & Below=1, 18100 - 50000=2, 50100 - 100000=3, 100100 ï 250000=4, > 250,000=5)
ET	Education attainment of household head (no formal edu.=0, FSLC=1,SSCE=2,OND=3, B.Sc & above=4)
	CCGG to GIw below were coded as: low=1, average=2, high=3, very high=4
CCGG	Civil/community group interaction with government agencies (sincerity of purpose)
CCGO	Civil/community group interaction with oil firms (sincerity of purpose)
CSRcl	Corporate Social Responsibility of oil firms towards cleaning of polluted land and water
CSRe	Corporate Social Responsibility of oil firms towards creation of employment in the community
CSRel	Corporate Social Responsibility of oil firms towards supply of electricity
CSRhe	Corporate Social Responsibility of oil firms towards provision of healthcare services
CSRho	Corporate Social Responsibility of oil firms towards housing in the community
CSRrd	Corporate Social Responsibility of oil firms towards provision of accessible roads in the community
CSRsb	Corporate Social Responsibility of oil firms towards provision or maintenance of school building
CSRsch	Corporate Social Responsibility of oil firms towards provision of scholarship
CSRw	Corporate Social Responsibility of oil firms towards provision of portable water
GIcl	Government intervention towards cleaning of polluted land and water
GIe	Government intervention towards creation of employment in the community
GIel	Government intervention towards supply of electricity
GIhe	Government intervention in provision of healthcare services
GIho	Government intervention in provision of housing facility in the community
Gird	Government intervention towards provision of accessible roads in the community
GIsb	Government intervention in provision and maintenance of school building
GIsch	Government intervention in provision of scholarship
GIw	Government intervention towards provision of portable water
	MWTAa to MWTPhe below were coded as: very unwilling=1, unwilling=2, willing=3, very willing=4
MWTAa	Marginal willingness to accept pay to tolerate further air pollution
MWTAd	Marginal willingness to accept pay to tolerate further land degradation
MWTAo	Marginal willingness to accept pay to tolerate further oil spill
MWTPhe	Marginal willingness to pay for efficient healthcare services provided by government
MWTPho	Marginal willingness to pay for housing facility provided by government

3.3 Evaluation Procedure

A. Descriptive Analyses

Distribution of the responses to the questions in terms of frequencies, percentages and correlations were presented as:

i. Tables
ii. Bar graphs
iii. Pie charts

B. Inferential Analyses: Interpretation of Ordinal Logit Model Estimation

Each of the ordinal logit models was evaluated using the following procedure (with 5% level of significance):

i. **Overall Model Test:** testing the overall model includes:
   a. Percent of the observations used in the model: This describes the percentage of the observations from the sample used in the model.
   b. Goodness-of-fit of the model (using Chi-square statistic and p-value of Chi-square): This indicates if the predictors explained the variations in the dependent variables or not.
   c. Overall relationship between the independent variables and the dependent variable (using statistic G and its p-value).

   G-test is a likelihood-ratio statistical significance test. In ordinal logit model estimation, instead of Chi-square statistic or F-statistic, Minitab uses G-test in evaluating the overall relationship between the independent variables and the dependent variable. Statistic G is also called G-test. It evaluates if, at least, one of the explanatory variables is different from zero or not.

   The general formula for statistic G is:

$$G = 2\sum_i O_i * \ln\left(\frac{O_i}{E_i}\right) \text{.....3.14}$$

where O_i is the observed frequency in a cell, E_i is the expected frequency on the null hypothesis, where ln denotes the natural logarithm (log to the base *e*) and the sum is taken over all non-empty cells (Sokal and Rohlf, 1981).

d. Test of hypothesis: The estimates of the predictors in the ordinal logit models were tested (in terms of the associated hypothesis of each predictor) using p-value (t_{prob}) of the predictor with alpha-level (α) = 5%.
Decision rule: Reject H_o if p-value < Ŭ(0.05); accept if otherwise.

ii. Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable

iii. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable: Keeping the estimated parameters fixed (that is, ɓ = 0), the cumulative predicted probabilities for each category of the dependent variable were obtained using equation 3.15.

$$prob\,(score\ \ j) = \frac{1}{1 + e^{-(x_j - \beta x)}} \text{..... ..... } 3.15$$

Also, the probabilities for the individual scores were calculated by using equation 3.16.

$$prob\,(score\ \ j) = prob\,(score\ less\ than\ or\ equal\ to\ j) - prob\,(score\ less\ than\ j) \text{.....} 3.16$$

In addition to tests i, ii and iii, models on marginal willingness to accept pay and marginal willing to pay (that is, equations 3.9 ï 3.13) were further examined in terms of marginal effect of individual predictor on odds ratios.

3.4 Estimation Software

MINITAB, which is a powerful statistical software package that provides a wide range of basic and advanced data analysis capabilities, was used to estimate the ordinal Logit (ologit) model specified for this research. Although SAS, SPSS and MINITAB software packages give

some similar results for the logit function, they have some major differences. For instance, although SPSS and MINITAB have the same values of the estimated parameters, the 95% confidence interval (C.Iôs) bounds are not equal, that is because SPSS uses Waldôs Chi-Square values, while MINITAB uses the approximation of the standard normal distribution. SAS does not provide C.Iôs by default for the model parameters. Pearson, Deviance, and Hosmer-Lemeshow Chi-square tests are available by default in MINITAB. In the SPSS output, only the first two tests are available, while none of them is provided by SAS. In addition, like SAS, Minitab automatically eliminates all the observations with missing values. MINITAB and SPSS are user friendly softwares while SAS requires learning experience in writing its program. This informed the selection of MINITAB for the estimation of the specified ologit model. However, SPSS was used for the descriptive analyses of responses.

3.5 Data Source, Instrument Design and Data Collection Procedure

This section discusses the data source, sample size, instrument design, and data collection management.

Data used in this research were obtained using a multistage sampling method. The stages are:

i. Rivers State was purposively selected for this study.
ii. Also, the four local governments that constitute Ogoni community in Rivers State were purposively selected ï namely Eleme, Gokana, Khana, and Tai.
iii. Then, a quota sample was determined for each of the four local government areas (see table 3.3) using the number of households in each local government as a proportion of the total households in Ogoniland in the light of the sample size.
iv. Finally, given the quota sample for each local government area and using MS-Excel random function, specified quota for each local government area was randomly selected from the sampling frame. List of households in each local government area of Ogoniland, which was obtained from Nigerian Population Commission, was used as the sampling frame.

3.5.1 Population and Sample Size

As stated in the introductory section, the 2010 population of Ogoni community in the Niger Delta Region is as shown in table 3.2:

Table 3.2: Number of inhabitants by LGA (2010 estimate)

LGA	Inhabitants	Total No. of Regular Households
Eleme	209,972	45,397
Gokana	251,711	54,422
Khana	323,639	69,973
Tai	129,577	28,015
Total Population	**914,899**	**197,807**

Source: National Bureau of Statistics (2006) and World Bank (2010)

The sample size was determined using 95 percent degree of accuracy. The sample size formula specified by Yamane (1967) and Cochran (1977) as stated in equation 3.17 was applied.

$$s = \frac{N}{1 + N(e^2)} \text{..... ..... } 3.17$$

s = required sample size.

N = the population size.

e = margin of error.

Margin of error, here, represents the amount of random sampling error in the surveyôs result used in this work. Given the possible sampling error (limitations of this study) as discussed in the introductory section and the work of Almeda, Capistrano and Sarte (2010), 0.05 was selected as the margin of error.

Using the above formula, 400 was obtained as the sample size. This sample size was distributed in proportion to number of households in each local government in Ogoniland as shown in table 3.3.

Table 3.3: Sample Size distributed in proportion to LGA Population

LGA	Total No. of Regular Households	Sample Size (Household)
Eleme	45,397	92
Gokana	54,422	110
Khana	69,973	141
Tai	28,015	57
Total Population	**197,807**	**400**

3.5.2 Instrument Design and Data Collection Management

Structured interview schedule was used with predominately closed ended questions to enhance response rate. The interview schedule consists of 57 questions. The questions were developed based on reviewed literature and preliminary interviews. Some multiple choice questions also allowed respondents to comment further where necessary. The instrument covers all aspects of socio-economic issues required for this research. The estimated time for completion of a copy of the questionnaire is 20 minutes. This design method also ensured that data point is generated using the same yard-stick. Given the sensitive nature of this survey, indigenes of Ogoni community, were used as enumerators. They were trained on general techniques for successful questionnaire administration. Also, they were given detailed review of each question ï why the question and expected range of responses ï and how to ask the question to avoiding ôleading questionô bias. In addition, they were instructed to adequately explain to the respondents the purpose of the survey as to avoid, as much as possible, biased responses. The use of educated indigenes of Ogoni community enhanced communication and reduced security risks given the emotional and political nature of the subject of interest and the study area. The questions were asked by the enumerators who filled-in the responses into the interview schedule. This reduced the chances of misinterpreting the questions.

Data was collected directly from selected households in Ogoniland, River State, in the Niger Delta Region of Nigeria. The respondent in each of the selected households was the head of the household or its representative (who must be a spouse or adult son/daughter, where an adult is a person not less than 18 years old). Interview schedule was adopted as the survey instrument.

3.5.3 Instrumentation

The interview schedule used in this study has four sections: demography, socio-economic related issues, environment related issues, and marginal willingness to pay or accept pay. Each section is described below:

Section A: Demography

This focuses on the respondent personal information such as gender, age, marital status, and relationship with household head (if not the head). Also, it includes basic household

information such as number of persons in the household, academic qualification of the household head and most educated member of the household, and employment status of the household head as well as the principle income earner in the house household.

Section B: Socio-economic Related Issues

This section examines the availability of social services and amenities, household school drop-out, disease prevalent, number of employed and unemployed adults in the household, household agricultural productivity, household social capital, cost of housing, cooperate social responsibility activities of the oil firms, and intervention activities of government.

Section C: Environment Related Issues

Household perception of environmental damages is the focus in this section. The environmental issues captured are oil spill, land degradation, and air pollution.

Section D: Marginal Willingness To Pay Or Accept Pay

This focuses on household marginal willingness to pay for government services such as efficient healthcare services delivery, and housing. It also examines the marginal willingness of households to accept pay to tolerate further environmental damages.

3.5.4 Pilot Stage and Test of the Instrument

The researcher solicited the assistance of lecturers[1] in the department and other researchers (including a research expert[2] ï an indigene of Ogoni community) for the face and content validation of the interview schedule. The final draft the instrument was submitted to the project supervisor for vetting and approval. Through this process, necessary modifications were made to ensure the face content and construct validity of the instrument.

The reliability of the instrument was determined during the pilot study of 30 households randomly selected in Tai local government area (which is one of the local government areas of the study). The interview instrument was administrated to the 30 households. Their responses

[1] Prof. Stella Madueme, Asst. Prof. O. Onyukwu, and Dr. Emmanuel Nwosu
[2] Dr. August Legborsi ï Ministry of Health, Rivers State, Nigeria

were tested using Split-half reliability index ï coefficient alpha (Cronbach, 1951). Split-half was chosen given that the items in the instrument have several response options (example: 1 = strongly disagree to 5 = strongly agree). In split-half technique, the coefficient alpha is calculated using equation 3.18 (Allen and Yen, 1979):

$$\alpha = \frac{N}{(N-1)[1-\frac{\sum Var(Y_i)}{Var(X)}]} \quad \text{..... ..... } 3.18$$

where N = number of items

× Var(Y_i) = sum of item variances

Var(X) ï composite variance

Coefficient alpha ranges from 0 to 1: the closer it is to 1, the more reliable the instrument.

Using SPSS, the coefficients alpha for the different sections of the instrument was computed for the responses from the 30 plot households. These are presented in table 3.4:

Table 3.4: Reliability Test using Split-half Coefficient

Section	Demography	Socio-economic Related Issues	Environment Related Issues	Marginal Willingness To Pay Or Accept Pay
Split-Half Coefficient	0.670	0.953	0.787	0.902

Table 3.4 indicates that the research instrument achieved high reliability. For instance, demography section, which had the least reliability coefficient, achieved 67% reliability. Questions on environmental issues had about 79% reliability; while questions on socio-economic issues and marginal willingness had about 95% and 90% reliabilities respectively. On the average, therefore, the research instrument achieved about 83% reliability. These high levels of reliabilities achieved in each section of the research instrument could be attributed to the quality inputs made by the project supervisor and other research experts who vetted it.

3.6 Measurement and Process of Data Collection

3.6.1 Measurement

As indicated in the model specification, ordinal measurement was adopted for structuring the questions used for data generation. These were captured using the scale given on a 5-point response format or less.

3.6.2 Data Preparation and Quality Assurance

The survey was conducted in about forty-five days. The field supervisor maintained contacted with the enumerators each day of the survey ï to collect questionnaire and for the submission of completed questionnaire as well as discussion on their field experience. Each copy of the completed questionnaire was scrutinized by field supervisor the same day it was returned to make sure that answers to the questions are consistent with expectation. For instance, each copy of the completed questionnaire was examined for the followings:

- inconsistent responses
- unexpected averages figure
- large number of missing values

3.6.3 Data collation and Presentation

Data collation and coding were done using SPSS. Before the ordinal logit (ologit) models analyses using the set of collated data, the descriptive features were obtained using SPSS and presented in the following formats:

- Tables
- Bar graphs
- Pie charts

3.6.4 Code of Standards and Ethics for Survey Research

The professional and legal responsibilities to the respondents were maintained during the field work (survey). Underlying these specific responsibilities are four fundamental ethical principles:

Respondents should be:

a. Willing participants in survey research;
b. Appropriately informed about the surveyôs intentions and how their personal information and survey responses will be used and protected;
c. Sufficiently satisfied with their survey experience;
d. Willing to participate again in survey research.

CHAPTER FOUR

DESCRIPTIVE STATISTICS OF THE SURVEY

Survey method was employed in collecting the data used in this study. The objectives of the survey, survey report and major finding from the survey are discussed in this section.

4.1 Objectives of the Household Survey

The household survey was aimed at collecting information relating to the following specific indicators as specified in the methodology of this study:

i. Demographic
ii. Socio-economic factors
iii. Environment factors
iv. Marginal willingness to pay or accept pay

The main objective of the survey was to obtain reliable, up-to-date household information and perception of the members of the community about the effect of oil and gas exploration in their community. Specifically, the survey aimed at collecting information on variables necessary to achieve the objectives of this study. In addition, the survey was aimed at providing baseline data for future studies as well as monitoring and evaluation of socio-economic development programmes in the community.

4.2 Survey Report

As specified in the methodology, the household survey was conducted in all the four local government areas (LGAs) in Ogoni community: Tai, Eleme, Gokana and Khana in River State, Nigeria. The survey started in December 3, 2013 and ended in January 17, 2014. Due to the sensitive nature of the survey, Ogoni indigenes were used as field supervisor and fieldworkers while the author worked as the project manager. The field supervisor, Pastor Sunday Baridilo Promise (with MA in religion ï a lecturer in a Bible School in Ogoni Community), was trained by the project manager. After the training, the field supervisor recruited and trained four fieldworkers ï one for each local government area. They are Rev. Mene Kobaa (with Diploma in Theology) for Tai LGA, Mrs. Beauty Kale Nelson (with

SSCE) for Eleme, Miss Gift Gbogbara (a Sociology Student in Gilgal University Bori, River State) for Gokana, and Miss Lezor (an ND student in Rivers State Polytechnic) for Khana. The use of these educated and experienced supervisor and fieldworkers enhanced the quality of the data and response rate. In addition, the questionnaire was not lengthy ï six (6) pages on the whole; however, two pages were printed on a paper, making a 3-paper questionnaire. With this strategy, the respondents did not complain on the length of the questionnaire; which would have made some of them leave without finishing the interview. Also, given that a scheduled survey method was used, responses from sample size of 400, as specified, were successfully collected. Thus, 100 percent of the sample size was obtained. Sampling in each local government area was done at the household level using a random procedure. Data collected were entered and analyzed using SPSS spreadsheet. Data cleaning was carried out to further check for quality, completeness and consistency of the collected data. The major findings of the household survey are organized in line with four main themes: demographic, socio-economic factors, environment factors, and marginal willingness to pay or accept pay. However, as discussed in the methodology, given the possible sampling error (including possible sentiments from the respondents), 0.05 margin of error was included in the study sample. In other words, the surveyôs results presented below have a sampling error of ± 5%.

4.3 Major Findings of the Household Survey

4.3.1 Demography

The proposed sample size of 400 respondents was achieved during the survey (see table 4.1). The 100 percent response rate was made possible as a result of the scheduled survey method used. This method required the trained enumerators to fill the questionnaires using responses from the representative of each household. The enumerators returned copies of the filled questionnaire to the field supervisors who screened each of them for completeness and consistency.

Table 4.1: Respondents by LGA

LGA	Proposed Sample (%)	Achieved Sample (%)
Tai	57 (14.3)	57 (14.3)
Eleme	92 (23.0)	92 (23.0)
Gokana	110 (27.5)	110 (27.5)
Khana	141 (35.3)	141 (35.3)
Total	400 (100)	400 (100)

Analysis of gender distribution of respondents in all the four local government areas of Ogoni community (pooled data) indicate that an average of 51.3% of the household representatives in the survey were male (Table 4.2). The proportion of female respondents (70.7%) was relatively higher in Eleme compared to the other three local government areas. Tai had the highest male respondents (64.9%) followed by Gokana (54.5%). Most of the respondents in the community (in the four LGAs) were within the age range of 26 ï 35 years (35.8%) and 36 ï 50 year (26%). About 6.3% of the respondents were 51 year and above (table 4.3).

Table 4.2: Respondents Sex

	Male (%)	Female (%)
Tai	37 (64.9)	20 (35.1)
Eleme	27 (29.3)	65 (70.7)
Gokana	60 (54.5)	50 (45.5)
Khana	81 (57.4)	60 (42.6)
Pool	205 (51.3)	195 (48.8)

Table 4.3: Respondents Age range

18-25 years (%)	26-35 years (%)	36-50 years (%)	51-65 years (%)	66 years & above (%)
125 (31.3)	143 (35.8)	107 (26.8)	18 (4.5)	7 (1.8)

A good number (58%) of the respondents were married, while 31.5% were single; the rest consists of divorced, separated or widows/widowers (table 4.4). Larger proportion (54%) of the respondents was household head. Table 4.5 indicates that the 46% non-household head respondents were wife (22.8%), son (34.8%) and daughter (42.4). The gender distribution of household house heads, where respondents are not household heads, is as shown in table 4.6 which indicates that 74.5% of them were male.

Table 4.4: Respondent marital status

Single (%)	Married (%)	Divorced (%)	Separated (%)	Widow/Widower (%)
126 (31.5)	232 (58.0)	13 (3.3)	15 (3.8)	14 (3.5)

Table 4.5: Category of Respondent

Household head (%)	216 (54.0)
Non-Household head (%)	184 (46.0)
Non household head	
Wife (%)	42 (22.8)
Son (%)	64 (34.8)
Daughter (%)	78 (42.4)

Table 4.6: If Respondent is not Household head, sex of household head

Male (%)	137 (74.5)
Female (%)	47 (25.5)
Household Size	
Minimum	1
Maximum	16
Mean	6
Standard Deviation	2

Table 4.6 also indicates that the average household size in the community is 6 persons with 2 as standard deviation. Majority (81.5%) of the households surveyed were indigenes of Ogoniland; while the rest are non-indigenes who are residing in Ogoni community (table 4.7). Eleme had the highest proportion (53.3%) of non-indigenes. On other hand, Tai and Gakana had 96.5% and 96.4% indigenous households respectively. About 79.5% of the households had lived in the community beyond 10 years (table 4.8).

Table 4.7: Status of Household head in the community

Ogoni indigene (%)	326 (81.5)
Non-Ogoni indigene (%)	74 (18.5)

Status of household head in the community				
	Tai (%)	Eleme (%)	Gokana (%)	Khana (%)
Ogoni indigene	55 (96.5)	43 (46.7)	106 (96.4)	122 (86.5)
Non-Ogoni indigene	2 (3.5)	49 (53.3)	4 (3.6)	19 (13.5)

Table 4.8: Duration of the household in the LGA

Below 5 years (%)	5 - 10 years (%)	Above 10 years (%)
28 (7.0)	54 (13.5)	318 (79.5)

Analysis of literacy level of household heads reveals that only about 3.8% of the household heads in the community had no formal education (table 4.9). Majority of the household heads were literate with primary school (10.3%), secondary school (26.3%), national diploma (22.8) and first degree/post graduate degree (37%). The analysis further reveals that larger proportion (50.5%) of the most educated members of the households had first degree and above. About 20% and 24% of them had secondary school and national diploma respectively.

Table 4.9: Academic Qualification

Household head	
No formal education (%)	15 (3.8)
Primary School/First school leaving Certificate (%)	41 (10.3)
Secondary Certificate/WAEC/SSCE (%)	105 (26.3)
OND/Diploma/Diploma equivalent (%)	91 (22.8)
HND/ First Degree/ Post Graduate degree (%)	148 (37.0)
Most educated member of household	
No formal education (%)	3 (0.8)
Primary School/First school leaving Certificate (%)	19 (4.8)
Secondary Certificate/WAEC/SSCE (%)	80 (20.0)
OND/Diploma/Diploma equivalent (%)	96 (24.0)
HND/ First Degree/ Post Graduate degree (%)	202 (50.5)

Table 4.10 shows that only 22.8% of the households had, at least, a member as a political, community or organizational leader. This proportion is distributed as organizational leader (51.6%), community leader (23.1%) and political leader (25%).

Table 4.10: Households with, at least, a member as a Political, Community or Organizational Leader?

