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# Public Health Implications of Oil Pollution in Koluama: Nigeria

Esther Bridget Sako
*Walden University*

Walden University

College of Health Sciences

This is to certify that the doctoral dissertation by

Esther Sako

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Review Committee
Dr. Patrick Tschida, Committee Chairperson, Public Health Faculty
Dr. Michael Schwab, Committee Member, Public Health Faculty
Dr. Egondu Onyejekwe, University Reviewer, Public Health Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
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Abstract

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MA, Hull University, England 1991

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Dissertation Submitted in Partial Fulfillment

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Abstract

As the global demand for oil increases, human health implications related to its discovery and transport remain a serious concern. The Niger Delta has been the site of severe environmental degradation since the oil boom of the 1970s. While some researchers have examined the environmental effects of oil procurement, few have explored human health implications in this region. This phenomenological study investigated the human physical and mental health consequences of oil-related environmental degradation through the perceptions and lived experiences of villagers in Koluama, Nigeria. The conceptual framework for the study was based on research conducted by Morello-Frosch, Zuk, Jerrett, Shamasunder and Kyle (2011) on the public health consequences of environmental pollution to which marginalized populations are vulnerable. Participants included a random sample of 33 residents of Koluama. Data were collected via individual semistructured interviews and 3 focus groups and analyzed using: interpretative phenomenological analysis. Themes that emerged from analysis included children's health issues, including asthma and other breathing problems; and death rates among the elderly in the area. The villagers, aware of the increase in mortality and illness in the area, also suffered from anxiety and depression. The research findings demonstrated the perception of the participants that the oil companies appeared not to be concerned about the lack of health care in the area; although illness increased in the area of the oil fields. This study might be beneficial in eliciting positive social change at the individual and organizational levels by illuminating oil-related health problems and may lead to better health care access for the population.

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# Dedication

I dedicate this dissertation to my maternal grandfather, who spoiled me with love. You were an embodiment of what I wanted and wished for in a grandfather. I hope we cross paths again one day and I still want to walk home with you as we did. Thank you again for being there when I needed it the most.

To my mother Yinlade without whom life would have taken a different direction. You stood in when my biological mother abandoned me. Because of you, I have overcome and achieved far beyond what is expected of an ‘orphaned’ and abused child, who was later adopted and given the love and guidance to survive adulthood. For that, I am eternally grateful to you, and to God who made all things possible. 'Teach me thy way, O Lord, I will walk in the truth: unite my heart to fear thy name...For great is thy mercy toward me, and thou hast delivered my soul from the lowest hell.' (Psalm 86:11-13, King James Version).

Although the final lap of the journey was rifled with hurdles and challenges, I was inspired by the great King whose incomparable humility and championing of the rights of the common man would be remembered by the people he ruled for example. As a result, he left a much better place. HRH Dr. Harris (M.D.) was my father, and he was also my best friend, so I will wait until we meet again with God’s consent to be cuddled in your arms, where I will once again breathe.

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# Chapter 1: Introduction to the Study

## Introduction

The study involved a phenomenological examination of the mental and physical health consequences of oil pollution, as perceived and experienced by the villagers of Koluama, Nigeria. Existing research on the consequences of petroleum activities in the Niger Delta is largely focused on environmental damage, rather than human health issues. Results from this investigation could provide a foundation for future studies regarding oil-related health issues faced by the inhabitants of the Niger Delta region. This research may also raise awareness of the seriousness of the problem.

This introductory chapter begins with background information on oil-related health and environmental issues in the Niger Delta region. The chapter follows with the study's problem, purpose, and research questions. I also discuss the conceptual framework and the nature of the study. Important definitions, assumptions, delimitations, limitations, and the significance of the study are presented next. The chapter concludes with a brief summary.

## Background

As the global demand for oil has skyrocketed during recent decades (Nashawi, Malallah, & Al-Bisharah, 2010; Owen, Inderwili, & King, 2010), the commodity has increased in valuable. Often referred to as *black gold* (Parsons, 2010), crude oil is highly desired by many nations. Developed nations, which represent the largest consumers of oil (Amodeo, 2006), are comfortably removed from the havoc that oil discovery, drilling, and transport causes to the regions where oil is extracted. The attention that oil spills

receive in developed countries is significant, but the damage caused by these spills, such as the one that affected the Gulf Coast of the United States in 2010, is disproportionate to the pollution that routinely effects the Niger Delta (Safina, 2011).

Oil discovery has been viewed by poor countries as a foundation for economic and national development (Dell, 2004). In light of this perception, Dell (2004) noted,

> it is not surprising that many have placed their hopes in resource exploitation as the means for lifting out of poverty a large proportion of the 2.7 billion people (nearly half of the world's population) who live on less than US $2 per day. (p. 38)

Although oil has brought economic development to some nations, most oil-rich regions, such as Latin America, Africa, and the Middle East, remain impoverished, corrupt, and underdeveloped (Dell, 2004). Nations rich in natural oil and mineral resources typically have more income disparities and higher rates of poverty, mortality, and malnutrition than countries that are not dependent on such resources (Dell, 2004). In addition, oil-rich countries with monoproduct economies have higher rates of government corruption, lower levels of education, substandard health care systems, larger sovereign debts, elevated military spending, and higher incidences of civil war (Kennedy & Tiede, 2013).

The connections between oil abundance and low levels of development are because oil discovery "often fuels internal corruption and conflict, encourages unethical corporate behavior, leads to the violation of human rights, and results in environmental degradation" (Dell, 2004, p 39). The human health consequences of oil-related

environmental degradation should be an interest of lawmakers and government officials. For example, oil pollution in the Delta region contaminates sources of drinking water and agricultural fields, which causes inhabitants to consume contaminated food and water (Jernelov, 2010). Some of the acute effects of exposure to crude oil include nausea, vomiting, dizziness, headaches, and respiratory problems (Solomon & Janssen, 2010). More serious, long-term effects of exposure include cancer, respiratory diseases, skin diseases, and death (Ana et al., 2009).

The health problems caused by oil pollution can take multiple forms, including air pollution from gas flaring (Abdul-Wahab, Ali, Sardar, & Irfan, 2012), water and land pollution from spills and pipeline damage (Abdus-Salam, Adekola, & Apata, 2010; Adedeji & Adetunji, 2011; Nduka & Orisakwe, 2011), and mental health problems from the stress caused by physical and economic hardships that result from living in oil polluted regions (Gill, Picou, & Ritchie, 2011; Grattan et al., 2011; Shreve, 2011). The Niger Delta has been the site of intense environmental degradation since the oil boom of the 1970s (Akpomuvie, 2011). Although research exists on the environmental consequences of oil extraction and transport in the region (Jibiri & Amakom, 2010; Linden & Palsson, 2013; Nduka & Orisakwe, 2011), few researchers have investigated the consequences of these effects on the health of local inhabitants (Ordinioha & Brisibe, 2013). Research regarding the health consequences of oil-related environmental degradation is largely limited to accidents that have occurred in developed nations (Grattan et al., 2011; Palinkas, 2012; Shreve, 2011)—the effects of which may differ significantly from those in impoverished parts of the world.

The aim of this phenomenological investigation was to explore the mental and physical health consequences of oil-related environmental degradation on the inhabitants of Koluama, a village located in the Niger Delta region of Nigeria. The results have potential for positive social change by drawing attention to the physical and mental health problems that Koluama's inhabitants suffer from because of oil pollution. The study also provides a foundation for future research on the health consequences of oil pollution in the Niger Delta, which represents a significant gap in the existing research.

## Problem Statement

The problems that I explored in this study were the detrimental physical and mental health consequences of environmental degradation among human communities in Koluama, Nigeria. As the demand for oil continues to increase throughout the world, greed fuels its discovery and extraction, despite the environmental or human health implications. The literature on the effects of oil discovery, extraction, and transport in the Niger Delta has focused on environmental consequences; few researchers have studied health implications. Most of the available research pertaining to the effects on human health from oil accidents is limited to developed regions of the world, where regulations and fast, effective cleanup measures offer local residents far more protection against the dangers of oil pollution. Through this study, I addressed the gap in the literature, provided a foundation for future research on the health consequences of oil pollution in the Niger Delta, and drew attention to the problem. Further, the study gave a voice to the marginalized inhabitants of the Niger Delta through the exploration of the

physical and mental health consequences of oil pollution, as perceived by Koluama villagers.

## Purpose of the Study

The purpose of this qualitative investigation was to explore perceptions and lived experiences of villagers residing in the village of Koluama regarding the physical and mental health consequences of oil-related environmental pollution. Through this research, I addressed a gap in the existing literature, drew attention to a pressing human health issue, and provided a foundation for future studies on the health implications of oil pollution among inhabitants of the Niger Delta region.

## Research Questions

The following research questions guided the study.

RQ1. What are the perceptions and lived experiences of the villagers of Koluama regarding the effect of oil pollution on their physical health?

RQ2. What are the perceptions and lived experiences of the villagers of Koluama regarding the possible effects of oil pollution on their mental health?

## Conceptual Framework

Research by Morello-Frosch, Zuk, Jerrett, Shamasunder, and Kyle (2011) served as the conceptual framework for the study. According to their analysis of existing scientific evidence related to the public health consequences of environmental pollution, marginalized populations, such as those consisting of racial or ethnic minorities or those

of low socioeconomic status, are especially vulnerable to environmental pollution. This population tends to face the following factors:

1. Disparities in the incidence and severity of disease because of a variety of material, psychosocial, environmental, and biological factors. Common health issues and associated socioeconomic and environmental outcomes include threats to prenatal health, low levels of self-rated health, and cardiovascular disease.
2. Increased exposure to environmental hazards, which may drive such health disparities, and are often related to proximity to pollution, neighborhood environments, and exposure to pollutants.
3. Biological factors, which may increase susceptibility to health problems, including age, genetics, and preexisting health conditions.
4. Psychosocial pathways linking race and socioeconomic status, which may increase the effect of environmental stressors on individual health.

Because of the increased vulnerability to pollution-related health ailments that may threaten marginalized groups, Morello-Frosch et al. (2011) posited that "holistic and transparent approaches to the regulatory science underlying decision-making that affects such communities are needed" (p. 884). The researchers suggested that addressing these problems is contingent on targeted efforts and enforcement of laws by policymakers and officials that include "multilevel, place-based strategies" (Morello-Frosch et al., 2011, p. 884). A growing paradigm of public health is based on a holistic perspective, which shows how social and environmental conditions affect human health (Hunter, 2008;

McMichael, 2006). As Tarkowski (2009) explained, populations are embedded in social, political, and economic systems, which all affect human behavior and access to health resources.

Although Morello-Frosch et al.'s (2011) analysis focused on race and socioeconomic marginalization within a developed country, this same focus can be used to analyze the pollution-related physical and mental health consequences faced by an entire population that has been marginalized, such as the villagers of Koluama.

## Nature of the Study

The nature of the research was qualitative phenomenology, which draws on the lived experiences of study participants. This design is appropriate for exploratory studies with unknown constructs (Lapan, 2012). The constructs of the study were unknown because other researchers have not explored them. Although researchers have studied the environmental effects of oil discovery, extraction, and transport in the Niger Delta (Jibiri & Amakom, 2010; Linden & Palsson, 2013; Nduka & Orisakwe, 2011), few researchers have conducted research on the mental and physical health consequences faced by Niger Delta inhabitants because of such oil-related activities. Most of the available research regarding the human health consequences of oil accidents is limited to developed regions of the world (Arata et al., 2000; Gill et al., 2011; Hirsch, 1996; Palinkas, Downs, Patterson, & Russell, 1993; Shreve, 2011), where effective regulations and cleanup measures protect local inhabitants from many of the mental and physical consequences of oil pollution. Further, I could not locate research specifically pertaining to the oil-related

mental and physical health consequences faced by inhabitants of the specific area of Koluama.

According to Moustakas (1994), phenomenology focuses on the original texture of participants' lived experiences surrounding a phenomenon, and helps researchers gain understanding of the essence of these experiences enhanced by their intuition and reflection (Moustakas, 1994). The face-to-face interviews, often employed during phenomenological investigations, present researchers with a variety of participant experiences and perceptions.

In-depth interviews are typically employed during phenomenological research as a method for exploring participants' descriptions of a phenomenon within a specific context (Lopez & Willis, 2004). Such phenomena can be complex and may be experienced differently by individual participants (Van Manen, 1990). In-depth interviews provide participants with the opportunity to describe phenomena through the lenses of their unique experiences and perspectives, which contribute to deeper, more meaningful data (Converse, 2012).

Participants included approximately 15 individuals, aged 18 and older, who currently reside in Koluama. Additional participants were recruited if this number did not produce saturation. Only individuals who have lived in Koluama for the past 5 years and who have spent their entire lives in the Niger Delta region were eligible to participate. I recruited participants in person, explaining the purpose of the study and inviting them to participate. Eight men and seven women of varying ages and occupations were recruited to present an array of local perspectives regarding health

issues related to oil pollution. All participation was voluntary, and no incentives were provided. The identities of all participants remained anonymous.

I conducted in-depth, one-on-one interviews using open-ended questions to investigate the perspectives and lived experiences of villagers regarding their health and oil-related environmental pollution. I developed an interview protocol, reviewed by a panel of experts in the field of public health to ensure that questions were not biased or leading. Interviews lasted approximately 60 minutes and were recorded and transcribed for analysis.

I analyzed the data using IPA, as described by Fade (2014). In IPA, the researcher analyzes phenomenological data to discern themes that describe the phenomenon of study, as the phenomenon is experienced and interpreted by participants (Fade, 2014). In the study, I read the interview data several times and assigned descriptive codes to salient words, phrases, and concepts within the transcripts. I combined the codes to form themes and subthemes that explain the participants' experiences regarding their health and oil-related environmental pollution.

## Definitions

**Crude oil.** Unrefined petroleum found in the earth is composed of hydrocarbons, metal, and organic compounds. Crude oil can be refined to produce other energy sources, such as gas and petrochemicals.

**Gas flaring.** The process of burning off the gas found in crude oil during extraction (Ekpoh & Obia, 2010)

**Koluama.** Village located in Bayelsa, Nigeria, situated in the Niger Delta region.

**Niger Delta.** A fan-shaped area in Nigeria that includes the following states: Delta, Bayelsa, and Rivers. The Niger Delta is home to approximately 31 million people and includes one of the 10 most important wetland and marine ecosystems in the world (Gaughran, 2012).

**Oil pipelines.** A crisscrossing network of pipelines throughout Nigeria used to transport crude oil. The length of oil and gas pipelines throughout the region is estimated at more than 7,000 kilometers, which cover a land area of more than 31,000 square kilometers (Akpan, 2005).

**Pipeline vandalism.** Dangerous acts of intentional destruction to pipelines committed by locals to siphon oil or demand payment from oil companies (Aroh et al., 2010).

## Assumptions

I assumed that the subjects were honest and forthcoming when answering the interview questions. To encourage honest responses, the identities of all participants remained anonymous. I also assumed that participants had an awareness of oil-related environmental degradation and the potential for existing health consequences. Finally, I assumed that participants understood the concepts of physical and mental health and described their perceptions and experiences related to their personal health or the observations of others' health.

## Scope and Delimitations

According to Creswell (2013), delimiting a study is necessary to enable proper management and understanding of a research topic. In an effort to define the boundaries

of the study, a few delimitations also existed (Creswell, 2012). Although oil pollution has the potential to affect the physical and mental health of inhabitants throughout the Niger Delta region, the scope was limited to the perceptions and lived experiences of the villagers of Koluama. Because of the phenomenological nature of this investigation, the scope was also limited to villagers' perceptions and experiences, and did not include objective medical assessments of physical and mental health. The research only included participants who have resided in Koluama for at least 5 years, and was limited by a timeframe of 2 to 4 weeks.

## Limitations

The research was also bound by a few limitations. The potential for researcher bias existed because I am from the same tribe and area as participants, who may be victims of oil spills. To reduce potential bias, I used the process of bracketing. *Bracketing* describes the act of suspending judgment about the natural world preceding phenomenological analysis (Williams, 2012). In addition, a peer briefing committee of three individuals, who have earned doctorate degrees and are familiar with phenomenological research, provided me with additional feedback to help eliminate researcher bias during the data analysis process. The purposes of peer briefing was for the committee members to alert me to the roles that I could play to enhance and diversify the range of assessment approaches and formats I used in the field. The process of the peer briefing committee can include reviewing and exploring interview documents, data analysis, and emerging themes (Andrews, Lyne, & Riley, 1996; Barbour, 2001; Cutcliffe & McKenna, 1999). The peer briefing improved the research process and results by

employing independent and qualified experts to provide analytical and advising appraisal of the benefits of my research project (Given & Saumure, 2008). Researchers have argued that peer briefing may help to guard against the potential for lone researcher bias (Brewerton & Millward, 2001) and help to provide further understanding into theme and theory progress.

## Significance

Researchers have studied the environmental effect of oil pollution in the Niger Delta region (Jibiri & Amakom, 2010; Linden & Palsson, 2013; Nduka & Orisakwe, 2011), but the health effects on the region's inhabitants have been widely ignored. This research represents an original contribution to the current body of literature by providing information on the effect that oil pollution has on the villagers of Koluama through their unique experiences and perspectives. Lawmakers should work to give a voice to the villagers of Koluama, as a marginalized population, and should explore the health implications that locals may be suffering because of the pollution caused by oil drilling in the region.

Raising awareness of related health problems may promote further studies in Koluama and lead to better health care access for the villagers. Data from this phenomenological investigation highlighted potential health consequences, through the perceptions and lived experiences of an understudied population. Villagers reported health problems that they believe are related to oil pollution; the results of this investigation could put pressure on stakeholders, such as the government and oil

companies, to assist villagers through the provision of health care access, environmental cleanup, or the enforcement of policies to reduce oil pollution.

The implications for positive social change from the study include gaining a better understanding of the health consequences of oil-related pollution faced by Koluama villagers, improving villagers' quality of and access to health care, and placing pressure on oil companies and government entities to assist with cleanup, policies, and health care provisions. This research also provided opportunities for the marginalized people of Koluama—a group largely ignored by the rest of the developed world—to make their experiences with oil-related pollution known. Data gathered from this research may also force oil-consuming individuals and groups around the globe to recognize the destruction caused by oil companies and the government entities responsible for overseeing oil drilling in the Niger Delta.

## Summary

The potentially deleterious effects of oil-related pollution on the physical and mental health of the inhabitants of the Niger Delta are significant but understudied. Through this research study, I addressed a gap in the literature by investigating the lived experiences and perceptions of Koluama villagers related to the physical and mental health consequences of environmental pollution caused by oil activities. The following chapter provides an in-depth investigation of the existing body of related research. An explanation of the methodology appears in Chapter 3.

# Chapter 2: Literature Review

## Introduction

In 2012, a gas wellhead explosion on the Chevron KS Endeavor occurred in the Funiwa oil field, off the coast of Koluama, Nigeria (Chevron, 2012). The explosion created a fire that burned for 46 days, furthering the environmental damage to an area already damaged by years of oil-related degradation (Environmental Rights Action, 2012). The delta region of the Niger River has been the site of many oil accidents because of transportation, vandalism, and leaky pipes (Akpomuvi, 2011). Together, these activities have had dire, environment-related health consequences for the inhabitants of the region.

