

**OIL PRODUCTION ACTIVITIES AND COMMUNITY WELL-BEING IN  
UPPER NILE (MELUT) AND UNITY STATE (KOCH)  
IN SOUTH SUDAN**

**BY  
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**A DISSERTATION SUBMITTED TO THE SCHOOL OF BUSINESS FOR THE FULFILMENT OF THE  
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**DECEMBER, 2021**

## DECLARATION

I, **Doreen Santino**, hereby declare that to the best of my knowledge, this dissertation is truly my original work and has never been submitted to any other University or Institution for any award of degree or any other qualification.

Signature: \_\_\_\_\_



**17th/10/2021**

Date: \_\_\_\_\_

## **APPROVAL**

This to certify that this Dissertation entitled “**Oil Production Activities and Community Well-being in Upper Nile (Melut) and Unity State (Koch) in South Sudan**” has been done under my supervision and now ready for submission to be examine.

Signature:

A handwritten signature in black ink on a light yellow background. The signature is cursive and appears to read 'Ngoma Muhammed'.

**PROF. NGOMA MUHAMMED**

**SUPERVISOR**

Date: 17/10/2021

## **DEDICATION**

This dissertation is dedicated to my beloved parents, Mr. Santino AjangAban (RIP) and Mrs. Veranica Santino and entire family members. Thanks for all the support you have given me throughout my academic career. Thank you for your genuine care, patience, inspirational advice, spiritual and financial support. I say, trust in God for academic victory.

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## **ABSTRACT**

The study was carried out in Upper Nile (MELUT) and Unity State (KOCH) in South Sudan. The Under-Secretary for the Ministry of petroleum, Chaung as reported by Reed of the energy voice in August 2020 noted that total production of oil currently is 170,000-172,000 barrels per day, this is below the projected total of 190,000 bpd. The study aimed at assessing the effects of Oil production activities on community well-being. The study objectives aimed at; to analyze the relationship between oil production activities on environmental and waste management, to examine the relationship between oil production activities on community health; and to assess the relationship between oil production activities on access to basic socio-economic amenities. The study used a descriptive cross-sectional survey research design. The target population included community members in Melut and Koch, community leaders, employees of oil operating companies and Ministry of Petroleum; equivalent to 136 participants. These were purposively and simple randomly selected. Data was collected by use of questionnaire and interview guide was majorly analyzed quantitatively and qualitatively. Findings of the research revealed that Oil production activities contaminate soil and water and may cause devastating explosions and fires; greatly influence on wildlife ecosystem, leads to deforestation, tree cutting and ecosystem destruction, greatly effect on soil and soil quality and or/ texture; and lead to noise and air quality; and other several environment pollution processes. It also revealed that Oil production activities leads to long-term harm to human and animal populations; causes physical, mental, and financial stress to people as individuals; leads to human health and safety risks for neighbouring communities and oil industry workers. It was further revealed that Oil production activities leads to infrastructure development like road network, education sector, health accessibility, led the rise of the national GDP and foreign direct investment. On the other hand, Oil production activities is associated with rise in corruption, linked to forced resettlements and displacement of indigenou communities. Basing on the above study findings, it is concluded that there is a significant positive relationship between oil production activities and environmental management in Upper Nile and Unity State. It is recommended that there is need for publicity, mass mobilization and sensitization on dangers associated with oil production activities to the local community and oil company workers; and areas of further research were suggested.

## **ACRONYMS AND ABBREVIATIONS**

AIDS                                      Acquired Immune Deficiency Syndrome

CVI	Content Validity Index
DV	Dependent Variable
DRC	Democratic Republic of Congo
DPOC	Dar Petroleum Operating Company
HIV	Human Immune Virus
IV	Independent Variable
GDP	Gross Domestic Product
GPOC	Greater Pioneer Operating Company
GNPOC	Greater Nile Petroleum Operating Company
MVA	Multivariable Analysis
NAPA	National Adaptation Programme of Action
NORM	Naturally Occurring Radioactive Material
TBAs	Traditional Birth Attendants
STP	Sao Tome/Principe
SPSS	Statistical Package for Social Scientists
UNEP	United Nations Environmental Programme
UCU	Uganda Christian University

# **CHAPTER ONE: INTRODUCTION**

## **1.0 Introduction**

This chapter provides the background to the study, statement of the problem, purpose and objectives of the study and research questions. It also highlighted the scope of the study, justification of the study, significance of the study and conceptual framework.

## **1.1 Background to the Study**

The study aims at assessing the effects of oil production activities on community well-being in Upper Nile (MELUT) and Unity State (KOCH) in South Sudan. This section gives a detailed historical background, theoretical review, contextual background and conceptual background a detailed below.

### **1.1.1 Historical Background**

World-over, Levy & Nassetta (2011) noted that nations are endowed with different natural resources contributing immensely to the gross domestic product (GDP) and annual budgets. A few of these studies from Ecuadorian Amazon did report that there were higher risk symptoms previously reported within workers who clean up after oil spills, for example fatigue, eyes irritation and headaches, and higher risk spontaneously abortions among women who come from exposed communities. The demand for oil globally no doubt has grown exponentially so also the exploration/production and effects of these production activities have been felt by host communities. The issue of community well-being in oil rich states is a major concern especially in developed countries as, Yager (2013) noted that natural resource revenues have been a missed opportunity for many developed and developing countries, yielding stagnation and corruption. At the heart of this failure has been a lack of transparency in the receipt of revenues, a lack of security in how they have been spent and a lack of stability in the economy. There has been continuous discontentment about the high impoverished state of host communities in the oil sector. This has led to accusations and counter accusations by host communities, government and the oil companies.

On the African continent, Ikelegbe (2015) noted that Nigeria, Angola and South Sudan are top oil dependent countries. There have been various agitations from host communities about the deplorable state of communities despite massive natural resources being excavated from them. Some have even referred to these problems as a “resource curse” meaning resources available have brought more evil

than good. The study conducted from the Niger Delta, reports higher frequency of neurological, hematological and irritation symptoms in inhabitants from a community where the main source of drinking water is contaminated with refined oil product, compared to a neighboring community (Barifaijo., Basheka & Oonyu, 2010). Libya was well known for its populations equally benefiting from oil production through ensuring monetary bonanza for example a fund for future generations and huge investment in education and health across the entire board. Currently, consensus is that in countries for example Nigeria where oil discovery has not greatly helped the population, the culprit is corruption. In the fight against corruption, it is vital that civil society organizations and groups such as NETRIGHT set up mechanisms to keep the Ghanaian state accountable particularly when oil revenues start flowing in to ensure equitable distribution. (Ikelegbe, 2015).