Leadership position (%)	91 (22.8)
No leadership position (%)	309 (77.3)
Political, Community or Organizational Leader of household member	
Organization leader (%)	47 (51.6)
Community/Traditional leader (%)	21 (23.1)
Political/Party leader (%)	23 (25.3)

The distribution of household heads according to employment status is presented in table 4.11. The analysis reveals that majority (42.8%) of the household heads were self-employed. About 31.3% had full time employment while 12.3% had part time employment. Only about 3.8% of the household heads were unemployed. Table 4.12 shows that the principal earners in the household are mainly self-employed as traders (25.8%), employee of government (19.5%), self-employed as agriculturists/farmers (19%) and employee of private companies (14.5%). UNEP (2011) had found that 18% of the principal earners in Ogoniland are traders.

Table 4.11: Employment status of household head

Full time employment (%)	125 (31.3)
Part time employment (%)	49 (12.3)
Self-employed (%)	171 (42.8)
Housewife/husband (%)	8 (2.0)
Student (%)	21 (5.3)
Unemployed (%)	15 (3.8)
Retired (%)	11 (2.8)

Table 4.12: Occupation of principal earner in the household (%)

Self-employed as laborer	30 (7.5)
Self-employed as trader	99 (25.8)
Self-employed as Agriculturist/Farmer	76 (19.0)
Self-employed as consultant or professional	39 (9.8)
Employee of a private company	54 (14.5)
Employee of government (public sector)	78 (19.5)
Pensioner	13 (3.3)
Donq know	2 (0.5)
Others	9 (2.3)

4.3.2 Socio-Economic Related Issues

To reduce biased response on household income, the household representatives were asked to indicate estimated household expenditure including saving. This was used as proxy for household income. Thus, the distribution of household average monthly income shows that larger proportion (65.6%) of the household are within the average monthly income category of ₦50,000 and below (table 4.13). Only about 17.3% of the household had an average monthly income of above ₦100,000. According to Aluko (2004), environmental degradation is the major factor responsible for the low income level in Ogoniland. Category by local government area indicates that none of the households surveyed in Gokana had an average monthly income of above ₦100,000. Khana has the highest proportion (36.2%) of households with an average monthly income of above ₦100,000.

Table 4.13: Average monthly household expenditure including savings {proxy for Household income} (%)

₦18,000 and Below	161 (40.5)			
₦18,100 - N50,000	100 (25.1)			
₦50,100 - N100,000	68 (17.1)			
₦100,100 ï N250,000	35 (8.8)			
Above ₦250,000	34 (8.5)			
	Category by L.G.A.			
	Tai (%)	Eleme (%)	Gokana (%)	Khana (%)
₦18,000 and Below	27 (47.4)	20 (21.7)	82 (75.9)	32 (22.7)
₦18,100 - N50,000	9 (15.8)	33 (35.9)	21 (19.4)	37 (26.2)
₦50,100 - N100,000	15 (26.3)	27 (29.3)	5 (4.6)	21 (14.9)
₦100,100 ï N250,000	3 (5.3)	9 (9.8)	0 (0)	23 (16.3)
Above ₦250,000	3 (5.3)	3 (3.3)	0 (0)	28 (19.9)

The respondents were asked to rate the availability of three social amenities in their villages namely primary schools, secondary schools, and healthcare centres (table 4.14). About 49% of them indicated that primary schools in their villages are just enough while 40% believed the primary schools are not enough; the rest believed the primary schools are more than enough. Only 6% indicated that secondary schools are more than enough. About 46 6% indicated that the healthcare centres are just enough or more than enough. This agrees with UNEP (2011) which found that only 42.3% of Ogoni community had access to healthcare. Larger proportion believed that the secondary schools (49.4%) and healthcare centres (54%) in their villages are not enough. Table 4.15 shows that about 47.4%, 65.6% and 56.5% of the respondents indicated that the availability of electricity supply, potable water and motorable roads respectively are either very low or low. In agreement with UNEP (2011) which found that less than 50% of Ogoni community had access to clean drinking water, the result of this study indicates that only about 34.4% rated availability of potable water mild, high and very high.

Table 4.14: Rating Availability of Social Amenities in Community/Village (%)

	Not enough	Just enough	More than enough
Primary school	158 (40.9)	189 (49.0)	39 (10.1)
Secondary school	190 (49.4)	172 (44.7)	23 (6.0)
Healthcare (hospital & health centre)	203 (54.0)	156 (41.5)	17 (4.5)

Table 4.15: Rating Availability of Infrastructure in Community/Village (%)

	Very low	**Low**	**Mild**	**High**	**Very high**
Electricity supply	84 (21.6)	100 (25.8)	101 (26.0)	55 (14.2)	48 (12.4)
Potable water	136 (35.0)	119 (30.6)	95 (24.4)	33 (8.5)	6 (1.5)
Motorable way	106 (27.2)	114 (29.3)	103 (26.5)	53 (13.6)	13 (3.3)

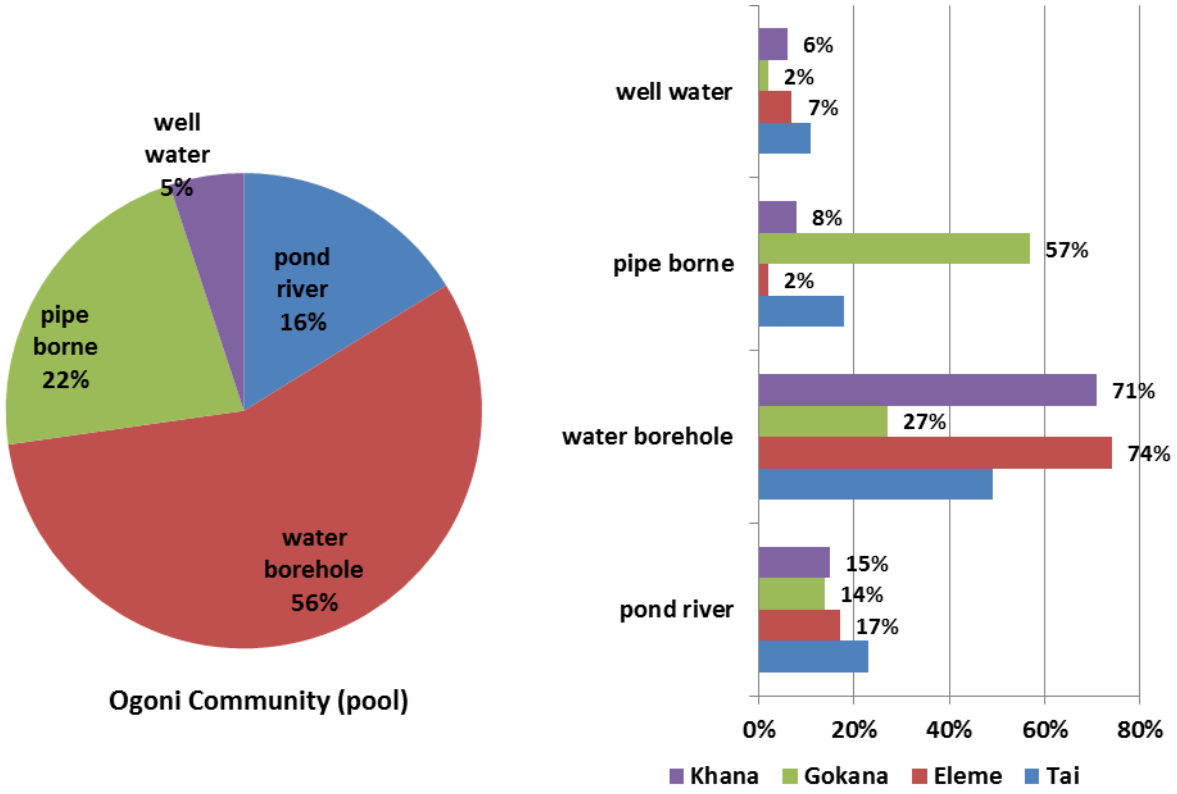
As shown in table 4.16, school completion rate in Ogoni community is high. The result reveals that only about 5.3% of the respondents indicated that, at least, a member of their household did not complete primary school, while about 10% indicated that, at least, a member of their household did not complete junior secondary school.

Table 4.16: School completion by household members (%)

At least a member did not complete primary school	21 (5.3)
At least a member did not complete junior secondary school	40 (10.0)
Every member completed junior secondary school	339 (84.8)

Water borehole is the major source of drinking water in the community according to 56% of the respondents (figure 18). About 16% had pond/river as their major source of drinking water. Only 22% had pipe borne water, while 5% used well water. Further analysis by local government category reveals that larger proportion (57%) of households in Gokana had pipe borne water while only 2% did in Eleme. Most households in Eleme (74%) and Khana (71%) had water borehole as major source of drinking water. Greater proportion of households using pond/river and well water are found in Tai.

Figure 18: *Source of drinking water in Community/Village*



The percentage of households that suffered from diseases related to environmental factors in the last two years is presented in table 4.17. About 86% of them suffered such diseases in the past two years. The frequencies of occurrence of such diseases among those affected are as indicated in the table ï not too often (44.6%) and somewhat often (42.6%). Only 12.8% of the households indicated such diseases occurred very often.

Table 4.17: Frequency and Percentage of household that suffered from diseases related to environmental factors in the last two years

Household affected by disease (%)	343 (86)
Frequency of disease occurrence	
Very often (%)	44 (12.8)
Somewhat often (%)	146 (42.6)
Not too often (%)	153 (44.6)

Table 4.18 shows that 75.8% of the surveyed households were involved in agricultural production. Crop farming (70%) is the major agricultural activities among the farming households. About 16.8% and 13.2% had fishery and poultry, respectively, as their major

product. Eleme had the least proportion (4%) of households involved in fishery and highest proportion (82%) of households involved in crops farming. About 71% of households in Tai are involved in crops farming. Not more than 20% of households in each local government area are involved in fishery; and not more than 16% of households in each local government area are involved in poultry farming. Larger proportion of the households rated the productivity of crops, fishery and poultry as mild, high or very high. As revealed in table 4.19, 83.1% of the crop farming households rated crops productivity as mild, high or very high; 84.3% of the fish framing households rated fishery productivity as mild, high or very high while 82.5% of the poultry framing households rated poultry productivity as mild, high or very high.

Table 4.18: Household and Agriculture

Household involved in agricultural productivity (%)				303 (75.8)
Major agricultural product by household (%)				
Crops				212 (70.0)
Fishery				51 (16.8)
Poultry				40 (13.2)
Major agricultural product by household in each L.G.A.				
	Tai (%)	Eleme (%)	Gokana (%)	Khana (%)
Crops	37 (71)	42(82)	72 (69)	60 (64)
Fishery	10 (19)	2(4)	20 (19)	19 (20)
Poultry	5 (10)	7(14)	13 (12)	15 (16)

Table 4.19: Rating of all major agricultural productivity in the household (%)

	Rating of agricultural productivity				
	Very low	Low	Mild	High	Very high
Crops	13 (6.1)	23 (10.8)	51 (24.1)	75 (35.4)	50 (23.6)
Fishery	2 (3.9)	6 (11.8)	10 (19.6)	18 (35.3)	15 (29.4)
Poultry	1 (2.5)	6 (15.0)	15 (37.5)	13 (32.5)	5 (12.5)

As indicated in table 4.20, only 37.1% of the households involved in agriculture indicated that they lost their produce due to oil spillage in the last two years. Among these 37.1% households, on the average, the estimated amount of money lost per household within the period is about ninety-five thousand naira (₦95,000). However, on the average, households in Khana lost most (₦111,355) followed by those in Tai (₦82,292). Households in Eleme were least affected as on the average each of them lost only about two thousand, two hundred and seventy naira (₦2,270).

Table 4.20: Losses in agricultural produce due to oil spillage in the last two years

Experience loss (%)	141 (37.1)
Average amount of money lost per household (Naira)	95,070.37

Estimated losses in agricultural produce due to oil spillage in each L.G.A.ï average of the households that experienced losses in the past two years (Naira)

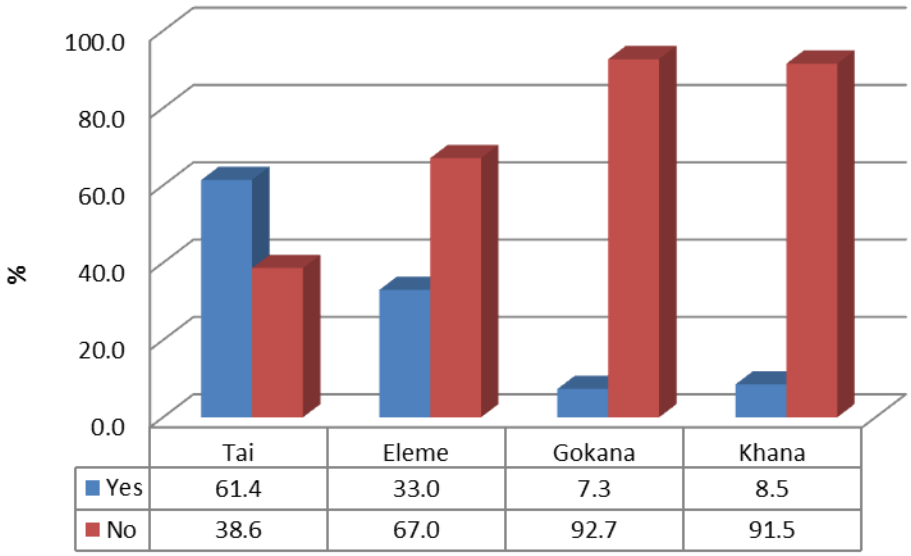
Tai (₦)	Eleme (₦)	Gokana (₦)	Khana (₦)
82,291.67	2,267.50	56,155	111,354.54

Participation in political activities in Ogoni community is relatively low (table 4.21). Only 21.3% of the respondents indicated that they participated in political activities in the last three years. According to the proportion of respondents who did not participate, lack of interest was the major factor (about 42%); about 32.5% did not participate due to the high risk involved in political activities in the community while 25.7% did not participate as a result of lack of trust in the electoral system. As shown in figure 19, none participation in political activities in the community is more in Gokana (92.7%) and Khana (91.5%); while about 61.4% participated in Tai followed by Eleme with 33%.

Table 4.21: Participation in Political Activities

Respondents who participated in political activities in the last 3years (%)	84 (21.3)
Major Reason for non-participation in political activities in the community (in the last 3years)	
High rick (%)	24 (32.43)
Lack of trust in electoral system (%)	19 (25.68)
No interest in politics (%)	31 (41.89)

Figure 19: *Percentage of households that participated in political activities in the last three years in each L.G.A*



As explained in the methodology, social capital was measured by the level of trust among members of the community. This result presented in table 4.22 indicates that larger proportion (47.1%) indicated that their level of trust is just on the average. However, 20.1% and 24.7% rated the level of trust very low and low respectively. Table 4.23 shows that about 77.2% of the respondents knew civil/community groups in the village that interact with government agencies for the purpose of improving communityôs wellbeing. About 46% and 30% of the respondents who know such group rated their sincerity of purpose very low and low respectively.

Similarly, Table 4.24 shows that about 74% of the respondents knew civil/community groups in the village that interact with oil companies for the purpose of improving communityôs wellbeing. According to the table, 28% and 27.4% of the respondents who know such group rated their sincerity of purpose very low and low respectively; larger proportion (35.5%) of these respondents rather gave the groupsôaverage rating in terms of sincerity of purpose.

Table 4.22: Social Capital: measured by level of trust among members of the community (%)

Very low	Low	Average	High	Very high
79 (20.1)	97 (24.7)	185 (47.1)	25 (6.4)	7 (1.8)

Table 4.23: Civil or community group in the village that interacts with *government agencies* for the purpose of improving communityôs wellbeing

Respondents who know such group (%)			305 (77.2)	
Rating groupôs sincerity of purpose (% of respondents who know such group)				
Very low	Low	Average	High	Very High
138 (46.3)	83 (27.9)	50 (16.8)	21 (7.0)	6 (2.0)

Table 4.24: Civil or community group in the village that interacts with *oil companies* for the purpose of improving communityôs wellbeing

Respondents who know such group (%)			293 (74.4)	
Rating groupôs sincerity of purpose (% of respondents who know such group)				
Very low	Low	Average	High	Very High
86 (28.0)	84 (27.4)	109 (35.5)	23 (7.5)	5 (1.6)

A good number of the households in the community had electricity and pipe-borne water in their houses. Table 4.25 shows that 84% and 81% had electricity and pipe-borne water respectively; 62% had borehole while 22% had pipe-borne water. Figure 20 presents further description of household accommodation in the community as observed by the enumerators. It shows that 61% of the households had cement floor while 15% had clay floor. Also, 6% and 4% had clay wall and wooden wall respectively; 88% had cement wall. Only about 3% had woven-leave as roof; majority (80%) had zinc roof. In terms of ownership of the residential house, 68% of the households lived in their own houses while 32% lived in rented houses. Further analysis of accommodation as presented in figure 21 reveals that Tai had the highest proportion (95%) of households living in their own houses. This could be because many (96.5%) of the households in Tai were indigenes. On the other hand, 75%, 65% and 56% lived in owned house in Eleme, Gokana and Khana respectively.

Table 4.25: Percentage of household with amenities in their house

Amenity	**Household (%)**
Electricity (%)	327 (84)
Borehole (%)	243 (62)
Pipe-borne water (%)	85 (22)
Toilet (%)	316 (81)

Figure 20: *Description of household accommodation (as observed by enumerators)*

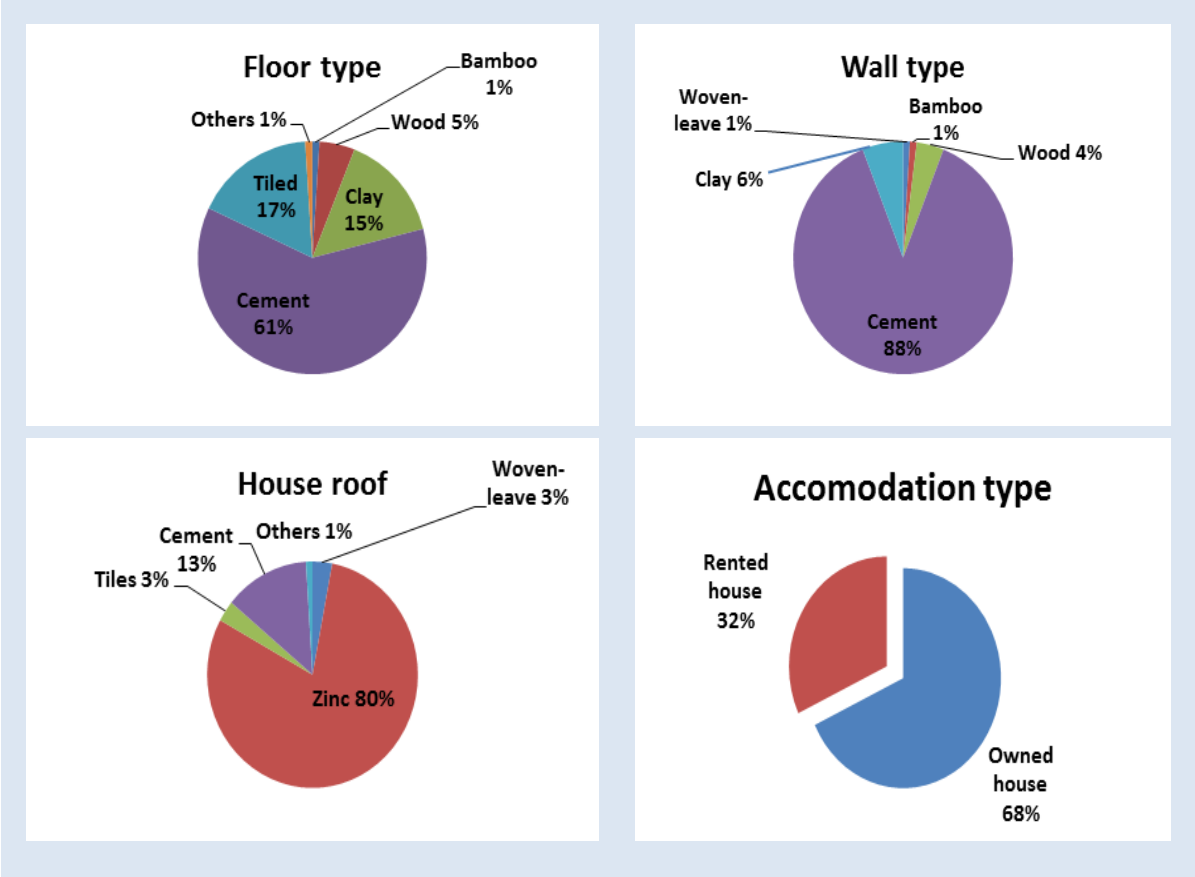
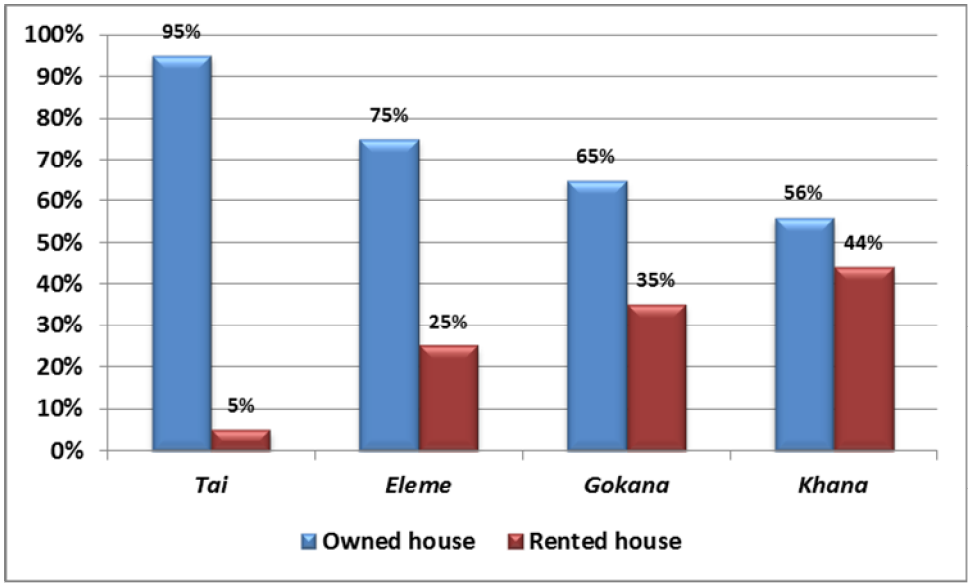


Figure 21: *Accommodation type in L.G.As*

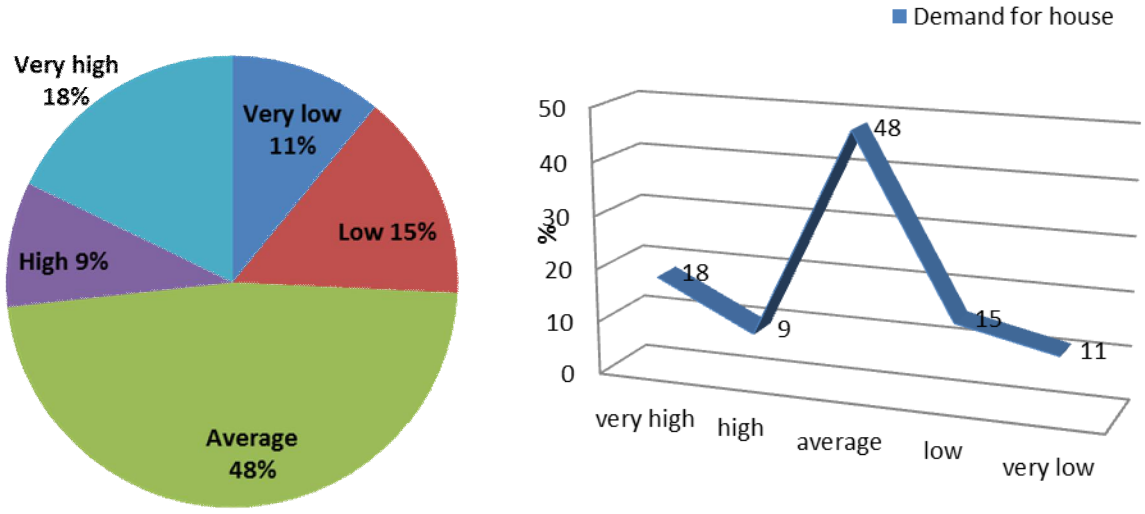


On the average, monthly rent per room is between two thousand three hundred naira and two thousand five hundred naira (table 4.26). Demand for house showed a form of normal distribution with 48% indicating average demand (figure 22).