Existing studies throughout the world on oil spills, explosions, leaks, and fire damage include investigations of the resulting environmental, health, and socioeconomic effects (Akhakpe, 2012; Odoemene, 2011). The related damage of oil pollution is well known, as researchers have studied the environmental havoc caused by oil spills in general, especially in the Niger River delta (Jibiri & Amakom, 2010; Linden & Palsson, 2013; Nduka & Orisakwe, 2011). Few researchers have explored the physical health consequences of environmental degradation caused by oil spills and fires in the Niger Delta region (Aroh et al., 2010; Ordinioha & Brisibe, 2013; San Sebastian & Hurtig, 2004); however, the effect of oil-related environmental damage on the mental health of the region's inhabitants has received little research attention. Further, few studies exist regarding how oil pollution specifically affects the villagers of Koluama. This phenomenological study filled this gap in the literature by providing an investigation of

the perspectives and lived experiences of local villagers in Koluama, Nigeria, related to the physical and mental public health consequences of oil pollution.

This chapter begins with a description of the search strategy used to locate literature for this review. I follow with a discussion of the conceptual framework. I dedicate the bulk of this chapter to a comprehensive review of the relevant literature regarding the health consequences of oil-related activities, such as oil spills, gas flaring, and pipeline damage. When possible, I focused the review on the health of villagers residing in the Niger Delta region; however, because the available literature is limited, studies on the consequences of oil-related pollution in other regions of the world are also included.

## Search Strategy

An extensive review of available literature was performed to gather research for this chapter. I accessed several online databases through Walden University's online library, including Academic OneFile, Academic Search Complete, InfoTrac, Sage Journals, PubMed, ScienceDirect, ProQuest, and Springer. I also used Google Scholar to identify seminal literature. The search terms used included *oil spill*, *oil pollution*, *environmental degradation*, *Nigeria oil*, *Niger River delta*, *Koluama*, *gas flaring*, *oil water pollution*, *petroleum pollution*, *Niger Delta villagers*, *health in Nigeria*, *Nigeria and oil companies*, *government corruption in Nigeria*, *acute health damage*, *long-term heath in Nigeria*, *pipeline vandalism*, *oil transport*, *oil-related accidents*, *history of Nigeria*, and *environmental laws in Nigeria*.

## Conceptual Framework

The conceptual framework for the study was based on research conducted by Morello-Frosch et al. (2011). The researchers' analysis of evidence on the public health consequences of environmental pollution revealed that marginalized populations are more vulnerable to environmental pollution; thus, these populations may experience more health consequences than nonmarginalized groups (Morello-Frosch et al., 2011). Many researchers have used a similar framework to explore social disparities in environment-related health consequences. For example, Balazs, Morello-Frosch, Hubbard, and Ray (2011) investigated water exposure to nitrate contaminants among residents in San Joaquin Valley, California. The researchers found that the water systems serving a larger percentage of Latino residents and residents of lower socioeconomic status contained higher nitrate levels (Balazs, Morello-Frosch, Hubbard, & Ray, 2011). Hicken et al. (2012) found significant disparities in the deleterious health consequences of lead exposure, with minorities and individuals of low socioeconomic status experiencing disproportionate effects. Similarly, Stevens, Dias, and Ezzati (2008) reported that marginalized communities in Mexico, composed of indigenous individuals and people of low socioeconomic status, experienced more environment-related health consequences than other Mexican communities.

The villagers residing in the Niger Delta region are marginalized on many levels by hegemonic political powers, racism, and the destructive activities of big petroleum companies. Local inhabitants, such as the villagers of Koluama, are virtually powerless against the environmental degradation and pollution to which they are exposed.

Although many are opposed to pollution and believe that oil-related activities, such as gas flaring, are deleterious to their health, few are willing to speak out or make any sign of protest for fear of recourse from government officials. Thus, Koluama villagers are largely helpless against exposure to oil-related pollution and are at elevated risks for associated health consequences. This framework provided a view for exploring the existing literature and analyzing the data obtained during the study.

## Geography and History of the Niger Delta

Nigeria is located in Africa, neighboring the Republics of Niger, Chad, Cameroon, and Benin. The country has a land area of 923,333 square kilometers and a coastline distance of 853 kilometers. Nigeria is a deeply divided country with an estimated 370 ethnic groups (Otite, 1991). Under British rule, the country was exploited for its natural resources. When England departed, the nation was left with a tenuous economic structure based on a monoproduct economy (Akhakpe, 2012). Since then, the achievement of independence has not changed Nigeria's economy in a positive way. Instead, it has resulted in an economy that is "dependent not on its internal dynamics but on external stimuli" (Akhakpe, 2012, p. 81).

The Delta region of Nigeria is a fan-shaped area that includes three states: Delta, Bayelsa, and Rivers. The Niger Delta is home to approximately 31 million people and includes one of the 10 most important wetland and marine ecosystems in the world (Gaughran, 2012). Most of the region's inhabitants live in small, remote communities located in mangroves, rainforests, and swamps and have livelihoods that depend on fishing and farming (Ifedi & Anyu, 2011). This lifestyle makes the region's inhabitants

especially susceptible to the hazards of water pollution. Many communities in the Niger Delta are only accessible by boat and are vulnerable to flooding, ocean encroachment, oil spills, and other forms of pollution (Ifedi & Anyu, 2011).

## Oil: A Troublesome and Precious Commodity

Africa contains rich deposits of oil, and its largest oil reserves exist in the Niger Delta region and on the adjoining continental shelf (Linden & Palsson, 2013). Nigeria is the eighth largest producer of oil on the planet (Adedeji & Adetunji, 2011), boasting an estimated 270 billion tons of oil reserves, which are among the largest in the world (Central Intelligence Agency, 2012). Oil extraction in this region began after the discovery of oil in the 1950s. Shortly after, the 1970s oil boom occurred, which left much of the Delta region exploited (Akpomuvie, 2011). In addition to the environmental damage created by oil extraction, Nigeria's heavy reliance on oil resulted in severe social and economic consequences. As Akpomuvie (2011) explained, "apart from the fact that it altered the nature of the Nigerian economy from multi-products to mono-product, it created excessive wealth for the national economy while the oil producing communities were left with socioeconomic and ecological crisis" (p. 201). Prior to British rule, Nigeria's economy was multiproduct. Afterwards, the economy became a monoproduct economy (oil).

The Niger Delta generates more than 80% of the country's revenues through oil (Ifedi & Anyu, 2011), but it is "the most neglected, repressed, ecologically devastated and underdeveloped region in Nigeria" (p. 201). Daily exports average an estimated 15 million tons, most of which are produced in the Niger Delta region (Linden & Palsson,

2013). The Delta region has experienced devastating spills and other oil degradation throughout the years, primarily caused during oil drilling and transport (Adedeji & Adetunji, 2011). The consequences to human health, as discussed in the following pages, can be dire.

## Environmental Degradation

Environmental degradation from gas and crude oil extraction has created a crisis in the Niger Delta region. Many activities with increased environmental hazards contribute to this, such as land clearing, land surveying, establishing seismic drilling camps, preparing sites, constructing infrastructure, drilling, and developing infrastructure for transportation (United Nations Environment Program, 2006). As Ekpoh and Obia (2010) explained, "there are numerous environmental, socio-economic, and health problems caused by petroleum exploration and exploitation through such activities as drilling, processing, refining, transportation, and distribution" (p. 347).

Researchers should try to understand the chain reaction set off by irresponsible oil exploration and extraction. The direct results are increasing levels of environmental damage to the water, land, and air, and the people who depend on these natural resources. Many studies show that the consequences of living in areas heavily polluted by oil are detrimental to human health (Ana, Srindhar, & Bamgboye, 2009; Bezek, Ujazy, Mach, Navarova, & Dubovidky, 2008; Goldstein, Osofsky, & Lichtveld, 2011; Hou et al., 2011; Howard, 2002; Jernelov, 2010; Tang & Ho, 2007). Thus, to understand the human health implications of oil-related pollution in the Niger Delta region, researchers must contextualize the extent of the environmental damage. The following pages provide a

review of existing studies on environmental pollution caused by oil spills, gas flaring, and pipeline damage.

**Spills**

According to the Niger Delta Environmental Survey (1997), 4,835 oil spills occurred in the Niger Delta between 1976 and 1996. These spills resulted in 1,832,189 billion barrels of unrecovered oil lost to the environment (Niger Delta Environmental Survey, 1997). Oil spills are categorized as minor, medium, major, and disaster, depending on the quantity of unrecovered barrels lost to the environment (see Table 1; Adedeji & Adetuniji, 2011). The category of spill is also contingent on whether a spill occurs in an inland or coastal region. For example, a spill of less than 25 barrels in an inland region is categorized as *minor*, while anything less than 250 barrels offshore is considered minor.

Table 1

*Categories of Oil Spills*

| | Minor | Medium | Major | Disaster |
|---|---|---|---|---|
| Inland | < 25 barrels | < 250 barrels | > 2,500 barrels | Any uncontrolled blowout, pipeline rupture, or storage tank failure that poses serious threats to human life |
| Coastal/offshore | < 250 barrels | 250-2,500 barrels | > 2,500 barrels | |

*Note.* Adapted from "Aquatic Pollution in Nigeria: The Way Forward," by O. B. Adedeji and V. E. Adetunji, 2011, *Advances in Environmental Biology*, *5*(8), pp. 2024–2031 Retrieved from http://www.aensiweb.com/

Since the discovery of oil in the Niger Delta region, thousands of spills have occurred, causing detrimental effects on the area's environment and the health of its

inhabitants. For example, an oil blowout that occurred in Rivers State in 1980 was one of the most destructive environmental disasters ever recorded (Aroh et al., 2010). During that spill, more than 40,000 barrels of oil spread throughout the Delta region, polluting 1,200 square kilometers and killing 180 people (Aroh et al., 2010). An additional 300 people contracted illnesses from consuming food and water that were contaminated by the spill (Odu & Offodum, 1986).

In October 1986, another major spill occurred at Escravos in Delta State, which affected eight creeks and villages in the area (Arob et al., 2010). The spill caused economic paralysis, with destruction to fishponds, nets, and traps. In 1998, another spill resulted in a loss of 40,000 barrels of oil to the environment, compounding existing damages to fishing nets, ponds, and boats (Aroh et al., 2010). Other devastating accidents include the 1979 Forcados terminal incident, in which about 570,000 barrels were spilled, and the Apoi North spill of 1980, which involved an estimated 280,000 barrels (Akpomuvie, 2011).

The Ministry of Petroleum Resources in Nigeria has attributed 3.8% of spills to equipment malfunction, 21% to equipment corrosion, and 18% to sabotage (Akpomuvie, 2011). However, many more causes exist, involving the complex relationships between the government, wealthy elites, oil companies, and inhabitants of the Niger Delta region. Researchers need to develop a comprehensive understanding of the depth of the environmental, social, and health problems related to oil extraction and pollution in Nigeria, explored later in this chapter.

**Gas Flaring**

*Gas flaring* is another dangerous activity of oil companies that has severe health and environmental consequences. Gas flaring is the process of burning off the gas found in crude oil during extraction (Ekpoh & Obia, 2010). Because separating commercially usable gas from oil is expensive, some oil companies burn gas, using pits or flare stacks. The resulting gas flares contain upwards of 250 toxic substances, including sulfur dioxide, carbon dioxide, formaldehyde, radon, lead, benzene, and hydrogen sulfide (Canadian Public Health Association, 2004). According to the World Bank (2004), Nigeria flares 75% of the gas it produces, which results in about 2.5 billion cubic feet of gas sent into the environment each year. According to Dokpesi et al. (2004), Nigeria flares more gas than any other country that produces petroleum.

Gas flaring has many detrimental effects on society and the environment because it allows for wide distribution of airborne pollutants. For example, gas flare emissions are often converted into sulfuric and nitric acid in the environment, which can result in acid rain that spreads the pollution across vast areas (Ekpoh & Obia, 2010). Acid rain is an environmental pollutant that can affect humans, animals, vegetative life, and manmade structures (Ekpoh & Obia, 2010).

In addition to diffusing toxic substances into the air, gas flaring may result in damages to structures in the region. According to Inyang (2001), oil companies often claim that their operations, which involve gas flaring, are not responsible for damage in the region, such as the decay of iron roofs. Ekpoh and Obia (2010) conducted an experimental study regarding the role of gas flaring in the corrosion of zinc roofs in the

Niger Delta region, including four regions prone to different exposures: (a) Site A, Ebocha, experienced flaring only; (b) Site B, Qua Iboe Terminal, experienced both flaring and brackish water; (c) Site C, Iko Village, experienced brackish water only; and (d) Site D, was a remote control site with virtually no pollution. At each site, pieces of weighed galvanized iron sheets were exposed to the environment for 12 months (Ekpoh & Obia, 2010). The researchers assessed corrosion by measuring weight loss from the sample during the study period at monthly intervals (Ekpoh & Obia, 2010). At the end of the exposure period, significant differences developed between sites (Ekpoh & Obia, 2010). Ekpoh and Obia reported, "From the mean weight loss at each site and the mean weight difference among the sites, different degrees of corrosion impact were observed" (p. 350). The flare points at Sites A and B were the cause of the high levels of corrosion, which enabled Ekpoh and Obia to conclude that "gas flaring has a role to play in the acid rain effects on zinc roofs in the Niger Delta" (p. 350). The researchers suggested that to reduce the rapid corrosion of zinc roofs, the government, oil companies, and other stakeholders must cooperate to bring gas flaring to a stop (Ekpoh & Obia, 2010). In addition, the release of other pollutants (from domestic sources, industrial processes, bush burning, etc.) into the environment must be curbed (Ekpoh & Obia, 2010).

**Pipeline Damage**

The transport of oil products through pipeline systems is another environmental issue that can lead to health problems. The length of oil and gas pipelines throughout the region is estimated at more than 7,000 kilometers. In Nigeria, these pipelines cross a land area of more than 31,000 square kilometers (Akpan, 2005). Inadequate pipeline

monitoring has resulted in unmitigated damage through accident, deterioration, and sabotage. The environmental damages resulting from the pipeline include oil seeping into the water supply and land (Christopher, Ayodele, & William, 2004). However, pipeline damage extends beyond environmental destruction—it can also be extremely dangerous for people living in surrounding areas. For example, a 1998 pipeline explosion in the Delta State, which was later attributed to sabotage, resulted in more than 1,000 deaths (Christopher, Ayodele, & William, 2004).

Locals seeking to claim compensation from petroleum companies, or trying to siphon fuel to sell as reported by Aroh et al. (2010), often sabotage pipelines. According to Aroh et al., "the volumes spilled as a result of deliberate action by communities to the environment are much larger" and can be "quite damaging to the environment" (p. 73). The sabotage of pipelines can interrupt the production and distribution of oil products, and next to corrosion, pipeline vandalism is a leading cause of oil spillage in the Niger Delta (Aroh et al., 2010). Pipeline vandalism is often conducted by restless youths, who use crude techniques to cut oil pipelines at night (Aroh et al., 2010).

Oil pipelines have been the focus of conflict between Delta region inhabitants and oil companies. Locals claim that thousands of miles of poorly maintained pipes have become rusted and leaky, pouring poisonous crude oil into their environments. When pipes leak or burst, oil companies blame vandalism by local militants to absolve themselves of responsibility. According to McCaskill (2013), the Nigerian government has historically sided with the oil companies because industry revenues are so critical to the national economy.

The sparks, fires, and explosions that can occur during pipeline vandalism have killed hundreds of thousands of looters and innocent bystanders (Johnson, 2004). A pipeline explosion in 2006 burned more than 200 people to death (Balogun, Olufowobi, & Nwachukwu, 2006). In 2000, two separate explosions, less than 10 days apart, killed an estimated 300 people (Johnson, 2004). Another accident in the Delta State, caused by an explosion that occurred from a spark ignited by locals trying to gather oil leaking from a damaged pipeline, resulted in more than 1,000 deaths (Johnson, 2004).

The consequences of oil pipeline leaks and explosions can be devastating. Aroh et al. (2010) conducted an analysis of spill incidents and pipeline vandalism that occurred in Nigeria between 1970 and 2006 to examine the dangers posed by such activities. The results showed that of approximately 1,000 reported spills, hundreds of thousands of oil barrels were lost to the environment (Aroh et al., 2010). The runoff caused significant degradation to local water quality and sea life, which in turn caused a reduction in the productivity of aquatic life that many locals depended on (Aroh et al., 2010). Aroh et al. reported that human ailments, such as dermatitis, cancer, organ failure, and genetic disorders, resulted from the pollution caused by pipeline breeches.

## Health Effects of Oil Pollution

Although the environmental issues caused by oil operations in the Niger Delta are devastating, the resulting human health problems are perhaps the most disconcerting. Oil pollution in the Niger Delta contaminates agricultural fields, fishing areas, and sources of drinking water. Because of this pollution, disadvantaged farmers, fisherman, and their families consume unsafe water and contaminated food (Jernelov, 2010). Trends of

carcinogenic diseases among inhabitants of the Niger Delta have been traced to exposure to the radioactive elements of gas flaring.

Worldwide, more than 13 million deaths are attributed to environmental pollutants each year (Hou, Zhang, Wang, & Baccarelli, 2011). A growing body of research suggests that environmental pollution can cause disease and genetic mutations (Bezek et al., 2008; Tang & Ho, 2007). Heavy metals are associated with numerous diseases, such as cancer, cardiovascular disease, neurological disorders, and autoimmune diseases (Howard, 2002). Exposure to arsenic, nickel, cadmium, mercury, and lead can result in a variety of genetic mutations (Hou et al., 2011).

Researches have document significant findings of the toxic effects of crude oil on human health (Ana, Srindhar, & Bamgboye, 2009; Bezek et al., 2008; Goldstein et al., 2011; Hou et al., 2011; Howard, 2002; Jernelov, 2010). In wealthy, developed nations, resources are available to mitigate ecological catastrophes; however, less developed countries, like Nigeria, lack these capacities. Consequently, the health effects of oil pollution in poor nations are significantly higher (McCaskill, 2013).

**Acute Health Effects**

Researchers have documented the short-term effects of crude oil exposure, especially among crews of individuals working to clean up spill damage. Researchers also documented the acute health effects of several large oil spills around the world (Aguilera et al., 2010). Commonly reported effects include nausea, vomiting, dizziness, headaches, and respiratory problems (Solomon & Janssen, 2010). According to Solomon and Janssen (2010), these effects can be expected from short periods of exposure to

chemicals, including benzene, naphthalene, and toluene. Precautionary measures, such as wearing gloves, goggles, and coveralls, as well as allowing workers to take breaks and stay hydrated, can minimize such acute effects (Walsh, 2010).

**Long-Term Impacts**

Although researchers know that the health consequences of long-term exposure to crude oil are much more dangerous than those of acute exposure, significantly fewer researchers have documented these effects (Woodward, 2010). This gap in research is because most of the data collected on the health effects of crude oil exposure involve developed nations that have the tools to halt the effects of exposure in acute phases. Although many researchers have conducted studies on long-term oil exposure in developing nations, many challenges to reliable data exist, including (a) seeking out subjects for studies; (b) unreliable reports from medical facilities; (c) difficulty obtaining provisional care for those in need; and (d) unreliable self-reports (McCaskill, 2013). This lack of data is a tragedy for underdeveloped nations, such as Nigeria. McCaskill (2013) explained:

> In the developing world, oil spills garner far less attention than they do in the United States or Europe. Unfortunately, developing states have other equally critical crises occurring simultaneously. Spill-related problems tend to lie dormant because the most serious health damage done by spills only occurs when exposure is severe and protracted, and that damage takes time to manifest. (p. 547)

Ana, Srindhar, and Bamgboye (2009) conducted a study in two Rivers State communities of the Niger Delta region to assess the prevalence of health outcomes that can be associated with environmental risk factors from exposure to oil pollutants. The two communities under investigation were Eleme and Ahoada East (Ana, Srindhar, & Bamgboye, 2009). Ana et al. chose Eleme for its comparably high level of industrialization; Ahoada East had experienced little industrial growth and was chosen as a control. The research methods involved a triangulation of laboratory experiments, community health surveys, and hospital record reviews (Ana et al., 2009). The researchers collected air, soil, water, and urine samples from each of the sites (Ana et al., 2009). A researcher-designed, 77-item health survey assessed participants' demographic, occupational, environmental, toxicological, and health features (Ana et al., 2009). A total of 349 respondents from both communities completed the survey (Ana et al., 2009). Finally, Ana et al. analyzed hospital records to assess conditions of the respiratory system, skin, gastrointestinal tract, and eyes, as well as cases involving poisoning.