In most oil rich communities in Sub Saharan Africa, no commensurate development is seen especially third world countries, this led to the notion that the resources are more of a curse than a blessing, as oil production activities also bring its own hazards on the host community. Dadiowei (2013) posit that a lot of literature exist emphasizing the destructive socio-economic impact of oil wealth and traces how many oil-rich countries have turned into “resource curse”. The host communities should gain from revenue received from these resources but this has not been the reality in a lot of African oil rich states. Countries like Botswana, Norway in Africa have however been able to harness opportunities in natural resources way more than some of their counterparts in Africa. A good chunk of Botswana revenue is from the mining sector with good reserves in diamond, silver and other resources. According to UNCTAD (2017), “Botswana has managed to beat the resource curse; it has the second highest public expenditure on education as a fraction of gross national product”. Some schools of thoughts have expressed fact that the resource curse can be avoided if resources are well managed for the benefit of all. There are basically three phases of oil production: Pre-drilling activities that involves exploration, drilling and production (upstream); midstream (involves processing and transportation); and downstream (that involves distribution and sale to end users/consumers). A common characteristic in developing countries whose economy rely on oil are various problems affecting host communities as a result of the operations of oil producing companies (Akosua, 2020).

### **1.1.2 Theoretical Background**

There are various theories that talk about oil production activities on community well-being. These ranges from Peak Oil Theory, and *abiotic* oil formation theory. The finite nature of oil resources is the origin of the-peak oil theory, which states that the world’s oil production will reach a maximum

value when approximately half of the existing resources have been extracted. Peak oil doesn't mean running out of oil, as it is sometimes wrongly stated (Höök., Bardi., Feng & Pang, 2014). It simply means that the yield of extraction, in economic and energy terms, gradually declines to the point that it is not convenient any longer to invest the huge amounts of financial resources that would be needed to keep production increasing.

### **1.1.3 Conceptual Background**

#### **Oil Production**

According to Levy & Nassetta (2011), oil production refers to the quantities of oil extracted from the ground after the removal of inert matter or impurities. Oil exploration and production involve quite a number of processes which the oil industry generally group into the upstream, midstream and the downstream. Kuch (2019) noted that in South Sudan, the upstream sector handles crude oil exploration while the downstream sector involves the refining of crude oil, marketing, sale and its distribution. The midstream link the upstream and downstream sectors, activities here include storage, transportation of products through pipelines or transportation. In the course of all these oil exploration and production activities, each of these streams are at a risk and a number of things could possibly go wrong causing havoc on host communities.

#### **Community Well-Being**

According to Pfeiffer., Vilianni & Dora (2010), community well-being is the combination of social, economic, environmental, cultural, and political conditions identified by individuals and their communities as essential for them to flourish and fulfill their potential. This connotes that the community must be conducive enough for everyone to thrive individually and collectively. An important factor influencing not falling into the resource curse proposition is the enhancement of the well-being of oil communities. There has been a growing awareness all over the world for the government and companies involved in the exploitation of natural resources to give back to the communities where they operate.

### **1.1.4 Contextual Background**

South Sudan is one of the most oil reliant economies in the world. It is the major export for the country contributing over 90% to its annual revenue and annual budget, the need to increase revenue has no doubt increased demand for exploration and production of oil in South Sudan oil rich communities. South Sudan is blessed with natural resources, as reported by Goodrich (2020) "Rich in oil, iron ore and other mineral resources, South Sudan contains the third largest oil reserves in

Sub-Saharan Africa after Angola and Nigeria, estimated at 3.5 billion barrels. Reserves are found throughout the country, especially in the North, where oil production is concentrated”. Indeed, the Under-Secretary for the Ministry of petroleum, Chaung as reported by Reed of the energy voice in August 2020 noted that total production of oil currently is 170,000-172,000 barrels per day, this is below the projected total of 190,000 bpd. South Sudan’s oil come from three areas but only two are currently producing. “Blocks 3 and 7 in Great Upper Nile is operated by Dar Petroleum Operating Company, and they are producing around 130,000 bpd, which sometimes drops due to logistic and other challenges. In Blocks 1, 2 and 4, there is a production around 52,000 bpd at the moment, which is projected to be around 60,000 bpd,” The 2020 UNICEF Social Assessment Report on South Sudan noted about the Upper Nile region that despite presence of private industry-based oil drilling sites, the region remains extremely poor with negligible service lacking basic development indicators like education, health, sanitation and access to clean drinking water.

Additionally, the oil productive activities with its challenges no doubt have its effect on the means of livelihood of people in these communities. Goodrich (2020) in his report noted that “oil production need land, but access to land use is also the basis for the livelihood of communities in Melut County”. A major issue in situations like this is if landowners are adequately compensated, most times got little or no compensation from the oil companies or the South Sudanese government. This must have caused them untold hardships due to loss of income. There have been incidences of people’s land being used or polluted by oil producing companies. The forced movement of people from their lands affected the two communities under study. Referring to how production activities have endangered people’s lives. Kuch (2019) assert that “first it started with displacement of some population in Unity State, where block 1, 4 and 5A is based to Melut”. The effect of oil contamination on soil in communities cannot be underplayed, Mayen (2020) noted that “oil is the most dangerous substance that can contaminate soil and water and the contamination can biodegrade the soil for a long time, putting animals and lives at stake”. Crop and animal farming being the main vocation in these communities were definitely affected.

In research covering Jonglei, Lakes and upper Nile, Kuch (2019) noted “Overall oil spillage affected crop yield and farm income and by extension, the social and economic livelihoods of farming communities”. The level of productivity in farming no doubt has been adversely affected from the effects of by products from oil producing companies.

Nenadic & Koehler (2016) noted that “The high concentrations of lead and barium in the hair of the volunteers from Koch, Leer and Nyal prove badly disposed wastes of the oil industries to be the



source of the contamination”. These results no doubt indicate a serious need for concern as the health of people in these areas are at a risk due to oil production activities. Research carried out on Melut and Koch by Kuch (2019) showed that health challenges like fatigue and stomach pains, were increasing in the number of community members having appendicitis. It was from the above background that instigated the researcher to carry out the research on the effects of oil production activities in the Upper Nile state with focus on Melut community and Unity state with Koch as the case study. Oil wells in the Upper Nile state are managed by Dar petroleum operating company (DPOC) and Unity state oil block is managed by Greater pioneer operating company (GPOC).

## **1.2 Statement of the Problem**

There have been complaints by community members about the adverse effects of oil production on the quality of life and well-being of the population. Kuch (2019) assert that “contamination occurs during all crude production and exploration processes and negatively affect the environment which in turn reflect risk to human health through food chain such as apparition of heavy metals; lead and Barium in the hair of some of the South Sudanese people”. In September 2020, protests sprang up in Melut against Dar petroleum operating company as community members complained about pollution from oil activities causing havoc to community health. Contamination can occur in all crude oil production and exploration stages and has negative effects on the environment which then reflects risks to health of humans through food chain for example apparition of heavy metals such as Barium and lead in hair some South Sudanese men and women (Mayen, 2020). Additionally, there have also been reports of birth defects, miscarriages and other health problems among residents of the oil-producing areas in Upper Nile and Unity states. The oil companies on the other hand have refuted the link between oil production activities and health hazards in these communities. Kush (2019) asserts that “the health of the civil population in the country part of upper Nile is endangered by the exploration and production of oil activities”. Underdevelopment have plagued these communities with little infrastructures or development attributed to the oil revenue from these regions. Consequently, this spurred the need to assess the effects of oil production activities on community wellbeing

## **1.3 Purpose and Objectives of the Study**

### **1.3.1 Purpose**

The purpose of the study was to assess the effects of Oil production activities on community well-being in Upper Nile (MELUT) and Unity State (KOCH) in South Sudan.