Table 4.26: Monthly average payment on one room apartment (₦)

If rented house, how much do you pay monthly per room?	2,499.52
If owned house, how much do you charge monthly per room?	2,299.03

Figure 22: *Demand for housing in Village/Community*



According to table 4.27, only 4.3% of the household had, at least, a member on scholarship from oil companies. About 10.4% had, at least, a member on scholarship from government. The respondents were required to rate the performance of the oil companies in terms of corporate social responsibilities and government intervention programmes in the community. Table 4.28 presents their responses. Both oil companies and government rated lowest with regard to cleaning of polluted land and water. Government rated relatively high in the provision of scholarship (20.9%), provision/renovation of school building (24.8%), construction/maintenance of roads (25.8%) and provision of electricity (28.1%). Oil companies also had relatively high rating in provision of electricity to the community.

Table 4.27**:** Household and scholarship sources

Household with, at least, a member on scholarship from government (%)	41 (10.4)
Household with, at least, a member on scholarship from oil company (%)	17 (4.3)

Table 4.28: Oil Company and Government Intervention programmes in the community: Rating by respondents

Corporate Social Responsibility of Oil Companies in the community/village				
	Low	Average	High	Very high
Provision of scholarship (%)	279 (70.5)	87 (22)	18 (4.5)	12 (3)
Provision/Renovation of school building (%)	243 (61.5)	121 (30.6)	21 (5.3)	10 (2.5)
Provision of low scheme housing (%)	304 (77)	72 (18.2)	16 (4.1)	3 (0.8)
Job creation (%)	273 (69.1)	98 (24.8)	21 (5.3)	3 (0.8)
Provision of free or subsidized healthcare services (%)	241 (61.0)	120 (30.4)	28 (7.1)	6 (1.5)
Building/renovation of Healthcare building	221 (55.9)	126 (31.9)	36 (9.1)	12 (3.0)
Construction/maintenance of roads (%)	237 (60.0)	95 (24.1)	46 (11.6)	17 (4.3)
Provision of potable water (drinkable water) (%)	274 (69.4)	85 (21.5)	28 (7.1)	8 (2.0)
Provision of electricity (%)	250 (63.3)	77 (19.5)	28 (7.1)	40 (10.1)
Cleaning of polluted land and water (%)	322 (81.7)	61 (15.5)	7 (1.8)	4 (1.0)

Government Intervention programmes in the community/village				
Provision of scholarship (%)	210 (52.9)	104 (26.2)	41 (10.6)	41 (10.3)
Provision/Renovation of school building (%)	159 (40.2)	139 (35.1)	51 (12.9)	47 (11.9)
Provision of low scheme housing (%)	260 (65.7)	116 (29.3)	16 (4.0)	4 (1.0)
Job creation (%)	225 (56.8)	139 (35.1)	19 (4.8)	13 (3.3)
Provision of free or subsidized healthcare services (%)	162 (41.0)	182 (46.1)	40 (10.1)	11 (2.8)
Building/renovation of Healthcare building (%)	163 (41.3)	175 (44.3)	48 (12.2)	9 (2.3)
Construction/maintenance of roads (%)	173 (43.8)	120 (30.4)	47 (11.9)	55 (13.9)
Provision of portable water (drinkable water) (%)	246 (62.3)	98 (24.8)	38 (9.6)	13 (3.3)
Provision of electricity (%)	164 (41.6)	119 (30.2)	38 (9.6)	73 (18.5)
Cleaning of polluted land and water (%)	306 (77.5)	71 (18.0)	10 (2.5)	8 (2.0)

4.3.3 Environment Related Issues

In addition, the respondents were required to rate environmental problems in the community. Their responses are presented in table 4.29. Their responses show that environmental problems are not severe in the community. For the instance, about 46%, 47% and 52% of the respondents indicated that oil spillage, land degradation and air pollution respectively are either very low or low (pool data). About 32% indicated that oil spill and land degradation are just mild while 24% indicated that air pollution is just mild. Only about 22.3% of the respondents indicated that oil spillage, land degradation and air pollution are either high or

very high in the community. This result is relatively in agreement with Ndubuisi and Asia (2007) who found that only about 52 percent of the community believed that the major cause of conflict between the host community and oil firms is environmental pollution; while the rest think otherwise. Table 4.29 also presents rating of these environmental problems by local government category.

Table 4.29: Rating of environmental problems in the community by respondent

	Very low (%)	*Low* (%)	*Mild* (%)	*High (*%)	*Very high (%)*
Oil spillage	91 (23.2)	91 (23.2)	128 (32.6)	45 (11.5)	38 (9.7)
Land degradation	84 (21.4)	100 (25.4)	124 (31.6)	61 (15.5)	24 (6.1)
Air pollution	108 (27.6)	96 (24.6)	93 (23.8)	47 (12.0)	47 (12.0)

	Category by L.G.As			
	Tai (%)	Eleme (%)	Gokana (%)	Khana (%)
		Oil spillage		
Very low	17 (29.8)	29 (33.3)	6 (5.6)	39 (27.7)
Low	10 (17.5)	14 (16.1)	24 (22.2)	43 (30.5)
Mild	24 (42.1)	18 (20.7)	50 (46.3)	36 (25.5)
High	2 (3.5)	14 (16.1)	18 (16.7)	11 (7.8)
Very high	4 (7.0)	12 (13.8)	10 (9.3)	12 (8.5)
		Land degradation		
Very low	13 (22.8)	28 (32.2)	6 (5.6)	37 (26.2)
Low	13 (22.8)	12 (13.8)	32 (29.6)	43 (30.5)
Mild	14 (24.6)	24 (27.6)	46 (42.6)	40 (28.4)
High	14 (24.6)	20 (23.0)	18 (16.7)	9 (6.4)
Very high	3 (5.3)	3 (3.4)	6 (5.6)	12 (8.5)
		Air pollution		
Very low	27 (47.4)	27 (31.4)	17 (15.7)	37 (26.4)
Low	11 (19.3)	18 (20.9)	21 (19.4)	46 (32.9)
Mild	12 (21.1)	10 (11.6)	42 (38.9)	29 (20.7)
High	2 (3.5)	15 (17.4)	18 (16.7)	12 (8.6)
Very high	5 (8.8)	16 (18.6)	10 (9.3)	16 (11.4)

4.3.4 Marginal Willingness To Pay or Accept Pay

The respondents were asked if they would be willing to pay for an additional member of their household if government charges ₦3000 per month to provide efficient healthcare services. Their responses are captured in figure 23. The result shows that 50% were very willing or

willing, while the rest were very unwilling or unwilling. The respondents who were willing or very willing to pay for such healthcare services indicated that the highest amount they would pay per person is about six hundred and thirty naira per month (Table 4.30).

The respondents were asked if they would be willing to pay for an additional room if government charges ₦3500 per month to provide one room apartment (with toilet, steady supply of electricity and pipe-borne-water). Their responses are also captured in figure 23. The result shows that larger proportion (41.2%) was willing and 13.1% was very willing. Other the other hand 45.6% was either very unwilling or unwilling. The respondents who were willing or very willing to pay for such apartment from government indicated that the highest amount they would pay per room is about eight hundred and sixty naira [₦860] per month (Table 4.30).

Figure 23: *Marginal willingness to pay for Government services (healthcare and housing)*

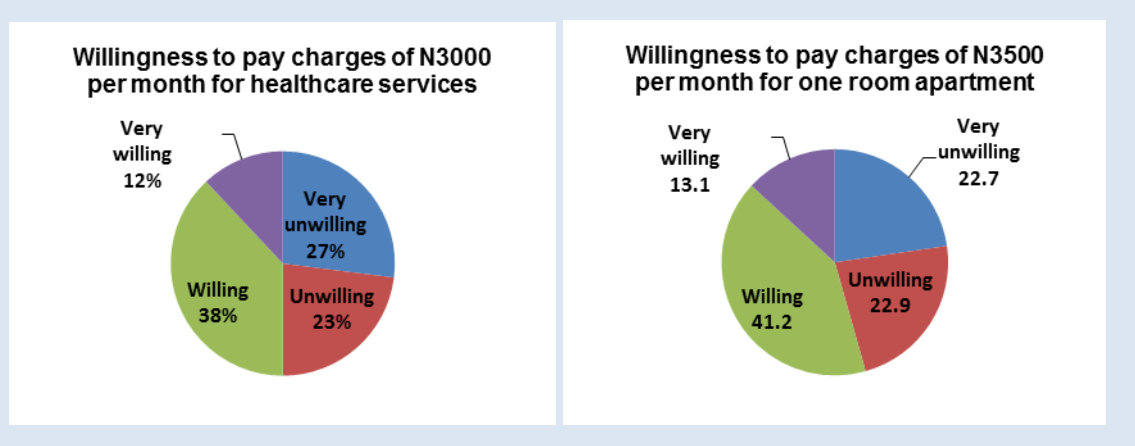


Table 4.30: Marginal Amount willing to pay per month for Government services

Highest amount, in Naira, willing to pay for healthcare services per person	₦625.27 (611.29)*
Highest amount, in Naira, willing to pay for one room apartment	₦863.20 (875.47)*

* Standard deviation

The respondents were asked if they would be willingness to accept payment from the oil companies to tolerate an extra unit of environmental damages. Their responses are captured in table 4.31. The result shows that about 60% were very willing or willing to accept payment from oil companies to tolerate extra units of oil spill, land degradation and air pollution. This

could be traced to the level of poverty in the community as table 4.13 shows that about 65% of the households had monthly income of ₦50,000 and below. On the other hand, between 13.8% and 19% indicated that they are very unwilling while between about 22% and 26% indicated that they are unwilling to accept such pay. About 60% of the respondents who were willing or very willing to accept such to tolerate extra environmental damages indicated that the minimum amount they would accept per month as shown in table 4.32.

Table 4.31: Marginal Willingness to accept payment from the oil companies to tolerate extra unit damage (%)

	Very unwilling	Unwilling	Willing	Very willing
Oil spillage	54 (13.8)	101 (25.9)	124 (31.8)	111 (28.5)
Land Degradation	61 (15.6)	95 (24.4)	132 (33.8)	102 (26.2)
Air Pollution	74 (19.0)	85 (21.8)	127 (32.6)	104 (26.7)

Table 4.32: Smallest amount willing to accept, per month, from oil companies to tolerate extra unit damage

Oil spillage (₦)	135,220.68
Land Degradation (₦)	116,489.51
Air Pollution (₦)	100,934.49

CHAPTER FIVE

REGRESSION ANALYSES AND EVALUATION OF HYPOTHESES

As stated in the introductory chapter, this research examined three hypotheses in relation to the socio-economic wellbeing of Ogoni community. To test these hypotheses, fourteen endogenous variables were identified as specified in the methodology section. These endogenous variables are classified into four categories as stated below:

A. Social Effect: education, health, housing (cost of housing), and social capital

B. Economic Effect: income, road, potable water, electricity, and agricultural productivity

C. Marginal willingness To Accept Pay: oil spill, land degradation, and air pollution

D. Marginal willingness To Pay: healthcare, and housing (provided by government)

Results for each of these categories are presented in tables 5.1, 5.2 and 5.3. This section also discussed the results of model estimation for each of the fourteen endogenous variables. As specified, each of these models was examined in terms of the following:

iv. Overall Model

v. Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable

vi. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable

In addition, categories on marginal willingness to accept pay and marginal willing to pay were further examined in terms of marginal effect of individual predictor on odds ratios.

5.1 Social Effects

The four models under this category are presented in table 5.1.

Table 5.1: Ordinal Logistic Analysis of Social Effect Models

	Education		Health		Housing		SocialCap	
Variable Value	**1, 2, 3**		**1, 2, 3**		**1, 2, 3, 4**		**1, 2, 3, 4, 5**	
Predictor	**Coef**	**Odds Ratio**	**Coef**	**Odds Ratio**	**Coef**	**Odds Ratio**	**Coef**	**Odds Ratio**
Const (1)	-2.9873* {0.000}		-1.1444* {0.005}		04960 {0.210}		-1.2038 {0.076}	
Const (2)	-18155* {0.000}		1.0445* {0.010}		4.2991* {0.000}		-0.1257 {0.852}	
Const (3)					6.8190* {0.000}		2.5455* {0.000}	
Const (4)							4.0062* {0.000}	
GIsb	0.7705* {0.003}	3.02*						
GIsch	0.6028* {0.019}	1.83*						
GIhe			0.1365 {0.391}	1.15				
GIho					-0.2454 {0.203}	0.78		
CSRsb	0.2964 {0.289}	1.34						
CSRsch	0.0264 {0924}	1.03						
CSRhe			-0.0331 {0.841}	0.97				
CSRho					-0.0938 {0.650}	0.91		
OS			-1.0042 {0.975}	1.00				
AP			0.0482 {0.697}	1.05				
Income	-0.0310 {0.823}	-0.22	0.29748* {0.001}	1.35*				
DDH					0.65635* {0.000}	0.52*		
ET							-0.07246 {0.436}	0.93
Leadership							0.7520* {0.007}	2.12*
Nationality							-0.4731 {0.093}	0.62
CCGG							-0.4020* {0.013}	0.67*
CCGO							0.1740 {0.275}	1.19
Test that all slopes are zero (G)	11.558* {0.041}		15.150* {0.010}		52.204* {0.000}		22.389* {0.000}	
Goodness-of-Fit Test (χ^2)	320.232* {0.000}		383.721* {0.007}		137.403* {0.030}		460.878* {0.001}	
Cases used	392 (98%)		331 (82.75%)		393 (98.25%)		289 (72.25%)	
Cases with missing values	8 (2%)		69 (17.25%)		7 (1.75%)		111 (27.75%)	

Notes: p-values are in parentheses ï {}; percentages in brackets ï (); * represents 5% significant

A. Social Effect: Education (school completion – primary and secondary)

The first hypothesis (i) is not applicable to education. Thus, only hypotheses ii and iii were evaluated in relation to education. These hypotheses (i.e., ii and iii) are stated below in terms of education (school completion). The result of the model estimation is as presented in table 5.1.

Hypotheses II and III:

ii. Government interventions, in terms of providing education, towards mitigating the negative externalities of oil exploration in Ogoniland do not have significant effect on the socio-economic wellbeing of the community (school completion)

iii. Corporate social responsibility activities of the oil companies, in terms of providing education, towards mitigating the negative externalities of oil exploration in Ogoniland do not have significant effect on the socio-economic wellbeing of the community (school completion)

I. Overall Model: In this model, 98 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square ($\sigma^2 = 320.232$) with p-value (0.000), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (11.558), with p-value of 0.041, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined five factors namely government intervention in provision of scholarship (GIsch), government intervention in provision/renovation of school building (GIsb), corporate social responsibility of oil firms in terms of provision of scholarship (CSRsch), corporate social responsibility of oil firms in terms of provision/renovation of school building (CSRsb) and household income. The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that government intervention in provision of scholarship (GIsch) and government intervention in

provision/renovation of school building (GIsb) significantly affect education (school completion) in the community. These government interventions are positively associated with school completion. On the other hand, the result indicates that corporate social responsibility of oil firms in terms of provision of scholarship (CSRsch), corporate social responsibility of oil firms in terms of provision/renovation of school building (CSRsb) and household income are not among the significant factors affecting education (school completion) in the community. This is because the coefficients of the later variables were not found to be statistically different from zero in the estimation. In general, therefore, the following decisions were made about the null hypotheses:

a. Hypothesis II: These hypotheses about government interventions were rejected with the conclusion that government interventions, in terms of provision of scholarship (GIsch) and provision/renovation of school building (GIsb), have positive and significant effects on the socio-economic wellbeing (school completion) of Ogoni community.
b. Hypothesis III: The hypotheses about corporate social responsibility of oil firms in terms of provision of scholarship (CSRsch) and corporate social responsibility of oil firms in term of provision/renovation of school building (CSRsb) were accepted with the conclusion that corporate social responsibility activities of the oil companies, in terms of provision of scholarship (CSRsch) and provision/renovation of school building (CSRsb) do not have significant effect on the socio-economic wellbeing (school completion) of Ogoni community.

II. **Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable:** As stated above, government intervention in provision of scholarship (GIsch) and government intervention in provision/renovation of school building (GIsb) significantly affect school completion in Ogoniland. For instance, the result indicates that a unit increase in government intervention in provision of scholarship (GIsch) would result in about 0.603 unit increase in the log-odds of being in a higher category of school completion while the other variables in the model are held constant. Likewise, each unit increase in government intervention in provision/renovation of school building (GIsb)

would result in about 0.77 unit increase in the log-odds of being in a higher category of school completion given that the other variables are held constant in the model.

III. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables

As specified in the methodology, keeping the estimated parameters fixed (that is ϐ = 0), cumulative predicted probabilities for each category of the dependent variables were obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the three categories and probabilities for the individual scores of school completion in the community at the means of the independent variables are presented in table 5.1a.

Table 5.1a: Cumulative Predicted Probabilities of school completion

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	-2.9873	1	0.048003	0.048003
Const (2)	-18155	1 or 2	0.139975	0.091972
Cumulative scores (3)		1 or 2 or 3	1	0.860025

Table 5.1a indicates that Ogoni people have greater probability (0.860025) of being in the highest category of school completion. The descriptive analysis shows that about 84.8% of the household did not have any member who dropped out of school (primary and secondary schools). The regression result suggests that corporate social responsibility of oil firms in terms of provision of scholarship (CSRsch), corporate social responsibility of oil firms in terms of provision/renovation of school building (CSRsb) and household income are not significant contributors to school completion in the community. On the contrary, it suggests that government interventions in terms of provision of scholarship (GIsch) and provision/renovation of school building (GIsb) have contributed positively to school completion in the community.

B. Social Effect: Health

Hypotheses i, ii and iii in terms of health, stated below, are evaluated in this section with reference to table 5.1. These hypotheses are evaluated together since they were estimated using the same model.

Hypotheses 1, II and III:

i. Oil exploration in Ogoniland has no significant effects on health status of the host community.

ii. Government interventions, in terms of healthcare delivery, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (health status) in Ogoni community.

iii. Corporate social responsibility activities of the oil companies, in terms of healthcare delivery, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (healthcare delivery) in Ogoni community.

I. Overall Model: In this model, 82.75 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square (G^2 = 383.721**)** with p-value of 0.007, indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (15.15), with p-value of 0.01, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined five factors namely government intervention towards the provision of healthcare services (GIhe), corporate social responsibility of oil firms towards the provision of healthcare services (CSRhe), oil spill (OS), air pollution (AP) and household income. The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that only household income significantly effects on health status of

the community. On the other hand, the result indicates that government intervention towards the provision of healthcare services (GIhe), corporate social responsibility of oil firms towards the provision of healthcare services (CSRhe), oil spill (OS) and air pollution (AP) are not among the significant factors affecting health status in Ogoni community. This is because the coefficients of the later variables were not found to be statistically different from zero in the estimation. In general, therefore, the following decisions were made about the null hypotheses:

a. Hypothesis I: This hypothesis, with regard to oil spill and air pollution, was accepted with the conclusion that oil exploration and the presence of oil companiesô facilities in Ogoniland do not have significant effects on the health status of Ogoni people.
b. Hypothesis II: This hypothesis was accept with the conclusion that government interventions, in terms of healthcare services delivery, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (health status) of Ogoni community.
c. Hypothesis III: Given that the coefficient is not statistically significant, this hypothesis was also accepted with the conclusion that corporate social responsibility activities of the oil companies, in terms of healthcare services delivery, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (health status) of Ogoni community.

II. Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable: As stated above, only household income significantly affects health status in the community. As expected, household income is positively associated with health status. For instance, the result indicates that a unit increase in household income would result in about 0.30 unit increase in the log-odds of being in a higher category of health status (predominance of diseases tending towards ôNot too often) while the other variables in the model are held constant. In other words, increase in household income increases the log-odds of the household being in the category where diseases related to environmental factors are not experienced too often in the household.

III. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables

As specified in the methodology, keeping the estimated parameters fixed (that is ϐ = 0), cumulative predicted probabilities for each category of the dependent variable were obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the three categories and probabilities for the individual scores of health status in the community at the means of the independent variables are presented in table 5.1b.

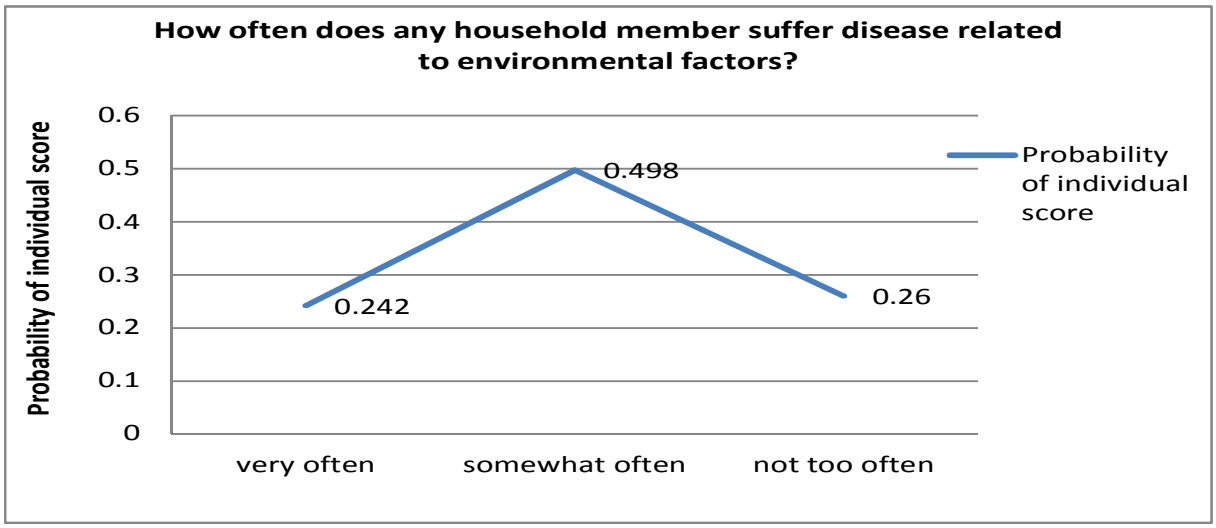
Table 5.1b: Cumulative Predicted Probabilities of health status and Correlation Analysis

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	-1.1444	1	0.241513	0.241513
Const (2)	1.0445	1 or 2	0.739717	0.498204
Cumulative scores (3)		1 or 2 or 3	1	0.260283
Correlation between household health status and household characteristics				
	Gender of household head	Household size	Academic qualification of household head	Household income
Pearson χ^2 (p-value)	0.018 (0.892)	24.057 (0.064)*	5.412 (0.248)	13.040 (0.011)**

Table 5.1b indicates that the health status probability of Ogoni people has a form of normal distribution ranging from *very often* to *not too often* in terms of frequency at which diseases related to environmental factors occur in households (see figure 24). The probability of such diseases occurring *very often* in household is about 0.242; while the probability of such diseases occurring *not too often* in household is about 0.26. The probability of such diseases occurring *somewhat often* in household is about 0.5. The regression result suggests that oil spill and air pollution are not significant detrimental factors to health status in the community. In addition, it indicates government intervention towards the provision of healthcare services and corporate social responsibility of oil firms towards the provision of healthcare services have not contributed positively to the health status of the community. Household income was

identified as the major determinant of improved health in the community. Correlation analysis of the household characteristics with the health status of the households indicates that household income is significantly correlated, at 5 percent, with the health status of the households. Household size is fairly correlated (at 10 percent) with health status of the households. Gender and academic qualification of the household head is not correlated with the health status of the households.

Figure 24: *Probability at which diseases related to environmental factors occur in households*



C. Social Effect: Housing (cost of housing)

The first hypothesis (i) is not applicable to housing. Thus, only hypotheses ii and iii are evaluated in relation to housing. These hypotheses (i.e., ii and iii) are stated below in terms of housing (cost of housing). The result of the model estimation is as presented in table 5.1.

Hypotheses II and III:

ii. Government interventions, in terms of provision of housing, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (cost of housing) of Ogoni community.

iii. Corporate social responsibility activities of the oil companies, in terms of provision of housing, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (cost of housing) of Ogoni community

i. **Overall Model:** In this model, 98.25 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square ($\chi^2 = 137.403$) with p-value (0.03), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (52.204), with p-value of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined three factors namely government intervention in provision of housing (GIho), corporate social responsibility of oil firms in terms of provision of housing (CSRho) and demand for housing (DDH). The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that only demand for housing (DDH) significantly affect cost of housing in the community. On the other hand, the result indicates that government intervention in provision of housing (GIho) and corporate social responsibility of oil firms in terms of provision of housing (CSRho) are not among the significant factors affecting cost of housing in Ogoni community. This is because the coefficients of the later variables were not found to be statistically different from zero in the estimation. In general, therefore, the following decisions were made about the null hypotheses:

b. Hypothesis II: Given that the coefficient is not statistically significant, this hypothesis was accepted with the conclusion that government interventions, in terms of provision of housing, towards mitigating the negative externalities of oil exploration, do not have significant effect on their socio-economic wellbeing (cost of housing).

c. Hypothesis III: Given that the coefficient is not statistically significant, the hypotheses about corporate social responsibility of oil firms in term of provision of housing was accepted with the conclusion that corporate social responsibility activities of the oil companies, in terms of provision of housing, towards mitigating the negative externalities of oil exploration do not have significant effect on their socio-economic wellbeing (cost of housing).

II. Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable: As stated above, only demand for housing (DDH) significantly affects cost of housing in Ogoniland. It is positively associated with cost of housing in the community. For instance, the result indicates that a unit increase in demand for housing would result in about 0.66 unit increase in the log-odds of being in a higher category of cost of housing while the other variables in the model are held constant.

III. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables

As specified in the methodology, keeping the estimated parameters fixed (that is ϐ = 0), cumulative predicted probabilities for each category of the dependent variable are obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the four categories and probabilities for the individual scores of housing in the community at the means of the independent variables are presented in table 5.1c.

Table 5.1c: Cumulative Predicted Probabilities of Cost of Housing

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	04960	1	0.621519	0.621519
Const (2)	4.2991	1 or 2	0.986601	0.365082
Const (3)	6.8190	1 or 2 or 3	0.998908	0.012307
Cumulative scores (4)		1 or 2 or 3 or 4	1	0.001092

Table 5.1c indicates that households in Ogoni have greater probability (0.621519) of being in the lowest category of cost of housing. The regression result suggests that government intervention in provision of housing (GIho) and corporate social responsibility of oil firms in term of provision of housing (CSRho) are not significant contributors to reduction in cost of housing in the community. The result, however, indicates that demand for housing positively affects cost of housing in the community.

D. Social Effect: Social Capital (scoialcap)

The first hypothesis (i) is not applicable to social capital. Thus, only hypotheses ii and iii are evaluated in relation to social capital. These hypotheses (i.e., ii and iii) are stated below in terms of social capital. The result of the model estimation is as presented in table 5.1.

Hypotheses II and III:

ii. Civil or community group interactions with government agencies, in terms of sincerity of purpose, do not have significant effect on the socio-economic wellbeing (social capital) of Ogoni community

iii. Civil or community group interactions with oil firms, in terms of sincerity of purpose, do not have significant effect on the socio-economic wellbeing (social capital) of Ogoni community

i. **Overall Model:** In this model, 72.25 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square (G^2 = 460.878**)** with p-value (0.001), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (22.389), with p-value of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined five factors namely education attainment of household head (ET), leadership (i.e., if a household member is a political/community/organizational leader in the community), nationality, civil or community group interactions with government agencies (CCGG), and civil or community group interactions with oil firms (CCGO). The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that leadership and civil or community group interactions with government agencies (CCGG) have significant effect on household social capital in the community. However, civil or community group interactions with government agencies (CCGG) is negatively associated with social capital in the community. On the other hand, the result indicates that education attainment of household head (ET), nationality and civil or community group interactions with oil firms (CCGO) are not among the significant factors affecting household social capital in Ogoni community. This is because the coefficients of the later variables were not found to be statistically different from zero in the estimation. In general, therefore, the following decisions were made about the null hypotheses:

a. Hypothesis II: This hypothesis was rejected with the conclusion that civil or community group interactions with government agencies (CCGG) have significant effect on the socio-economic wellbeing (social capital) of Ogoni community. However, these interactions have negative effect on household social capital.
b. Hypothesis III: This hypothesis was accepted with the conclusion that civil or community group interactions with oil firms (CCGO) do not have significant effect on the socio-economic wellbeing (social capital) of Ogoni community.

ii. **Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable:** As stated above, leadership and civil/community group interactions with government agencies (CCGG) have significant effect social capital in Ogoniland. However, civil or community group interactions with government agencies (CCGG) is negatively associated with social capital in the community. For instance, the result indicates that a unit increase in civil or community group interactions with government agencies (CCGG) would result in about 0.402 unit reduction in the log-odds of being in a higher category of social capital while the other variables in the model are held constant. On the other hand, each unit increase in leadership would result in about 0.75 unit

increase in the log-odds of being in a higher category of social capital given that the other variables are held constant in the model. In other words, if a household member is a political, community or organizational leader in the community, the log-odds of that household being in a higher category of social capital would increase by about 0.75 unit.

iii. **Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables**

As specified in the methodology, keeping the estimated parameters fixed (that is ϭ = 0), cumulative predicted probabilities for each category of the dependent variable are obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the five categories and probabilities for the individual scores of social capital in the community at the means of the independent variables are presented in table 5.1d.

Table 5.1d: Cumulative Predicted Probabilities of social capital

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	-1.2038	1	0.2308	0.2308
Const (2)	-0.1257	1 or 2	0.468616	0.237816
Const (3)	2.5455	1 or 2 or 3	0.927271	0.458654
Const (4)	4.0062	1 or 2 or 3 or 4	0.982123	0.054852
Cumulative scores (5)		1 or 2 or 3 or 4 or 5	1	0.017877

Table 5.1d indicates that Ogoni people have greater probability (0.860025: that is, 02308+0.237816+0.458654) of being in the lower category of social capital. The regression result suggests that civil or community group interaction with government agencies (CCGG) is a major contributor to low social capital in the community. The descriptive analysis shows that about 46% and 28% of the respondents rated civil or community group interacting with government agencies very low and low respectively, in terms of sincerity of purpose towards mitigating the negative externalities of oil exploration in the community. On the other hand, the regression result suggests that civil or community group interaction with oil firms (CCGO) is not a major determinant of social capital in the community.

These conclusions about social effects are presented in table 5.1e.

Table 5.1e: Social Effect

Dependent Variable: Education (school completion ï primary and secondary)		
Predictor	**Decision about H_o**	**Conclusion** *(marginal effect on log-odds given a unit increase of the predictor)*
Government interventions in terms of provision/ renovation of school building (GIsb)	Rejected	Increases school completion by about 0.77 unit
Government interventions, in terms of provision of scholarship (GIsch)	Rejected	Increases school completion by about 0.6 unit
Corporate social responsibility of oil firms in terms of provision/renovation of school building (CSRsb)	Accepted	Not significant
Corporate social responsibility of oil firms in terms of provision of scholarship (CSRsch)	Accepted	Not significant
Dependent Variable: Health		
Oil spill	Accepted	Not significant
Air pollution	Accepted	Not significant
Government interventions in terms of healthcare services delivery	Accepted	Not significant
Corporate social responsibility activities of the oil companies in terms of healthcare services delivery	Accepted	Not significant
Note: household income was found to be the significant determinant of health status in the community		
Dependent Variable: Housing (cost of housing)		
Government interventions, in terms of provision of housing	Accepted	Not significant
Corporate social responsibility of oil firms in terms of provision of housing	Accepted	Not significant
Note: Demand for housing was found to be the significant determinant of cost of housing in the community		
Dependent Variable: Social capital		
Civil or community group interactions with government agencies (CCGG)	Rejected	Reduces social capital by about 0.4 unit
Civil or community group interactions with oil firms (CCGO)	Accepted	Not significant
Note: Leadership position significantly increases household social capital in the community		

5.2 Economic Effects

The five models under this category are presented in table 5.2.

Table 5.2: Ordinal Logistic Analysis of Economic Effect Models

	Income		Road		Water		Electricity		Agric	
Variable Value	**1, 2, 3, 4, 5**		**1, 2, 3, 4, 5**		**1, 2, 3, 4, 5**		**1, 2, 3, 4, 5**		**1, 2, 3, 4, 5**	
Predictor	**Coef**	**Odds Ratio**	**Coef**	**Odds Ratio**	**Coef**	**Odds Ratio**	**Coef**	**Odds Ratio**	**Coef**	**Odds Ratio**
Const (1)	-1.0481 {0.175}		1.6447* {0.000}		0.6308 {0.074}		0.9807* {0.000}		-3.9158* {0.000}	
Const (2)	0.1494 {0.846}		3.1997* {0.000}		2.0058* {0.000}		2.4207* {0.000}		-2.5141 * {0.000}	
Const (3)	1.2784 {0.100}		4.9785* {0.000}		3.7543* {0.000}		4.0203* {0.000}		-1.1170* {0.031}	
Const (4)	2.2036* {0.006}		7.1824* {0.000}		5.9022* {0.000}		5.4006* {0.000}		0.5510 {0.284}	
GIw					0.7424* {0.000}	0.48*				
GIel							0.9784* {0.000}	0.38*		
Gird			0.9888* {0.000}	0.37*						
GIe	0.4733* {0.016}	0.62*								
GIcl									0.5246* {0.021}	0.59*
CSRw					0.4794* {0.002}	0.62*				
CSRel							0.4612* {0.000}	0.63*		
CSRrd			-0.3913* {0.001}	0.68*						
CSRe	-0.4190* {0.044}	0.66*								
CSRcl									0.1970 {0.468}	1.22
OS	-0.0370 {0.820}	0.96			0.0885 {0.255}	1.09			-0.1139 {0.477}	0.89
LD	0.0701 {0.689}	1.07	-0.15383 {0.062}	0.86					-0.5302* {0.002}	1.70*
Income					0.08895 {0.225}	1.09			0.26006* {0.005}	1.30*
AP									-0.2661* {0.048}	0.77*
ET	0.3270* {0.001}	0.72*							0.05489 {0.563}	1.06
Genderh	0.5237* {0.023}	1.69*								
Agric	0.2772* {0.007}	1.32*								
SocialCap	0.4866* {0.000}	1.63*								
Test that all slopes are zero (G)	56.478* {0.000}		139.920* {0.000}		61.152* {0.000}		163.437* {0.000}		25.236* {0.001}	
Goodness-of-Fit Test (χ^2)	1079.887* {0.048}		280.986* {0.004}		614.573* {0.000}		131.546* {0.000}		987.056* {0.000}	
Cases used	294 (73.5%)		384 (96%)		382 (95.5%)		383 (95.75%)		292 (73%)	
Cases with missing values	106 (26.5%)		16 (4%)		18 (4.5%)		17 (4.25%)		108 (27%)	

Notes: p-values are in parentheses ï {}; percentages in brackets ï (); * represents 5% significant

A. Economic Effect: Income

Hypotheses 1, II and III in term of income, stated below, are evaluated in this section. The result of the model estimation is as presented in table 5.2.

Hypotheses 1, II and III:

i. Oil exploration and the presence of oil companiesô facilities in Ogoniland have no significant effects on the household income of the host community
ii. Government interventions, in terms of employment creation, towards mitigating the negative externalities of oil exploration, do not have significant effect on their socio-economic wellbeing (income)
iii. Corporate social responsibility activities of the oil companies, in terms of employment creation, towards mitigating the negative externalities of oil exploration, do not have significant effect on their socio-economic wellbeing (income)

I. Overall Model: In this model, 73.5 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square ($G^2 = 1079.887$**)** with p-value (0.048), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (56.478), with p-value of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined eight factors namely government intervention in employment creation (GIe), corporate social responsibility of oil firms in terms of employment creation (CSRe), oil spill (OS), land degradation (LD), education attainment of household head (ET), gender of household head (Genderh), agricultural output (Agric), and social capital. The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that government intervention in employment creation (GIe), corporate social responsibility of oil firms in terms of employment creation (CSRe), education attainment of household head (ET), gender of household head (Genderh),

agricultural output (Agric), and social capital have significant effect on household income in the community. However, corporate social responsibility of oil firms in terms of employment creation (CSRe) is negatively associated with household income. On the other hand, the result indicates that oil spill (OS) and land degradation (LD) are not among the significant factors affecting household income in Ogoni community. This is because these coefficients were not found to be statistically different from zero in the estimation. In general, therefore, the following decisions were made about the null hypotheses:

a. Hypothesis I: This hypothesis was accepted with the conclusion that oil exploration and the presence of oil companiesô facilities in Ogoniland (given oil spill and land degradation) have no significant effects on the household income of Ogoni community.
b. Hypothesis II: This hypothesis was rejected with the conclusion that government interventions, in terms of employment creation, towards mitigating the negative externalities of oil exploration, have significant positive effect on their socio-economic wellbeing (income) of Ogoni community.
c. Hypothesis III: This hypothesis about corporate social responsibility of oil firms in terms of employment creation (CSRe) was also rejected with the conclusion that corporate social responsibility activities of the oil companies, in terms of employment creation, towards mitigating the negative externalities of oil exploration, have significant effect on the socio-economic wellbeing (income) of Ogoni community. However, the effect of corporate social responsibility of oil firms in terms of employment creation (CSRe) in household income of Ogoni community is negative.

II. **Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable:** As stated above, government intervention in employment creation (GIe), corporate social responsibility of oil firms in terms of employment creation (CSRe), education attainment of household head (ET), gender of household head (Genderh), agricultural output (Agric), and social capital significantly affect household income. However, corporate social responsibility of oil firms in term employment creation (CSRe) is negatively associated with household income; while government intervention in

employment creation (GIe), education attainment of household head (ET), gender of household head (Genderh), agricultural output (Agric) and social capital are positively associated with household income.

For instance, the result indicates that a unit increase government intervention in employment creation (GIe) would result in about 0.47 unit increase in the log-odds of being in a higher category of household income while keeping other variables fixed. Similarly, the result indicates that a unit increase in gender of household head would result in about 0.52 unit increase in the log-odds of being in a higher category of household income while the other variables in the model are held constant. In other words, if household head is a male, the ordered log-odds of the household being in a higher category of income would increase by about 0.52 unit given that the other variables are held constant in the model. Also, a unit increase in agricultural productivity would result in about 0.28 unit increase in the log-odds of being in a higher category of income while the other variables in the model are held constant. In other words, if a household agricultural productivity increases by a unit, its ordered log-odds of being in a higher category of income would increase by about 0.28 units given that the other variables are held constant in the model. Likewise, a unit increase in household social capital would result in about 0.49 unit increase in the log-odds of being in a higher category of income while the other variables in the model are held constant. In other words, if a household social capital increases by a unit, its ordered log-odds of being in a higher category of income would increase by about 0.49 units given that the other variables are held constant in the model. On the other hand, corporate social responsibility of oil firms in terms of employment creation (CSRe) would result in about 0.42 units reduction in the log-odds of being in a higher category of household income given that the other variables are held constant in the model.

III. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables

As specified in the methodology, keeping the estimated parameters fixed (that is ϭ = 0), cumulative predicted probabilities for each category of the dependent variable are obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the five categories and probabilities for the individual scores of household income in the community at the means of the independent variables are presented in table 5.2a.

Table 5.2a: Cumulative Predicted Probabilities of household income

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	-1.0481	1	0.25959	0.25959
Const (2)	0.1494	1 or 2	0.537281	0.277691
Const (3)	1.2784	1 or 2 or 3	0.782177	0.244897
Const (4)	2.2036	1 or 2 or 3 or 4	0.900572	0.118395
Cumulative scores (5)		1 or 2 or 3 or 4 or 5	1	0.099428

Table 5.2a indicates that Ogoni people have greater probability (0.25959 for ₦18,000 and below, 0.277691 for ₦18,100 ï ₦50,000) of being in the income range of ₦50,000 and below. Contrary to Aluko (2004), the regression result suggests that oil spill and land degradation are not significant contributors to such low income. On the other hand, the result indicates that positive contributors to household income in the community are government intervention in employment creation (GIe), education attainment of household head (ET), gender of household head (Genderh), agricultural output (Agric), and social capital.

B. Economic Effect: Road

Hypotheses 1, II and III in term of access road, stated below, are evaluated in this section. The result of the model estimation is as presented in table 5. 2.