Data analysis revealed that high levels of air, water, and soil pollution at Eleme were the result of higher toxicant input into the environment from industrial activities (Ana et al., 2009). The perceptions of participants, gauged through the health survey, revealed a higher level of morbidity cases, such as cancers, respiratory, and skin diseases at Eleme than at Ahoada East (Ana et al., 2009). These perceptions were corroborated by hospital records, which indicated that the ailments reported by respondents, as well as congenital malformations, dominated at Eleme (Ana et al., 2009). Ana et al. (2009) also concluded that "the exposure of humans at Eleme (highly industrialized community) and

Ahoada East (less industrialized community) to various environmental risk factors … might have contributed (based on the significant levels of associations) to the various levels of health outcomes recorded" (p. 190). In their recommendations, Ana et al. suggested ongoing environmental auditing to ensure that levels of environmental toxins are in compliance with regulatory limits.

## Health Effects of Specific Forms of Oil Pollution

### Air Pollution

As previously mentioned, gas flaring is a major contribution to air pollution in the Niger Delta, and can pose significant threats to human health. Gas flaring results in the release of sulfur dioxide and hydrogen sulfide into the atmosphere. Sulphur dioxide is the result of the oxidation of hydrogen sulfide (Abdul-Wahab et al., 2012). Sulfur dioxide can cause a variety of health issues, especially in vulnerable groups, such as asthmatics, children, the elderly, and those suffering with heart or lung disease (Abdul-Wahab et al., 2012). Health hazards from sulfur dioxide exposure include a number of diseases, such as lung cancer and allergic rhinitis (Abdul-Wahab et al., 2012). Long-term exposure to the sulfur dioxide can cause respiratory and cardiac diseases; however, even short-term exposure can be life-threatening (Al-Jahdali & Bisher, 2008). Changes in lung function have been observed among workers who are exposed to sulfur dioxide (Agency for Toxic Substances and Disease Registry, 1998).

Abdul-Wahab, Ali, Sardar, and Irfan (2012) conducted an investigation of the ground level concentration of sulfur dioxide because of flaring at a production station in Oman. Abdul-Wahab et al. also wanted to assess the ambient air quality of workplaces in

the same area. The study took place from June 1, 2010 to June 30, 2010 (Abdul-Wahab et al., 2012). Ground level concentrations of sulfur dioxide were assessed at 10 locations situated within 5 kilometers of one of Oman's largest oil fields (Abdul-Wahab et al., 2012). Abdul-Wahab et al. found that flaring resulted in sulfur dioxide emissions that exceeded health standards set by the government, and concluded that adverse health risks were present in these areas.

Although the health consequences of long-term exposure to contaminants released into the environment have been assessed by many researchers (Ishishone, 2004; Kindzierski, 2000), Edino, Nsofor, and Bombom (2010) conducted an investigation on the effects of gas flaring, as perceived by villagers in the Niger Delta. Study participants included villagers of Ubeji, located on the lower Niger Delta plane and host to the Warri Refining and Petrochemical Company, as well as the Nigeria Gas Company (Edino, Nsofor, & Bombom, 2010). The researchers gathered data through questionnaires, interviews, and focus groups (Edino et al., 2010). Edino et al.'s goals were,

> Get the different views on perception and attitude of the residents toward gas flaring; and to examine the nature of relationships between different segments of the community on this important subject, and between the community and the government and oil companies. (p. 70)

Data analysis revealed that 65% of respondents reported disliking the activities and attitudes of oil companies toward gas flaring near Ubeji (Edino et al., 2010). Edino et al. reported that the "interview session opened up new perspectives on respondents' perception of the extent of the harmful effects of gas flaring" (p. 71).

Although the majority of respondents believed that gas flaring contributed significantly to environmental and health damages, only half expressed the opinion that the community ought to be more proactive in putting an end to gas flaring activities (Edino et al., 2010). Among those who did support community action, many were reluctant to support such actions, for fear of government reprisals or betrayal. Edino et al. (2010) reported that "a general sense of helplessness that borders on apathy" (p. 72) permeated the village. I took into consideration this finding when exploring the perceptions of Koluama villagers—the fear of expressing disdain or concerns regarding oil extraction activities may affect the integrity of information that respondents provide.

**Contaminated Food and Water**

Water pollution is one of the most devastating environmental and health problems caused by petroleum activities in the Delta region. This problem exists primarily because water is essential to human and industrial development (Abdus-Salam et al., 2010). More than 1 billion people in the developing world lack access to safe drinking water, with a majority living in Africa (Abdus-Salam et al., 2010). Inadequate access to clean water causes significant suffering and disease, and pollution associated with unsafe water is caused by toxic substances in quantities too large to be naturally attenuated by the environment (Macer, 2000). Prolonged exposure to toxic compounds found in unsafe water can result in acute toxicities, genetic changes, cancer, and birth defects among humans and other organisms (Foudan & Kefatos, 2001). In developing nations, water pollution is a cause of concern (Adedeji & Adetunji, 2011).

Water pollution in the Niger Delta region is a byproduct of crude oil transport. Petroleum activities, including dredging, oil exploration, marketing, refining, spills, and gas flaring, are responsible for a significant amount of water pollution in the Niger Delta (Adedeji & Adetunji, 2011). Crude oil is often transported on tankers or through pipelines that result in spills and pollution (Slavic Research Center, 1999). Abdus-Salam, Adekola, and Apata (2010) explained this issue:

> When oil is spilled at sea, it washes up to coastlines. It destroys seaweeds, invertebrates, fish and their communities are changed for many years. Sea birds are very intolerant to oil and can die from hypothermia, if even a small of their feather is contacted with petroleum. (p. 334)

Oil pollution can affect wildlife and vegetation in many ways, such as the dissolution of protective fats on the body surfaces of birds (International Tanker Owners Pollution Federation, 2011), absorption of petroleum hydrocarbons through the gills of fish (Heubeck et al., 2003), contamination of wetlands and marshes that are nearly impossible to clean up (Chan & Baba, 2009), and poisoning of plants and animals that rely on the ecosystem (Linden & Palsson, 2013).

The lack of potable water in settlements around the Delta region makes it necessary for the population to rely on rivers for domestic, recreational, and agricultural needs. At about 4,100 kilometers in length, the Niger River is the third longest river in Africa (Linden & Palsson, 2013). The river's delta stretches from the Benin to the Bonny River, and the surrounding freshwater swamp is the third largest in the world (Linden & Palsson, 2013). The general neglect of the provision of safe water to people in the area

has led to studies regarding the well-being of inhabitants of the region. Abdus-Salam et al. (2010) conducted one such study in the Ondo State. Abdus-Salam et al. assessed water quality for chemical parameters and heavy metals at six sites in the same ecological zone. Analysis of water sources occurred from March 2008 to January 2009. The researchers found water from all of the sources to be generally unsafe for domestic and agricultural use, because of pollution from various sources (Abdus-Salam et al., 2010). Pollution sources included bedrock modifications, oil spillage, agrochemicals, farm run-off, and boat exhaust (Abdus-Salam et al., 2010). Abdus-Salam et al. called for a concerted effort from the Nigerian government and oil corporations to reduce water pollution for three reasons: (a) the river is a food source for many of the area inhabitants, (b) transboundary pollution drains into the Atlantic Ocean, and (c) addressing the water pollution problem would help to lessen the deplorable environmental conditions. Abdus-Salam et al. recommended "proper education, monitoring and clean up procedures be carried out promptly at these locations wherever there is oil spillage" (p. 342).

In another study, Nduka and Orisakwe (2011) investigated the heavy metal profiles and physicochemical properties of surface water samples used by local inhabitants at Bayelsa, Delta, and Rivers States. The researchers collected the water samples at intermittent times to account for variations in the river water properties that may occur throughout the day (Nduka & Orisakwe, 2011). Nduka and Orisakwe reported that the surface waters of the Delta and Rivers State were more contaminated than those at Bayelsa. Increased metal levels can affect the water's salinity, redox potential, and pH levels (Nduka & Orisakwe, 2011). The levels of lead, cadmium,

chromium, and manganese exceeded the threshold limits recommended by the World Health Organization for drinking water (Nduka & Orisakwe, 2011; World Health Organization, n.d.). Ingestion of such metals can threaten human health in many ways (see Table 2; Nduka & Orisakwe, 2011).

Table 2

*Health Problems Associated with Metal Toxicity*

| Lead/Cadmium | Manganese | Iron | Zinc | Chromium |
|---|---|---|---|---|
| Nephrotoxicity, neurotoxicity, hypertension, bone development, tooth enamel formation | Parkinson's disease, poor neurologic function, decreased intellectual function, damage to developing embryos | Primary hemochromatosis, secondary hemochromatosis, thalassemia, damage to the heart, liver, and endocrine system; diabetes, heart failure, or death. | Vomiting, diarrhea, | Cancer |

*Note.* Adapted from "Water-Quality Issues in the Niger Delta of Nigeria: A Look at Heavy Metal Levels and Some Physicochemical Properties," by J. K. Nduka and O. E. Orisakwe, 2011, *Environmental Science Pollution Research, 18*, pp. 237–246. doi:10.1007/s11356-010-0366-3

Linden and Palsson (2013) conducted another water assessment by testing the surface waters, drinking wells, sediment, and biota in Ogoniland, an area in the Niger Delta region consisting of Eleme, Tai, Gokana, and Khana. The researchers measured the parameters of water quality, including pH, temperature, dissolved oxygen, and conductivity, at rivers, streams, and ponds (Linden & Palsson, 2013). Analysis of the samples revealed significantly elevated levels of extractable petroleum hydrocarbons (EPHs) in most of the water (Linden & Palsson, 2013). High concentrations of EPHs can

cause even tolerant organisms to disappear and render water unfit for human consumption (United Nations Environmental Programme, 2011). For example, samples from Eleme indicated extremely high levels of the carcinogen, benzene (Linden & Palsson, 2013). The concentrations of EPHs in sediments were also elevated at all sample sites (Linden & Palsson, 2013).

Linden and Palsson (2013) stated that "the results of the analyses indicated that the oil contamination was substantial in the study area" (p. 698), and that surface waters, drinking wells, and river sediments were all contaminated. The researchers also observed that oil pollution caused extensive damage to mangroves, where vast amounts of vegetation had died (Linden & Palsson, 2013). Lindon and Palsson's conclusions were not optimistic: "Even if the pollution were to stop, the fact that mangroves and wetlands have been so heavily impacted indicates that a recovery of the affected areas is a matter of many years, perhaps decades" (p. 699).

**Psychological Damages**

In addition to the environmental and physical health consequences of activities related to crude oil discovery, extraction, and transport, oil disasters can also have a profound effect on the psychological health of people living in affected regions. Grattan et al. (2011) employed a community-based research model to explore the mental health consequences of oil pollution on inhabitants of areas affected by the Deepwater Horizon oil spill that occurred in April 2010. The disaster occurred when an oil platform exploded in the Gulf of Mexico, affecting more than 600 miles of shoreline along Florida, Alabama, Texas, and Louisiana (McCauley, 2010). Nearly 5 million barrels of oil spilled

into the Gulf for 5 months, making the Deepwater Horizon accident the largest offshore spill in U.S. history (McCauley, 2010). Researchers focused on the effects experienced among those living in Franklin County, Florida and Baldwin County, Alabama (Grattan et al., 2011). Grattan et al. (2011) wanted to understand the acute levels of psychological distress caused by the disaster and explore "whether participants who sustained economic loss as a result of the oil spill had greater evidence of psychological distress, reduced capacity for adjustment (coping, resilience), and greater perceived risk than persons who were economically stable" (p. 839). Researchers used a variety of quantitative instruments to assess psychological effects, including the World Health Organization Neurobehavioral Core Test Battery (Johnson, 1987), the Profile Mood States (McNair, Lorr, & Droppleman, 1992), the Brief Coping with Problems Experienced questionnaire (Carver, 1997), the Connor-Davidson Resilience Scale (Campbell-Sills & Stein, 2007), and the Health and Coastal Environment Questionnaire-V (Roberts et al., 2007).

Results of the investigation by Grattan et al. (2011) indicated that people living in areas affected by the Deepwater Horizon spill had elevated levels of anxiety, depression, and psychological distress. Income losses caused by the spill increased levels of tension, depression, fatigue, anger, and confusion (Grattan et al., 2011). The psychological effects of the spill seemed to be strongly tied to the economic losses incurred, in the form of resources, businesses, or job opportunities (Grattan et al., 2011). The researchers did not examine physical health consequences during this study (Grattan et al., 2011).

Many other researchers have reported similar psychological effects of U.S. oil spills related to economic losses (Gill et al., 2011; Shreve, 2011), litigation procedures

(Arata et al., 2000; Hirsch, 1996; Shreve, 2011), and substance abuse (Palinkas et al., 1993). Palinkas (2012) developed a three-tiered conceptual model for understanding the mental health effects of oil spills. Palinkas based the model on research conducted on the consequences of the Exxon Valdez and Deepwater Horizon oil spills. The first tier of the model included direct environmental factors, such as cleanup, cultural and economic impacts, litigation, and health consequences (Palinkas, 2012). The second tier related to long-term social tensions, conflicts, and increased uncertainties that develop in the aftermath of spills (Palinkas, 2012). Last, the third tier included increases in post-traumatic stress, anxiety, disorders, substance abuse, domestic abuse, and stress-related physical symptoms that result (Palinkas, 2012). Palinkas hypothesized that Tier 1 environmental effects and Tier 3 individual effects were mediated by Tier 2 community effects.

The literature on the psychological consequences of oil accidents has pertained to the inhabitants of developed nations, such as the United States. Although similarities exist in the emotional distress caused by oil accidents in different parts of the world, it is important to understand the mental health consequences in underdeveloped nations, such as Nigeria. For example, the psychological consequences from economic distress in a developed region would be different from those in an impoverished region. The mental health effects could be more contingent on the physical health consequences, as people in poor countries are more exposed to environmental pollution because of inadequate regulations and safeguards to protect them from exposure to harmful elements. Through this study, I sought to address this gap in the literature and to provide a foundation for

future research regarding the psychological effects of oil degradation in the Niger Delta region.

## The Role of Oil Companies

An important component of the discussion on oil-related health problems in the Niger Delta is the role that oil companies play. Several large, multinational oil companies operate in the region, including Shell, Total, Mobil, Chevron, Elf, and Agip. When evading responsibility for the oil pollution, oil companies often claim, "such spills are minor only, and that vandalism, theft, and sabotage by militants are the causes of most spills" (Jernelov, 2010, p. 359). These claims, however, are contested by human rights and environmental organizations. According to Jernelov (2010), "oil companies have enjoyed a cozy relationship with their partner, the Nigerian National Petroleum Company (NNPC) and with the Nigerian government, whose coffers they fill" (p. 359). The power that oil companies have in the Niger Delta has become the source of unrest at many levels.

### Oil Disputes

At the center of the disputes related to oil in the Niger Delta is the profound environmental and social devastation left in the wake of petroleum companies. The Niger Delta has been the site of significant conflict, traceable to a lack of development and governmental neglect (Ifedi & Anyu, 2011). Akpomuvie (2011) explained, "The Niger Delta has been described as a pathetic paradox; so rich and yet so poor; so endowed and yet so mismanaged; so much potential and yet so prodigal" (p. 203). The nation's democracy serves a self-seeking few, adding riches to the already wealthy and

taking resources from the citizens (Akpomuvie, 2011). Akpomuvie called the region a "predatory marvel" (p. 203), in which power is based on coercion and the maintenance of resource exploitation by the elite, through institutionalized practices that keep oil revenues controlled and turn a blind eye to blatant theft.

In addition, poverty, poor agricultural production, and major environmental pollution have resulted in severe social conflict. Although oil in the Niger Delta earns massive revenues, corrupt governments return little of that money to the region's inhabitants (Ifedi & Anyu, 2011). Growing dissent for the government's failure to address problems afflicting the region has resulted in organized, large-scale, armed conflicts. According to Udoh (2013), "The vast endowment of oil and gas companies in the Niger Delta has been a source of longstanding violent conflicts among oil-producing communities, multinational oil companies, and the national government" (p. 682). On the other hand, oil and gas companies have created posh living conditions for politicians and local elites (Hazen & Horner, 2007).

Instead of generating development for citizens, oil money has been a cause of widespread suffering and poverty, with most of the revenues mysteriously disappearing through corrupt schemes (Gilles, 2009). Despite enormous natural oil resources that place Nigeria as 13th in the world for crude oil production, more than 60% of its inhabitants live in poverty (Udoh, 2013). Some scholars blame this paradox of wealth and poverty on corruption, patterns of consumption, poor democratization, repression, and conflict (Udoh, 2013). McCaskill (2013) stated, "For Delta residents, the region's

vast oil reserves are a curse: black gold that has poisoned the earth, the water, the air, and the people" (p. 537).

The living conditions of the inhabitants of the oil-producing regions have resulted in social unrest. Politically powerless and experiencing no benefits from the oil production that has changed the environment, health, and livelihoods of the inhabitants, a sense of deprivation among the marginalized people of the Niger Delta has led many to take matters into their own hands. Groups devoted to sabotaging oil-extraction efforts move from village to village, hacksaws in tow, to loosen pipeline manifolds and release crude oil into farmlands, streams, swamps, and fishing grounds. These acts are often militant displays of defiance or grounds for demanding payment from oil companies. Akpomuvie (2011) documented the connections between these mobile sabotage squads, oil company officials, the Ministry of Petroleum Resources, and spill clean contractors, which resulted in agreements that benefit all parties, but at the expense of the broader population.

The center of the problems surrounding oil disputes lies in the country's system for allocating resources. Prior to the oil boom, and after Nigeria's independence, the country relied on cash crops—including groundnuts, cotton, cocoa, and palm oil—and allocations were made to each generating region. As oil began to dominate the economy, allocation distribution changed. Akpomuvie (2011) explained,

> as earnings of massive petroleum-dollars eclipsed earnings from agriculture, the ruling elite from three dominant groups (Hausa-Fulani, Yoruba and Ibo)

> connived, using levers of the federal political power to alter the formula to favor them and deny the indigenes of the Niger-Delta oil bearing communities. (p. 204)

The interests of the ruling class often conflict with those of the country's citizens (Akhakpe, 2012), and Nigeria's elite began to regularly exploit and steal oil revenues and crude oil, and sell them on the spot market. Akpomuvie (2011) described the tactics used by the powerful elite to maintain control of Nigeria's petroleum: (a) the employment of expatriates to steal petroleum from the region; (b) divide and rule tactics employed by oil companies to turn youth against elders and traditional leaders in the communities; (c) corruption of the Environmental Impact Assessment system by hiring "consultants" to turn in false reports to fulfill Federal Environmental Protection Agency requirements; and (d) the cover-up of crude oil theft by foreign nationals, government officials, and other elite.