### **1.3.2 Objectives of the Study**

The following were the study objectives for this study:

1. To analyze the relationship between upstream oil production activities and community wellbeing in upper Nile and Unity State
2. To examine the relationship between midstream oil production activities and community wellbeing in Upper Nile and Unity State
3. To assess the relationship between
4. downstream oil production activities and community wellbeing in Upper Nile and Unity State

### **1.4 Research Questions**

The study research questions included:

1. What is the relationship between upstream oil production activities and Community wellbeing in Upper Nile and Unity State?
2. What is the relationship between midstream oil production activities and community wellbeing in Upper Nile and Unity State?
3. What is the relationship between downstream oil production activities and community wellbeing in Upper Nile and Unity State?

### **1.5.0 Scope of the Study**

The scope of the study comprised of the content scope, geographical scope and time scope as follows: -

#### **Content Scope**

The study concentrated on the effects of Oil production activities on community well-being in South Sudan. Two variables were examined in this study, oil production activities with focus on upstream oil production activities, midstream oil production activities and downstream oil production activities as the independent variable and community well-being as dependent variable

#### **1.5.2 Geographical Scope**

This empirical research was conducted in Upper Nile Oil State (focus on Melut County) with oil operating activities managed by Dar petroleum operating company (DPOC) and also Unity State (focus on Koch County) oil production managed by Greater Pioneer Operating Company (GPOC). This is justified by the fact that these are the host communities, and therefore are the places that are most affected by oil production activities.

### **1.5.3 Time Scope**

Secondary information and review documents for the period from 2011 to 2021 was used, and this is the period when South Sudan got its independence thus become fully responsible for the community well-being. Secondly, the research considered November 2020 to June 2021 so that the researcher could accomplish other educational assignments within university calendar.

### **1.6 Justification of the Study**

The oil exploration and production processes lead to several risks for both human and the natural environment. The Environment Bill 2014 Mining companies in some countries are required to follow environmental and rehabilitation codes, ensuring the area mined is returned to close to its original state. One of the guiding principles of the National Environment Bill 2014 is that the polluters shall be responsible for paying for the pollution that they cause, according to Article 20 on the management of mineral resources (Garang & Bavumiragira, 2019). Polluters shall also pay a pollution tax to the Environment Fund (Article 52), that would be used to finance environmental programs at the local, state and national levels. The Environment Protection and Management Bill 2012 has provisions for Environmental Impact Assessments and Environmental Audits for projects in mining, all aimed at reducing environmental degradation and ensuring pollution control. The National Environment Policy 2012 also aims to control pollution and ensure protection of the environment and water bodies that may arise from mining activities [Akosua, 2020]. Although, South Sudan is richly endowed with many mineral resources and huge potential for secondary and tertiary industries, the oil industry is the only modern industrial sector. Despite the presence of legal framework regulating the oil exploration sector, the destruction of environment, poor waste disposal of oil pills that leads to poor health-life, environmental contamination e.t.c remain on the rise (Danga, 2020), which is less witnessed in developing countries and South Sudan in particular. The study would therefore find out the factors behind all these.

### **1.7 Significance of the Study**

The study shall be of benefit to the following people and institutions:

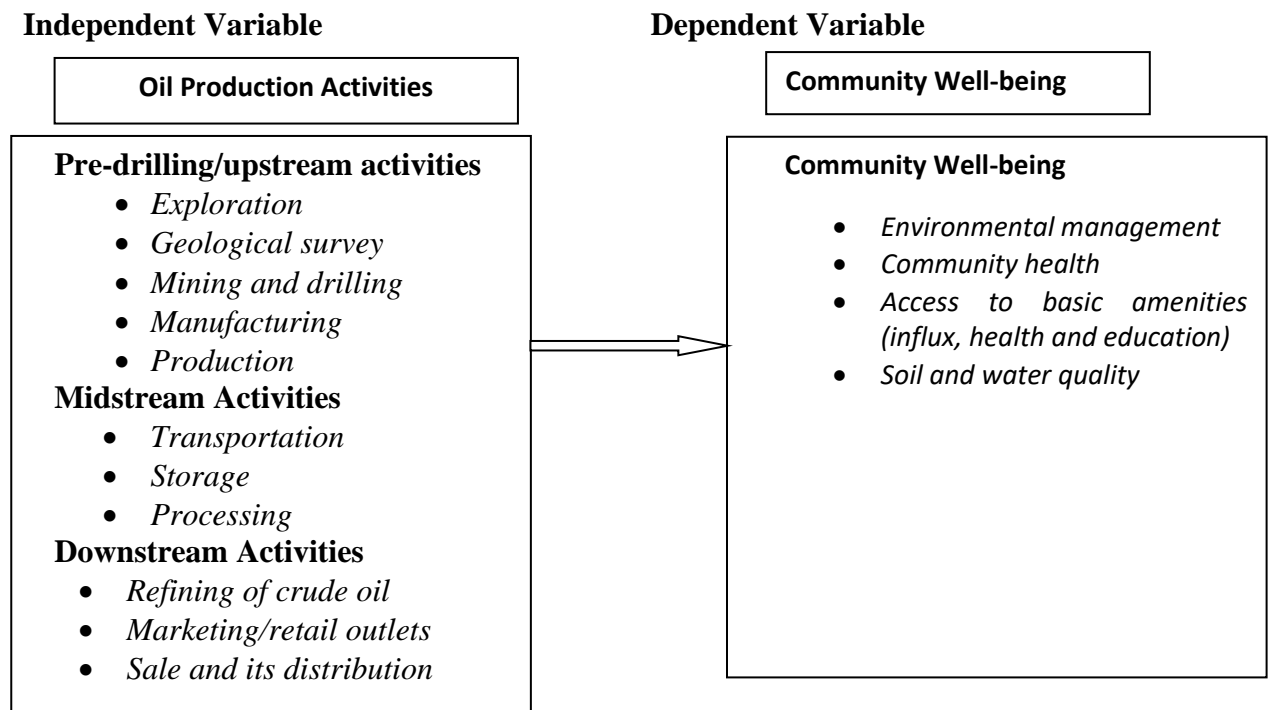
**Policy Makers:** Policy makers would use these research findings as source of information for making appropriate fiscal policy decisions. The study conclusions and references could be used to understand gaps in policy and then make policy solutions.

**Library Users:** This study adds to earlier researches that sought to investigate the relationship between natural resources and its effects on community well-being. It can also serve as a basis for further research.

### 1.8 Conceptual Framework

A conceptual framework is a tool used in research to assist a researcher in developing awareness and understanding of the situation under research and how to effectively communicate this.