Hypotheses 1, II and III:

a. Oil exploration and the presence of oil companiesô facilities in Ogoniland have no significant effect on access road in the host community

b. Government interventions, in terms of road construction, towards mitigating the negative externalities of oil exploration do not have significant effect on their socio-economic wellbeing (access road)
c. Corporate social responsibility activities, in terms of road construction, of the oil companies towards mitigating the negative externalities of oil exploration do not have significant effect on their socio-economic wellbeing (access road)

I. Overall Model: In this model, 96 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square (G^2 = 280.986**)** with p-value (0.004), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (139.92), with p-value of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined three factors namely government intervention towards provision of accessible roads (GIrd), corporate social responsibility of oil firms towards provision of accessible roads (CSRrd) and land degradation (LD). The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that Ogoni peopleôs perceptions about government intervention towards provision of accessible roads (GIrd) and corporate social responsibility of oil firms towards provision of accessible roads (CSRrd) are statistically significant. However, corporate social responsibility of oil firms towards provision of accessible roads (CSRrd) is negatively associated with availability of access road in the community. On the other hand, the result indicates that land degradation (LD) is not a significant factor affecting access road in the community. This is because its coefficient was not found to be statistically different from zero in the estimation. In general, therefore, the following decisions were made about the null hypotheses:

a. Hypothesis I: This hypothesis was accepted with the conclusion that oil exploration and the presence of oil companiesô facilities in Ogoniland (given land degradation) have no significant effect on availability of access road in Ogoni community.
b. Hypothesis II: This hypothesis was rejected with the conclusion that government interventions, in terms of provision of accessible roads, towards mitigating the negative externalities of oil exploration, have significant effect on their socio-economic wellbeing (access road).
c. Hypothesis III: This hypothesis was also rejected with the conclusion that corporate social responsibility activities of the oil companies, in terms of provision of accessible roads, towards mitigating the negative externalities of oil exploration have significant effect on their socio-economic wellbeing (access road). However, this effect is negative.

II. Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable: As stated above, government intervention towards provision of accessible roads (GIrd) and corporate social responsibility of oil firms towards provision of accessible roads (CSRrd) are significant. However, government intervention towards provision of accessible roads (GIrd) had positive effect while corporate social responsibility of oil firms towards provision of accessible roads (CSRrd) had negative effect on availability of access road in the community. For instance, the regression result indicates that each unit increase in government intervention towards provision of accessible roads (GIrd) would result in about 0.99 units increase in the log-odds of the community being in a higher category of accessible road given that the other variables are kept fixed. On the contrary, the regression result indicates that each unit increase in corporate social responsibility of oil firms towards provision of accessible roads (CSRrd) would result in about 0.39 units reduction in the log-odds of the community being in a higher category of accessible road given that the other variables are held constant in the model. On the other hand, the result shows that land degradation is not a major determinant of availability or otherwise of access roads in the community.

III. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables

As specified in the methodology, keeping the estimated parameters fixed (that is ϐ = 0), cumulative predicted probabilities for each category of the dependent variable are obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the five categories and probabilities for the individual scores of availability of access roads in the community at the means of the independent variables are presented in table 5.2b.

Table 5.2b: Cumulative Predicted Probabilities of Availability of Access Roads

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	1.6447	1	0.838173	0.838173
Const (2)	3.1997	1 or 2	0.960823	0.12265
Const (3)	4.9785	1 or 2 or 3	0.993163	0.03234
Const (4)	7.1824	1 or 2 or 3 or 4	0.999241	0.006078
Cumulative scores (5)		1 or 2 or 3 or 4 or 5	1	0.000759

Table 5.2b indicates that Ogoni community has greater probability (0.838173) of being at the lowest category in terms of availability of access roads in the community. The regression result suggests that land degradation is not a significant contributor to such low category of access road. This regression result is supported by the descriptive analysis which shows that larger proportion of the community believes that land degradation is not a major problem in the community as 21.4%, 25.4% and 31.6% rated it very low, low and mild in the community respectively (see table 4.28). The result, however, suggests that corporate social responsibility of oil firms towards provision of accessible roads (CSRrd) have contributed negatively to availability of accessible road in the community. This is unlike government intervention towards provision of accessible roads (GIrd) which shows positive effect on availability of accessible road in the community.

C. Economic Effect: Potable Water

Hypotheses 1, II and III in term of potable water, stated below, are evaluated in this section. The result of the model estimation is as presented in table 5.2.

Hypotheses 1, II and III:

i. Oil exploration and the presence of oil companiesô facilities in Ogoniland have no significant effect on the availability, or otherwise, of potable water in Ogoni community.
ii. Government interventions, in terms of provision of potable water, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (availability of potable water) of Ogoni community.
iii. Corporate social responsibility activities of the oil companies, in terms of provision of potable water, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (availability of potable water) of Ogoni community.

I. **Overall Model:** In this model, 95.5 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square (G^2 = 614.573**)** with p-value (0.000), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (61.152), with p-value of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

   The model examined four factors namely government intervention towards provision of potable water (GIw), corporate social responsibility of oil firms towards provision of potable water (CSRw), oil spill (OS) and household income. The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that government

intervention towards provision of potable water (GIw) and corporate social responsibility of oil firms towards provision of potable water (CSRw) are statistically significant. Both variables are positively associated with availability of potable water in the community. On the other hand, the result indicates that oil spill (OS) and household income are not a significant factors affecting availability of potable water in the community. This is because the coefficients of oil spill (OS) and household income were not found to be statistically different from zero in the estimation. In general, therefore, the following decisions were made about the null hypotheses:

I. Hypothesis I: This hypothesis was accepted with the conclusion that oil exploration and the presence of oil companiesô facilities in Ogoniland (given oil spill) have no significant effect on availability of potable water in Ogoni community.

II. Hypothesis II: This hypothesis was rejected with the conclusion that government interventions, in terms of provision of potable water, towards mitigating the negative externalities of oil exploration have positive and significant effect on the socio-economic wellbeing (potable water) of Ogoni community.

III. Hypothesis III: This hypothesis was also rejected with the conclusion that corporate social responsibility activities of the oil companies, in terms of provision of potable water, towards mitigating the negative externalities of oil exploration have positive and significant effect on the socio-economic wellbeing (potable water) of Ogoni community.

II. Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable: As stated above, government intervention towards provision of potable water (GIw) and corporate social responsibility of oil firms towards provision of potable water (CSRw) are significant. Government intervention towards provision of potable water (GIw) and corporate social responsibility of oil firms towards provision of potable water (CSRw) are positively associated with availability of potable water in the community. For instance, the regression result indicates that each unit increase in government intervention towards provision of potable water (GIw) and corporate social responsibility of oil firms towards provision of potable water (CSRw) would result in about 0.74 and 0.48 units increase respectively in the log-odds of the community being in a higher category of availability of potable water given that the other variables are held constant in the model.

On the other hand, the result shows that oil spill and household income are not major determinants of availability or otherwise of potable water in the community.

III. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables

As specified in the methodology, keeping the estimated parameters fixed (that is ϐ = 0), cumulative predicted probabilities for each category of the dependent variable are obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the five categories and probabilities for the individual scores of availability of potable water in the community at the means of the independent variables are presented in table 5.2c.

Table 5.2c: Cumulative Predicted Probabilities of availability of potable water

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	0.6308	1	0.652671	0.652671
Const (2)	2.0058	1 or 2	0.881405	0.229734
Const (3)	3.7543	1 or 2 or 3	0.977119	0.095714
Const (4)	5.9022	1 or 2 or 3 or 4	0.997274	0.020155
Cumulative scores (5)		1 or 2 or 3 or 4 or 5	1	0.002726

Table 5.2c indicates that Ogoni community has greater probability (0.652671) of being at the lowest category in terms of availability of potable water in the community. The regression result, however, suggests that oil spill is not a significant contributor to such low category of availability of potable water in the community. For instance, larger proportion of the community believes that oil spill is not a major problem in the community as 23.2%, 23.2% and 32.6% rated it very low, low and mild in the community respectively (see table 4.28). On the other hand, the regression result suggests that government intervention towards provision of potable water (GIw) and corporate social responsibility of oil firms towards provision of

potable water (CSRw) have contributed positively to availability of potable water in the community.

D. Economic Effect: Electricity

The first hypothesis (I) is not applicable to electricity. Thus, only hypotheses II and III are evaluated in relation to electricity. These (hypotheses II and III) are stated below in terms of electricity. The result of the model estimation is as presented in table 5.2.

Hypotheses II and III:

ii. Government interventions, in terms of provision of electricity, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (availability of electricity) of Ogoni community.

iii. Corporate social responsibility activities of the oil companies, in terms of provision of electricity, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (availability of electricity) of Ogoni community.

I. **Overall Model:** In this model, 95.7 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square (G^2 = 131.546**)** with p-value (0.000), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (163.437), with p-value of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

   The model examined two factors namely government intervention towards provision of electricity (GIel) and corporate social responsibility of oil firms towards provision of electricity (CSRel). The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that government intervention towards provision of

electricity (GIel) and corporate social responsibility of oil firms towards provision of electricity (CSRel) are statistically significant. Both variables are positively associated with availability of electricity in the community. In general, therefore, the following decisions were made about the null hypotheses:

a. Hypothesis II: This hypothesis was rejected with the conclusion that government interventions, in terms of provision of electricity, towards mitigating the negative externalities of oil exploration have positive and significant effect on the socio-economic wellbeing (availability of electricity) of Ogoni community.
b. Hypothesis III: This hypothesis was also accepted with the conclusion that corporate social responsibility activities of the oil companies, in terms of provision of electricity, towards mitigating the negative externalities of oil exploration have positive and significant effect on the socio-economic wellbeing (availability of electricity) of Ogoni community.

II. Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable: As stated above, government intervention towards provision of electricity (GIel) and corporate social responsibility of oil firms towards provision of electricity (CSRel) are significant. For instance, the regression result indicates that each unit increase in government intervention towards provision of electricity (GIel) and corporate social responsibility of oil firms towards provision of electricity (CSRel) would result in about 0.9784 and 0.46 units increase respectively in the log-odds of the community being in a higher category of availability of electricity given that the other variables are held constant in the model.

i. **Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables**

As specified in the methodology, keeping the estimated parameters fixed (that is ϭ = 0), cumulative predicted probabilities for each category of the dependent variable are

obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the five categories and probabilities for the individual scores of availability of electricity in the community at the means of the independent variables are presented in table 5.2d.

Table 5.2d: Cumulative Predicted Probabilities of availability of electricity

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	0.9807	1	0.727247	0.727247
Const (2)	2.4207	1 or 2	0.918392	0.191145
Const (3)	4.0203	1 or 2 or 3	0.982369	0.063977
Const (4)	5.4006	1 or 2 or 3 or 4	0.995506	0.013138
Cumulative scores (5)		1 or 2 or 3 or 4 or 5	1	0.004494

Table 5.2d indicates that Ogoni community has greater probability (0.727247) of being at the lowest category in terms of availability of electricity in the community. The regression result suggests that government intervention towards provision of electricity (GIel) and corporate social responsibility of oil firms towards provision of electricity (CSRel) have contributed positively to level of availability of electricity supply in the community.

E. Economic Effect: Agricultural Productivity

Hypotheses 1, II and III in terms of agricultural productivity, stated below, are evaluated in this section. The result of the model estimation is as presented in table 5.2.

Hypotheses 1, II and III:

i. Oil exploration and the presence of oil companiesô facilities in Ogoniland have no significant effect on the household agricultural productivity in the host community

ii. Government interventions, in terms of cleaning polluted land and water, towards mitigating the negative externalities of oil exploration do not have effect on the socio-economic wellbeing (agricultural productivity) of Ogoni community.

iii. Corporate social responsibility activities of the oil companies, in terms of cleaning of polluted land and water, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (agricultural productivity) of Ogoni community.

II. **Overall Model:** In this model, 73 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square (G^2 = 987.056**)** with p-value of 0.000, indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (25.236), with p-value of 0.001, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined seven factors namely government intervention towards cleaning of polluted land and water (GIcl), corporate social responsibility of oil firms towards cleaning of polluted land and water (CSRcl), oil spill (OS), land degradation (LD), air pollution (AP), household income, and education attainment of household head (ET). The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that government intervention towards cleaning of polluted land and water (GIcl), land degradation (LD), air pollution (AP) and household income have significant effects on household agricultural productivity in the community. However, land degradation and air pollution (AP) are negatively associated with agricultural productivity while government intervention towards cleaning of polluted land and water (GIcl) and household income are positively related to agricultural productivity in Ogoni community. On the other hand, the result indicates that corporate social responsibility of oil firms towards cleaning of polluted land and water (CSRcl), oil spill (OS) and education attainment of household head (ET) are not among the significant factors affecting household agricultural productivity in Ogoni community. This is because the coefficients of the later variables were not found to be statistically different from zero in the

estimation. In general, therefore, the following decisions were made about the null hypotheses:

a. Hypothesis I: This hypothesis, with regard to land degradation and air pollution, was rejected with the conclusion that oil exploration and the presence of oil companiesô facilities in Ogoniland have significant effects on the household agricultural productivity of Ogoni community. However, they have adverse effect on agricultural productivity. On the other hand, with regards oil spill, this hypothesis was accepted with the conclusion that oil exploration and the presence of oil companiesô facilities in Ogoniland have no significant effects on the household agricultural productivity of Ogoni community.
b. Hypothesis II: This hypothesis was rejected with the conclusion that government interventions, in terms of cleaning polluted land and water, towards mitigating the negative externalities of oil exploration have positive and significant effect on the socio-economic wellbeing (agricultural productivity) of Ogoni community.
c. Hypothesis III: This hypothesis was accepted with the conclusion that corporate social responsibility activities of the oil companies, in terms of cleaning polluted land and water, towards mitigating the negative externalities of oil exploration do not have significant effect on the socio-economic wellbeing (agricultural productivity) of Ogoni community.

III. **Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable:** As stated above, government intervention towards cleaning of polluted land and water (GIcl), land degradation (LD), air pollution (AP) and household income significantly affect household agricultural productivity. As expected, land degradation (LD) and air pollution (AP) are negatively associated with household agricultural productivity; while Government intervention towards cleaning of polluted land and water (GIcl) and household income are positively associated with household agricultural productivity. For instance, the result indicates that a unit increase in government intervention towards cleaning of polluted land and water (GIcl) and household income would result in about 0.53 and 0.26 units increase, respectively, in the log-odds of being in a higher category of agricultural productivity while the other variables in the model are held constant. On the

other hand, a unit increase in land degradation (LD) and air pollution (AP) would also result in about 0.53 and 0.27 units reduction, respectively, in the log-odds of being in a higher category of agricultural productivity while the other variables in the model are held constant. Crops exposure to high concentrations of different air pollutants can be detriment to agricultural productivity. Such injuries on crops include visible markings on the foliage, reduced growth and yield, and premature death of plant.

IV. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables

As specified in the methodology, keeping the estimated parameters fixed (that is ϭ = 0), cumulative predicted probabilities for each category of the dependent variable are obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the five categories and probabilities for the individual scores of agricultural productivity in the community at the means of the independent variables are presented in table 5.2e.

Table 5.2e: Cumulative Predicted Probabilities of agricultural productivity

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	-3.9158	1	0.019535	0.019535
Const (2)	-2.5141	1 or 2	0.074876	0.05534
Const (3)	-1.1170	1 or 2 or 3	0.246568	0.171693
Const (4)	0.5510	1 or 2 or 3 or 4	0.634368	0.387799
Cumulative scores (5)		1 or 2 or 3 or 4 or 5	1	0.365632

Table 5.2e indicates that Ogoni people have greater probability (0.387799 for very high, and 0.365632 for high ï i.e.: 0.75343 all together) of being in high category of agricultural productivity. The regression result suggests that land degradation and air pollution are significant detrimental factors to agricultural productivity in the community. On the other hand, the result suggests that household income and government intervention towards cleaning of polluted land and water (GIcl) contribute positively to agricultural productivity in the

community. The result also indicates that education attainment of household head does not contribute to household agricultural productivity.

These conclusions about economic effects are presented in table 5.2f.

Table 5.2f: Economic Effect

Predictor	**Decision about H_o**	**Conclusion** *(marginal effect on log-odds given a unit increase of the predictor)*
Dependent Variable: Income (Household income)		
Oil spill resulting from the activities of oil companiesô facilities in Ogoni land (OS)	Accepted	Not significant
Land degradation resulting from the activities of oil companiesô facilities in Ogoni land (LD)	Accepted	Not significant
Government interventions in terms of employment creation (GIe)	Rejected	Increases household income by about 0.47 unit
Corporate social responsibility of oil firms in terms of employment creation (CSRe)	Rejected	Reduces household income by about 0.42 unit
Dependent Variable: Road (accessible roads)		
Land degradation resulting from the activities of oil companiesô facilities in Ogoni land (LD)	Accepted	Not significant
Government interventions in terms of provision of accessible roads (GIrd)	Rejected	Increases accessible roads by about 0.99 unit
Corporate social responsibility activities of the oil companies in terms of provision of accessible roads (CSRrd)	Rejected	Reduces accessible roads by about 0.39 unit
Dependent Variable: Water (potable water)		
Oil spill resulting from the activities of oil companiesô facilities in Ogoni land (OS)	Accepted	Not significant
Government interventions in terms of provision of potable water (GIw)	Rejected	Increases potable water by about 0.74 unit
Corporate social responsibility activities of the oil companies in terms of provision of potable water (CSRw)	Rejected	Increases potable water by about 0.48 unit
Dependent Variable: Electricity		
Government interventions in terms of provision of electricity (GIel)	Rejected	Increases potable water by about 0.74 unit
Corporate social responsibility activities of the oil companies in terms of provision of electricity (CSRel)	Rejected	Increases potable water by about 0.48 unit
Dependent Variable: Agriculture		
Oil spill resulting from the activities of oil companiesô facilities in Ogoni land (OS)	Accepted	Not significant
Land degradation resulting from the activities of oil companiesô facilities in Ogoni land (LD)	Rejected	Reduces agricultural productivity by about 0.53 unit
Air pollution resulting from the activities of oil companiesô facilities in Ogoni land (AP)	Rejected	Reduces agricultural productivity by about 0.27 unit
Government interventions in terms of cleaning polluted land and water (GIcl)	Rejected	Increases agricultural productivity by about 0.53 unit
Corporate social responsibility activities of the oil companies in terms of cleaning polluted land and water (CSRcl)	Accepted	Not significant
Note: Household income also significantly increases agricultural productivity in the community		

5.3 Marginal willingness To Accept Pay

The three models under this category are presented in table 5.3.

Table 5.3: Ordinal Logistic Analysis of Marginal Willingness To Accept pay (MWTA)

	MWTAo		**MWTAd**		**MWTAa**	
Variable Value	**1, 2, 3, 4**		**1, 2, 3, 4**		**1, 2, 3, 4**	
Predictor	**Coef**	**Odds Ratio**	**Coef**	**Odds Ratio**	**Coef**	**Odds Ratio**
Const (1)	-2.1467* {0.000}		-2.4775* {0.000}		-2.3118* {0.000}	
Const (2)	-0.6404 {0.232}		-1.1093* {0.043}		-1.1751* {0.028}	
Const (3)	0.7468 {0.164}		0.3912 {0.474}		0.2598 {0.625}	
Nationality	0.4291 {0.064}	1.54	0.5269* {0.023}	1.69*	0.5469* {0.018}	1.73*
Income	-0.19932* {0.008}	1.22*	-0.24385* {0.001}	1.28*	-0.22408* {0.003}	1.25*
SocialCap	-0.2669* {0.011}	1.31*	-0.2964* {0.005}	1.35*	-0.2311* {0.027}	1.26*
Genderr	-0.2716 {0.156}	0.69	-0.2796 {0.144}	0.76	-0.1696 {0.374}	0.84
OS	-0.36754* {0.000}	0.69*				
LD			-0.29080* {0.000}	0.75*		
AP					-0.25252* {0.000}	0.78*
Test that all slopes are zero (G)	33.855* {0.000}		33.399* {0.000}		29.495* {0.000}	
Goodness-of-Fit Test (χ^2)	610.376* {0.000}		569.875* {0.001}		581.413* {0.002}	
Cases used	384 (96%)		384 (96%)		383 (95.75%)	
Cases with missing values	16 (4%)		16 (4%)		17 (4.25%)	

Notes: p-values are in parentheses ï {}; percentages in brackets ï (); * represents 5% significant

Table 5.3 presents the analyses of Ogoni peopleôs marginal willingness to accept pay from oil companies to tolerate negative externalities resulting from the companiesô activities. The externalities considered are oil spill, land degradation and air pollution. These results are discussed in turn below.

A. Marginal willingness To Accept Pay from oil companies to tolerate negative externality – Oil Spill in the Community (MWTAo):

Hypothesis IV (a): Socio-economic factors are not significant determinants of Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate negative externalities (oil spill) resulting from the companiesô activities

I. Overall Model: In this model, 96 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square (G^2 = 610.376**)** with p-value (0.000), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (33.855), with p-value of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined five socio-economic factors namely nationality, household income, social capital, gender of respondent and perceived level of oil spill (OS). The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that household income, social capital and perceived level of oil spill (OS) significantly affect marginal willingness to accept pay or not to accept pay from oil companies to tolerate oil spill in the community resulting from the companiesô activities in the community. On the other hand, the result indicates that nationality and gender of respondent are not significant determinants of marginal willingness to accept pay from oil companies to tolerate oil spill in the community since their coefficients were not found to be statistically different from zero in the estimation.

Therefore, in general, the null hypothesis about marginal willingness to accept pay to tolerate oil spill in the community is rejected with the conclusion that socio-economic factors significantly influence Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate oil spill in the community. This willingness

to accept pay or not to accept pay from oil companies to tolerate oil spill in the community is influenced by three key socio-economic factors namely household income, social capital and perceived level of oil spill (OS).

II. **Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable:** As stated above, only household income, social capital and perceived level of oil spill (OS) significantly affect the dependent variable. The result shows that one unit increase in household income would result in about 0.2 unit reduction in the log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate oil spill in the community while the other variables in the model are held constant. In other words, if a household income increases by a unit, its ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate oil spill in the community would reduce by about 0.2 units given that the other variables are held constant in the model. Likewise, a unit increase in household social capital would result in about 0.27 unit reduction in the log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate oil spill in the community while the other variables in the model are held constant. In other words, if a household social capital increases by a unit, its ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate oil spill in the community would reduce by about 0.27 units given that the other variables are held constant in the model. Also, each unit increase in perceived level of oil spill (OS) would result in about 0.37 unit reduction in the log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate oil spill in the community while the other variables in the model are held constant. In other words, if perceived level of oil spill (OS) increases by a unit, its ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate oil spill in the community would reduce by about 0.37 units given that the other variables are held constant in the model.