## Protective Measures

According to Salu (1999) and Oshineye (2000), many laws are in place to guide oil operations, including regulations on pollution. These laws include (a) Endangered Species Act, (b) Federal Environmental Protection Agency Act, (c) Harmful Waste Act, (d) Mineral Oil Regulation, (e) International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, (f) African Convention on the Conservation of Nature and Natural Resources, (g) Petroleum Regulation, (h) Oil in Navigable Waters Act, (i) Oil Pipeline Act, and (j) Environmental Impact Assessment Decree No. 86. However, these laws were created in close collaboration with the Nigerian oil industry, so they are weak and are rarely applied. These two factors clearly

favor oil companies and fail to protect the environments of oil-producing communities (Edo, 2012). The lack of enforcement has resulted in the continuous degradation of the Niger Delta environment (Natufe, 2001). For example, gas flaring has been illegal in Nigerian since 1984; however, the practice continues in the 21st century (Edo, 2012).

Edo (2012) performed a critical assessment of Nigeria's oil laws and enforcement challenges. In the study, many important elements of the problem became apparent. One problem was the corruption of public officials charged with enforcement, which effectively stopped the enforcement of oil-related laws and diverted funds meant for environmental protection to less significant uses (Edo, 2012). Both of these problems were derived from the power shift that occurred when Nigeria's economy (Edo, 2012) gave way to dependence on petroleum. As Edo explained,

> For an industry that has been providing more than 90 percent of Nigeria total export earnings and more than 82 percent of recurrent revenue, with little or nothing coming from most of the other sectors, like the manufacturing and agricultural sectors, it becomes easy to understand how such an economy can have a decisive effect on environmental enforcement in the Niger Delta Region. (p. 271)

The alliance between the powerful elites and oil companies, combined with the nation's dependence on petroleum, has provided oil companies with unregulated power. Multinational oil corporations benefit significantly from doing business in underdeveloped countries, such as Nigeria, because of the lack of comprehensive regulatory systems. In countries that do have regulatory laws, few are actually enforced

(McCaskill, 2013). Developing states are favorable to big oil companies because the inhabitants tolerate dangerous business practices that keep costs low and investors happy (McCaskill, 2013). Edo (2012) outlined how difficult it is to regulate oil company activities in the first place, and how many of the commissions of inquiry were likely to fail from the beginning. Enforcing environmental regulation could hinder oil production and damage revenues flowing to the political and elite, and as long as Nigeria remains a monoproduct economy and does not pursue diversification, the status quo of environmental law enforcement will likely remain (Edo, 2012). Government officials should aim to enforce a diversification policy to expand the economy so that Nigeria is not so dependent on petroleum revenues.

## Social Consequences

Dissent has grown as the inhabitants of the Niger Delta witnessed the land heavily altered by oil companies to make the rich richer while they continue to live in poverty. Some of the indigenous peoples have become resolute in defending their basic human rights and protecting their environments, at times violently, resulting in significant social consequences. According to Odoemene (2011), such consequences include youth militancy, kidnappings, violence and suppression by the state, intercommunal conflicts, the breakdown of cultural values, increased poverty, and reinforced underdevelopment. After many years of peaceful protests, the struggle for justice has become violent, resulting in military actions by the state (Akhakpe, 2012).

Women's social development has also been affected, although it has gone virtually unnoticed. Odoemene (2011) suggested that the only way to salvage the current

situation in the Niger Delta is to put responsible, enforceable environmental mandates in place. The enforcement of environmental protection laws could "increase environmental social justice within and across societies" and "improve social infrastructures, build capacities, and satisfy basic human needs alongside furthering sustainable development" (Odoemene, 2011, p. 131).

## Conclusion

In this review, I provided a comprehensive analysis of the human health and environmental consequences of petroleum activities in the Niger Delta region of Nigeria. Previous researchers provided significant evidence of the health effects of environmental pollution on Delta region inhabitants; however, existing health research in the Niger Delta has some shortcomings: (a) studies on the long-term health consequences are limited; (b) related research focuses on the physical, rather than the mental or emotional health of inhabitants; and (c) the researchers disregarded the lived experiences and perspectives of the people living in the Niger Delta. Further, the explosion of the KS Endeavor received little attention from researchers, although the consequence of the resulting environmental damage to people living in the nearby village of Koluama may have been significant.

Although I did not address the small number of studies on long-term health consequences of exposure to oil-related pollution in this study, I explored inhabitants' perspectives on physical and mental health, related to oil pollution. Through this study, I addressed the gaps in the literature with a phenomenological investigation of the perceptions and experiences of the villagers of Koluama, related to physical and mental

health, as well as the role that they believe various stakeholders play in the oil-related environmental degradation. The following chapter contains an in-depth discussion of the study's methodology. A discussion of study results appears in Chapter 4, followed by a discussion of the research implications in Chapter 5.

# Chapter 3: Research Method

## Introduction

The objective of this research was to carry out a phenomenological study regarding the effects of oil exposure on human health through the perceptions of those who have first-hand experience of oil spillage in the Koluama Community of the Niger Delta Region of Nigeria. In this chapter, I describe the qualitative research paradigm and research design for this study, as well as discuss the rationale for choosing each research question in this context. In addition, this chapter presents the methodology for this study, including a description of the research population, the selection of participants, my role, and ethical issues. In this chapter, I aim to provide an explanation of the data collection tools, how data were collected and analyzed, and strategies to mitigate threats to the validity of the study.

## Research Design and Rationale

The following research questions guided this study.

**Research Question 1:** What are the perceptions and lived experiences of the villagers of Koluama regarding the effect of oil pollution on their physical health?

**Research Question 2:** What are the perceptions and lived experiences of the villagers of Koluama regarding the possible effects of oil pollution on their mental health?

The phenomenon that I studied was the perceptions of Koluama villagers concerning the effect of oil spills on their physical and mental health. The study gave people who have experienced this phenomenon a chance to express their feelings and

thoughts in their own words. The objective of the study was to explore the physical and mental health effects of oil spills at Koluama through the perceptions of those who are directly affected, and the effects of oil spills on their daily activities and lives.

This qualitative study followed a phenomenological design. According to Flood (2010), "phenomenology is a philosophic attitude and research approach. Its primary position is that the most basic human truths are accessible only through inner subjectivity, and that the person is integral to the environment" (p. 1). Phenomenology is a way of thinking about what life experiences are like for the people who experienced the event and participate in the study (Powers & Knapp, 1995). Phenomenology also involves the interpretation or the meaning of these experiences (Bergum, 1991).

The phenomenological approach was best suited for this study because of my interest to explore this subject through the perspectives of individuals who have direct experience with the phenomenon. In this way, I hoped to capture the themes that describe their experiences. The aim in phenomenological research is to produce a vivid description of an event as it is concretely lived. My goal for utilizing the qualitative phenomenological research was to describe a lived experience of the event from the perspectives of victims of the catastrophes relating to oil spills and the health consequences in Koluama. As Finlay (2002) stated, "phenomenological description must stick close to the experience and yet not limit itself to the experiential but restore to each experience the ontological cipher that marks it internally" (p. 1).

## Role of the Researcher

In qualitative research, the researcher is considered an instrument of data collection (Hoepfl, 1997). This means that data are mediated through a human instrument, rather than being collected through objective, detached methods. According to Rudestam and Newton (2007), the primary role of a researcher is to clarify or explain a specific position in relation to past research or theories. I was responsible for identifying and soliciting participants, distributing and collecting data, analyzing responses, and identifying trends. As a qualitative researcher, I focused on exploring, examining, and describing people's perspectives and their natural environments. I also gathered, sorted, categorized, analyzed, interpreted, and securely stored data. Also, as the interviewer, I was responsible for developing an open-ended, semistructured interview to ask in-depth questions to the participants. I took notes during the interviews and reminded the participants that breaks are allowed if they feel the need for one.

Personally, as a child I remember the beaches, the smell of the ocean, and going fishing with my friends. I have no memories of people becoming ill from the atmosphere. As a child, I loved this region, and as an adult this affection remains. This experience caused me to become interested in researching how the environment has been effected by the oil spills, how things have changed, and why things have changed. Being aware of these feelings and memories enabled me to consciously bracket these feelings to make a clear assessment of the current realities.

I have no professional relationship with the prospective participants. As such, no conflict of interest was expected to influence the study. Given that this study included a

marginalized group of citizens in Nigeria, potential existed for participants to feel pressure to participate in the study, as cultural norms dictate that in my role as the researcher, I hold a position of power. I took every precaution to ensure that all participants and families felt safe, comfortable, and understood that they have the freedom to withdraw from the study if they feel the need to do so.

Mahoney (1998) asserted that a researcher must be able to withhold personal opinions and perceptions while maintaining a good listening communication relationship with the participants. In phenomenological language, this may be accomplished through *bracketing*, or consciously and actively working to set aside prior experiential knowledge and personal bias so as not to influence the description of the given phenomenon (Tymieniecka, 2003). To accomplish bracketing, I described relevant aspects of self, including biases, assumptions, and previous experiences relevant to the topic of study (Creswell, 2009). I maintained a research journal explicating personal reactions and reflections, and recorded insights into self and past in a separate journal to document the bracketing process throughout the research.

## Methodology

### Participant Selection Logic

The target population for this research was citizens of the village of Koluama in the Niger Delta Region of the Bayelsa State of Nigeria. According to the most recent Nigerian Census conducted in 2006, Koluama has a projected population of approximately 5,000. I used a purposeful sampling approach to enable me to select participants who have prior experience regarding the phenomenon under study, and can

therefore provide rich information about it (Palinkas et al., 2013). According to Champion (2002), purposive sampling is used when "clear criteria for selecting the participants for the sample group to be studied" exist (p. 62).

I utilized the following inclusion criteria for my sample. The participants (a) were individuals who live in the Koluama Community of the Niger Delta Region of Nigeria, (b) were older than age 18, and (c) have lived at Koluama in the past 3 years or in the Niger Delta Region for the past 5 years, with at least one year at Koluama. Each individual was evaluated by me to determine his or her eligibility for the study. Because of the small sample size and sample selection process, generalization of the study was limited to the Koluama Community.

I anticipated that there would be 50–100 potential participants. I selected 15 participants from this group for the study sample. Eight men and seven women of varying ages and occupations were recruited to present an array of villager perspectives regarding health issues related to oil pollution. Small sample sizes are a norm in qualitative research. Such small-scale studies enable researchers to gain a deeper understanding of participant experience and to develop a thick, rich description of that experience (Creswell, 2009; Merriam, 2009). Because the emphasis is on quality rather than quantity, the objective in qualitative research is not to maximize the sample size, but to obtain sufficient data to achieve *saturation* (Padgett, 1998, p. 52). Saturation refers to the point at which no new themes result from the addition of more participants and all identified themes are fully explored within the collected data (Padgett, 1998). Guest, Bunce, and Johnson (2006) recommended the use of 15 participants in qualitative

interview-based research. In their examination of various qualitative studies, Guest et al. determined that the data generally reached saturation by the completion of the 12th interview. Based upon this suggestion, I believed that 15 was an appropriate sample size for the study.

I intended to recruit participants for the study through word of mouth and through the assistance of local government and health officials. I enlisted the aid of these individuals in distributing research flyers throughout the Koluama community. Appendix E includes a copy of the recruitment letter. Further sections of this paper define the procedures for contacting and recruiting participants, as well as procedures for conducting the research.

**Instrumentation**

Various means of collecting qualitative data exist. For this study, I utilized in-depth, semistructured interviews to collect data to explicate the topic of study. In-depth interviews are typically employed during phenomenological research as a method for exploring participants' descriptions of a phenomenon within a specific context (Lopez & Willis, 2004). Such phenomena can be complex and experienced differently by individual participants (Van Manen, 1990). In-depth interviews provide participants with the opportunity to describe phenomena through the lenses of their unique experiences and perspectives, which contributes to deeper, more meaningful data (Converse, 2012).

To conduct the interviews, I used two questionnaires—one for demographic questions (see Appendix B), and one based on the existing literature regarding perceptions of the effects of oil pollution on physical and mental health (see Appendix

C). The interview questions were to be tested through the pilot study. The interview questions were open-ended to encourage respondents to freely volunteer their views on questions, and the questions were also conversational so that the participants were relaxed throughout the interview process. I designed the questions to elicit information regarding opinions, feelings, meanings, and experiences of the participants, which are areas of interest to me. My goal was to explore the individuals' understanding of the physical and psychological effects of oil spillage and to determine if these occurrences have affected their personal lives.

**Procedures for Recruitment, Participation, and Data Collection**

I solicited participants for the study through word of mouth and through the assistance of the chief of the town and State Public Health Practitioners. I asked these individuals to assist with distributing recruitment flyers throughout the community to describe the study and invite interested individuals to contact me for more information. Once contacted by prospective participants, I confirmed, during a brief phone conversation, that the individuals met the inclusion criteria for the study. I sent the individuals informed consent forms (see Appendix D) via email or hand delivery service, as no regular mail delivery services are available, and asked that they sign and return the forms. I then scheduled an interview with each participant, and a private location for the interview was agreed upon by the participant and me.

Data collection consisted of 15 individual semistructured interviews, lasting approximately 60 minutes each in duration. The interviews were conducted face-to-face in a private location. To conduct the interviews, I used an interview protocol (see

Appendix B) with questions developed based on the existing literature regarding perceptions of the effects of oil pollution on physical and mental health. I provided sufficient space in each protocol for field notes after the interview. I audio recorded each interview, with the prior knowledge and agreement of the participant, to be transcribed after the interview. I clearly labeled each audio recording and field note with such information as date, location, time, interviewer, and the participant identifier code for interviewee identification. After the interview was complete, I thanked the participant for his or her time. I then answered any questions the participant had regarding the study. My contact information was provided to answer any future questions regarding the study. I also reminded participants that they would receive a transcript of their interview within 5 to 10 business days to review for accuracy (Mero-Jaffe, 2011).

If initial recruitment procedures resulted in too few participants for the study, I planned to utilize snowball sampling to recruit additional participants (Palinkas, 2012). In snowball sampling, existing participants are asked to recommend other individuals who may meet the eligibility criteria. In the study, I asked the participating Koluama residents to recommend other villagers who may be interested in participating in the study.

In addition, to add credibility to the study, I conducted a series of three focus groups with 4 to 6 participants. The focus group is a specific form of group interview that involves a researcher asking a set of questions that target the phenomenon under study. The goal of using a focus group is to gather collective views regarding a specific phenomenon (Fontana & Frey, 2005). An important part of the focus group is the

participants' interactions with each other (Wilkinson, 1998). In this study, I asked the participants a series of preset questions designed to generate conversation and discussion (see Appendix C). I did not use participants in the focus groups for any individual interviews. Participants in the focus groups received a small token, such as a pen, as a mark of appreciation for their willingness to share information.

**Data Analysis Plan**

The purpose of data analysis is to organize, provide structure to, and elicit meaning from the research data gathered (Polit & Beck, 2008). I conducted data analysis of the interviews, as recommended by Polit and Haunglar (1999). I analyzed the data using IPA, as described by Fade (2014). In IPA, phenomenological data is analyzed to discern themes, which describe the phenomenon of study as it is experienced and interpreted by participants.

Throughout the data collection and analysis, I remained mindful to bracket and document any preconceived ideas to allow the data to produce unbiased themes. I read and reread the interview transcripts to obtain an intuitive, holistic grasp of the content. I then loaded the documents into NVivo 10 to aid with data organization and analysis. Using NVivo, I assigned descriptive codes to salient words, phrases, and concepts within the transcripts. During this process, I identified and coded fundamental concepts and emerging issues. The codes coalesced to form themes and subthemes that explicate the participants' experiences regarding their health and oil-related environmental pollution. I combined the initial codes into categories and created a node with a descriptive name. Through further analysis, I combined the categories into themes. The category nodes

became subnodes. I assigned the theme node a title that captured the essence of the experiences located in that node.

Rather than waiting until the end of data collection to begin the analysis, coding and data collection progressed simultaneously. Carrying out analysis at the same time that the data collection occurred made it possible for me to identify areas in need of further exploration, and to determine when saturation was achieved. To achieve complete data saturation, thorough reading and coding is necessary to ensure all reoccurring information and variations are identified and no new themes can be found (Holloway & Wheeler, 2002; Polit & Beck, 2008).

## Issues of Trustworthiness

Qualitative researchers measure the rigor of a study by different standards than quantitative researchers do (Petty, Thomson, & Stew, 2012). Quantitative studies are assessed in terms of their validity and reliability. In qualitative research, however, the rigor of a study is assessed in terms of credibility, transferability, dependability, and confirmability.

### Credibility

Credibility refers to the truthfulness and value of the research findings (Houghton, Casey, Shaw, & Murphy, 2013). The primary method for demonstrating the credibility of the study is triangulation (Lietz & Zayas, 2010). Triangulation involves the cross-checking of information from different dimensions. Lietz and Zayas (2010) noted that data triangulation is when a researcher refers to different sources of data to explore a particular phenomenon. The various sources are examined comparatively to arrive at a

convergence of experience, perspective, or interpretation (Lietz & Zayas, 2010). By finding commonalities among the insights offered by participants with a variety of perspectives and unique experiences, I made a powerful argument that the interpretation was more credible.

Member checking also contributes to credibility (Hanson, Balmer, & Giardino, 2011). To conduct member checking via transcript review, I returned the interview transcripts to the individuals who were interviewed to verify that the interview transcript accurately represented what they said during the interview (Mero-Jaffe, 2011). In the study, I sent participants a copy of their transcript to review for accuracy prior to the initiation of data analysis. This process of verification improves the credibility of the research.

The final strategy by which I enhanced the credibility of the study was through the achievement of saturation (Lietz & Zayas, 2010). Saturation refers to the point at which no new themes result from the addition of more participants, and all identified themes are fully explored within the collected data (Lietz & Zayas, 2010). By demonstrating that each of the identified themes was fully supported by the data, I was able to confidently argue that the themes were valid components of the essence of the phenomenon, as suggested by Houghton et al., 2013.

**Transferability**

Transferability refers to whether the findings of a study can be generalized to another setting or context (Houghton et al., 2013). Benz and Newman (1998) maintained that generalizability is not consistent with the qualitative paradigm or perspective, and

should not be a researcher's goal. Rather, the objective should be for the researcher to describe the population, setting, and results in as much detail as possible (Benz & Newman, 1998). This process enables other individuals to make their own determinations concerning the ability of the results to be applied to other settings (Hanson et al., 2011). To enable the reader to make estimations of the study's transferability, researchers include *thick description* (Petty et al., 2012). Thick description refers to vivid and highly detailed descriptions of the participants' accounts and the context surrounding their perspectives (Petty et al., 2012). This level of description allows the reader to conclude the extent to which broader generalizations can be made (Petty et al., 2012). I kept detailed field notes and clearly described all processes and procedures to provide enough information so that another researcher could clearly trace each step of the process and would be able to replicate the study (Lincoln & Guba, 1985). In addition, I also used a variety of questions and probes to elicit detail from the participants to ensure that the data received was thick and rich.