**Figure 1: Concept Framework**



*Source: Developed personally for the study guided by ideas adopted from Goodrich (2020)*

Figure 1 shows the concepts related to the two-study variables namely the ‘Oil Production Activities’ as the independent variable; and ‘Community Well-Being’ as a dependent variable. There oil production activities at each stage of oil production affect community wellbeing negatively. An important factor influencing not falling into the resource curse proposition is the enhancement of the well- being of oil communities, because these communities have the resource but in the end oil production activities end up leaving them worse than they were before, therefore this study will help to enlighten how and why this happens and then the government and oil companies will come up with viable solutions to this problem.

**CONCLUSION:** The study aims at assessing the effects of oil production activities on community well-being in Upper Nile (MELUT) and Unity State (KOCH) in South Sudan. According to Levy

&Nassetta (2011), oil production refers to the quantities of oil extracted from the ground after the removal of inert matter or impurities. This has many effects on the wellbeing of people in the host communities, in many underdeveloped and developing countries, the effects have been more negative than positive. This research seeks to understand the effects of the oil production activities on community wellbeing. The study research questions include, what is the relationship between upstream oil production activities and Community wellbeing in Upper Nile and Unity State? What is the relationship between midstream oil production activities and community wellbeing in Upper Nile and Unity State? What is the relationship between downstream oil production activities and community wellbeing in Upper Nile and Unity State? The conceptual framework shows the concepts related to the two-study variables namely the ‘Oil Production Activities’ as the independent variable; and ‘Community Well-Being’ as a dependent variable.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.0 Introduction**

This chapter presents literature that is relevant to the study giving reference to the study objectives, sub-divided into three sections. The literature involved opinions and views of other scholars and researchers that are related to the topic in study. Such information had been given basing on the research objectives set. It was guided under the following study themes: the relationship between oil production activities on environmental management, the relationship between oil production activities on community health and the relationship between oil production activities on access to basic socio-economic amenities.

## **2.1 The Upstream Oil Production Activities and Community Wellbeing**

This area entails findings, studies and reports on the relationship between oil production activities and environmental management in Upper Nile and Unity State. According to Akosua (2020), up to date evidence mainly from developing countries indicates that the discovery and then exploration of high value natural endowments such as oil have instead pushed oil-producing nations into environmental disaster. Oil spills contaminate soil and water and may cause devastating explosions and fires. In support of the above, Garang & Bavumiragira (2019) further noted that the government and industry are developing standards, regulations and procedures to reduce the potential for accidents and spills and to clean up spills when they occur. Most oil spills are the result of accidents at oil wells or on the pipelines, ships, trains and trucks that move oil from wells to refineries. Oil spills contaminate soil and water, and may cause devastating explosions and fires. Oil spills can damage life that depends on it. They can also cause physical, mental, and financial stress to people as individuals.

More so, Kakuba (2013) further put forward that wildlife is negatively affected when it comes into contact with petroleum products or other contaminants found in the reserve pits and in management facilities of water. Many get trapped in oil and drown, ingest toxic elements of oil by preening or licking of their fur; or death due to cold stress when oil damages the insulation that feathers or fur provide. In locations where naturally occurring radioactive material (NORM)-bearing produced water and solid wastes are generated, poor mismanagement of such wastes may result in radiological contamination of soils or water body surfaces.

Alyssa (2020) noted that environmental impact which occurs during the production of crude oil and natural gas mostly occurs from long-term habitat change within the gas and oil field, production activities, the presence of workers and potential spills. This concurs with Ikelegbe (2015) who revealed that the major impacts of oil production activities on environmental and waste management include deforestation, ecosystem destruction, chemical contamination of land and water; long-term harm to animal populations, particularly migratory birds and marine mammals; human health and safety risks for neighbouring communities and oil industry workers, and displacement of indigenous communities.

It is noted that oil production activities have a great effect on soil and soil quality and or/ texture. Bategeka, Kiiza&Ssewanyana (2019) noted that plants grow well where air, water and nutrient resources supply plants for profitable agriculture. The Frequent crude-oil spillage into agricultural

soils, and the negative effects that follow, make the soil unproductive and toxic. This concurs with Jones & Kiesecker (2015) who revealed that the oil reduces the soil's fertility such that most of the essential nutrients are no longer available for plant and crop utilization. The enormity of toxicity by oil spillage on crop performance is exemplified in mangrove vegetation, which has been dying off in recent times. Spilled crude-oil which is denser than water reduces and restricts permeability: organic hydrocarbons which fill the soil pores expel water and air, thus depriving the plant roots the much-needed water and air.

In South Sudan, oil spillages affect soil quality and will in the end affect plants, Kush (2019) noted "from various experiments, it has been elucidated that crude oil spillage would affect plants in the following ways: inhibit the germination of plants, delay germination by inducing stress which prolongs lag phase, inhibit the uptake of water and nutrients by the root of the plant, hence causing deficiency to other parts of the leaves". However, the effect of all of these on farmlands crop cannot be over-emphasized. The aquatic sector is also not spared from the effects of oil production activities. A 2016 report on climate change in South Sudan by National adaptation program of action (NAPA) noted that the change in water quality has also had negative effects on fishing, pollution from oil industry is a serious risk to Wetlands, particularly in the Unity and Upper Nile states.

In terms of noise, Elson (2013) noted that the main noise sources during production of natural gas and crude oil may include producing wells, traffic of vehicles and compressor and pumping stations. Compressor stations produce levels of noise between 64 and 86 dBA at the station to approximately between 58 and 75 dBA at about 1 mile (1.6 km) from the location of station. In line with the above, Kakuba (2013) further revealed that the primary impacts from noise would be localized disturbance to wildlife, recreationists, and residents. Noise associated with cavitations is a major concern for landowners, livestock, and wildlife. In South Sudan, Mayen (2020) noted that the issue of noise from the use of heavy equipment in the course of exploration and production is also of great concern. Impact of noise will be localized disturbances to recreationists, residents and wildlife. The disturbance on daily life as people go about their businesses can only be imagined. No tourist would want to come to a noisy area when they have other options that can be explored.

Yager (2013) noted that the volatile fractions of the oil had a high capacity of wetting and a penetrating power and when it comes in contact with the seed, the oil enters the seed coat killing the embryo readily, which leads to reduction in percentage germination. Various experiments have elucidated that crude oil spillage would affect plants in ways such as: They inhibit the germination of the plants. Delays germination by inducing seed stress. In regard to this, hinder water uptake and

uptake of nutrients by the roots of plants causing deficiency to other plant parts such as the leaves. More so, Osuji & Ozioma (2017) noted that oil production activity affects regeneration of plant stumps, affects anatomical features of the leaves, it also causes stomatal and cellular abnormalities; and disrupts plant water balance, which indirectly influences metabolism of plants. It's known to also cause root stress, reducing growth of leaves via stomata conductance, leads to chlorosis of the leaves, and cells enlargement in different tissues because of oxygen starvation.