III. **Marginal Effect of Individual Predictor on Odds Ratio:** The result indicates that a unit increase in household income would lead to higher odds of lower category of marginal willingness to accept pay from oil companies to tolerate oil spill in the

community given that the other variables in the model are held constant. For instance, the result shows that if a household income increases by a unit, its odds of lower category of marginal willingness to accept pay from oil companies to tolerate oil spill in the community will be 0.22 times greater given that the other variables in the model are held constant. This means that households with higher income have lower tendency to accept pay from oil companies to tolerate oil spill in the community than households with lower income. Similarly, if a household social capital increases by a unit, its odds of lower category of marginal willingness to accept pay from oil companies to tolerate oil spill in the community will be 0.31 times greater given that the other variables in the model are held constant. In order words, households with higher social capital have lower tendency to accept pay from oil companies to tolerate oil spill in the community than households with lower income. Likewise, if perceived level of oil spill (OS) increases by a unit, the odds of lower category of marginal willingness to accept pay from oil companies to tolerate oil spill in the community will be 0.69 times greater holding other variables in the model fixed. This implies that households that have the perception that level of oil spill (OS) in the community is high would have lower tendency to accept pay from oil companies to tolerate additional spillage than households that perceive otherwise.

IV. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables

As specified in the methodology, keeping the estimated parameters fixed (that is ϐ = 0), cumulative predicted probabilities for each category of the dependent variable are obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the four categories and probabilities for the individual scores of marginal willingness to accept pay from oil companies to tolerate oil spill in the community at the means of the independent variables are presented in table 5.3a.

Table 5.3a: Cumulative Predicted Probabilities of Marginal Willingness to Accept Pay from Oil Companies to Tolerate Oil Spill in the Community

Predictor	Coeff	Score	Cum Prob(score)	Prob (individual score)
Const (1)	-2.1467	1	0.10464	0.10464
Const (2)	-0.6404	1 or 2	0.345156	0.240516
Const (3)	0.7468	1 or 2 or 3	0.678481	0.333325
Cumulative scores (4)		1 or 2 or 3 or 4	1	0.321519

Table 5.3a indicates that Ogoni people have greater probability (0.333325 for willing and 0.321519 for very willing) of being willing to accept pay from oil companies to tolerate oil spill in the community. This could be as a result of the poverty level in the community. The descriptive analysis shows that about 65.6 percent of the households in the community have average monthly income of less than or equal to fifty thousand naira (₦50,000). In addition, the regression analysis has shown that households with higher income and higher social capital have lower tendency to accept pay from oil companies to tolerate oil spill in the community than households with lower income or social capital. Thus, greater number of the households community receiving average monthly income of less than or equal to fifty thousand naira (₦50,000) could have informed their greater probability (about 0.66) of being willing to accept pay from oil companies to tolerate oil spill in the community. Based on the descriptive analysis, the least amount, on the average, that households would be willing to accept from oil companies per month to tolerate additional oil spill is about one hundred and thirty-five thousand naira (₦135,000).

B. Marginal willingness To Accept Pay from oil companies to tolerate negative externality – Land Degradation in the community (MWTAd):

Hypothesis IV (b): Socio-economic factors are not significant determinants of Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate negative externalities (land degradation) resulting from the companiesôactivities

I. Overall Model: In this model, 96 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square (G^2 = 569.875**)** with p-value (0.001), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is

significant. This is because the statistic G (33.399), with p-value of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined five socio-economic factors namely nationality, household income, social capital, gender of respondent and perceived level of land degradation (LD). The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that nationality, household income, social capital and perceived level of land degradation (LD) significantly affect marginal willingness to accept pay or not to accept pay from oil companies to tolerate land degradation in the community resulting from the companiesô activities in the community. On the other hand, the result indicates that gender of respondent is not a significant determinant of marginal willingness to accept pay from oil companies to tolerate land degradation in the community since its coefficient was not found to be statistically different from zero in the estimation.

In general, however, the null hypothesis about marginal willingness to accept pay to tolerate land degradation in the community is rejected with the conclusion that none of the socio-economic factors significantly influence Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate land degradation in the community. This willingness to accept pay or not to accept pay from oil companies to tolerate land degradation in the community is influenced by four key factors namely nationality, household income, social capital and perceived level of land degradation (LD).

II. **Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable:** As stated above, nationality, household income, social capital and perceived level of land degradation (LD) significantly affect the dependent variable. The result shows that one unit increase in nationality would result in about 0.53 unit increase in the log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community while the other variables in the model are held constant. In other words, if a respondent were an Ogoni indigene, his

ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community would increase by about 0.53 unit given that the other variables are held constant in the model. Also, one unit increase in household income would result in about 0.24 unit reduction in the log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community while the other variables in the model are held constant. In other words, if a household income increases by a unit, its ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community would reduce by about 0.24 units given that the other variables are held constant in the model. Likewise, a unit increase in household social capital would result in about 0.3 unit reduction in the log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community while the other variables in the model are held constant. In other words, if a household social capital increases by a unit, its ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community would reduce by about 0.3 units given that the other variables are held constant in the model. On the other hand, each unit increase in perceived level of land degradation (LD) would result in about 0.29 unit reduction in the log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community while the other variables in the model are held constant. In other words, if perceived level of land degradation (LD) increases by a unit, its ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community would reduce by about 0.29 units given that the other variables are held constant in the model.

III. **Marginal Effect of Individual Predictor on Odds Ratio:** The result indicates that a unit increase in nationality would lead to higher odds of lower category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community given that the other variables in the model are held constant. For instance, the result shows that if a respondent were an Ogoni indigene, his odds of lower category of marginal willingness to accept pay from oil companies to tolerate land degradation in the

community will be 0.69 times greater given that the other variables in the model are held constant. This means that residents who are Ogoni indigenes have lower tendency to accept pay from oil companies to tolerate land degradation in the community than residents who are not Ogoni indigenes. Also, a unit increase in household income would lead to higher odds of lower category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community given that the other variables in the model are held constant. Specifically, the result shows that if a household income increases by a unit, its odds of lower category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community will be 0.28 times greater given that the other variables in the model are held constant. This means that households with higher income have lower tendency to accept pay from oil companies to tolerate land degradation in the community than households with lower income. Similarly, if a household social capital increases by a unit, its odds of lower category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community will be 0.35 times greater given that the other variables in the model are held constant. In order words, households with higher social capital have lower tendency to accept pay from oil companies to tolerate land degradation in the community than household with lower income. Likewise, if perceived level of land degradation (LD) increases by a unit, the odds of lower category of marginal willingness to accept pay from oil companies to tolerate land degradation in the community will be 0.75 times greater holding other variables in the model fixed. This implies that households with the perception that level of land degradation (LD) in the community is high would have lower tendency to accept pay from oil companies to tolerate additional degradation than households that perceive otherwise.

IV. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables

As specified in the methodology, keeping the estimated parameters fixed (that is $\theta = 0$), cumulative predicted probabilities for each category of the dependent variable are

obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the four categories and probabilities for the individual scores of marginal willingness to accept pay from oil companies to tolerate land degradation in the community at the means of the independent variables are presented in table 5.3b.

Table 5.3b: Cumulative Predicted Probabilities of Marginal Willingness to Accept Pay from Oil Companies to Tolerate land degradation in the Community

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	-2.4775	1	0.077451	0.077451
Const (2)	-1.1093	1 or 2	0.248001	0.170551
Const (3)	0.3912	1 or 2 or 3	0.967428	0.719427
Cumulative scores (4)		1 or 2 or 3 or 4	1	0.032572

Table 5.3b indicates that Ogoni people have greater probability (0.719427) of being willing to accept pay from oil companies to tolerate land degradation in the community. This could be as a result of their perception about the level of land degradation in the community. The descriptive analysis indicates that only 15.5% and 6.1% believe that land degradation in the community is high and very high respectively. The remaining respondents believe that land degradation in the community is very low, low or just mild. The descriptive analysis further indicates that the smallest amount, on the average, households would be willing to accept from oil companies per month to tolerate additional land degradation is about one hundred and seventeen thousand naira (₦117,000).

C. Marginal willingness To Accept Pay from oil companies to tolerate negative externality – Air Pollution in the community (MWTAa):

Hypothesis IV (c): Socio-economic factors are not significant determinants of Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate negative externalities (air pollution) resulting from the companiesô activities

I. **Overall Model:** In this model, 95.75 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square ($c^2 = 581.413$) with p-value (0.002), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (29.495), with p-value of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined five socio-economic factors namely nationality, household income, social capital, gender of respondent and perceived level of air pollution (AP). The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that nationality, household income, social capital and perceived level of air pollution (AP) significantly affect marginal willingness to accept pay or not to accept pay from oil companies to tolerate air pollution in the community resulting from the companiesô activities in the community. On the other hand, the result indicates that gender of respondent is not a significant determinant of marginal willingness to accept pay from oil companies to tolerate air pollution in the community since its coefficient was not found to be statistically different from zero in the estimation.

In general, however, the null hypothesis about marginal willingness to accept pay to tolerate air pollution in the community is rejected with the conclusion that socio-economic factors significantly influence Ogoni peopleôs marginal willingness to accept pay or not to accept pay from oil companies to tolerate air pollution in the community. This willingness to accept pay or not to accept pay from oil companies to tolerate air pollution in the community is determined by four key socio-economic factors namely nationality, household income, social capital and perceived level of air pollution (AP).

II. **Marginal Effect of Individual Predictors on the Log-odds of the Dependent Variable:** As stated above, nationality, household income, social capital and perceived level of air pollution (AP) significantly affect the dependent variable. The result shows that one unit increase in nationality would result in about 0.55 unit increase in the log-

odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community while the other variables in the model are held constant. In other words, if a respondent were an Ogoni indigene, his ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community would increase by about 0.55 unit given that the other variables are held constant in the model. On the other hand, one unit increase in household income would result in about 0.22 unit reduction in the log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community while the other variables in the model are held constant. In other words, if a household income increases by a unit, its ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community would reduce by about 0.22 units given that the other variables are held constant in the model. Likewise, a unit increase in household social capital would result in about 0.23 unit reduction in the log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community while the other variables in the model are held constant. In other words, if a household social capital increases by a unit, its ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community would reduce by about 0.23 units given that the other variables are held constant in the model. Similarly, each unit increase in perceived level of air pollution (AP) would result in about 0.25 unit reduction in the log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community while the other variables in the model are held constant. In other words, if perceived level of air pollution (AP) increases by a unit, its ordered log-odds of being in a higher category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community would reduce by about 0.25 units given that the other variables are held constant in the model.

III. **Marginal Effect of Individual Predictor on Odds Ratio:** The result indicates that a unit increase in nationality would lead to higher odds of lower category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community given that the other variables in the model are held constant. For instance, the result

shows that if a respondent were an Ogoni indigene, his odds of lower category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community will be 0.73 times greater given that the other variables in the model are held constant. This means that residents who are Ogoni indigenes have lower tendency to accept pay from oil companies to tolerate air pollution in the community than residents who are not Ogoni indigenes. Also, a unit increase in household income would lead to higher odds of lower category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community given that the other variables in the model are held constant. Specifically, the result shows that if a household income increases by a unit, its odds of lower category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community will be 0.25 times greater given that the other variables in the model are held constant. This means that households with higher income have lower tendency to accept pay from oil companies to tolerate air pollution in the community than households with lower income. Similarly, if a household social capital increases by a unit, its odds of lower category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community will be 0.26 times greater given that the other variables in the model are held constant. In order words, households with higher social capital have lower tendency to accept pay from oil companies to tolerate air pollution in the community than households with lower income. Likewise, if perceived level of air pollution (AP) increases by a unit, the odds of lower category of marginal willingness to accept pay from oil companies to tolerate air pollution in the community will be 0.78 times greater holding other variables in the model fixed. This implies that households with the perception that level of air pollution (AP) in the community is high would have lower tendency to accept pay from oil companies to tolerate additional air pollution than households that perceive otherwise.

IV. Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables

As specified in the methodology, keeping the estimated parameters fixed (that is ϐ = 0), cumulative predicted probabilities for each category of the dependent variable are obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the four categories and probabilities for the individual scores of marginal willingness to accept pay from oil companies to tolerate air pollution in the community at the means of the independent variables are presented in table 5.3c.

Table 5.3c: Cumulative Predicted Probabilities of Marginal Willingness to Accept Pay from Oil Companies to Tolerate Air Pollution in the Community

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	-2.3118	1	0.09015	0.09015
Const (2)	-1.1751	1 or 2	0.235934	0.145784
Const (3)	0.2598	1 or 2 or 3	0.564587	0.328653
Cumulative scores (4)		1 or 2 or 3 or 4	1	0.435413

Table 5.3b indicates that Ogoni people have greater probability (0.328653 for willing and 0.435413 for very willing) of being willing to accept pay from oil companies to tolerate air pollution in the community. This could be as a result of their perception about the level of air pollution in the community. The descriptive analysis indicates that 27.6%, 24.6% and 23.8% believe that air pollution in the community is very low, low and mild respectively. In other words, larger proportion (about 76%) of Ogoni people believes that air pollution in the community is neither high nor very high. The descriptive analysis further indicates that the smallest amount, on the average, households would be willing to accept from oil companies per month to tolerate additional air pollution is about one hundred thousand (₦100,000).

These conclusions about marginal willingness to accept pay are presented in table 5.3d.

Table 5.3d: Marginal willingness To Accept Pay

Dependent Variable: Marginal willingness To Accept Pay from oil companies to tolerate negative externality ï Oil Spill ï (MWTAo)		
Predictor	**Decision about H_o**	**Conclusion** *(marginal effect on log-odds given a unit increase of the predictor)*
Nationality	Accepted	Not significant
Household Income (income)	Rejected	Reduces marginal willingness to accept pay by about 0.2 unit
Social capital (SocialCap)	Rejected	Reduces marginal willingness to accept pay by about 0.27 unit
Gender of respondent (Genderr)	Accepted	Not significant
Oil spill (OS)	Rejected	Reduces marginal willingness to accept pay by about 0.37 unit

Dependent Variable: Marginal willingness To Accept Pay from oil companies to tolerate negative externality ï Land degradation ï (MWTAd)		
Nationality	Rejected	Increases marginal willingness to accept pay by about 0.53 unit
Household Income (income)	Rejected	Reduces marginal willingness to accept pay by about 0.24 unit
Social capital (SocialCap)	Rejected	Reduces marginal willingness to accept pay by about 0.3 unit
Gender of respondent (Genderr)	Accepted	Not significant
Land degradation (LD)	Rejected	Reduces marginal willingness to accept pay by about 0.3 unit

Dependent Variable: Marginal willingness To Accept Pay from oil companies to tolerate negative externality ï Air pollution ï (MWTAa)		
Nationality	Rejected	Increases marginal willingness to accept pay by about 0.55 unit
Household Income (income)	Rejected	Reduces marginal willingness to accept pay by about 0.22 unit
Social capital (SocialCap)	Rejected	Reduces marginal willingness to accept pay by about 0.23 unit
Gender of respondent (Genderr)	Accepted	Not significant
Air pollution (AP)	Rejected	Reduces marginal willingness to accept pay by about 0.25 unit

5.4 Marginal willingness To Pay

The three models under this category are presented in table 5.4.

Table 5.4: Ordinal Logistic Analysis of Marginal Willingness To Pay (MWTP)

	MWTPhe		MWTPho	
Variable Value	**1, 2, 3, 4**		**1, 2, 3, 4**	
Predictor	**Coef**	**Odds Ratio**	**Coef**	**Odds Ratio**
Const (1)	0.7206 {0.149}		1.2827* {0.007}	
Const (2)	1.8139* {0.000}		2.4869* {0.000}	
Const (3)	3.9644* {0.000}		4.8010* {0.000}	
Nationality	-0.5469* {0.020}	0.58*	-1.0299* {0.000}	0.36*
Income	0.02480 {0.740}	1.03	0.15783* {0.049}	1.17*
SocialCap	-0.5078* {0.000}	0.60*	-0.6648* {0.000}	0.51*
Genderr	0.0268 {0.889}	1.03		
DDH			-0.05520 {0.518}	0.95
Test that all slopes are zero (G)	33.147* {0.000}		67.830* {0.000}	
Goodness-of-Fit Test (χ^2)	273.362* {0.003}		463.987* {0.000}	
Cases used	386 (96.5%)		381 (95.25%)	
Cases with missing values	14 (3.5%)		19 (4.75%)	

Notes: p-values are in parentheses ï {}; percentages in brackets ï (); * represents 5% significant

Table 5.4 presents the analyses of Ogoni peopleôs marginal willingness to pay for government intervention programmes in the community. Government intervention programmes considered are healthcare services and housing. These results are discussed in turn below.

A. Marginal willingness To Pay for healthcare services (MWTPhe):

Hypothesis V (a): Socio-economic factors do not have significant influence on Ogoni peopleôs marginal willingness to pay or not to pay for government ***healthcare*** intervention programmes in the community

I. **Overall Model:** In this model, 96.5 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square (G^2 = 273.362**)** with p-value (0.003), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (33.147), with p-value of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined four socio-economic factors namely nationality, household income, social capital, and gender of respondent. The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that nationality and social capital significantly affect marginal willingness to pay for healthcare services if provided by the government. On the other hand, household income and gender of respondent are not significant determinants of marginal willingness to pay for healthcare services if provided by the government since their coefficients have not been found to be statistically different from zero in the estimation.

However, in general, the above null hypothesis is rejected with the conclusion that socio-economic factors are determinants of Ogoni peopleôs marginal willingness to pay or not to pay for government *healthcare* intervention programmes in the community. The two key socio-economic factors are nationality and social capital.

II. **Marginal Effect of Individual Predictor on the Log-odds (Coefficient):** The ordered log-odds (logit) coefficient shows that one unit increase in nationality would result in about 0.55 unit reduction in the ordered log-odds of being in a higher category of marginal willingness to pay for government healthcare services while the other variables in the model are held constant. In other words, if a respondent were to be an Ogoni indigene, his ordered log-odds of being in a higher category of marginal willingness to pay for government healthcare services would reduce by about 0.55 unit given that the other variables are held constant in the model. Likewise, a unit increase in respondentôs social capital would result in about 0.51 unit reduction in the ordered

log-odds of being in a higher category of marginal willingness to pay for government healthcare services while the other variables in the model are held constant. Thus, each unit increase in social capital is associated with about 0.51 units reduction in the log-odds of being in a higher category of marginal willingness to pay for government healthcare services holding other variables in the model fixed.

III. **Marginal Effect of Individual Predictor on Odds Ratio:** Nationality and social capital have positive odds ratios. Thus, a unit increase in nationality indicates higher odds of lower category of marginal willingness to pay for government healthcare services given that the other variables in the model are held constant. In other words, if a resident were to be an Ogoni indigene, his odds of lower category of marginal willingness to pay for government healthcare services will be 0.58 times greater holding the other variables in the model fixed. This means that residents who are Ogoni indigenes have lower tendency to pay for government healthcare services than residents who are non-indigenes. Similarly, each additional unit increase in respondentôs social capital indicates higher odds of lower category of marginal willingness to pay for government healthcare services holding the other variables in the model fixed. For instance, the result shows that if a respondentôs social capital increases by a unit, his odds of lower category of marginal willingness to pay for government healthcare services will be 0.6 times greater given that the other variables in the model are held constant. In order words, members of the community with higher social capital have lower tendency to pay for government healthcare services. This could be because they trust to promptly receive assistance from relatives and friends in the event of health crisis.

IV. **Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables**

As specified in the methodology, keeping the estimated parameters fixed (that is ϐ = 0), cumulative predicted probabilities for each category of the dependent variable are

obtained using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the four categories and probabilities for the individual scores of marginal willingness to pay for government healthcare services at the means of the independent variables are presented in table 5.4a.

Table 5.4a: Cumulative Predicted Probabilities of Marginal Willingness to Pay for Government Healthcare Services

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	0.7206	1	0.672739	0.672739
Const (2)	1.8139	1 or 2	0.859833	0.187093
Const (3)	3.9644	1 or 2 or 3	0.981374	0.121542
Cumulative scores (4)		1 or 2 or 3 or 4	1	0.018626

Table 5.4a indicates that Ogoni people have greater probability (0.672739) of being very unwilling to pay for government healthcare services if government charges ₦3000 per month to provide efficient healthcare services to one person in the household. This high probability (0.672739) of being very unwilling to pay for government healthcare services is significantly determined by nationality, household income and social capital. The smallest amount, on the average, households would be willing to pay per month for an additional member for efficient healthcare services from government is about six hundred and twenty-five naira (₦625).

B. Marginal willingness To Pay for housing provided by government (MWTPho):

Hypothesis V (b): Socio-economic factors do not have significant influence on Ogoni peopleôs marginal willingness to pay or not to pay for government ***housing*** intervention programme in the community.

I. Overall Model: In this model, 95.25 percent of the observations were used while the rest were excluded due to missing values. The goodness-of-fit test, Chi-square (G^2 = 463.987**)** with p-value (0.000), indicates that the model is appropriate for the data. Similarly, the overall relationship between the independent variables and the dependent variable is significant. This is because the statistic G (67.83), with p-value

of 0.000, indicates that there is sufficient evidence to conclude that at least one of the estimated coefficients in the model is different from zero. Thus, the independent variables are simultaneously significant.

The model examined four socio-economic factors namely nationality, household income, social capital, and DDH. The p-values of the predictors indicate that for 0.05 alpha-level, there is sufficient evidence to conclude that nationality, household income and social capital significantly affect marginal willingness to pay for housing (an apartment with toilet, steady supply of electricity and pipe-borne-water) if provided by the government. On the other hand, demand for house is not a significant determinant of marginal willingness to pay for house if provided by the government since its coefficient has not been found to be statistically different from zero in the estimation.

However, in general, the null hypothesis about government housing intervention programme is rejected with the conclusion that socio-economic factors significantly influence Ogoni peopleôs marginal willingness to pay or not to pay for government ***housing*** intervention programme in the community. This willingness to pay or not to pay is determined by three key factors namely nationality, household income and social capital.