**Dependability**

According to Houghton, Casey, Shaw, and Murphy (2013), dependability addresses the question: How reliable are the results of this study across time? It is difficult to replicate results in qualitative research, as research findings are be context-dependent. However, the relative dependability of a study can be improved through various strategies. The primary method I used to enhance dependability in the study was through the creation of an audit trail (Petty et al., 2012). Audit trails are detailed accounts of the methodological procedures and decisions involved in carrying out a study

and analyzing the results. In the study, I described the methods by which I collected the data, and the process by which the research findings were determined.

### Confirmability

Confirmability refers to the extent to which research findings represent the true opinions of the participants, and not those of the individuals conducting the research study (Petty et al., 2012). High confirmability indicates that the research findings are valid, and researcher bias has not significantly influenced the results of the study. Confirmability can be enhanced through the concept of reflexivity (Houghton et al., 2013). Reflexivity refers to the adoption of an attitude of continual self-reflection and monitoring of one's own personal biases. A researcher can accomplish reflexivity through bracketing, which involves consciously and actively working to set aside prior experiential knowledge and personal bias so as not to influence the description of phenomenon at hand (Tymieniecka, 2003). I maintained a research journal to document the bracketing process throughout the research.

## Ethical Procedures

Prior to beginning data collection, I obtained approval from the Institutional Review Board (IRB) to conduct the study (Jacob & Furgerson, 2012). I treated all of the participants in accordance with the ethical guidelines of the American Psychological Association and Walden University's IRB. As I did not use organizations in the sampling frame for this study, no organizational permissions were required for recruitment.

The research presented minimal risk to participants and I ensured that the participants fully understood the nature of the study and that participation was voluntary (Qu & Dumay, 2011). I made known to the participants that their confidentiality was maintained at all times, during and after the study. I took every precaution to ensure that the participants felt safe, comfortable, and understood that they had the right to withdraw from the study at any time, and for any reason (Turner, 2010).

I strove for honesty in all communications (Tufford & Newman, 2010). A variety of strategies assisted with mitigating bias in the research process during data collection, analysis, and interpretation (Chenail, 2011). I avoided discrimination against any participant on the basis of sex, race, ethnicity, or other factors not related to the inclusion criteria. I obtained informed consent from all participants to ensure that participation was voluntary and that participants felt free from coercion or pressure. As the study was voluntary in nature, participants could elect to decline participation or to withdraw from the study at any time (Qu & Dumay, 2011). I explained withdrawal procedures to the participants verbally and through the informed consent form (see Appendix D). If participant drop-out resulted in too few participants for the study, I planned to repeat recruitment procedures to solicit more participants.

I treated all collected data confidentially (van Wijk & Harrison, 2013). To protect the confidentiality of participants, I met with them privately to conduct the interviews and assigned the participants an alphanumeric identifier at that time (Mero-Jaffe, 2011). I used this identifier throughout data collection and in the presentation of the results. I stored data, and other study-related materials, in a locked filing cabinet in my residence

and on my password-protected computer. The data are only accessible by me, and will be stored securely for a period of 5 years following the completion of the study. After this period has passed, I will destroy the data through commercial shredding.

## Summary

In this chapter, I described the purpose of this study and the phenomenological design. Using in-depth, semistructured interviews, I collected the data needed to address the research questions. Participants in the study included 12 adult male and female residents of Koluama. Through IPA, I analyzed the interview responses to illuminate the participants' beliefs and experiences regarding the effect of oil spills on their physical and mental health, thereby highlighting the essence of the phenomenon. In the next chapter, I describe the results of the pilot study and discuss these results in light of the literature in Chapter 5.

# Chapter 4: Results

The purpose of this qualitative investigation was to explore the perceptions and lived experiences of villagers residing in the village of Koluama regarding the physical and mental health consequences of oil-related environmental pollution. Through this research, I addressed a significant gap in the existing literature, drew attention to a pressing human health issue, and provided a foundation for future studies regarding the health implications of oil pollution among inhabitants of the Niger Delta region.

## Setting

The interviews and focus groups were held in the town of Koluama, in the country of Nigeria. All individual interviews occurred in the participants' homes. Focus Groups one and two were conducted at the Community Town Hall and Group 3 met at the town pier. The third focus group was held at an alternate location because it occurred in the evening and the Community Center was not available. All interviews were in a comfortable, familiar setting, in order to conduct the study in the respondent's real life environment.

This research study occurred in an area of Nigeria that has been affected by multiple oil spills over the last 20 years. It was again affected by an oil spill that arose after an explosion at the Funiwa field five nautical miles from Koluama on January 16, 2012 four years before I conducted my research. Prior to this explosion, Koluama was a thriving fishing community. The effects of the oil explosion and subsequent oil spills brought many hardships to the people of Koluama, along with both physical and mental illness. Participant 2 stated "the oil spill affected us, we are fishermen and when it

occurred it affected the river and we couldn't go fishing. The well water became contaminated, people had stroke, hypertension and diarrhea," I conducted my research in order to assess the perceptions of the local population on the physical ailments and mental illnesses that arose in the aftermath of the oil explosion and oil spill

**Demographic Data**

Two sub-samples were obtained for use in the study. Initially contacted individuals consisted of 100 Koluama community residents. A screening questionnaire for this study was randomly distributed to the 50 persons at the Koluama town hall, and living in the Niger Delta region of Nigeria. Due to logistical constraints in the Niger Delta and the militant activities occurring in the region, I faced issues with getting in contact and confirming interview times and dates. The lack of electricity and the need to have armed guards escort me to and from each participant's home left time management out of my hands and reliant on other's availability. Outside of these, the very real and present threat of physical danger severely affected the data collection process. As a result of these unforeseen circumstances and constraints, the final pool for selection of the sample consisted of 33 residents. Out of these 33 Koluama community residents, 15 were randomly selected for the individual interviews based on inclusion criteria and willingness to participate.

Of the fifteen who participated in the individual interview portion of the study, 40% had completed a university bachelor's degree, 40% had a secondary school education, and 20% did not complete their elementary school education. Males represented 53% of the sample, whereas women represented 47% of the sample. The age

distribution was 46-60 years (40%), 18-30 (40%), 31-45 (13%) and over 60 years (7%). Roughly 40% of this sample had had a Secondary School education, and 20% had never had any formal education. Almost all considered themselves to be either unemployed or in the fishing industry. Table 3 includes information for the sample of individual interviewees.

Table 3

*Demographic Information for Individual Interviews*

| Demographic | *n* | % |
|---|---|---|
| Gender | | |
| Male | 8 | 53 |
| Female | 7 | 47 |
| Age | | |
| 18–30 | 6 | 40 |
| 31–45 | 2 | 13 |
| 46–60 | 6 | 40 |
| 61–90 | 1 | 7 |
| Educational level | | |
| Elementary school | 3 | 20 |
| College | 6 | 40 |
| Secondary education | 6 | 40 |
| Occupation | | |
| Fishing | 12 | 80 |
| Student | 1 | 6.6 |
| Self-employed | 1 | 6.6 |
| Unemployed | 1 | 6.6 |

*Note.* Due to rounding error some percentages may not sum to 100%.

After the 15 in-depth semi-structured interviews, I moved forward to recruiting participants for three focus groups. Each focus group consisted of six individuals who met the criteria for the focus group i.e. each participant of the focus group must have

been living at Koluama for five years and had at least a secondary school level education. Next, three groups of six interviewees each were gathered for a series of focus groups. Prior to conducting the focus groups, demographic features were examined individually for each focus group. Focus Group 1 consisted of equal numbers of interviewees age 18-30 (50%) and 31-45 (50%). In this group, four (67%) participants earned College Degrees, while 2 (33%) had earned a secondary education. Half of this group were fishermen (50%), and others were either self-employed (17%), worked in the private sector (17%), or were unemployed (17%).

Focus group 2 consisted of a larger proportion of participants in the age group 18-30 (83%). Two in this focus group had a college education (33%), while the remaining four had secondary school education (67%). Similar to focus group 1, this group consisted of three (50%) fishermen, and assorted other occupations such as private sector (17%) or civil service (17%). One of the participants in this group was self-employed (17%).

In focus group 3, a majority were in the age group of 18-30 (83%), with only 17% from the 31-45 year old age group. Similar to focus group 1, this group consisted of four with a college education (67%), and two with a secondary school education (33%). In this focus group, the most common occupation was student (67%), with one fisherman (17%) and one who was self-employed (17%). Demographic information for all three focus groups can be found in Table 4.

Table 4

*Demographic Information for Focus Groups 1 through 3*

| Demographic | Group 1 | | Group 2 | | Group 3 | |
|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *N* | % |
| Age | | | | | | |
| 18–30 | 3 | 50 | 5 | 83 | 5 | 83 |
| 31–45 | 3 | 50 | 1 | 17 | 1 | 17 |
| Educational level | | | | | | |
| Elementary school | 0 | - | 0 | - | 0 | - |
| College | 4 | 67 | 2 | 33 | 4 | 67 |
| Secondary school | 2 | 33 | 4 | 67 | 2 | 33 |
| Occupation | | | | | | |
| Fishing | 3 | 50 | 3 | 50 | 1 | 17 |
| Student | 0 | - | 0 | - | 4 | 67 |
| Self-employed | 1 | 17 | 1 | 17 | 1 | 17 |
| Private sector | 1 | 17 | 1 | 17 | 0 | - |
| Civil service | 0 | - | 1 | 17 | 0 | - |
| Unemployed | 1 | 17 | 0 | - | 0 | - |

*Note.* Due to rounding error some percentages may not sum to 100%.

## Data Collection

Data collection was specifically aimed at the residents of Koluama in Bayelsa State of Nigeria. The data was collected using 15 individual one-on-one interviews and three focus groups.

Travel to the research site was long and arduous. The only way to access the site was through a long and difficult boat ride from Yenagoa (the capitol of Bayelsa State) to Koluama. Travel via boat was the only method to use to access the site. Because I was regarded as an outsider, my transport fare to Koluama was 300% more than the normal fare of 3,500 Naira (Nigeria Monetary System). As of July 26th, 2016 the 3,500 naira

translates to about $11.21 in US dollars. While this is not an extraordinary cost in comparison to prices within the United States, this clued the qualitative researcher to take notice how her presence as an outsider translated into her being targeted as a source of profit compared to the lay person. On the way, I was able to note some of the effects of the oil spill on the environment during my three and half hour trip to Koluama; these included dead mangrove trees, some farmland covered by crude oil patches, and the eroding coastline. All these observations were recorded in the form of photos (see Appendix K).

Participant selection was specifically aimed at the residents of Koluama in Bayelsa State of Nigeria. As an outsider the qualitative researcher relied on recruiting by word of mouth or through the help of the local Chief, who helped assemble citizens at the local Town Hall. The qualitative researcher, as an outsider, used the following steps in order to recruit potential participants with the help of the local Chief:

1) An initial meeting at the town center, where the local Chief informed the residential population about my arrival and informed them of the pending study.

2) After the initial introduction to the Koluama community I held a town meeting. It was during this town meeting that I explained the purpose of the project to 100 people and asked the community for their assistance to complete the project.

3) Afterwards I did an initial screening for any interested participants. At this time, I answered questions, administered a paper questionnaire to gather demographic information, and explained the informed consent forms. During this time, I explained how their rights would be maintained and preserved throughout

the data collection process through confidentiality. Once this had been explained, and any questions that arose were answered, I asked that each participant sign their name once they had a clear understanding of the research study.

4) After reviewing the contents of the demographic questionnaire, I followed up with each participant by scheduling a meeting with them to conduct the one-to-one interview. This process occurred for each of the 15 participants for the one-to-one in-depth interviews. In order to conduct the focus group interviews, I followed the same process to establish a date and time that worked for all participants.

5) I met with the participants and conducted the one-on-one interviews. I then met with the members of each focus group and conducted the focus group interview. At the end of the both interviews, one-to-one interviews and focus group interviews, participants were given $5.00 USD in recognition for their participation. As of July 26th, 2016 this translates to approximately 1560 Nigeria Naira.

A semi-structured interview format was the data collection method employed to gather data from the one-on-one and focus group interviews for this study. Semi-structured interviews were used to gain in-depth knowledge from the respondents about their perceptions and lived experiences regarding the effect of oil pollution on their physical health and the effect of oil pollution on their mental health. The interviews occurred in a private location that was established by the participant and, with the participant's permission, were audio recorded. At the beginning of the interview, I re-

explained the purpose of the study to the participant and allowed time for questions. Participants were assured that data would not be linked with any identifiers. Participants were only identified through the use of an alphanumeric identifier. The informed consent was signed with their name, however this information was kept under lock and key separately from the remainder of the study information and data. Once all questions had been asked the interviews commenced.

Due to the remoteness of the study site, it had not been possible to test the interview questions. Thus it was that, during the data collection, some of the participants had difficulty answering questions on the effects of the oil spill on their physical and mental wellbeing. In order to gather rich and thick data, I was required to reword the questions and to spend up to thirty additional minutes per interview. Once the interview questions were reworded so that the participants understood the meaning of the questions, all participants were eager to share their experiences and perceptions.

## Data Analysis

Once the interviews were transcribed the data analysis process began. This process began with listening to the audio recordings, then reading and rereading the transcripts to gain an understanding of what was said during the interviews. This was also done to ensure that the transcripts were correct and verify that the integrity of the interviews were maintained. During this process notes were taken about any common words or phrases used as well as patterns that were found in the data. This process of familiarization is an important initial step of the data analysis process. In becoming familiar with the data, the qualitative researcher immerses herself into the data in order to

fully explore the topics that are discussed, which will lend itself to answering the research questions.

Once this was completed, the transcripts were uploaded into Nvivo 11 to aid with the organization and management of the assorted data. Nvivo 11 is a computer-assisted qualitative data analysis software, CAQDAS, that enables the qualitative researcher to organize and manage the resulting data. While the software enables the qualitative researcher to have ease of moving through the data and organizing the data in a coherent way, the qualitative researcher is the primary instrument behind the analysis. The two sets of data were uploaded, the one-on-one interviews and the focus group interviews. Separate files were created for the two data sets. The data were coded and thematized separately, then the results of each data set were explored to identify commonalities, differences, and relationships.

As aforementioned, the transcripts were read and reread to enable me to become familiar with the contents of each interview. During this process, I carefully noted the occurrence of patterns, reoccurring terms, and shared ideas. Once this stage was completed, the coding process began. The transcripts were broken down into individual units of meaning. A unit of meaning could be a word, phrase, or paragraph. Each unit of meaning was assigned a code that described the contents. Codes were assigned based on the meaning of the selected excerpt. A code could describe an action, emotion, or thought. At the end of the process, the words were reduced to their essential meanings, which became the subordinate themes- also known as categories.

During this process, 149 units of meaning were sorted into the 30 codes for the one-on-one interviews, as shown in Table 5. Sixty units of meaning were sorted into the 25 codes for the focus groups, as shown in Table 6.

Table 5 *Effects of Oil Spills:*

*Codes for One-On-One Interviews*

| | |
|---|---|
| Clean up after spill | Houses damaged |
| No income | Death |
| Fish | Cholera |
| Fishing | High blood pressure |
| Food | Gas fumes |
| Effect of oil spill | No potable water |
| Time | Skin infection |
| Cause of oil spill | No treatment |
| Physical effects | Little aid |
| Emotional effects | Fear |
| Illness/disease | Panic attack |
| Hospital | |
| No doctors | |
| No help from government | |
| Worry | |
| Children | |
| Money | |
| Earthquake | |
| Shake | |

Table 6 *Health and Environmental Alliance:*

*Codes for Focus Groups*

| | |
|---|---|
| Abandoned by government | Houses fall |
| Cause illnesses | Locations affected |
| Children ill | Lost jobs |
| Community suffered | Mental health issues |
| Community upset | Needs clean up |
| Contaminated Wells | No local hospital |
| Date of spill | No medical care |
| Eat polluted fish | People died |

| | |
|---|---|
| Emotions | River damage |
| Environmental impact | Spills |
| Explosions | Travel for care |
| Fishes contaminated | We need help |

Once coding was completed and reviewed for accuracy, the researcher assigned the codes into subordinate themes, also known as categorical representations of the codes. These categories were compiled to generate the superordinate themes, simply called themes. The resulting themes provide the answers to the research questions, which will be further expanded in order to provide a comprehensive and thorough answer. Themes that were applicable to the research questions were separated from topics that were not applicable to the research questions, as shown in Table 7.

Table 7

*One-on-One Interview Theme Topics, Used and Discarded*

| *Theme topics used* | *Theme topics discarded* |
|---|---|
| Physical Effects of the oil spill on the people of Koluama | Time and cause of oil spill |
| Psychological Effects as a result of dealing with the aftermath of the oil spills on the people of Koluama | Job and job status |
| Healthcare | Effected areas |
| Hospitals | Economic effect |
| Effect on children | Oil spill clean up |
| | Environmental effects |

The above process was replicated when working with the focus group interviews, whereby the qualitative researcher familiarizes herself with the resulting data. During this familiarization process, the qualitative researcher noted reoccurring topics, shared

ideas, and similar feelings. Once the data was uploaded to Nvivo 11 the qualitative researcher began coding the resulting data by incorporating the previous notes to the coding process. By breaking the interviews into units of meaning, codes, the qualitative researcher was able to explore the casual relationships that existed between and among those codes. This formed the basis for assigning subordinate themes, also known as categories, to codes that shared features, whether it be description of eye problems or the impact the oil explosion had on the fishing industry. These categories were further examined in order to assess the thematic relationships between them. I compiled the superordinate themes on the basis of what allows the qualitative researcher to answer the research questions in the most comprehensive and effective way. In doing so, there were outlier themes that were not applicable to answer the research questions. These were discarded, which left the qualitative researcher with the appropriate data to answer the research questions. Table 8 outlines which themes were discarded and which themes were used to answer the research questions.

Table 8

*Focus Group Theme topics, Used and Discarded*

| *Theme topics used* | *Theme topics discarded* |
|---|---|
| Psychological Effects as a result of dealing with the aftermath of the oil spills on the people of Koluama<br>Physical Effects of the oil spill on the people of Koluama | Economic effects<br>Environmental Effects<br>Oil Spill |

Once further reduction was not possible, the theme topics were examined and specific themes identified. A total of 2 superordinate themes and 6 subordinate were created. The newly created themes were used to provide answers to the research questions. Table 9 displays these superordinate themes and the subordinate themes that make up each superordinate theme.

Table 9

*Superordinate Themes and Subordinate Themes*

| *Superordinate themes* | *Subordinate themes* |
|---|---|
| Psychological effects as a result of dealing with the aftermath of oil spills on population | Feelings of Worry/Anxiety<br>Feelings of Fear/Depression |
| Physical effects of the oil spill on population | People suffered from illness<br>Children's health declined<br>Mortality<br>Lack of care available after the oil spill |

## Issues of Trustworthiness

In qualitative research, the term *trustworthiness* is employed to describe the quantitative terms of validity and reliability (Babbie, 2012; Marshall & Rossman, 2010; Maxwell, 2012). Trustworthiness is established through four separate aspects, credibility, transferability, dependability, and confirmability. The higher the level of trustworthiness, the more likely that the results of a study are an accurate representation of the findings (Robson, 2011). Following is a brief overview of the techniques used to establish the techniques that address the issues of trustworthiness.