In-terms of oil production activities effects on plants, According to Barifaijo., Basheka & Oonyu (2010) noted that germination of seeds can be affected by oil in two ways namely: when the seeds are affected by high oil contact, oil soaks through the outer integument of the seeds hindering germination. When air oil pollution is at lower levels, seed germination becomes retarded by oil presence. Akosua (2020) put forward that oil causes damage to different parts of plants which are vital for its survival and hence hinders development and growth. Akosua observed that the leaves of plants affected by oil usually tended to get dehydrated and show a general sign of chlorosis, which implies deficiency of water. Dehydration can lead to reduced leaf area.

In terms of air quality, Akosua (2020) also observed that primary emission sources during production of natural gas and oil would include vehicle traffic, compressor and pumping station operations, production well operations, separation of oil and gas phases, and on-site storage of crude oil. Air pollution during oil and gas production may cause health effects and reduce visibility. In South Sudan, Kuch (2019) noted that “smoke and noxious smells have been causing distress and discomfort to people living in or close to production fields. Research shows that health workers in Melut and Koch indicate a positive correlation between these health issues and increased pollution from the oil industry”.

Olajire, Altenburger, Küster & Brack (2015) put forward that the oil industry, especially the exploration stage, is destructive to the environment or what Kharaka & Otton (2013) describes this as perpetuating ecological violence. Gas flaring minus emissions control pollutes the environment and releases huge amounts of carbon dioxide into the atmosphere. In Ogoniland Nigeria, two independent found that total petroleum hydrocarbons in water streams located here are between 360 and 680 times the European Community permissible levels (Kakuba, 2013). Oil spillages happen frequently in fields of oil most especially in the global south. More so, according to the UNCTAD (2017) report, between the year 2000 and 2004, around 5,400 official records of oil spills in the Niger Delta area.



Additionally, exploration of oil has serious negative implications for the survival of species in host communities. Oil spills pollute water bodies hence a threat to fishing and tourism, causing harm to bird life, and negatively affecting ecological ocean life (UNCTAD, 2017). The pollution of environment caused by oil drilling leads to destruction of livelihoods among local communities which makes it difficult for both present and future generations to earn a living using their land. In addition, Kharaka&Otton (2013) noted that farming and fishing which are the main components of these economies, literally grind to a halt with the exploration of oil. Likewise, according to Dadiowei (2013), the ten-kilometer construction of the Gbaran Deep Oil Field led to the destruction of seasonal creeks, lakes, swamp pools and other water bodies which hitherto had been relied on by fisherwomen from the Gbaran field communities for fish, shrimps and lobster. This dislodged the economic base of the women in the Gbaran communities in Nigeria leaving them with one less option for earning a living.

Kuch (2019) noted that the issue of waste disposal from oil production is another area of concern. A South Sudan parliamentary report of 2013 covering all oil producing areas managed by Greater pioneer operating company (GPOC) and Dar petroleum operating companies (DPOC) found evidence of environmental hazards resulting from the operations of the oil companies. Further research in 2018 found containers of expired chemicals in some areas in Melut, which is a threat to human health and the environment. Host communities have expressed dissatisfaction on the operations of oil companies to the detriment of the health and environment of the community. An example was Danga (2020) of the VOA news who reported that “residents around South Sudan’s Palouch and Melut fields in Upper Nile state demonstrated on Wednesday for the third consecutive day against environmental pollution caused by the oil companies”. The community members going violent and shutting down roads, airports and buildings of oil companies’ gives credibility to what some of the scholars have written. Danga also reported that “In the county of Melut, community members issued a statement on Tuesday with threats to conduct “violent” protests if the government and oil companies fail to address their demands, which include employment opportunities for local citizens, health care services, and environmental clean-up activities”. These huge numbers of complaints prove to a large extent the adversative effects of oil production activities in Melut.

Although, traditional livelihoods are no longer sustainable due to environment destruction through oil exploration, powerlessness and vulnerability of locals, especially women, puts them at a disadvantage in two ways. First, all money paid in compensation claims most times goes to male

traditional leaders and male local elites whom culture sees as owners of all land and water resources (Ikelegbe, 2015). Secondly, little efforts are made to come up with alternative livelihood means for women. Young men and women of communities near oil reserves therefore remain unemployed. According to Kharaka&Otton (2013), most jobs in the oil sector are given to highly-paid expatriates and Nigerians hailing from less marginalized parts Nigeria while most residents closest to oil fields are given casual laborer jobs to clean out oil spills or pipeline bursts. Women, as Ikelegbe (2015) put forward, are less likely than men employment in these oil companies even in such instances. Take an example of the Bagyeli of Cameroon, who lost their traditional livelihood because of the pipeline project, only about five percent got employed under the project (UNCTAD 2017).

Furthermore, the UNCTAD (2017) report didn't point out gender ratios constituted in the 5% of the Bagyeli that were lucky to get employed in oil project, Dadiowei (2013) points out that women were considered last to benefit from 'left over' trickling down effects of the oil exploration in the Gbaran area. Kakuba (2013) has pointed out that that oil producing countries are generally poor at incorporating women into the formal work force. Besides the issue that women usually lose livelihood due to oil activities without necessarily having the chance to employ in the formal sectors, degradation of the environmental, especially forest destruction has severe negative impacts on the availability of sources of energy which locals use to cooking and lighting. Among many communities in Africa for example the Gbaran of Nigeria, Dadiowei (2013), observes that traditionally labor division makes women responsible to provide and manage natural energy sources needed for sustenance of homesteads.

Barifaijo., Basheka & Oonyu (2010) observed that village commons and forests located in these communities entail different resources crucial for survival of rural homesteads, especially poor homestead, for example food, fiber, fodder, fuel wood and medicinal herbs. Therefore, environmental degradation as a result of oil activities puts an extra burden on the women, to keep on providing the energy sources despite total loss or scarcity of these energy resources. Maybe because women more than men are more affected by the negative impacts of oil discovery and exploration, they have championed efforts in changing operations of oil companies in the host community. As Ikelegbe (2015) noted, marginalization of women in host communities provides a basis for gendered movement, for example in the Niger Delta, between 2012 July and 2013 February, thousands of women stripped in front of male leaders of oil companies, which was seen as a very

extreme form of traditional social protests, this gained worldwide recognition and was adopted internationally as a protest means against oil activities and also the Iraq war. The main complaint of the women was livelihoods loss that their children faced and all negative effects that came with it. Protests were held against oil activities in the Melut region, members protested about environmental hazards caused by pollution from oil production activities. Mayen (2020) noted that Dar Petroleum Operating Company (DPOC) runs major oil fields – Block 3 and block 7 – found Melut Basin. Later, local youth in the hundreds protested lifting placards, blocked roads and demanding for the suspension of oil production activities because oil companies were ignoring obvious safety and environmental measures.