II. **Marginal Effect of Individual Predictor on the Log-odds (Coefficient):** The ordered log-odds (logit) coefficient shows that one unit increase in nationality would result in about 1.03 unit reduction in the log-odds of being in a higher category of marginal willingness to pay for housing provided by government while the other variables in the model are held constant. In other words, if a respondent were to be an Ogoni indigene, his ordered log-odds of being in a higher category of marginal willingness to pay for housing provided by government would reduce by about 1.03 unit given that the other variables are held constant in the model. Likewise, a unit increase in respondentôs social capital would result in about 0.67 unit reduction in the log-odds of being in a higher category of marginal willingness to pay for housing provided by government while the other variables in the model are held constant. However, each unit increase in household income is associated with about 0.16 units

increase in the log-odds of being in a higher category of marginal willingness to pay for housing provided by government holding other variables in the model fixed. This may be because the higher the household income the more their dispensable income.

III. **Marginal Effect of Individual Predictor on Odds Ratio:** The result indicates that a unit increase in nationality would lead to higher odds of lower category of marginal willingness to pay for housing provided by government given that the other variables in the model are held constant. In other words, if a resident were to be an Ogoni indigene, his odds of lower category of marginal willingness to pay for housing provided by government will be 0.36 times greater holding the other variables in the model fixed. This means that residents who are Ogoni indigenes have lower tendency to pay for housing provided by government than residents who are non-indigenes. This could be because most of the indigenes have got apartments ï no matter how substandard it may be. Similarly, each additional unit increase in respondentôs household income and social capital indicate higher odds of lower category of marginal willingness to pay for housing provided by government given that the other variables in the model are held constant. For instance, the result shows that if a respondentôs social capital increases by a unit, his odds of lower category of marginal willingness to pay for housing provided by government will be 0.17 and 0.51 times greater respectively given that the other variables in the model are held constant. This means that members of Ogoni community with higher household income and/or social capital have lower tendency to pay for housing provided by government. This could be because those with higher income may rather decide to construct their own houses; and those with higher social capital believe that they will to promptly receive assistance from relatives and friends in the event of housing challenges.

IV. **Cumulative Predicted Probabilities for each Score Category and Probabilities for the Individual Scores of the Dependent Variable at the means of the Independent Variables**

As specified in the methodology, keeping the estimated parameters fixed (that is ϭ = 0), cumulative predicted probabilities for each category of the dependent variable are obtained

using equation 3.15. In addition, probabilities for the individual scores were calculated using equation 3.16.

Thus, following these equations, the cumulative predicted probabilities for each category of the four categories and probabilities for the individual scores of marginal willingness to pay healthcare services (provided by government) at the means of the independent variables are presented in table 5.4b.

Table 5.4b: Cumulative Predicted Probabilities of Marginal Willingness to Pay for Government Healthcare Services

Predictor	**Coeff**	**Score**	**Cum Prob(score)**	**Prob (individual score)**
Const (1)	1.2827	1	0.782909	0.782909
Const (2)	2.4869	1 or 2	0.923218	0.140309
Const (3)	4.8010	1 or 2 or 3	0.991846	0.068627
Cumulative scores (4)		1 or 2 or 3 or 4	1	0.008154

Table 5.4b indicates that Ogoni people have greater probability (0.782909) of being very unwilling to pay for housing provided by government if charged **₦3500** per month for one room apartment (with toilet, steady supply of electricity and pipe-borne-water). The smallest amount, on the average, households would be willing to pay per month for an additional room provided by government is about eight hundred and sixty naira (₦860).

These conclusions about marginal willingness to pay are presented in table 5.4c.

Table 5.4c: Marginal willingness To Pay

Dependent Variable: Marginal willingness To Pay for government intervention programme ï healthcare services ï (MWTPhe)		
Predictor	**Decision about H_o**	**Conclusion** *(marginal effect on log-odds given a unit increase of the predictor)*
Nationality	Rejected	Reduces marginal willingness to pay by about 0.55 unit
Household Income (income)	Accepted	Not significant
Social capital (SocialCap)	Rejected	Reduces marginal willingness to accept pay by about 0.51 unit
Gender of respondent (Genderr)	Accepted	Not significant
Dependent Variable: Marginal willingness To Pay for government intervention programme ï housing ï (MWTPho)		
Nationality	Rejected	Reduces marginal willingness to accept pay by about 1.03 unit
Household Income (income)	Rejected	Increases marginal willingness to accept pay by about 0.16 unit
Social capital (SocialCap)	Rejected	Reduces marginal willingness to accept pay by about 0.67 unit
Demand for housing (DDH)	Accepted	Not significant

CHAPTER SIX

SUMMARY, RECOMMENDATION AND CONCLUSION

6.1 Summary

This study examined the effects of oil exploration on the socio-economic wellbeing of Ogoni community, and the socio-economic effects of government and oil companiesô intervention programmes. The study also sought to know whether Ogoni people are willing to accept pay from oil companies to tolerate negative externalities resulting from the companiesô activities; and if they are willing to pay for government intervention programmes in the community. Data used in the study was collected through a survey of 400 households in the community. The survey covered demographic and socio-economic factors in the community. Other areas considered in the survey are environmental factors and marginal willingness to pay for government intervention services as well as marginal willingness to accept pay to tolerate further damages to their environment. Major findings from the survey indicate that only about 3.8% of the household heads in the community had no formal education (table 4.9) while the remaining had primary school education and above. Also only about 3.8% of the household heads were unemployed; the rest were employed. The distribution of household average monthly income shows that 65.6% of the household were within the average monthly income category of ₦50,000 and below (table 4.13). Only about 17.3% of the household had an average monthly income of above ₦100,000. As shown in table 4.16, school completion rate in Ogoni community is high. The result reveals that only about 5.3% of the respondents indicated that, at least, a member of their household did not complete primary school, while about 10% indicated that, at least, a member of their household did not complete junior secondary school.

In addition, only 22% had pipe borne water as the major source of drinking water in the community; the rest used water borehole, pond/river or well water. About 75.8% of the surveyed households were involved in agricultural production. Among the farming households, 70% had crops farming as their major agricultural activities. Only 37.1% of the households involved in agriculture indicated that they lost their produce due to oil spillage within the last two years.

Participation in political activities in Ogoni community is relatively low (table 4.21). Only 21.3% of the respondents indicated that they participated in political activities in the last three years. Reasons for non-participation include lack of interest, high risk involved in political activities in the community and lack of trust in the electoral system. The respondents indicated that environmental problems are not severe in the community. For instance, about 46%, 47% and 52% of the respondents indicated that oil spillage, land degradation and air pollution respectively are either very low or low.

Furthermore, the analysis shows that 50% of the household were very willing or willing to pay for an additional member of their household if government would provide efficient healthcare services at the cost of ₦3000 per month for each household member, while the rest were either very unwilling or unwilling. Also, 41.2% were willing and 13.1% were very willing to pay for an additional room if government would provide one room apartment (with toilet, steady supply of electricity and pipe-borne-water) at the cost of ₦3500 per month for each room; while the rest were either very unwilling or unwilling. On the other hand, about 60% were very willing or willing to accept payment from oil companies to tolerate extra units of oil spill, land degradation and air pollution. This could be traced to the low income level of the households in the community.

The inferential analyses of the responses from the survey revealed that government interventions, in terms of provision/renovation of school building and provision of scholarship, have positive effect on school completion in the community. On the contrary, corporate social responsibility activities of the oil companies, in terms of provision of scholarship and provision/renovation of school building (CSRsb), do not have significant effect on school completion in the community. Oil exploration and the presence of oil companiesô facilities in the community (measured by oil spill and air pollution) as well as government interventions and corporate social responsibility activities of the oil companies, in terms of healthcare services delivery, do not have significant effect on the health status of Ogoni community. Rather, household income was established as the major determinant of their health status. The result suggests that households with higher income would suffer little or no environmental related diseases. Also, government interventions and corporate social responsibility activities of the oil companies, in terms of provision of housing, do not have

effect on cost of housing in the community. The result indicates that demand for housing is a significant determinant of cost of housing. In line with the law of demand and supply, increase in demand for housing increases costing of housing in Ogoni community. Details of these conclusions about social effects are presented in table 5.1e.

Furthermore, government interventions, in terms of employment creation, have positive effect on their household income. This is unlike corporate social responsibility activities of the oil companies, in terms of employment creation, which have significant but negative effect on household income in the community. In any case, oil spill and land degradation have no effect on household income in the community. Government interventions and corporate social responsibility activities of the oil companies, in terms of provision of accessible roads, have positive effect on availability of access roads in the community. However, land degradation does not significantly affect access roads in the community. Similarly, oil spill does not have significant effect on availability of potable water in the community. This could be because Ogoni people have devised strategies for coping with their degraded environment. However, the result also shows that government interventions and corporate social responsibility activities of the oil companies, in terms of provision of potable water, have positive effect on availability of potable water in the community. Government and oil companiesô interventions also affect electricity supply in the community positively. Contrary to previous debates (UNDP, 2011; and Amnesty International, 2009), the result suggests that oil spill does not significantly effect on agricultural productivity in the community. In any case, this agrees with UNEP (2007). UNEP observed during the course of its study that vegetation had continued to grow and cover some oil contaminated land-areas even though remediation measures had not been carried out. UNEP concluded that this was partly because some vegetation types can vigorously survive hydrocarbon pollution and partly because many vegetation types need only limited clean amounts of topsoil to re-establish. Thus, it is possible that most crops in Ogoniland have developed resistance to oil contamination or that the farmers have adopted some strategies to ensure crop survival in oil contaminated land, both may as well be the case. However, land degradation and air pollution cause significant reduction in agricultural productivity in the community. On the other hand, government interventions, in terms of cleaning polluted land and water, have positive effect on their agricultural productivity. This is unlike corporate social responsibility activities of the oil companies, in terms of cleaning

polluted land and water, which do not have effect on their agricultural productivity. Details of these conclusions about economic effects are presented in table 5.2f.

On the other hand, willingness to accept pay or not to accept pay from oil companies to tolerate oil spill in the community is determined by three key factors namely household income, social capital and perceived level of oil spill (OS). Similarly, willingness to accept pay or not to accept pay from oil companies to tolerate land degradation in the community is determined by four key factors namely nationality, household income, social capital and perceived level of land degradation (LD). Similarly, willingness to accept pay or not to accept pay from oil companies to tolerate air pollution in the community is determined by four key factors namely nationality, household income, social capital and perceived level of air pollution (AP). Details of these conclusions about marginal willingness to accept pay are presented in table 5.3d.

Furthermore, two key socio-economic factors that are determinants of Ogoni peopleôs marginal willingness to pay or not to pay for government healthcare intervention programmes in the community are nationality and social capital. On the other hand, three key socio-economic factors that are major determinants of Ogoni peopleôs marginal willingness to pay or not to pay for government housing intervention programme in the community are nationality, household income and social capital. Details of these conclusions about marginal willingness to pay are presented in table 5.4c.

6.2 Recommendation

In view of the findings from this study, the recommendations below can help to improve the socio-economic wellbeing of Ogoni community.

i. Given their high literacy level, the household heads can contribute meaningfully to community development. Therefore, development agencies willing to improve the wellbeing of Ogoni people should consider engaging the household heads during the formation of development programmes for the community to ascertain community priorities. Involving these household heads from the conception of these development programmes through the implementation stage would improve

the chances of such programmes effecting significantly on the members of the community.

ii. Similarly, oil companies should engage these household heads for direct dialogue based on principle of respect, inclusion and informed consent in resolving complaints or conflicts between the companies and the community.

iii. Although only 3.8% of the household heads were unemployed, the result indicates that the household income is relatively low. Therefore, there is need to improve the level of household income in the community to reduce poverty incidence. This can be achieved through skill acquisition programmes and expansion of market opportunities for goods produced in the community. In addition, reducing oil spillage and recovering degraded farmland as well as reducing air pollution can improve agricultural productivity; hence increase household income since over 70% of them were involved in agriculture.

iv. Both the government and oil companies should demonstrate sincere commitment in oil pollution clean-up exercises and apply international standards.

v. Granting that school completion rate in Ogoni community is relatively high; having 10% of the household with, at least, a member who did not complete junior secondary school would have long run adverse effect on the community. Government should increase effort towards ensuring that every member of the community is given basic education. Many of the affected households blamed the development on lack of fund. Making basic education free is a good policy; but if the households would need their children to be involved in raising income for the household, the policy would fail. Thus, empowering the household heads and other working-class adult members of the household to raise enough income for the household would reduce the problem of child labour and make the children available to benefit from free education or even household-funded education.

vi. Oil companies in the community should establish affirmative action plans such as giving a certain percentage of job opportunities directly to members of the community, devoting a certain percentage of the companiesô income to infrastructural, institutional and human capital development in the community. This study has shown that most of the households would not worry so much about environmental degradation if they were paid between ₦100,000 and ₦135,000 per

month. Thus, in as much as environmental degradation should not be tolerated at all, it can be inferred that if most of the households in the community have, at least, a member working with the oil companies with averagely monthly income between N100,000 and N135,000 per month better harmony could exist between the community and the oil companies.

vii. Government should embark on community-wide potable water projects. This could reduce the level of environmental related diseases in the community thereby improving public health which in turn could improve productivity among members of the community.

viii. Government should establish effective approach for ascertaining households who lost their agricultural produce to oil spillage and ensure that proper compensation is given.

ix. Government should improve the credibility of electoral process and reduce the high risk associated with political activities in the community to avoid indirectly denying over 70% of the household their civic right.

x. Government should ensure that appropriate environmental and socio-economic impacts statements are prepared for any future oil development in the community. Effective and independent monitoring bodies should be established in line with these statements to minimize negative externalities on the community.

xi. Environmental monitoring agencies should be restructured and properly equipped with necessary machines and skills to effectively handle complaints of environmental degradation and exploitative or intimidating acts from the oil companies.

xii. Agricultural research institutes should seek to develop crops or seeds that are tolerant to oil polluted soil. This could improve agricultural productivity in communities hosting oil exploration activities thereby enhancing the achievement of food security in such communities. Government and oil firms should invest in such research.

6.3 Conclusion

In spite of what is often reported about the adverse effects of oil exploration in the Niger Delta region, especially Ogoni community, what cannot be measured cannot be managed. This study

has attempted to measure the socio-economic effects of oil exploration in Ogoni community. However, the conclusions drawn from the survey and its analyses could have been influenced by the fact that the major oil producing company, Shell Petroleum Development Company (SPDC), had stopped oil production in the community since 1993 due its crises with the community ï in any case, the community has continued to serve as transit route for pipelines transporting both SPDC and third-party oil production from other areas, also Chevron and NNPC still operate in the community. Shell closed-up its oil wells in the community with the hope of commencing production as soon as the community becomes receptive again. In June 2008, the Nigerian government announced that it would replace SPDC with another operator in Ogoniland as the best solution to end the ñstalemateò between SPDC and the community (SPDC, 2014). Whether it is SPDC or another operator, one thing is important: there is need for a more comprehensive baseline study in the community. This would serve as a yardstick for monitoring programmes aimed at correcting the damages already done, and for evaluating the effects of further exploration of those closed oil wells as well as the activities of other operators in the community.

In addition, it should be noted that the results obtained from this study are subject to two important limitations which are theoretical and empirical. The use of theoretical propositions allowed considerable advantages although this introduces a certain degree of simplification from the actual reality. The assumptions made may be too restrictive. On the other hand, the empirical problems relate to data limitations (example: respondents answered certain questions correctly only to the extent they could remember at the time of the interview) which could affect the quality of the analyses. Despite all these limitations, special care was taken so as to ensure that the data available for this study was properly managed. For instance, the data was properly cleaned and scrutinized for consistency. Also, questions that required the respondents to give information on previous events in the household were restricted to maximum of three years ï most of such questions were actually restricted to two years apart from participation in political activities which was restricted to three years. This is because the last general election in Nigeria was in 2011 while the survey for this study was largely conducted in 2013. Thus, the this study is important contribution to debates around the socio-economic effects of oil exploration in Nigeria.

6.4 Suggestions for Further Research

This study examined the socio-economic effects of oil exploration in the Niger Delta region of Nigeria with focus on Ogoniland. However, to generate more achievable policy strategies and development targets with regards to sustainable development in host communities in the face of oil exploration, there is need for more case studies in Ogoniland and other oil producing communities. Therefore, in addition to the recommended comprehensive baseline study in Ogoni community, the following areas for further research are also suggested:

1. A qualitative study on the socio-economic effect of oil exploration in Ogoni community: this could reveal other dimensions to the debate which are often crowded-out during quantitative studies.
2. Cultural effect of oil exploration in Ogoniland is another area of research which needs researchersô attention. A multi-disciplinary research approach is recommended.
3. A study to ascertain the minimum conditions at which Ogoni people would be willing to allow further oil exploration of the SPDCôs closed oil wells: harmony between the host community and the oil production operators in the community will ensure sustainable production as well as sustainable socio-economic development in the community.
4. Evaluation of the socio-economic effects of the amnesty programme declared by the Nigerian government to end restiveness among the Niger Delta youth: the finding of this study could guide government in its future strategies towards ending restiveness in any other community.
5. Oil exploration in the Niger Delta Region and the vulnerable groups: these groups of people are often neglected in studies around this region. So, such study could be revealing.
6. A study to certain crops or seeds that are tolerant to oil-polluted soil: introduction of such crops or seeds in the community could enhance agricultural productivity of the region.
7. A study of the socio-economic effect of oil exploration activities and interventions (from government and oil firms) in terms of pre and post such activities or interventions.

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APPENDICES

APPENDIX I: SURVEY INSTRUMENT

LETTER OF INTRODUCTION

Department of Economics
Faculty of Social Sciences
University of Nigeria, Nsukka

Dear Sir/Ma,

I would require your assistance to complete this survey which is needed for completion of my doctorate degree dissertation in the above-named university.

The purpose of this questionnaire is to get your opinion as accurate as possible to enable me understand the ***Socioeconomic Issues in the Niger Delta region of Nigeria***.

Your household was randomly selected. You will not be identified by name. All information provided by you will be treated as strictly anonymous. Please note that these opinions are for research purposes only.

Thank you,

MakuaChukwu Gabriel Ojide
Ph.D. Student

QUESTIONNAIRE

SECTION A: DEMOGRAPHY

Instruction: please tick (√) where appropriate and fill in the blank space where necessary

1. Sex: Male ☐ Female ☐

2. Age: 18-25 years ☐ 26-35 years ☐ 36-50 years ☐ 51-65 years ☐ 66 years and above ☐

N/B: Do not interview anybody below 18 years

3. What is your marital status? Single ☐ Married ☐ Divorced ☐ Separated ☐ Widow/Widower ☐

4. Are you the **head** of your household? Yes ☐ No ☐

5. If you answered '**No**' in 4, what is the gender of the head of your household? Male ☐ Female ☐

N/B: Interview only the head, spouse, or adult son/daughter

6. If you answered '**No**' in 4, what is your relationship with the household head? _____

7. How many persons (**children and adults**) are in your household? ..... persons

8. Status of household **head** in the community: Indigene of Ogoni ☐ Non-indigene of Ogoni ☐

9. How long has your household been living in this LGA? Below 5 years ☐ 5-10 years ☐ above 10 years ☐

10. What is the highest academic qualification of the **head** of your household? (Tick one)

a.	HND/ First Degree/ Post Graduate degree	
b.	OND/Diploma/Diploma equivalent	
c.	Secondary Certificate/WAEC/SSCE	
d.	Primary School/First school leaving Certificate	
e.	no formal education	

11. What is the highest academic qualification of the **most educated member** of your household?

_____

12. Is any member of your household **a Political/Community/Organizational Leader**? Yes ☐ No ☐

13. If your answer in 12 above is 'Yes', kindly specify the position and organization: _____

_____ _____

14. What is the employment status of **the head** of your household? (Tick one): Full time employment ☐ Part time employment ☐ Self-employed ☐ Housewife/husband ☐ Student ☐ Unemployed ☐ Retired ☐

15. How many people in your household receive **income** from any source? _____Person(s)

16. What is the occupation of the **Principal income earner** in the household?

Self-employed as laborer		Employee of a private company	
Self-employed as trader		Employee of government (public sector)	
Self-employed as Agriculturist/Farmer		Pensioner	
Self-employed as consultant or professional		Don't know	
Other (specify)			

SECTION B: SOCIO-ECONOMIC RELATED ISSUES

17. How much, on the average, is your **monthly household expenditure including savings** (total expenditure of everybody receiving income in your household):

a.	N18,000 and Below	
b.	N18,100 - N50,000	
b.	N50,100 - N100,000	

c.	N100,100 – N250,000	
d.	Above N250,000	

18. How **many** schools and hospitals are in your community?

Primary Schools	Secondary Schools	Hospitals (including health centres)

19. How would you rate the **availability** of the following social services and amenities in your community?

	Social Services and Amenities	More than enough	Just enough	Not enough	Don't know
a.	Primary schools				
b.	Secondary schools				
d.	Healthcare (hospitals and health centres)				

20. Did any member of your household **dropped out** of school (Primary or Junior Secondary school)?

No	Yes	If **Yes**, kindly indicate the major stage below	
		Junior Secondary School	Primary School

21. If you answered **Yes** in '20', kindly specify: How many (persons): _____ person(s), and the reason(s)

_____ _____ _____ _____ _____ _____ _____ _____ _____

22. How would you rate the **availability** of the following infrastructure in your community?

	Very high	High	Mild	Low	Very low
Electricity supply					
Potable water (drinkable)					
'Motorable' roads					

23. What is the major source of drinking water in your community? (**tick one**):
Pipe Borne ☐ Water Borehole ☐ Pond River ☐ Others (specify)……..