**Credibility**

In this study, transcript review, multiple data sources and saturation were used to assess and prove credibility in this study. All audio recordings and transcripts were compared to ensure accuracy of the transcription of the responses to the transcripts. Once this step was completed, participants were asked to review their interview transcripts to insure the accuracy of the transcription. Based on feedback from the participants, no transcripts required editing. During the study design, I chose to use two methods of information gathering to be able to contrast, compare, and use the data to build a robust picture of the phenomenon under study. As Guest, Bunce and Johnson (2006) have stated, once three consecutive interviews reveal no novel information, saturation is considered to be achieved. In this study, fifteen interviews and 3 focus groups were conducted and saturation was achieved after the completion of analysis of interview 6.

**Transferability**

When examining the results of a qualitative research study, transferability is determined by the reader. It is up to the reader to determine if the results of the study could be applied to the population he or she is considering. In order to enhance the transferability of the results of this study, I gathered demographic information, used careful interviews to insure that the responses from the participants were thick and rich in detail and content, and was careful to include high levels of detail about my processes during data analysis.

**Dependability and Confirmability**

To check for confirmability and dependability in this qualitative study, a thorough and descriptive audit trail was created. This would provide future readers, who might be interested in the results, a method to assess the quality of the study and assess the decisions made while it was being conducted. This information is recorded in this chapter, as well as, detailed in my field notes.

## Results

The two research questions guiding this study were:

RQ1 What are the perceptions and lived experiences of the villagers of Koluama regarding the effect of oil pollution on their physical health?

RQ2. What are the perceptions and lived experiences of the villagers of Koluama regarding the possible effects of oil pollution on their mental health?

In response to these questions, the data revealed two superordinate themes, *Physical Effects of the oil spills on local population (Physical Effects)* and *Psychological Effects (Psychological Effects) as a result of dealing with the aftermath of the oil Spills on local community.* The theme *Physical Effects of the oil spills on local population* was made up of 4 subordinate themes: (a) *People suffered from illnesses,* (b) *Children's Health Declined*, (c)*Mortality in the local community,* and (d) *Lack of Care Available to the local population after the oil spill*. The superordinate theme of *Psychological Effects as a result of dealing with the aftermath of the oil spills in local population* was made up of 2 subordinate themes: *Feelings of worry and anxiety* and *Feelings of fear and depression*. The qualitative researcher did not employ the use of descriptive analysis,

which would require that themes provide a description of the categories that make them up. Instead I utilized the interpretative phenomenological analysis (IPA) procedures, which entails breaking down codes into categories, also known as subordinate themes. These categories are further broken down into the basic themes of the categories, which in this case were *Physical Effects of the oil spill on the people of Koluama* and *Psychological Effects as a result of dealing with the aftermath of the oil spills on the people of Koluama.* Each of these resulting superordinate themes use the exact language that the research questions employ. This is to ensure that following analysis is directly applicable to answering those research questions. Superordinate themes are compositions of subordinate themes, which were compiled from the resulting codes.

**Physical Effects of the Oil Spill on the Local Population**

The superordinate theme of *Physical Effects of the oil spill on the local population* was used to describe the physical consequences of the oil spill on the respondents and their families. All fifteen of the participants had data that were used to construct the theme. Also included in this theme were the challenges and experiences associated with participant's attempts to access and receive medical care in the aftermath of the January 16th, 2012 oil spill. The theme was made up of 4 subordinate themes. Figure 1 is a visual representation of the superordinate and subordinate themes.

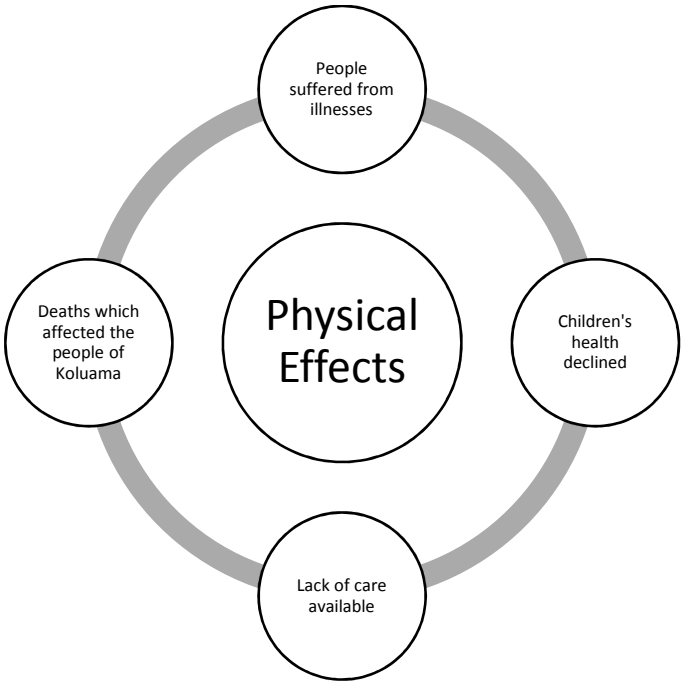


*Figure 1.* Physical effects of the oil spill on the people of Koluama (physical effects).

The theme of *Physical effects of the oil spill on the local neighborhood* describes the effect of the January 2012 oil spill on the physical health of the participants. The participants described a wide range of health issues that began at the time of the spill and continued on to the present. They also spoke about the health of their families and children. Many of them had difficulties in accessing basic health care. Overall, these participants spoke about the difficulties they endured and their feelings of abandonment. They believed that they had been forgotten and that no one in the government or the oil companied cared about what would happen to them. Participant 2 spoke about the immediate aftermath of the spill and said, "Those affected were taken to hospital by good Samaritans…and not the oil companies or government." One of the focus group participants supported this statement and reported, "we treated ourselves from our pocket

because the government did not take care of our health needs, we paid from our pocket." The participants had to fend for themselves and find methods to cope with the physical results of the January 2012 oil spill.

The four subordinate themes that made up the super ordinate theme focused on different aspects of the experiences. The themes were: (a) *People suffered from illnesses,* (b) *Children's Health Declined*, (c) *Deaths which effected the local population,* and (d) *Lack of Care Available to the local population after the oil spill*.

**Subordinate Theme 1: People suffered from illnesses.** This subordinate theme was comprised of data from 2 of the focus groups and all fifteen of the participants. The participants reported that they, their families, and their friends suffered from a host of medical issues in the aftermath of the January 2012 oil spill. The health issues were immediate and long term. Participant 4 spoke about the immediate aftermath of the spill and said, "almost everybody became sick." Participant 2 agreed and went into specifics and stated, "Yes, people were becoming sick after drinking the water and from breathing the polluted [air] from the oil spill." He continued on and said, "the smell of the gas gave us so many sicknesses. Some people fainted, even myself I had a cough because through inhalation and mouth contact as the doctors told me. It affected my chest a lot." Participant 3 also spoke about air and said, "There was this smell, it affected many people." Participant 14 also shared this experience and said, "when we breathe our chest will pain." The respiratory issues seemed to be severe and universal. The participants indicated that difficulty breathing was accompanied by coughing, tightness in the chest and dry throat.

Ten of the participants indicated that they or a family member had difficulty with their blood pressure. Participant 15 stated, "that [the oil spill] was the origin of my mother's blood pressure." Participant 3 observed this as well and said, "some people have high blood pressure." Participant 8, who was one of the only participants who received medical treatment from the physicians who responded to the January 2012 oil spill, reported, "they tested me and said that I have…high blood pressure." This issue seemed to effect a majority of the individuals who were exposed to the oil spill that occurred in January 2012.

Other health issues mentioned during the interviews included diseases such as cholera, stomach issues which included bloating and diarrhea, as well as, catarrh and stroke. The reported physical illness experienced by the participants were connected to the vascular, digestive, epidermal, or respiratory systems. Many of the digestive issues were attributed to the lack of potable water and the lack of untainted fish. In the immediate aftermath of the spill Participants 6 said, "the fishes in the river died, we saw them floating in the river." Participant 3 spoke about the fish and said, "Now, I go fishing, sometimes I can catch fish…the fish still smells of gas." Although consuming the fish has caused illnesses, the participants reported that they still ate the fish as it was often the only source of food they could access. A member of Focus Group 3 said, "When we drink this water, too we have cholera." For the people of Koluama, when faced with starvation or eating contaminated fish, the villagers chose to eat the fish in order to survive.

Seven of the participants and two of the focus groups mentioned that the January 2012 oil spill had contaminated the potable water supply for the area. Participant 7 described this event and said, "the explosion caused the community houses and land to crack and now water from the sea flows into the community directly". In Focus Group 1, a respondent stated, "we see diverse types of sicknesses because of the contaminated well water we have and drink, [as well as the] polluted atmosphere and river.... When we drink water, we fall sick." As little aid, and no other sources of potable water were available, the participants had little choice but to use the contaminated water. The most commonly mentioned disease, associated with the contaminated wells was cholera, with 7 participants and members of Focus Group 1, discussing the subject.

All of the participants and the focus groups indicated that the long term effect of the January 2012 oil spill on their physical wellbeing was significant. They faced a variety of health issues that they traced directly to the January 2012 oil spill and its aftermath. A member of Focus Group 3 stated, "you will see people with things like measles, chicken pox, eye itching, chronic cough, asthma, and chest pain because of the air that touches their body or the one they breathe." Most of the participants noted that even in the present, four years after the January 2012 Chevron oil spill, significant health effects continued to occur. The Koluama region of Nigeria has experienced multiple oil spills, dating back several decades. Currently the most recent oil spill occurred in January of 2012.

**Subordinate Theme 2: Children's health declined.** The participants spoke at length about effect of the January 2012 oil spill on the health of the children who resided

in Koluama. Five of the participants and 2 of the 3 focus groups spoke about the area of children's health declining in relation to the oil spill. When speaking about the January 2012 oil spill, in Focus Group 1, a participant said, "Our children fell sick as a result of consumption of the contaminated water and fishes." The participant noted that the damage to the surrounding area was great and because of this, the parents who had lost their livelihood (as the majority of the population had relied on fishing to support their families) had no choice but to use the available water and fish, in spite of the contamination associated with those resources. Another focus group member went into great detail about this and stated:

> A great percentage of the sickness experienced by our children today is as a result of the oil spill. We were not used to sickness but because of the hunger we still eat the polluted fish from the river and our children become asthmatic. Some have skin and respiratory diseases, eye problem[s], diarrhea and others. This oil spill contribute[d] to serious health issues that were previously not common amongst us.

He indicated that the health issues faced by the children and the surrounding community were uncommon. Previously the community had been healthy and did not face some of the complications that they wrestle with at the present. The children suffer some long term effects such as asthma and other respiratory diseases.

The members of Focus Group 1 spoke about this topic at great length. One of the members spoke about the severity of the situation and said, "seeing our children die" was something they had to face on a regular basis. This is compounded by the lack of

monetary compensation from Chevron for the long term effects that impact both individuals and the community at large. One focus group participant stated that the "lack of money to pay for treatment of illnesses caused by the spills causes mental shock" (Focus Group 1 Participant). The long term *Psychological Effects as a result of dealing with the aftermath of the oil spills on the people of Koluama* will proceed the analysis of *Physical Effects of the oil spill on the people of Koluama* theme, however there is an explicit connection between the physical effects and the mental effects that this oil spill has had on the People of Koluama.

The fact that parents observe their children becoming ill and dying was echoed by a member of Focus Group 2 who said, "our children died from various illnesses." The community lacked the resources necessary to provide interventions or pay for health care interventions that were necessary for these children because of the oil spill.

The other impact on children's physical health was due to simple lack of uncontaminated food and water. Children require adequate nourishment to thrive. The oil spill had already effected family's ability to support themselves and subsequently provide for their children. Many households lacked the basic funds necessary to provide food. Before the oil spill, the majority of the population were fishermen, who relied on the sea for income and food. The oil spill destroyed the local economy, which has still not recovered. The surrounding land and water are still contaminated, making it hazardous to imbibe the water or food. Participant 7 spoke about his family and said, "life is very hard now. I think always on how I am going to take care of my children." Participant 3 spoke about his present circumstances and said, "I don't have other means of feeding my children."

For the people of Koluama, the oil spill has affected their lives in many ways. They worry about their children and their children's health, but do not see how things will change.

**Subordinate Theme 3: Mortality in the local population.** As has been recorded previously, the oil spill caused some deaths. Although some people died immediately after the spill, many others developed medical conditions that shortened their lives. Six of the participants for the one-to-one interviews and 2 of the focus groups spoke about death. In particular a participant's response during the Focus Group 2 stands out discussing how the oil spill has effected the community's hierarchy and individual households. He or she states:

> [There have been] a lot of epidemics such as increased death rate and no old people as it used to be, no good water, the bad air has led to a lot of hypertension, cancer, asthma, lung cancer, diarrhea, cholera, [and] early deaths.

Due to the fact that the Focus Group transcripts do not denote a male or female speaker, the identity of the speaker cannot be assured as one or the other. This is why I have referred to the individual as a he or a she. It was iterated that there are a variety of health hazards that effect the People of Koluama "such as lung cancer, reduction in the lifespan of community dwellers, the entire environment is polluted, no good drinking water, air, etc. In short the whole ecosystem is polluted" (Focus Group 2 Participant).

A member of Focus Group 2 spoke about the immediate aftermath of the oil spill. This participant said, "This explosion and subsequent spill led to the death of two persons I know due to inhalation of carbon monoxide especially those that were asthmatic." The

deaths were caused directly by the oil spill. The carbon monoxide released into the atmosphere aggravated existing conditions and led to their deaths. Participant 10 reflected on the day of the spill and said, "when the explosion occurred the whole ground and walls of houses shook as though it was a bomb some elderly folks even died from panic." He attributed those deaths to sheer terror and fright. The oil spill was overwhelming and had a negative effect on those who experienced it.

A participant in Focus Group 1 spoke about death and said, "people have died because they don't have money for treatment." Because the economy was devastated by the oil spill many individuals lacked the resources necessary to access medical treatment. By resources I mean money in order to afford medical treatment. This was expressed by a participant of the Focus Group 1, who said that "people have died because they don't have money for treatment." This is why many participants state that the oil spill has led to death for many people, whether immediate or delayed. Participant 10 reflected on the oil spill and simply stated,

> I lost my mother to that incident. People still live in fear [to] date. . . .I even lost my mother who took ill following the incident and died a year later. . . .[She] became hypertensive and [subsequently] died.

He did not offer details, he simply stated the fact of her death and that he believed it to be linked to the oil spill.

The participants described immediate deaths that they could easily attribute to the oil spill. They also indicated that the long term effects of the oil spill continue to the

present. They reported that people continued to die and felt that these deaths were directly attributed to the lingering issues associated with the oil spill.

**Subordinate Theme 4: Lack of access to care after the oil spill.** The participants spoke at length about the lack of care available to the community as a whole. They reported that conditions after the spill were challenging and the lack of access to health care made it almost impossible to provide immediate or long term treatments to any patient. Eleven of the participants and 2 of the focus groups spoke the lack of access to hospital care. There was no local hospital or clinic. A clinic that had operated in the town had closed down. The closest hospital was located over a 3-hour boat ride away. In order to access health care at the hospital, individuals need to have a method of transportation to reach the hospital and payment to the hospital before treatment commenced. Many of the participants indicated that they did not possess the requisite funds or transportation to be able to access these services.

A participant in Focus Group 1 spoke about the aftermath of the oil spill and said, "there was no proper medical care given to us, and our community health facility is not functional so for those that can afford it they travel to Yenagoa." The lack of health care available to the majority of the population was inadequate as most did not have the money to access care in Yenagoa. Participant 1 spoke about the health care that was offered after the oil spill and said:

> After the oil spill I was told the doctors only attended to few persons and later complained that the relief materials were not enough to treat as many people as possible, so they went ever since then have not seen them.

The qualitative researcher had no access to the physician findings or from the New Nigeria Foundation (NNF), an agency contracted by Chevron to provide and coordinate the entire logistics including emergency medical services in response to the Gas Explosion at the Funiwa Gas Field on January 16th, 2012. Mr. Emmanuel and Duke were part of the delegation and accompanied the personnel from the NNF and officials representing the State of Bayelsa Health Department to Koluama. According to Emmanuel and Duke, (they) first responders arrived at Koluama on or about March 29th, 2012 even though the oil explosion occurred on January 16, 2012. Mr. Duke is an employee of the Federal Ministry of Health, Bayelsa State. Both Mr. Duke and Emmanuel confirmed that the most challenging was the lack of resources such as medication, clean water, no food, and personnel for the local population. They added that all first responders left Koluama and the surrounding villages on April 2nd, 2012 because the trip was for four days even though there were still hundreds of locals who were yet to be physically and psychologically examined.

It would be surmise to say that the physician and other medical practitioners who came to Koluama did not have the supplies necessary to adequately care for the victims. They provided some care, then left the area when realizing that it was not possible to contribute any further. Due to the fact that the services they provided were very minimal, there was a definite lack of care for those still suffering from the oil spill. No other health care workers were sent to provide services. Participant 3 also spoke about the physicians who came to the area and stated:

> The doctors they sent after the oil spill were not very helpful. They only came to ask questions and went back. On my own I have been to the hospital before and the doctors said that I had been affected by the gas explosion.

The participant indicated that the physicians who had been sent to care for the people affected by the oil spill did not offer services. In an effort to seek help he went to the hospital on his own to find answers and to receive a diagnosis.

Many of the participants never sought out any formal medical care. They did not have the funds to travel and did not receive services from the physicians who came to the area after the oil spill. They often self-treated to deal with health issues. Participants 4 stated:

> No, I have not been checked by any doctor before, there is no hospital around…no doctor has been sent to care for us. I have just been taking over the counter drugs that I buy from the village chemist.

Over all, the participants felt as if they had been abandoned. Adequate care had not been available after the oil spill. The doctors who had come to the area, provided little service and most people did not have access to them. The closest hospital was hours away and most of the participants did not have the requisite funds to pay for the care. Some settled for using the local chemist and over the counter treatments, while others simply endured and hoped that things would get better in the future.

**Psychological effects on the local population of dealing with the aftermath of oil spills.** The superordinate theme of *Psychological Effects as a result of dealing with the aftermath of the oil spills on local population* was used to describe the emotional and

psychological consequences of the oil spill on the people of Koluama. The fifteen participants and member of the 3 focus groups provided data that were used to construct the theme. The theme was made up of 2 subordinate themes. Figure 1 is a visual representation of the superordinate and subordinate themes.

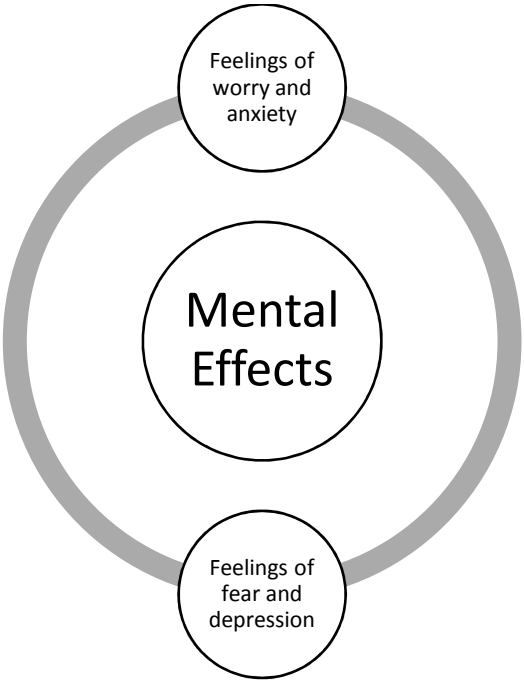


*Figure 2.* Psychological effects as a result of dealing with the aftermath of the oil spills on the local population (mental effects).