## **2.2 Midstream Oil Production Activities and Community wellbeing**

This section covers reports and studies about relationships between midstream oil production activities and community wellbeing in the Upper Nile and Unity State. According to Alyssa (2020), the most severe effects reported by cleanup workers who were exposed to oil spillages among are skin symptom, respiratory and eye irritations, dizziness, headaches and fatigue. In agreement with this, Cristina, Martin & Monotis (2016) noted that extraction of oil is a cause of extended environmental impacts which negatively affect health of people in host communities. Entire communities can be exposed to oil production related contaminations through being resident in the places where oil companies operate, mostly in low- and middle-income countries such as South Sudan. Many studies have focused on oil related contamination among workers who clean up after oil spillages, but not much effort has been put in to study health effects among people in host communities.

According to Kharaka and Otton (2013), the oil business encompasses the exploration of oil fields and the extraction of crude oil to the surface, as well as the transportation and storage of crude oil or refined petroleum products, as well as the refining and processing of crude oil. Human populations are exposed to varied levels of radiation in each of these eras. Blood lead levels among indigenous children and adults in the Peruvian Amazon were compared according to distance from home to oil fields in studies (Yager, 2013; Jones & Kiesecker, 2015). The area had high blood lead levels, but no link was found between blood lead levels and distance to oil extraction locations.

Furthermore, according to Dadiowei (2013), the most common acute consequences reported by cleanup personnel after exposure to oil spillages are respiratory, eye, and skin problems, headache, nausea, dizziness, and exhaustion. Psychological problems, a reduction in respiratory symptoms, and a decline in lung function are all long-term impacts. In some instances, genotoxicity and

hormone imbalances have also been reported and observed. Volunteers and workers participating in cleaning up after the major oil spills were also considered to have greater levels of aluminum, nickel, lead, and zinc.

According to Jones & Kiesecker (2015), three studies done in the Ecuadorian Amazon found an elevated cancer risk in exposed locations. Contamination from oil extraction exposes people to a variety of pollutants. Produced waters are derived from natural oil reservoirs and separated from oil and gas at the production facility. Produced waters were the primary source of petroleum-derived waste (Kakuba, 2013). They may contain harmful molecules from natural sources, such as polycyclic aromatic hydrocarbons (PAHs), BTEX (benzene, toluene, ethyl benzene, and xylenes), heavy metals, and radioactive elements, as well as chemicals from synthetic sources.

Bategeka, Kiiza and Ssewanyana (2019) additionally uncovered that oil spillages can harm the environment and the wild and marine-life that rely upon it. They can likewise cause physical, mental and monetary pressure to individuals as people. Yet, even at a bigger social level, similar to a local area, oil slicks can compromise the normal order of how things happen. Osuji and Ozioma (2017) further added that the people possibly more helpless with the impact of oil related pollution and not normally exposed, like babies, kids, pregnant ladies, older or individuals with past ailments are additionally at risk. For sure, natural gas flaring is additionally a typical practice in oil fields. It prompts openness to unstable natural mixtures (VOCs), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), PAHs and benzo (a) pyrene. More to the abovementioned, Olajire., Altenburger., Küster and Brack (2015) added that the wellbeing impacts among individuals staying in these areas to oil extraction related pollution have been ineffectively archived, but among the wellbeing outcomes incorporate oil field laborers and individuals living around oil fields affected by ingestion of debased waters/food varieties and by dermal contact with sullied water and additionally land during day by day exercises like washing, farming exercises and so forth all the more along these lines, people possibly more susceptible to the impact of these activities include babies, youngsters, pregnant ladies, older and individuals with past ailments.

In terms of the public health implications of crude oil industry, Levy & Nassetta (2011) mentioned that toxins from the oil resource extraction industry were also likely to also have led to emerging health problems such as rising proportion of female fertility problems, birth defects, eye problems, and even blindness and skin problems. In addition, some people experience weariness, stomach issues, and an increased risk of appendicitis. People living in or near producing oil fields are also impacted from unpleasant smells and fumes, which cause discomfort and distress

[Garang&Bavumiragira, 2019]. Per the study, health staff in Melut and Koch show a positive correlation between health problems and these oil production activities [Kuch, 2019]. A 2014 study showed that 88.5 percent of women in host communities had birthed babies with birth defects.

Positive correlation was found between the proximity to oil and gas fields and to the prevalence of congenital heart problems and neural tube anomalies in infants according to studies in the US state of Colorado [Akosua, 2020]. Oil spills from refineries, leaking pipelines, or rusted or old equipment, as well as damage from warfare, are widespread in the oil-producing areas, and have increased exposure to carcinogenic petrochemicals. Gas flaring emissions are also a serious environmental concern. Gas produced together with the oil is flared or re-injected throughout the mining process [Levy &Nassetta, 2011].

Many particles and other hazardous gases are released into to the air in oil field settings. Benzene, styrene, ethynyl benzene, ethynyl-methyl benzenes, toluene, xylenes, acenaphthylene, biphenyl, and fluorine are only a few of the toxic hydrocarbons. Some of these are well-known carcinogens, while others are projected to bring to abnormalities in fetuses [Danga, 2020]. Oil leak around Tharjat oil field, Unity, a few of those are well-known carcinogens, whereas others are believed to lead to complications in fetuses [Danga, 2020]. The high lead and barium percentages in the hair of the Koch, Leer, and Nyal volunteers show a substantial exposure to this poisonous metal. High lead contents in local well water tests demonstrate that polluted water plays an important role as a sour agent.

Acid rain precursor gases (NO<sub>2</sub> and SO<sub>2</sub>) are part of six (6) prevalent outdoor pollutants, in addition to acidic precipitation and its detrimental influence (Danga, 2020). Inhalation of fine particles produced by acid precursor gases has been related to heart and lung illnesses such as asthma and bronchitis, as well as premature death. Nitrogen dioxide (NO<sub>2</sub>) is a health hazard that also contributes to the development of the photochemical pollutant ozone. Previous research has found that animals exposed to NO<sub>2</sub> had lower resistance to bacterial and viral infection [Kharaka&Otton, 2013], but that kids exposed to high indoor NO<sub>2</sub> levels will become more prone to infection.

Sulphur dioxide (SO<sub>2</sub>) is a transient irritant, yet studies have shown that elevated SO<sub>2</sub> levels in combination with particle matter can cause minor, but measurable, momentary deficits in chronic bronchitis [Jones &Kiesecker, 2015]. Acid rain may also be connected to skin malignancies and lesions. Stomach ulcers may develop as a result of consuming acidic water, which alters the pH of the stomach and leaches the mucosal membrane of the intestinal walls. This is especially true

because South Sudanese rely largely on rainfall for drinking, cooking, washing, and other household purposes.

Another issue that arises frequently in areas near oil sources is the indigenous residents' poor overall health. There are numerous options available.

For instance, according to a UNCTAD (2017) assessment, oil and gas extraction has the potential to cause health concerns, which are exacerbated in developing nations. In the Niger Delta, for example, a study by Assessment of Health Status and the Environment in Oil Producing Areas (2014) found that diseases like respiratory illnesses, skin rashes, coughing blood, tumors, gastrointestinal problems, various types of cancers, and malnutrition were common in the local communities.