24. In the last two years, did any person in your household suffer any disease related to environmental factors (pollution, contaminated water, air-born or water-born diseases, etc)? Yes ☐ No ☐

25. If you answered Yes in '24', how often do you have a member of your household suffer any form disease?

Very often	Somewhat often	Not too often

26. How **many adults** are in your household? _____ person(s)

27. How **many adults** in your household are currently employed? _____ person(s)

28. How **many adults** in your household are currently in school? _____ person(s)

29. Is your household involved in any form of agricultural productivity? Yes ☐ No ☐

30. If you answered **Yes** in 29, kindly indicate the **major agricultural product** below (tick one)?

Crops	Fishery	Poultry	Other (Specify)

31. How would you rate **productivity** of your household's **major agricultural product** in the last two years? (**answer for only the major product ticked in '30'**)

	Very high	High	Mild	Low	Very low	Not Applicable
Crops						
Fishery						
Poultry						
Other (specify)						

32. In the past two years, has your household experienced any form of losses in your agricultural produce due to oil spillage? Yes ☐ No ☐

33. If you answered **Yes** in '32', how much did you loss – **in terms of monetary valuation? ₦** _____

34. Did anyone in your community borrowed (or attempted to borrow) money from you in the last two years?
Yes ☐ No ☐ Don't know ☐

35. If you answered **Yes** or **No** in 34, why did (or didn't) you lend the person money: _____
_____ _____ _____

36. Have you participated in political activities in your community in the last three years?
Yes ☐ No ☐ Don't know ☐

37. If you answered **Yes** or **No** in 36, why did (or didn't) you participate in political activities: _____
_____ _____ _____ _____

38. On the whole, how would you rate your level of **trust** in other members of your community in connection with informal relationship (lending money, surety, etc) and participation in political activities?

Very high	High	Average	Low	Very low

39. Do you know any civil or community group in your community/village that interacts with government agencies or oil companies for the **purpose of improving your community's wellbeing**?

	Yes	No	If **Yes**, how would you rate their sincerity of purpose?				
			Very high	High	Average	Low	Very low
Government agencies							
Oil companies							

40. Does the building where your household lives have the following facilities?

	Electricity	Pipe-borne water	Bore-hole	Toilet
Yes				
No				

N/B: For Qs 41-43, tick as observed.

41. What is the nature of the **floor** of your house? Bamboo ☐ Wood ☐ Clay ☐ Cement ☐ Tiled ☐ others (specify) _____

42. What is the nature of the **wall** of your house? Woven-leave ☐ Bamboo ☐ Wood ☐ Cement ☐ Clay ☐ others (specify) _____

43. What is the nature of the **roof** of your house? Woven-leave ☐ zinc ☐ Tiles ☐ Cement ☐ others (specify) _____

44. What type of accommodation does your household live in? Owned house ☐ Rented house ☐

45. If your household lives in **rented house**, on the average, how much do you pay **monthly per room**: ₦ _____

46. If your household lives in **owned house** and you were to rent-out some rooms, on the average, how much would you charge **monthly per room**: ₦_____

47. How would you describe the demand for housing in your community/village?

Very high	High	Average	Low	Very low

48. Is any member of your household on any scholarship scheme?

	Government agencies	Oil companies
Yes		
No		

49. Overall, how would you rate the corporate social responsibility of the **oil firms** in your **community/village** in the following areas?

		Very high	High	Average	Low
a.	Provision of scholarship (for student/youth)				
b.	Building/renovation of school blocks (primary & Sec Schools)				
c.	Provision of housing schemes (low cost housing or grant/loan for housing)				
d.	Employment creation (including business grant/loads)				
e.	Provision of free or subsidizes healthcare services				
f.	Building/renovation of Healthcare buildings				
g.	Construction/maintenance of roads				
h.	Provision of portable water (drinkable water)				
i.	Provision of electricity				
k.	Cleaning of polluted land and water				

50. Overall, how would you rate the intervention activities of **Government** in your **community/village** in the following areas?

		Very high	High	Average	Low
a.	Provision of scholarship (for student/youth)				
b.	Building/renovation of school blocks (primary & Sec Schools)				
c.	Provision of housing schemes (low cost housing or grant/loan for housing)				
d.	Employment creation (including business grant/loads)				
e.	Provision of free or subsidizes healthcare services				
f.	Building/renovation of Healthcare buildings				
g.	Construction/maintenance of roads				
h.	Provision of portable water (drinkable water)				
i.	Provision of electricity				
k.	Cleaning of polluted land and water				

SECTION C: ENVIRONMENT RELATED ISSUES

51. How would you rate the level of the following environmental problems in your community?

	Problem	Very high	High	Mild	Low	Very low
a.	Oil spillage					
b.	Land Degradation (Deterioration in the quality of land)					
c.	Air Pollution					

SECTION D: MARGINAL WILLINGNESS TO PAY OR ACCEPT PAY

52. Assuming that government charges **₦3000** per month to provide efficient healthcare services to one person in your household, what would be your willingness to pay for other member of your family?

Very willing	Willing	Unwilling	Very unwilling

53. If you answered ***'Unwilling' or 'Very unwilling'*** in '52', what is the highest amount you will be willing to pay per month for an additional member of your household for efficient healthcare services from government? ₦_____

54. Assuming that government charges **₦3500** per month to provide one room apartment (with toilet, steady supply of electricity and pipe-borne-water), what would be your willingness to pay for an additional room?

Very willing	Willing	Unwilling	Very unwilling

55. If you answered ***'Unwilling' or 'Very unwilling'*** in '54', what is the highest amount you will be willing to **pay per month for each room** apartment (with toilet, steady supply of electricity and pipe-borne-water) **₦**_____

56. Given a scale of 5 points, if the environmental damage in your community/village is at point 3, will you be willing to accept payment from the oil companies to tolerate an extra unit of such damages?

	Problem	Very willing	Willing	Unwilling	Very unwilling
a.	Oil spillage				
b.	Land Degradation (Deterioration in the quality of land)				
c.	Air Pollution				

57. If you answered 'Very willing' or 'Willing' in '56', what is the smallest amount you will be willing to accept per month for the damages?

	Environmental damage	Naira (₦)
a.	Oil spillage	
b.	Land Degradation(Deterioration in the quality of land)	
c.	Air Pollution	

Appendix II: Ordinal Logistic Regression

1.

Link Function: Logit

Response Information

Variable	Value	Count
MWTAo	1	54
	2	99
	3	120
	4	111
	Total	384

384 cases were used
16 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	-2.1467	0.5492	-3.91	0.000			
Const(2)	-0.6404	0.5354	-1.20	0.232			
Const(3)	0.7468	0.5367	1.39	0.164			
National	0.4291	0.2317	1.85	0.064	1.54	0.98	2.42
Income	-0.19932	0.07492	2.66	0.008	1.22	1.05	1.41
Socialca	-0.2669	0.1054	2.53	0.011	1.31	1.06	1.61
Gender	-0.2716	0.1913	-1.42	0.156	0.76	0.52	1.11
OS	-0.36754	0.07908	-4.65	0.000	0.69	0.59	0.81

Log-likelihood = -500.540
Test that all slopes are zero: G = 33.855, DF = 5, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	610.376	487	0.000
Deviance	550.842	487	0.024

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	32790	60.7%	Somers D	0.24
Discordant	20069	37.2%	Goodman-Kruskal Gamma	0.24
Ties	1150	2.1%	Kendalls Tau-a	0.17
Total	54009	100.0%		

2.

Link Function: Logit

Response Information

Variable	Value	Count
MWTAd	1	61
	2	93
	3	128
	4	102
	Total	384

384 cases were used
16 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	-2.4775	0.5620	-4.41	0.000			
Const(2)	-1.1093	0.5482	-2.02	0.043			
Const(3)	0.3912	0.5466	0.72	0.474			
National	0.5269	0.2318	2.27	0.023	1.69	1.08	2.67
Income	-0.24385	0.07511	3.25	0.001	1.28	1.10	1.48
Socialca	-0.2964	0.1050	2.82	0.005	1.35	1.09	1.65
Gender	-0.2796	0.1916	-1.46	0.144	0.76	0.52	1.10
LD	-0.29080	0.08223	-3.54	0.000	0.75	0.64	0.88

Log-likelihood = -503.245
Test that all slopes are zero: G = 33.399, DF = 5, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	569.875	469	0.001
Deviance	532.490	469	0.022

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	32405	59.8%	Somers D	0.22
Discordant	20493	37.8%	Goodman-Kruskal Gamma	0.23
Ties	1251	2.3%	Kendalls Tau-a	0.16
Total	54149	100.0%		

3.

Link Function: Logit

Response Information

Variable	Value	Count
MWTAa	1	74
	2	83
	3	123
	4	103
	Total	383

383 cases were used
17 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	-2.3118	0.5441	-4.25	0.000			
Const(2)	-1.1751	0.5331	-2.20	0.028			
Const(3)	0.2598	0.5310	0.49	0.625			
National	0.5469	0.2321	2.36	0.018	1.73	1.10	2.72
Income	-0.22408	0.07490	2.99	0.003	1.25	1.08	1.45
Socialca	-0.2311	0.1042	2.22	0.027	1.26	1.03	1.55
Gender	-0.1696	0.1906	-0.89	0.374	0.84	0.58	1.23
AP	-0.25252	0.07134	-3.54	0.000	0.78	0.68	0.89

Log-likelihood = -508.810
Test that all slopes are zero: G = 29.495, DF = 5, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	581.413	487	0.002
Deviance	567.994	487	0.006

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	32503	59.9%	Somers D	0.21
Discordant	20981	38.6%	Goodman-Kruskal Gamma	0.22
Ties	809	1.5%	Kendalls Tau-a	0.16
Total	54293	100.0%		

4.

Link Function: Logit

Response Information

Variable	Value	Count
MWTPhe	1	104
	2	91
	3	147
	4	44
	Total	386

386 cases were used
14 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	0.7206	0.4994	1.44	0.149			
Const(2)	1.8139	0.5053	3.59	0.000			
Const(3)	3.9644	0.5415	7.32	0.000			
National	-0.5469	0.2359	-2.32	0.020	0.58	0.36	0.92
Income	0.02480	0.07471	0.33	0.740	1.03	0.89	1.19
Socialca	-0.5078	0.1048	-4.84	0.000	0.60	0.49	0.74
Gender	0.0268	0.1914	0.14	0.889	1.03	0.71	1.49

Log-likelihood = -488.777
Test that all slopes are zero: G = 33.147, DF = 4, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	273.362	212	0.003
Deviance	265.302	212	0.008

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	31896	60.0%	Somers D	0.26
Discordant	18300	34.4%	Goodman-Kruskal Gamma	0.27
Ties	2981	5.6%	Kendalls Tau-a	0.18
Total	53177	100.0%		

5.

Link Function: Logit

Response Information

Variable	Value	Count
MWTPho	1	88
	2	87
	3	156
	4	50
	Total	381

381 cases were used
19 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	1.2827	0.4743	2.70	0.007			
Const(2)	2.4869	0.4827	5.15	0.000			
Const(3)	4.8010	0.5344	8.98	0.000			
National	-1.0299	0.2445	-4.21	0.000	0.36	0.22	0.58
Income	0.15783	0.08010	1.97	0.049	1.17	1.00	1.37
Socialca	-0.6648	0.1105	-6.02	0.000	0.51	0.41	0.64
DDH	-0.05520	0.08537	-0.65	0.518	0.95	0.80	1.12

Log-likelihood = -464.373
Test that all slopes are zero: G = 67.830, DF = 4, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	463.987	338	0.000
Deviance	396.590	338	0.015

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	33891	65.8%	Somers D	0.36
Discordant	15324	29.8%	Goodman-Kruskal Gamma	0.38
Ties	2291	4.4%	Kendalls Tau-a	0.26
Total	51506	100.0%		

6.

Link Function: Logit

Response Information

Variable	Value	Count
Agric	1	13
	2	32
	3	73
	4	105
	5	69
	Total	292

292 cases were used
108 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	-3.9158	0.5930	-6.60	0.000			
Const(2)	-2.5141	0.5378	-4.68	0.000			
Const(3)	-1.1170	0.5165	-2.16	0.031			
Const(4)	0.5510	0.5147	1.07	0.284			
Gicl	0.5246	0.2281	-2.30	0.021	0.59	0.38	0.93
CSRcl	0.1970	0.2714	0.73	0.468	1.22	0.72	2.07
LD	-0.5302	0.1719	3.08	0.002	1.70	1.21	2.38
AP	-0.2661	0.1348	-1.97	0.048	0.77	0.59	1.00
OS	-0.1139	0.1603	-0.71	0.477	0.89	0.65	1.22
Income	0.26006	0.09282	2.80	0.005	1.30	1.08	1.56
ET	0.05489	0.09478	0.58	0.563	1.06	0.88	1.27

Log-likelihood = -406.723
Test that all slopes are zero: G = 25.236, DF = 7, P-Value = 0.001

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	987.056	725	0.000
Deviance	615.055	725	0.999

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	19065	60.6%	Somers D	0.23
Discordant	11818	37.5%	Goodman-Kruskal Gamma	0.23
Ties	595	1.9%	Kendalls Tau-a	0.17
Total	31478	100.0%		

7.

Link Function: Logit

Response Information

Variable	Value	Count
Electric	1	81
	2	99
	3	101
	4	54
	5	48
	Total	383

383 cases were used
17 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	0.9807	0.2263	4.33	0.000			
Const(2)	2.4207	0.2401	10.08	0.000			
Const(3)	4.0203	0.2986	13.46	0.000			
Const(4)	5.4006	0.3654	14.78	0.000			
CSRel	0.4612	0.1149	-4.01	0.000	0.63	0.50	0.79
Giel	0.9784	0.1086	-9.01	0.000	0.38	0.30	0.47

Log-likelihood = -518.162
Test that all slopes are zero: G = 163.437, DF = 2, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	131.546	58	0.000
Deviance	117.936	58	0.000

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	37723	65.7%	Somers D	0.47
Discordant	10452	18.2%	Goodman-Kruskal Gamma	0.57
Ties	9278	16.1%	Kendalls Tau-a	0.37
Total	57453	100.0%		

8.

Link Function: Logit

Response Information

Variable	Value	Count
Water	1	134
	2	115
	3	94
	4	33
	5	6
	Total	382

382 cases were used
18 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	0.6308	0.3525	1.79	0.074			
Const(2)	2.0058	0.3635	5.52	0.000			
Const(3)	3.7543	0.4136	9.08	0.000			
Const(4)	5.9022	0.5723	10.31	0.000			
OS	0.08850	0.07776	1.14	0.255	1.09	0.94	1.27
CSRw	0.4794	0.1532	-3.13	0.002	0.62	0.46	0.84
Giw	0.7424	0.1390	-5.34	0.000	0.48	0.36	0.63
Income	0.08895	0.07330	1.21	0.225	1.09	0.95	1.26

Log-likelihood = -485.392
Test that all slopes are zero: G = 61.152, DF = 4, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	614.573	468	0.000
Deviance	498.352	468	0.160

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	33594	64.1%	Somers D	0.33
Discordant	16349	31.2%	Goodman-Kruskal Gamma	0.35
Ties	2448	4.7%	Kendalls Tau-a	0.24
Total	52391	100.0%		

9.

Link Function: Logit

Response Information

Variable	Value	Count
Road	1	103
	2	113
	3	103
	4	53
	5	12
	Total	384

384 cases were used
16 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	1.6447	0.3309	4.97	0.000			
Const(2)	3.1997	0.3527	9.07	0.000			
Const(3)	4.9785	0.4158	11.97	0.000			
Const(4)	7.1824	0.5334	13.47	0.000			
LD	-0.15383	0.08254	-1.86	0.062	0.86	0.73	1.01
CSRrd	0.3913	0.1229	-3.18	0.001	0.68	0.53	0.86
Gird	0.9888	0.1096	-9.02	0.000	0.37	0.30	0.46

Log-likelihood = -485.893
Test that all slopes are zero: G = 139.920, DF = 3, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	280.986	221	0.004
Deviance	260.072	221	0.037

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	40193	72.7%	Somers D	0.49
Discordant	13302	24.1%	Goodman-Kruskal Gamma	0.50
Ties	1763	3.2%	Kendalls Tau-a	0.37
Total	55258	100.0%		

10.

Link Function: Logit

Response Information

Variable	Value	Count
Income	1	142
	2	70
	3	46
	4	20
	5	16
	Total	294

294 cases were used
106 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	-1.0481	0.7728	-1.36	0.175			
Const(2)	0.1494	0.7703	0.19	0.846			
Const(3)	1.2784	0.7781	1.64	0.100			
Const(4)	2.2036	0.7995	2.76	0.006			
OS	-0.0370	0.1626	-0.23	0.820	0.96	0.70	1.33
LD	0.0701	0.1751	0.40	0.689	1.07	0.76	1.51
CSRe	0.4190	0.2085	-2.01	0.044	0.66	0.44	0.99
Gie	-0.4733	0.1958	-2.42	0.016	0.62	0.42	0.91
ET	0.3270	0.1029	-3.18	0.001	0.72	0.59	0.88
Gender	0.5237	0.2295	2.28	0.023	1.69	1.08	2.65
Agric	0.2772	0.1027	2.70	0.007	1.32	1.08	1.61
Socialca	0.4866	0.1386	3.51	0.000	1.63	1.24	2.13

Log-likelihood = -361.218
Test that all slopes are zero: G = 56.478, DF = 8, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	1079.887	1004	0.048
Deviance	680.480	1004	1.000

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	20546	70.1%	Somers D	0.41
Discordant	8611	29.4%	Goodman-Kruskal Gamma	0.41
Ties	143	0.5%	Kendalls Tau-a	0.28
Total	29300	100.0%		

11.

Link Function: Logit

Response Information

Variable	Value	Count
Socialca	1	69
	2	65
	3	131
	4	18
	5	6
	Total	289

289 cases were used
111 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	-1.2038	0.6776	-1.78	0.076			
Const(2)	-0.1257	0.6746	-0.19	0.852			
Const(3)	2.5455	0.6956	3.66	0.000			
Const(4)	4.0062	0.7803	5.13	0.000			
ET	-0.07246	0.09305	-0.78	0.436	0.93	0.78	1.12
leadersh	0.7520	0.2764	2.72	0.007	2.12	1.23	3.65
National	-0.4731	0.2815	-1.68	0.093	0.62	0.36	1.08
CCGG	0.4020	0.1623	-2.48	0.013	0.67	0.49	0.92
CCGO	0.1740	0.1594	1.09	0.275	1.19	0.87	1.63

Log-likelihood = -361.486
Test that all slopes are zero: G = 22.389, DF = 5, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	460.878	371	0.001
Deviance	378.588	371	0.382

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	17449	61.2%	Somers D	0.24
Discordant	10527	36.9%	Goodman-Kruskal Gamma	0.25
Ties	531	1.9%	Kendalls Tau-a	0.17
Total	28507	100.0%		

12.

Link Function: Logit

Response Information

Variable	Value	Count
Housing	1	57
	2	270
	3	59
	4	7
	Total	393

393 cases were used
7 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	0.4960	0.3958	1.25	0.210			
Const(2)	4.2991	0.4735	9.08	0.000			
Const(3)	6.8190	0.6116	11.15	0.000			
DDH	0.65635	0.09755	-6.73	0.000	0.52	0.43	0.63
CSRho	-0.0938	0.2067	-0.45	0.650	0.91	0.61	1.37
Giho	-0.2454	0.1928	-1.27	0.203	0.78	0.54	1.14

Log-likelihood = -325.381
Test that all slopes are zero: G = 52.204, DF = 3, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	137.403	108	0.030
Deviance	102.280	108	0.637

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	24162	64.6%	Somers D	0.39
Discordant	9712	26.0%	Goodman-Kruskal Gamma	0.43
Ties	3511	9.4%	Kendalls Tau-a	0.19
Total	37385	100.0%		

13.

Link Function: Logit

Response Information

Variable	Value	Count
Health	1	147
	2	141
	3	43
	Total	331

331 cases were used
69 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	-1.1444	0.4030	-2.84	0.005			
Const(2)	1.0445	0.4074	2.56	0.010			
OS	-0.0042	0.1344	-0.03	0.975	1.00	0.77	1.30
AP	0.0482	0.1239	0.39	0.697	1.05	0.82	1.34
CSRhe	-0.0331	0.1643	-0.20	0.841	0.97	0.70	1.34
Gihe	0.1365	0.1590	0.86	0.391	1.15	0.84	1.57
Income	0.29748	0.09266	3.21	0.001	1.35	1.12	1.61

Log-likelihood = -319.826
Test that all slopes are zero: G = 15.150, DF = 5, P-Value = 0.010

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	383.721	319	0.007
Deviance	358.569	319	0.063

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	18992	57.4%	Somers D	0.17
Discordant	13356	40.3%	Goodman-Kruskal Gamma	0.17
Ties	763	2.3%	Kendalls Tau-a	0.10
Total	33111	100.0%		

14.

Link Function: Logit

Response Information

Variable	Value	Count
Educatio	1	20
	2	37
	3	335
	Total	392

392 cases were used
8 cases contained missing values

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Const(1)	-2.9873	0.4408	-6.78	0.000			
Const(2)	-1.8155	0.4010	-4.53	0.000			
Income	-0.0310	0.1385	-0.22	0.823	0.97	0.74	1.27
Gisb	0.7705	0.2554	3.02	0.003	0.46	0.28	0.76
Gisch	0.6028	0.2576	2.34	0.019	1.83	1.10	3.03
CSRsb	0.2964	0.2794	1.06	0.289	1.34	0.78	2.33
CSRsch	0.0264	0.2775	0.10	0.924	1.03	0.60	1.77

Log-likelihood = -193.703
Test that all slopes are zero: G = 11.558, DF = 5, P-Value = 0.041

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	320.232	235	0.000
Deviance	209.378	235	0.884

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	12216	61.6%	Somers D	0.28
Discordant	6703	33.8%	Goodman-Kruskal Gamma	0.29
Ties	916	4.6%	Kendalls Tau-a	0.07
Total	19835	100.0%		