This theme was used to explore the emotional and psychological effects of the oil spill on the people who resided and worked in Koluama. The experience of the oil spill caused great trauma and the population of the area deal with environmental, economic, and emotional hardships. Many of the participants relied on the local waterways for fishing which they used to support themselves and their families. The environmental contamination that occurred as a result of the oil spill completely changed their lives. Even today these individual feel the effect of the oil spills. Many live in poverty with no

means to adequately care for themselves and their families. They have high levels of anxiety and depression, and cannot conceive of a path that would lead to improvement.

**Subordinate Theme 1: Feelings of worry and anxiety.** Many of the participants spent time feeling worry or anxiety for the future. Six participants and 1 Focus Group spoke about anxiety and worry. Some of the participants reported the symptoms that would accompany a panic attack. The participants had high levels of anxiety for the future. They worried about caring for their families and their children. Participant 2 spoke about the effect that not being able to provide for his family, wife and children, has left him feeling "like a dead man" since there is not enough money to put food in his children's mouths.

The amount of stress and anxiety that each participant expressed speaks in part to the prevalence of physical ailments such as high blood pressure and hypertension. Participant 2 stated that he has seen,

> Other people having stroke and high blood pressure because of thinking of their problems. When you say stress, I cannot sleep, just thinking of the oil spill and how to continue living in this remote place with no money for transport and no other place to go. I do not have no other place to relocate to. . . .Where can we go? Nowhere I am thinking.

This kind of stress was not isolated to a few participants, it was a common experience of many participants. It is this kind of stress and anxiety that many participants believe has contributed to the early deaths of community members. Participant 6 spoke about his

mother and believed that excessive worry about her family caused her to have high blood pressure and eventually led to her death.

Participant 11 felt anxiety when thinking about the future. The participant said, "[I feel] the frustration, the worry of not knowing when the next spill will occur." Participant 11 did not question whether a spill will occur again, the participant worried about when the next spill would happen. Participant 11 also said, "The food shortage occurred…I was worried that nothing was being done to assist the villagers to get through the ordeal. I had body aches from not sleeping well." His anxiety about the wellbeing of others manifested in physical symptoms such as insomnia. Participant 7 also spoke about feelings of anxiety. The participant said:

> It has been almost 5 years since the destruction but no day passes without me thinking about the life we used to live. Sometimes, my head is hot because I constantly worry about little things, I am worried that the poisonous fish we still eat every day is not good but I have no choice.

The anxiety level had not decreased for this participant; the effects continued on and had a quality of life impact. The participant was aware that a great deal of time had passed since the oil spill but the anxiety about day to day living still existed. Participant 4 did not mention worry or anxiety, however the participant clearly described the symptoms of a panic attack. Participant 4 said, "I have been having constant heartbeat and nervous breakdown….Every day, I think of how we are going to feed and how to survive." The sheer level of anxiety had a great effect on the behavior and daily life of this participant.

Over all for these individuals, the daily wear and tear of managing their emotions and feelings was challenging. They carried high levels of worry and anxiety about the present and the future. They did not seek any mental health services, they simply tried to cope with their psychological distress.

**Subordinate Theme 2: Feelings of fear and depression.** Seven of the participants and two of the focus groups spoke about depression and fear. Many of them had experienced these emotions and did not know where to turn for help and support. They were depressed about what the future and present held for them and their families. One of the members of Focus Group 3 said, "there is no fish to catch so we don't have any to sell and meet up family needs leading to frustration and thinking and depression." Losing jobs and the ability to care for their families made it difficult for these individuals to have hope. They simply felt as if nothing could be fixed. These feels of malaise were extensive. A participant for Focus Group 2 stated, "there is mental demoralization in the entire region. . . .Generally, the Niger Delta people are all in the state of depression." The participant was speaking for everyone in his region who felt as if they were being ignored. No support or aid was forthcoming. The population was forced to live with daily reminders of the oil spill with no end in sight.

Participant 1 spoke about depression and said, "I struggle with depression thinking of what the community people are going through, how they can't fish and even if they do no fish or polluted fishes in the river." This feeling was generalized to everyone in the area, it was not specific to the participant's situation, rather it was an all-encompassing feeling of sadness for everyone. Participant 12 also spoke about

depression as it related to the people effected by the oil spill and said, “our people began to suffer depression.” Everyone suffered during this period. It was difficult because entire villages had lost their livelihoods.

Some participants experienced fear. Participant 4 attributed some of the health issues to fear. The participants said, “people started having respiratory problems and blood pressure because of fear and stress.” This participant believed that the emotions that people’s experiences had a direct effect on how they reacted physically to the oil spill. Participant 5 supported this statement and said, “People started having respiratory problems; there was cholera outbreak, eye problems and blood pressure because of fear and worrying.” Participant 6 took this one step further and said, “[other people had] fear and thinking, leading them to early graves.” These participants believed that the emotional responses were tied to the physical responses. They felt that the emotions of depression and fear were so negative that they manifested in a physical manner. Participant 10 spoke about others and said, “People still live in fear.” The oil spill still effects every day. Because no interventions or cleanup has occurred the population must face the results of the oil spill on a daily basis.

Participant 3 spoke about specific fears and stated, “Our greatest fear is our house. Since the ground and the foundations of our houses shook during the oil spillage, we are afraid that our houses might…collapse.” The participants feared what might happen in the future. They worried about the safety of their homes and families. None of the participants expressed any sense of hope for the future. Instead they focused on the short

term and survival from day to day. No participant spoke about seeking or receiving any type of mental health services to aid them in managing their depression or anxiety.

## Summary

The results of this study were captured in two superordinate themes: *Physical Effects of the oil spill on the people of Koluama* and *Psychological Effects as a result of dealing with the aftermath of the oil spills on the people of Koluama.* The theme Physical Effects was made up of 4 subordinate themes: (a) *People suffered from illnesses,* (b) *Children's health declined*, (c) *Deaths which affected the people of Koluama,* and (d) *Lack of care available to the people of Koluama after the oil spill*. The superordinate theme of *Psychological Effects as a result of dealing with the aftermath of the oil spills on the people of Koluama* was made up of 2 subordinate themes: *Feelings of worry and anxiety* and *Feelings of fear and depression.*

Participants suffered from a variety of physical ailments and very few had access to any adequate medical care. Their wellbeing was effected through the destruction of the environment and economy. Their mental health was also effected and they spent a great deal of time living with worry and fear for the future.

Chapter 4 was used to report the results of this research study. Included in this chapter was a description of the setting, demographics, data collection and data analysis processes. Also included were the results of the analysis. Chapter 5 includes a discussion of the results.

# Chapter 5: Discussion

## Introduction

The growing demand for oil across the world has fueled its discovery and extraction, creating a bevy of human health issues (Jernelov, 2010). Some of the acute effects of exposure to crude oil include nausea, vomiting, dizziness, headaches, and respiratory problems (Solomon & Janssen, 2010); more serious, long-term effects include cancer, respiratory diseases, skin diseases, and death (Ana et al., 2009). The health problems caused by oil pollution can take multiple forms, including maladies related to air pollution from gas flaring (Abdul-Wahab, Ali, Sardar, & Irfan, 2012); water and land pollution from spills and pipeline damage (Abdus-Salam et al., 2010; Adedeji & Adetunji, 2011; Nduka & Orisakwe, 2011); and mental health problems from the stress caused by physical and economic hardships that result from living in oil polluted regions (Gill, Picou, & Ritchie, 2011; Grattan et al., 2011; Shreve**, 2011).**

Prior to the current investigation, research on the effects of oil discovery activities in the Niger Delta focused on the consequences to the environment, rather than human health. The purpose of this qualitative investigation was to explore perceptions and lived experiences of locals residing in the village of Koluama regarding the physical and mental health consequences of oil-related environmental pollution. I collected data via interviews and focus groups. Fifteen villagers participated in one-on-one interviews, and an additional 18 villagers took part in focus groups. The aim of this chapter is to provide an interpretation and discussion of study findings. I also review important limitations and

make recommendations for future research. Finally, I discuss theoretical and practical implications, and the chapter closes with my concluding remarks.

## Interpretation of the Findings

Analysis of data from interviews and focus groups revealed two main themes – mental effects and physical effects. The subthemes of physical effects included children's health, illness, lack of care, and death. The subthemes of mental health included worry/anxiety and fear/depression. In light of findings from previous studies discussed in Chapter 2, I discuss each of these subthemes as follows.

### Physical Health: Children's Health

Many respondents brought up problems related to children's physical health. Several participants believed children in Koluama had fallen ill from consuming contaminated fish and water. One participant in particular claimed that the health issues of the village's children did not exist until recently, citing long-term health problems such as asthma.

Participants believed that the consumption of contaminated fish and water created health problems, an effect well documented in other studies. For example, lack of access to clean water, and pollution associated with unsafe water, create a toxic load in quantities too large for the environment to attenuate, naturally (Macer, 2000). Adedeji and Adetunji (2011) reported that water pollution was a significant cause for concern in developing nations, and researchers have substantiated the poor water quality in relation to oil-related environmental degradation in the Niger Delta (Abdus-Salam et al., 2010; Chan & Baba, 2009; Linden & Palsson, 2013; Nduka & Orisakwe, 2011). As pollutants

are absorbed by plants and animals that people eat, water pollution contaminates the food supply (Heubeck et al., 2003; Linden & Palsson, 2013).

**Illness**

Local villagers described short- and long-term illnesses they believed were related to oil pollution exposure. Because they were unable to obtain reliable healthcare, respondents could not provide diagnoses, but they detailed ailments they believed were related to oil pollution. These ailments included issues related to breathing contaminated air, eating contaminated food, and drinking contaminated water. Participants described respiratory ailments such as coughing, fainting, and asthma from inhalation of smoke and fumes. Some described issues with blood pressure, which may have also been related to the emotional effects of the pollution, as discussed later in this section. Others reported illnesses included those of vascular, digestive, and epidermal nature. Some of the long-term issues reported included measles, chicken pox, itchy eyes, chronic coughing, asthma, and chest pain.

Data provided by respondents on illness echoed that of previous research on the acute and long-term health effects of exposure to oil-related pollution. For example, Solomon and Janssen (2010) reported that common human health effects of oil spills include nausea, vomiting, dizziness, headaches, and respiratory problems. While some research exists on the short-term health consequences, less is known about the long-term health effects of exposure to oil pollution in developing nations. As Woodward (2010) explained, far fewer studies have documented the long-term health effects of oil pollution. According to McCaskill (2013), the reasons for the dearth of research on the

long-term physical effects of oil pollution include (a) seeking out subjects for studies; (b) unreliable reports from medical facilities; (c) difficulty obtaining provisional care for those in need; and (d) unreliable self-reports.

**Lack of Care**

Inadequate access to healthcare was a recurring theme in this investigation. The main barriers to healthcare included the lack of a local hospital or clinic, lack of transportation to the nearest hospital (which was a 3-hour boat ride away), and the inability to pay for healthcare. While a community health facility exists in Koluama, respondents described it as inadequate. Largely, participants felt their healthcare needs were marginalized and ignored by representatives from oil companies and the local government. Most respondents described simply dealing with physical health ailments on their own or visiting their local chemist for treatments. The lack of access to healthcare described by respondents in this investigation echoed findings from previous studies on the physical effects of oil-related environmental degradation reported by other researchers. For example, McCaskill (2013) acknowledged the lack of reliable facilities and access to healthcare as a significant challenge to obtaining reliable data on the health impacts of long-term exposure to oil pollution in developing nations.

**Death**

Another subtheme of the physical effects of oil pollution reported by respondents was death. Many participants discussed the deaths of villagers in terms of immediate experiences (as with explosions and carbon monoxide inhalation), while others discussed death as the consequence of long-term health problems from exposure to oil-related

pollution and the lack of healthcare treatment for such ailments. Death was an ongoing problem expressed by respondents, who reported that villagers continued to die from the lingering effects of exposure to oil-related environmental degradation. The villagers' beliefs for the correlation between death and exposure to oil pollution are supported by past empirical investigations on the physical health consequences. Hou et al. (2011) reported that over 13 million deaths were caused by environmental pollution around the world, each year. Research indicates that exposure to oil-related pollution can cause a number of deadly health problems, such as genetic mutations (Bezek et al., 2008; Tang & Ho, 2007), cancer, cardiovascular disease, neurological disorders, and autoimmune diseases (Howard, 2002). Significant findings of the toxic effects of crude oil on human health have been documented (Ana, Srindhar, & Bamgboye, 2009; Bezek et al., 2008; Goldstein et al., 2011; Hou et al., 2011; Howard, 2002; Jernelov, 2010). However, the long-term health consequences, including risks of death, may be higher in poor nations that are unequipped to mitigate ecological catastrophes and provide healthcare to individuals exposed to pollution (McCaskill, 2013).

**Mental Effects**

Worry, anxiety, fear, and depression were reported by participants concerning the effects of oil-related environmental degradation. While the physical effects discussed above are likely to have direct effects on health, the mental effects may be more indirect. For example, oil-related damages to the environment had a significant negative effect on the livelihoods of many participants whose income relied on fishing. In turn, this reduced

their abilities to earn income, placing them and their families in poverty. Impoverished living, in turn, created high levels of anxiety and depression for respondents.

Anxiety was created over the fear of the future. Participants described feeling anxious about their lack of control over the environmental damage caused by oil companies**.** Participants also worried about their livelihoods, physical health, food shortages, and lack of sleep**.** The anxiety created by the environmental damage seemed to have a significant impact on the villagers' quality of life. Perhaps worsening their worry and anxiety, respondents reported dealing with psychological distress on their own, rather than seeking mental health services. Because Koluama's villagers lack access to healthcare in general, it is unlikely that they even had access to professional mental health services**.**

Many participants also relayed feelings of fear and depression related to the same concerns that created anxiety and worry. Respondents discussed economic stress related to their inabilities to make money due to the environmental pollution. The general feelings of depression throughout the region were described by one respondent, who said, "The Niger Delta people are all in a state of depression." Another common cause of fear and depression described by participants related to the physical health consequences of living in the polluted environment of Koluama.

The mental health effects described by participants in this study were significantly different from those described by previous researchers who explored the psychological effects of oil-related environmental degradation. For example, Grattan et al. (2010) investigated the effects of the Deepwater Horizon spill on individuals who lived in two

counties significantly affected by the spill (Franklin County, Florida, and Baldwin County, Alabama). The researchers found that participants experienced increased levels of anxiety, depression, and distress, mostly due to the economic losses incurred due to resource reductions or job losses. While Grattan et al. found that economic losses were the greatest causes of negative mental effects linked to the spill, the economic damage felt by businesses in a developed nation are significantly different from those experienced by Koluama's villagers. Doubtless, economic hardships faced by participants in Grattan's et al. investigation may have created financial challenges and temporary hardships, but for people of the Niger Delta, such hardships can be deadly. Without the ability to earn an income and provide for their families, Koluama's villagers reported extreme levels of poverty. These individuals do not have a social welfare safety net to protect them when their livelihoods are compromised due to environmental degradation created by large oil companies and corrupt governments, which are both outside of the villagers' control.

Other studies on the mental health consequences of oil-related environmental degradation conducted prior to the current investigation also focused on litigation procedures (Arata et al., 2000; Hirsch, 1996; Shreve, 2011) and substance abuse issues (e.g., Palinkas et al.,1993; Russell & Downs, 1993). Neither of these topics were brought up by respondents from the current investigation, highlighting the chasm between first- and third-world countries in terms of the ways oil pollution impacts local inhabitants. The lack of research on the effects oil pollution has on third world inhabitants must be acknowledged and rectified.

## Limitations of the Study

A few limitations were inherent to the current investigation. First, the validity of study data was based on the assumption that respondents provided open, honest, and accurate responses. I encouraged forthright responses through the protection of participants' identities, and by conducting data collection inside of the village, at a place of comfort for them. Because this study was based on self-reported data, and no other local data were available, I was unable to verify any of the information provided by participants. Rather, I had to use information that respondents reported in interviews, focus groups, and questionnaires at face value. However, fears regarding repercussions from government officials may have still prevented some individuals from responding with absolute candor. Another limitation was time. I gathered data from one point in time, and a longitudinal investigation may have provided different insights. It is also possible that participants' responses might have been different if data collection occurred right after a significant oil-related incident.

Another possible limitation was my presence during the data collection process, which is unavoidable in qualitative research. Promoting credibility can involve providing detailed descriptions of all aspects of the investigation. Without this understanding, it is hard for the reader of the concluding interpretation to determine the scope to which the general findings are true. Although I performed bracketing to prevent intrusion of my personal opinions and thoughts during the data collection and analysis process, some unintentional bias may have occurred due to my familiarity with the village, since I was born in the region.

## Recommendations

Recommendations for future research can be made based off findings from this study. First, research is needed to complete a thorough evaluation of the critical physical and emotional effects of exposure to oil-related environmental degradation among individuals in developing nations. Second, in the event of an oil spill, trained individuals should be available to help contain the spread of the effects, regardless of whether the spill occurs in a developed nation or an undeveloped one. Slow responses result in environmental degradation that may be impossible to reverse. Thus, research is needed to develop a protocol for best practices to quickly contain spills and provide residents with the economic and healthcare assistance they require. Similarly, it is important that the legal obligations of oil companies be enforced to prevent accidents, as well as to provide cleanup efforts in the wake of accidents.

Only one participant had ever been employed by an oil company, and prior to the investigation, he had been terminated from his position for conduct. Another was a contractor with Chevron at the time of the investigation. Both of these participants, who had personal experience working for Chevron, felt the oil companies should help local communities in the Niger Delta by employing villagers and involving them in meetings between the communities and the oil companies. Thus, participant responses indicated that community participation in the governing of oil activities and operations of spills had not been accomplished. Community stakeholders' participation in oil activities in the region may improve environmental conditions among the Niger Delta villages – that is, individuals employed by the oil companies, and who call the Niger Delta their home, are

more likely to have a vested interest in enforcing environmental protection policies to safeguard the health of local inhabitants. Similarly, community members' participation in meetings and dialogue with oil companies could help hold oil company leaders accountable for their obligations to the environment and to the health of inhabitants of the Niger Delta regions where oil companies are active. The onus of retribution should also be on oil companies, and an open dialogue with the Niger Delta inhabitants may encourage that. For example, fishermen whose livelihoods have been eroded due to oil-related environmental degradation must be provided with support to help them develop alternative income sources. Policymakers and elected officials need to make changes and take action to remedy the wrongdoings committed by oil companies in the Niger Delta.

In addition to improving the dialogue between villagers and the oil companies, employment of locals by the oil companies could help to improve the economic situations of the Niger Delta inhabitants. Results from this investigation indicated that one of the greatest barriers to physical and mental health among Koluama's villagers was the lack of economic resources to access healthcare, fresh food, clean water, and sanitary living environments. For example, the extreme poverty among the villagers, increased through the activities of the oil companies, prevents villagers from accessing healthcare. Further, the cost of living in the area has escalated due to the presence of multinational oil companies whose workers are paid very high wages compared to the livelihoods earned by the indigenes of the Niger Delta. The presence of oil companies in the region encourages escalating housing costs and goods through the principle of supply and

demand. By employing local, the oil companies could help Koluama's villagers earn the money needed to make improvements to their health and living situations.

Also, in proposing specific policy changes for managing the coastal resources, results from the current study should be considered, which indicated the community had poor access to basic amenities such as potable water, health facilities, and basic sanitation services. Their daily living patterns revolve around the availability of coastal natural resources, such as fish and fuel wood. When it came to environmental concerns, issues of safe drinking water, food, and sanitation were most important to respondents. Results from this investigation provided awareness to the pressing health and mental health related problems and encourage future research on ways to improve villagers' access to healthcare.