According to Ikelegbe (2015), the frequency of hematopoietic illnesses rises as one gets closer to oil fields, as well as the overall prevalence of cancer is much greater in both males and females in nations where oil exploitation has been ongoing for more than 20 years. In Ecuador, for example, cancer has been found in both males and females under the age of ten who have been exposed to oil drilling. Because it is commonly known that females bear the bulk of the obligation of caring for sick family members, a rise in the number of sick people in an oil-producing community only adds to the job load of already overworked females, the health risks can be very fatal.

According to a report published by the Sudan Tribune on April 3, 2009, 27 adult and three kids have died in Sudan since 2006 as a result of drinking contaminated water from oil fields.

Individuals in the surrounding towns have been injured and, in some cases, killed as a result of pipeline explosions. Also because oil industry's products are largely combustibles and explosives, incidents like fires and explosions can have catastrophic consequences, according to a UNCTAD (2017) report.

A pipeline breach, for example, caused an oil flood in the town of Jesse in the Niger Delta in October 1998, which ended in an explosion that killed over 700 people, mostly women and children. Although some explosions resulting in injuries and deaths have been caused by faulty pipes, others have been triggered by locals attempting to siphon some oil. Attempts to siphon oil from pipelines, however criminal they may be, are what Marxist criminologists like Bloomfield (2018) refer to as crimes of accommodation, in which poor people in local communities, in response to the destruction of their livelihood, attempt to siphon oil to sell in the open market.

In addition to medical risks posed by environmental pollution and tragedies as a consequence of industrial exploration, the inflow of migrant populations also poses a health danger to the local population by introducing new diseases.

In other cases, new settlers and migrant laborers become vectors for the introduction of previously unknown diseases into local people.

According to Dadiowei (2013), environmental damage caused by oil exploration has resulted in a scarcity of medicinal plants utilized by traditional birth attendants (TBAs) in Nigeria. The lack of appropriate and fully qualified medical workers in these areas exacerbates the problem.

Oil drilling raises the hazards and dangers that come with women carrying out their reproductive functions. These risks and dangers come as a result of a community's vulnerability to unusual diseases as a result of oil exploration (Kharaka&Otton, 2013). Expectant mothers in these areas face a unique set of challenges, including poor prenatal care and hunger.

Pregnant women who live near oil reserves have a higher mortality risk for themselves and their unborn children, according to research. Women living in villages near oil fields have a 2.5 higher chance of spontaneous abortion than other women, according to Bategeka, Kiiza, and Ssewanyana (2019). Pregnant mothers who live near oil sources are more likely to give birth to children with birth abnormalities. ChevronTexaco's oil development in the Ecuadorian Amazon has led in a number of birth abnormalities in villages near the oil fields (UNCTAD, 2017).

Women's general health is also negatively impacted by living near oil sources, in addition to reproductive issues. According to Pfeiffer, Viliani, and Dora (2010), women who live near oil fields had more skin mycosis, weariness, itchy nose, sore throat, migraine, red eyes, ear pain, diarrhea, and gastritis. As a result, it's unclear where the link between oil production and community health is in Upper Nile and Unity State, a question that this study attempted to address.

## **2.4 Downstream Oil Production Activities and Community Wellbeing**

This section contains results, studies, and reports on the relationship between oil production and fundamental socioeconomic facilities in Upper Nile and Unity States. According to Ikelegbe (2015), while the discovery of oil inspires hope and expectation that the revenue will lead to the advancement of the society and nations as a whole, in most instances, this dream has remained illusory because oil exploration has resulted in the destruction of local communities and anarchy in the oil sector.

World bank group on the South Sudan economy update in February 2020, noted that all the oil led growth may have limited the impact on the welfare of most citizens as relatively little of it tickles down and very little is spent on basic service delivery. This whole situation brings to question if the tenets of corporate social responsibility are being applied by the oil producing companies in host communities of Melut and Koch.

Barifaijo, Basheka, and Oonyu (2010) went on to say that oil, dubbed "black gold," is undeniably important in the world economy. Oil is transformed into petrol and diesel, which fuels our numerous modes of transportation and allows products and people to move throughout the world. The discovery of oil in any region, particularly developing ones, is met with considerable hope due to the enormous financial resources that can accrue from this business.

Between 2012 and 2030, it is anticipated that oil output per day in the Golden Jubilee fields in Ghana's Western region would reach 120,000 barrels, and revenue from oil and gas exploration will reach a total value of US\$20 billion (Dadiowei, 2013). J. A. Kufuor, Ghana's president at the time, expressed his excitement by saying, "Oil is money, and we need money to build schools, roads, and hospitals... We are already doing so well without oil. We're going to fly now, using oil as a shot in the arm" (Dadiowei, 2013). The rest of the world is also stimulated by the discovery and development of oil in developing countries.

Extractive activities [including oil exploration] can also have major social and political repercussions, according to the United Nations Conference on Trade and Development (UNCTADWorld)'s Development Report (2017:95). They can contribute to development by producing jobs, promoting business, and providing essential infrastructure for rural populations, such as roads, electricity, education, and health care.

In terms of water quality, Danga (2020) stated that when oil is discovered in locations where water is scarce, the water resources are stressed.

Offshore drilling poses a threat to marine life, while oil distribution and transportation provide a rising risk to the environment in the event of spills or accidents. Oil drilling, shale gas exploration, pipeline transmission, and oil tanker transportation all face the risk of accidents, leaks, and spills. The impact of oil-related contamination on both surface and subsurface waters is a severe threat. When there is an oil spill or an effluent discharge, the oil seeps into the earth and mixes with the subsurface water system (Dadiowei, 2013).

It has been discovered that cleaning up dirty underground water takes a long time. However, this subsurface water seeps into streams and wells, which are the community's primary supplies of local water, leading to an increase in water-borne diseases. In the oil-bearing enclaves, this has had an impact on the people's customary relationship with water. There is a widespread concern that, rather than providing life, these water systems have now become sources of suffering, disease, and death. Oil and water are always pumped together and must be separated.



Garang&Bavumiragira (2019) went on to say that there are large amounts of produced water stagnating in ponds with apparently insufficient treatment, such as skimming, which is ineffective. On the other hand, discarded drilling water may contain a large amount of salts, which can constitute a major hazard to the environment and aquatic ecology when salt concentrations surpass certain thresholds. [Kharaka&Otton, 2013] Petroleum pollutants in the African tropical region are complex mixes of both aliphatic and aromatic hydrocarbons. Petroleum hydrocarbons, halogenated hydrocarbons, and taste-and-odour compounds (w) are the three principal contaminants found in drinking water supplies.

The volatile organic compounds (VOCs) benzene, toluene, ethyl benzene, and xylenes (BTEX) are the most common [Danga, 2020]. Because of the extensive use of petroleum hydrocarbons and their relatively high water solubility (130 – 1780 mg l<sup>-1</sup> at 20°C), BTEX are commonly detected in water supplies, but not primarily in ground waters.