When these data have accumulated, they can be consolidated with data on deforestation and land degradation, so as to figure out where the greatest preventative measures are needed. The damages to human health from oil spills and gas flaring need to be considered. The improvement of a procedure to remotely detect oil pollution in the Niger Delta area utilizing radar or high determination remote detection, for example, Quick Bird, is another avenue for future research (Ekong, Essien, & Onye, 2013).

## Implications

The conceptual framework for this investigation was based on Morello-Frosch's et al. (2011) research on the public health consequences of environmental pollution and marginalized populations. The researchers suggested that marginalized populations are particularly vulnerable to environmental pollution due to: (a) disparities in disease

incidence and severity due to psychosocial, environmental, and biological factor; (b) heightened exposure to environmental hazards and pollution; (c) biological factors, such as age, genetics, and preexisting health conditions; and (d) psychosocial pathways that link race and socioeconomic status. This study may provide support for the first two factors the researchers described. Although biological factors such as genetics and preexisting health conditions were not considered in this investigation, results did suggest that Koluama's villagers may be at an increased risk for health risks due to the severity of exposure to the environmental pollution, through air, water, and food.

Morello-Frosch et al. (2011) believed that the way to address health problems among marginalized populations related to environmental pollution was contingent upon targeted efforts and enforcement of laws by policy-makers and officials that include multilevel, place-based strategies. Thus, practical implications for findings from this investigation may follow. Perhaps, most importantly, many of the health risks and effects of oil pollution are readily stoppable, if necessary actions are taken by appropriate stakeholders.

The impoverished conditions that most of Koluama's villagers live in severely limit their abilities to take action to mitigate the health effects of oil-related pollution. Without access to healthcare or the resources necessary to acquire it, there is little villagers can do to seek mental and physical health treatment. Further, most of the villagers do not possess the ability to relocate to safer locations. Thus, the practical implications for change most likely rely on actions taken by the oil companies. The local government is corrupt, and officials have demonstrated little concern for the health of the

Niger Delta's residents. The large companies that drill in the area, which are ultimately responsible for the environmental damages done, should provide resources to the villagers and implement better environmental controls to prevent oil leaks and pipeline explosions. This could begin with the provision of local hospitals or clinics, staffed and funded by the oil companies. Such actions would indicate corporate social responsibility and may ultimately improve oil companies' public relations.

## Conclusion

Prior to the current investigation, little research had been conducted on the potentially hazardous physical and emotional effects of oil-related pollution on the inhabitants of the Niger Delta region. This study addressed a significant gap in the research by investigating the lived experiences and perceptions of Koluama's villagers related to the physical and mental health consequences of environmental pollution caused by oil activities. Data analysis revealed two main themes of mental effects and physical effects. The subthemes of physical effects included children's health, illness, lack of care, and death. The subthemes of mental health included worry/anxiety and fear/depression. Findings from this investigation were largely reflective of findings from previous researchers on the effects of exposure to oil-related environmental degradation; however, significant differences were noted in the effects experienced by individuals in first- and third-world nations. Although significantly more research is needed to create a better understanding of these effects, this study provided a foundation for future investigation.

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# Appendix A: Recruitment Letter

August 20th, 2015
Esther B. Sako
18009 Flynn Drive,
Santa Clarita, CA 91387

Dear Sir/Ma'am,

My name is Esther Sako. I am a graduate student at Walden University in the Department of Public Health. I am conducting a research study about cumulative oils spills and the physical health and mental health consequences on the Koluama Communities. I am inviting you to participate because you live in Koluama and have experienced oil spills. The study is being conducted to learn more about the health effect of oil pollution at Koluama.

Taking part in a research study is always optional. I am conducting the research study for my doctoral dissertation at Walden University.

To participate in this study, you must:
1. be 18 years of age and older
2. have resided in the Niger Delta for the past 3 years, including 1 full year in Koluama.

The study will last for three weeks and will involve participation in one focus group lasting for 60-90 minutes as well as an individual interview that will last for about 60 minutes. The focus group will be conducted by the researcher at an easily accessible location and the interview will take place at a time and place agreed upon by the researcher and participant.

Participants who have to travel to Koluama to participate in the study will be offered a gift card worth $10.00 in Naira (Nigerian money) to assist with transportation costs.

Some participants will receive t-shirts purchased from the 99 cent store. Some will be given office supplies, such as pens and some colorful pencils. Soda will be available for those who want a drink.

Please be aware that the study is completely voluntary. There are no consequences if you choose not to participate.

If you decide to take part in the study,

- I will review the study with you at a time and place that is convenient for you.
- you will be asked to sign a consent form that explains the research in detail
- you will take part in one interview and one Group with 4-6 participants both led by me
- you will answer questions on your physical and mental health during and after the oil spills and at Koluama

If you are interested in participation, please return the card or call me or my office at (818) 434- 4268. You can also email me at esthersako@sbcglobal.net. When responding please include your name and cellphone number, so that I can contact you. And do not hesitate to call me if you have any questions as you read this material. I will be happy to review any of this with you and answer any questions you may have. Thank you for your time.

Sincerely,

_____

Esther B. Sako
Lead Researcher (Walden University).
Kobi Asu B.A., LVN
Assistant Phone # (661 219-4388)

Appendix B: Demographic Questions

What region/village of the Niger Delta do you currently reside in?

_____

Which age group do you belong to? (please circle one)

18-30 years

31-45 years

46-60 years

61-90 years

91+ years

What is your sex? (please circle one)

Male

Female

What is the highest level of education you have completed? (please circle one)

No formal education

Elementary school

Junior/secondary school

Post secondary (college or university)

Technical school

What industry is your occupation in?

Farming

Fishing

Public Sector (e.g. civil servant)

Private Sector

Other (please describe _____)

# Appendix C: Interview Questions

Has your community been affected by any oil spills in the last year?

If yes, please describe those effects.

Please describe any effects that the environmental damage caused by these spills has had on your livelihood

Tell me about your experiences with oil spills in your community?

How have oil spills affected your daily activities?

Please describe any physical and/or mental health problems that you have personally experienced or have witnessed others experience, as a result of environmental degradation caused by oil spills?

Please describe any health care you have sought after being affected, either physically or mentally, by oil spills?

# Appendix D: Focus Group Questions

Please tell me about any oil spills you have experienced at Koluama or in the Niger Delta region in the past year.

Who was affected by the KS Endeavor oil spill on January 16, 2012? Please describe your experiences.

Please describe your feelings regarding the oil spills in the Niger Delta region.

Please tell me about any physical health problems you have experienced, which you believe are a consequence of pollution from oil spills.

What treatments have you received for these physical health issues? How often are you treated?

Please tell me about any mental health problems you have experienced, which you believe are a consequence of pollution from oil spills.

What treatments have you received for these mental health issues? How often are you treated?

How do you believe these physical or mental health issues are attributable to oil spills?

# Appendix E: Consent Form

## CONSENT FORM

You are invited to take part in a research study of the mental and physical health consequences of oil pollution as perceived and experienced by the villagers of Koluama, Nigeria. The researcher is inviting (a) individuals who live in the Koluama Community of the Niger Delta Region of Nigeria, (b) are over age 18, and (c) have lived at Koluama in the past three years or in the Niger Delta Region for the past five years with one year at Koluama. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by a researcher named Esther Sako, who is a doctoral student at Walden University.

**Background Information:**
The purpose of this study is to explore the mental and physical health consequences of oil pollution as perceived and experienced by the villagers of Koluama, Nigeria.

**Procedures:**
If you agree to be in this study, you will be asked to:

- Participate in a 60 minute individual interview, and
- Participate in a 60-90 minute focus group (with 4-6 members).

Here are some sample questions:

Who was affected by the KS Endeavor oil spill on January 16, 2012?

What factors do you believe are responsible for the oil spills?

**Voluntary Nature of the Study:**
This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. No one at Walden University will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time.

**Risks and Benefits of Being in the Study:**
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as fatigue, stress, or becoming upset. Being in this study would not pose risk to your safety or well-being.

The study will give you the opportunity to speak about the oil spills and share your opinions.

**Payment:**
Participants will be offered assistance with transportation fees. The researcher will give participants who have to travel to Koluama to participate in the study a gift card worth $10.00 in the Naira equivalent (Nigeria Monetary System).

Some participants will receive t-shirts purchased from the 99 cent store.

Participants in the focus group will be given office supplies, such as pens and some colorful pencils purchased from the 99 cent store. Soda will be available for those who want a drink.

**Privacy:**
Any information you provide will be kept confidential. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure by lock and key and be stored in a file cabinet in the researcher's home office. Data will be kept for a period of at least 5 years, as required by the university.

**Contacts and Questions:**
You may ask any questions you have now. Or if you have questions later, you may contact the researcher via phone at 1-818-434-4268. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 001-612-312-1210 (for participants outside the US). Walden University's approval number for this study is **IRB will enter approval number here** and it expires on **IRB will enter expiration date.**

The researcher will give you a copy of this form to keep. (for face-to-face research)

**Statement of Consent:**

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By signing below, I understand that I am agreeing to the terms described above.

Only include the signature section below if using paper consent forms.
Printed Name of Participant

Date of consent

Participant's Signature

Researcher's Signature _____

Appendix F: Distribution of Oil Wells in Niger Delta's Petroleum System, Shown in Black Dots

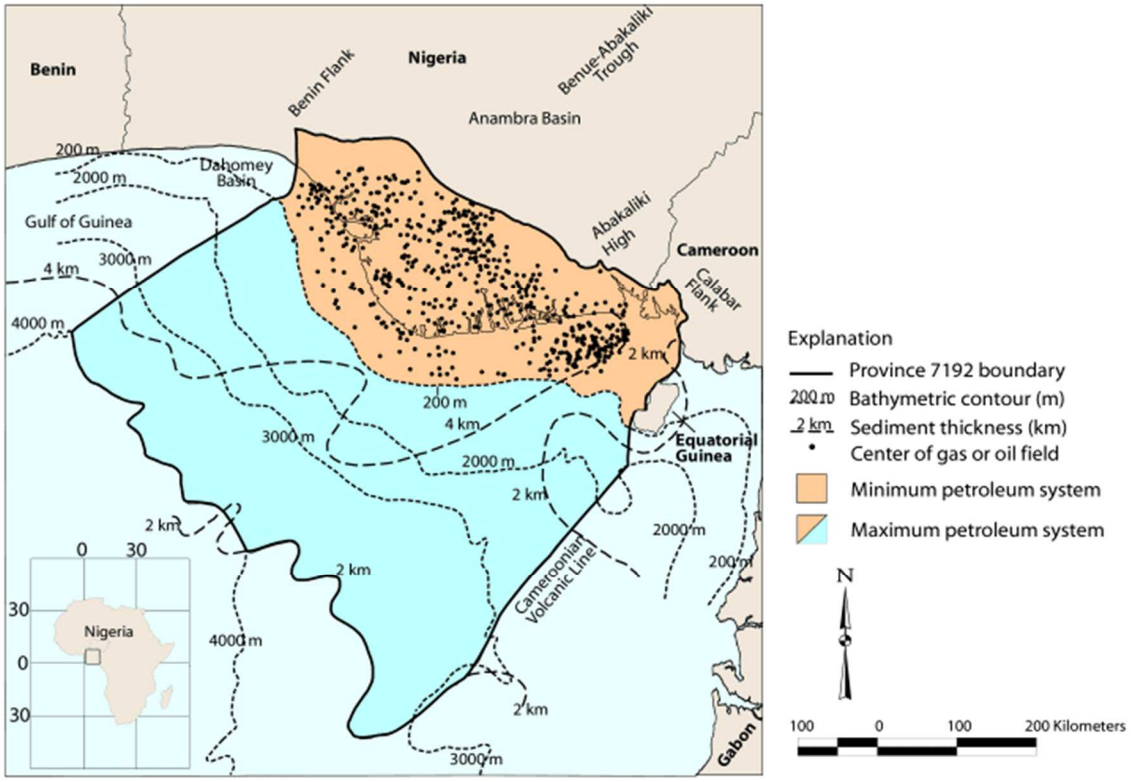


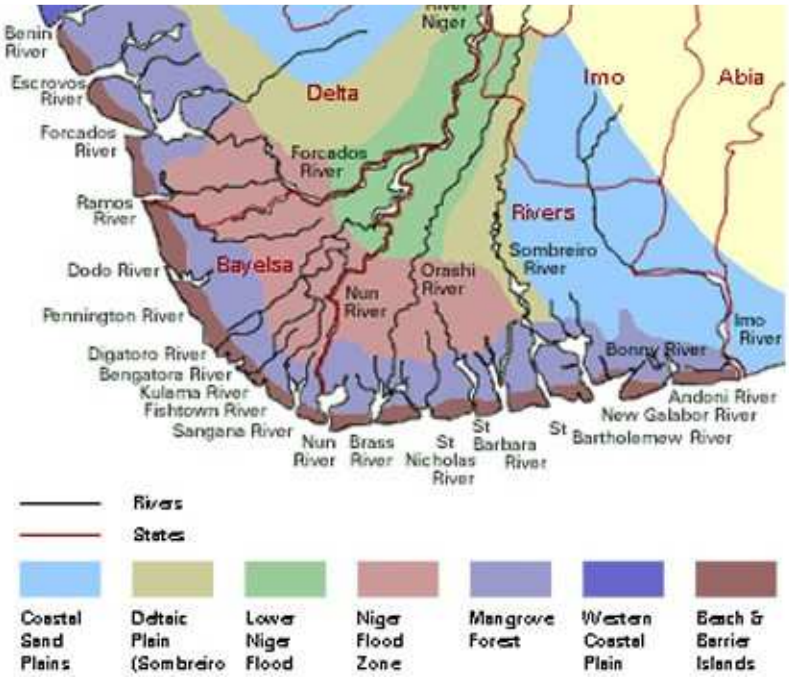

Figure 1 Index map of Nigeria and Cameroon. Map of the Niger Delta showing Province outline (maximum petroleum system); bounding structural features; minimum petroleum system as defined by oil and gas field center points (data from Petroconsultants, 1996a); 200, 2000, 3000, and 4000 m bathymetric contours; and 2 and 4 km sediment thickness.

Source: Tuttle, Charpentier, & Brownfield (n.d)

Appendix G: Map of the Nigerian Coastal Areas, its surrounding nations and the Gulf of Guinea


Source: U.S. Energy Information Administration, n.d.

Appendix H: Map of Niger Delta Showing the Rivers, Oil Producing States, and Vegetation Zones




Source: Ugochukwu & Ertel, 2008

Appendix I: Cities in the Inland Areas of the Niger Delta and to the Bottom Showing Water Bodies, Flood Vulnerability, Vegetation and Settlements


Source: Technology Times, n.d.

Appendix J: Flare Activity at Night in parts of Europe, North Africa, Arab Nations and the Niger Delta at the bottom left below of the Map

Source: Simmon, 2003

# Appendix K: Photographs from Koluama

All photographs by the author

## Koluama Coastline

Man fishing on the Koluama River

Dying Trees at Koluama Beach

Dead Trees at Koluama Beach

Dead Trees at Koluama Beach

Koluama Waterside

Mangroves coated with oil on the Way to Koluama

Oil Soaked Coastline Across Koluama Community

Road from Yenagoa to Koluama

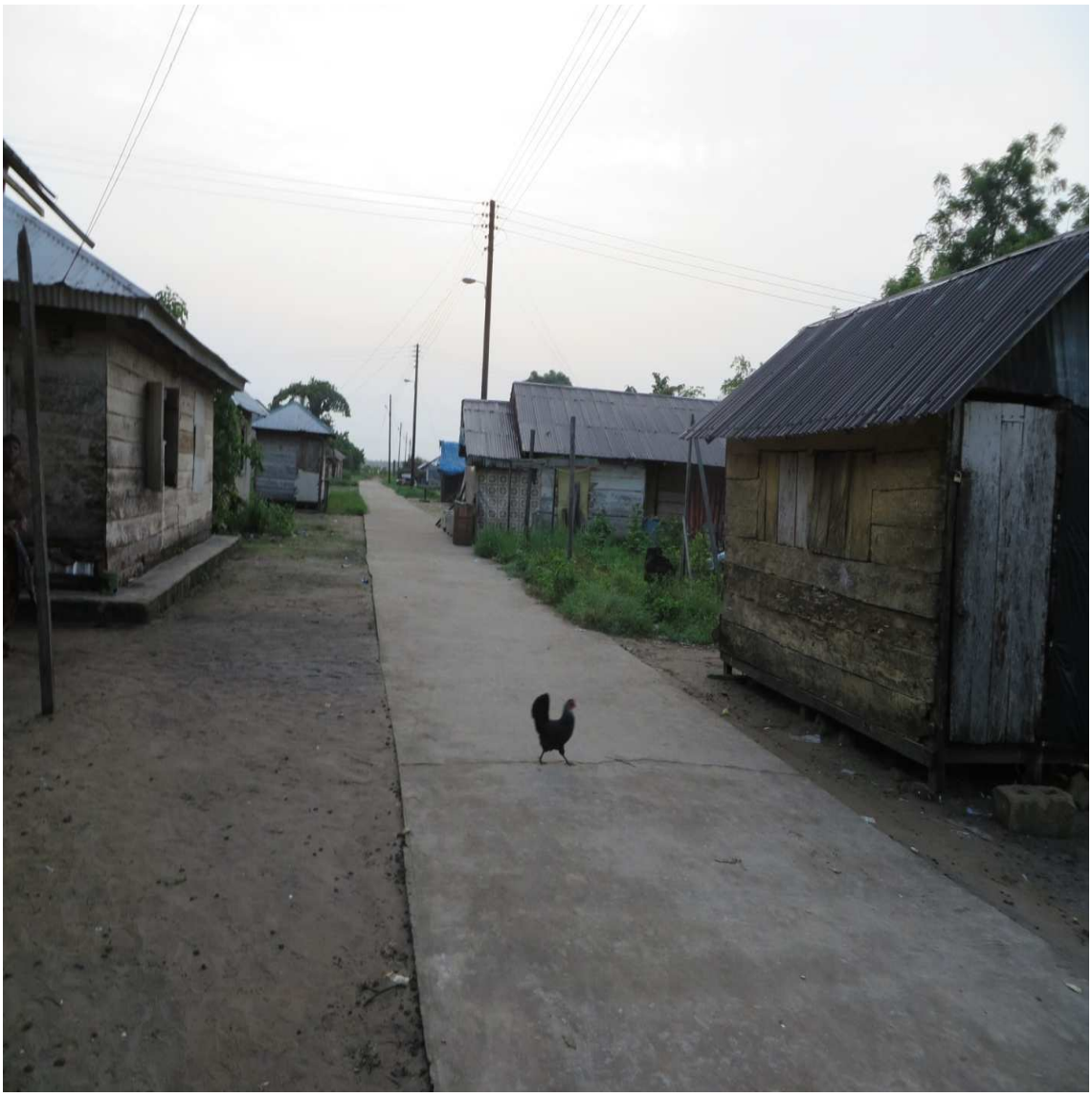
Transport Services to Koluama

Passengers on a Speed Boat at Koluama Waterside

Koluama Fisherman showing off his catch of the Day

Eroding Coastline of Koluama

Dawn at Koluama Main Street



Koluama Town Hall Meeting