Polycyclic aromatic hydrocarbons (PAHs) with two to five fused aromatic rings, according to Bategeka, Kiiza, and Ssewanyana (2019), are of considerable concern because of their persistence in nature due to their lipophilic character and electrochemical stability.

PAHs are known to be difficult to remove from soils, and some have been recognized as carcinogens, mutagens, or teratogens. Because the Dar blend (South Sudan) crude oil is acidic in nature and contains heavy metals, the use of technologies such as high efficient halophile oil-degrading microorganisms in biological treatment should be combined with membranes (SBR) biological treatment systems for effective management of produced water.

In regards of oil and corruption, according to Pfeiffer, Viliani, and Dora (2010), corruption is linked to the harmful influence of oil exploration on local politics. Petro-states are thought to be particularly corrupt. According to a UNCTAD (2017) document, the oil industry's large spending and contract distribution might lead to corruption in countries. According to Kuch (2019), countries that rely on oil revenues have higher levels of corruption because the resources are frequently misappropriated by corrupt leaders and officials, in addition to scoring low on the Human Development Index. For instance, in Nigeria, the oil industry provided a chance for corrupt officials to profit themselves, which they actually did to enrich themselves instead developing the country.

Equatorial Guinea also serves as a wonderful example of how corruption may undermine the potential benefits of oil wealth. Equatorial Guinea's GDP rose at a quicker rate than any other country in the world between 1997 and 2001 (Kakuba, 2013), and by 2003, its GDP per capita was estimated to be \$5,310, one of the highest in Africa (Kakuba, 2013). Equatorial Guineans, on the other hand,

are unaffected by this wealth; the government spends far less on health and education than many other African countries, even petro-states.

Equatorial Guinea's government spent only 1.23 percent of its budget on health during a period when its GDP increased at a greater pace than any other country in the world, compared to 3.4 percent in Cameroon, 5.95 percent in Nigeria, 10.6 percent in Mozambique, and 12.1 percent in South Africa (Kakuba, 2013).

In the field of education, a similar story can be told. "Living conditions for the majority [of Equatorial Guineans] have... deteriorated despite a substantial growth in GDP per capita," Kharaka&Otton (2013) write. The President and his close family members appear to be the true recipients of Equatorial Guinea's oil wealth; his eldest child is the Minister of Infrastructure, his second child is the Deputy Oil Minister, and other friends and family associates run employment agencies that require party membership before providing jobs in the oil industry to citizens.

Similarly, Barifaijo, Basheka, and Oonyu (2010) contend that the major benefactors of the oil exploration operations in Sao Tome/Principe (STP) are the owners of ERHC/Chrome, particularly Emeka Offor; the latter's owner and one of the major financial backers of the PDP, Nigeria's administration at the time. A coalition with only \$1.5 million in cash and \$30 million in market capitalization could find a partner with \$50 million to buy an oil concession for which they did not have to pay a signature bonus in this agreement, which the group in issue obtained without competitive bidding. Furthermore, they possessed future entitlement to benefits that should have gone to citizens.

Oil revenue is unlikely to trickle down to local communities, much less the women in these communities, for who access to social amenities such as piped water would mean fewer distances travelled in search of water, or a good transportation system would mean fewer chances of dying during childbirth due to an inability to access a medical center.

In regards of oil and forced forced relocation, Dadiowei (2013) went on to say that forced resettlements have also been linked to the expansion of extractive sector. For example, the Sudan Tribune reported on April 3, 2009 that hundreds of people in Sudan were forcibly removed to make way for a low-sulphur crude oil business in South-Central Sudan. The inhabitants of this village lost their ancestral homes, perished of contamination, and had their livelihoods jeopardized as a result of this forced expulsion.

Agriculture is the primary source of income for a large number of African households, and as authors such as Bategeka, Kiiza, and Ssewanyana (2019) have shown, African agricultural systems rely just

as much on the efforts of women as they do on the efforts of men. Men, on the other hand, are more likely to be cash crop farmers, while food crop farmers are often the poorest in our societies (Danga, 2020). Forced resettlements that jeopardize the livelihoods of women food agricultural producers place an unnecessary strain on them and their families as they try to adopt alternative income patterns to support their already income households.

Kharaka&Otton (2013) added that one of the important effects of oil exploration on communities near oil reserves is its impact on cultural practices, specifically the ways in which otherwise benign cultural practices may become problematic in the face of changes resulting from the discovery of oil. The manner, in which commercial sex work can grow, with possibly more severe repercussions in such communities, is a good example. As previously stated, oil exploration reduces the viability of farming and fishing as viable economic activities, increasing the likelihood those women will choose commercial sex work for money as a way of survival.

Furthermore, according to Kuch (2019), the presence of foreign oil workers, who are generally paid well as expatriates, makes commercial sex activity potentially more lucrative in such places. "See, in our (Ogoni) neighborhood, we have young girls from Lagos, Warri, Benin City, Enugu, Imo, Osun, and other areas of Nigeria here every day and night going after the white guys and staff of Chevron, they are practicing prostitution," a Nigerian female activist explained.

According to Dadiowei (2013), Gbaran villages are seeing an upsurge in the number of adolescent moms with fatherless children. While social historians such as Kharaka&Otton (2013) and Dadiowei (2013) on Ghana and Kenya, respectively, show that commercial sex labor is not a new creation in Africa, the nature, scope, and repercussions of such activities in our current environment are more concerning. Despite the fact that this era has seen the development of potentially lethal sexually transmitted illnesses such as HIV/AIDS, our women still have little power to negotiate safer sexual practices (Levy &Nassetta, 2011).

Whether it's commercial sex workers who are more vulnerable to sexually transmitted infections like HIV/AIDS or teenage mothers who are left to care for their children alone, the destruction of the structures that provide livelihoods for women in oil-producing communities places an undue burden on them.

The data so far demonstrates that the discovery and exploration of high-value natural resources, such as oil, has thrown oil-producing states into chaos and violence, particularly in developing countries. According to Levy &Nassetta (2011), the exploration of natural resources has generated at least 18

violent confrontations since 1990, including as the Democratic Republic of Congo, Angola, Cambodia, Darfur in Sudan and the Middle East.

These armed conflicts within states might be national or limited to a certain region of the country. In some circumstances, inequalities in the allocation of oil income impact intra-state armed conflicts, particularly when local people near oil sources are disadvantaged, as is the case in Nigeria's Niger Delta. Insurrection is on the rise in Nigeria, according to Ikelegbe (2015), which is accompanied by frequent attacks on oil sites and an increase, in the abduction of foreign workers (over 100 between 2006 and 2007). As a result, it's unclear whether there's a link between oil output and community well-being in Upper Nile and Unity State.

## **2.5 Summary of the Literature Review**

Large populations may be exposed to oil extraction-related contamination as a result of living in areas where oil extraction is carried out, particularly in developing nations like South Sudan. Although oil industry personnel and oil spill cleanup professionals are aware of the negative health and environmental effects of exposure to oil extraction related substances, there are surprisingly few research concentrating on populations that are exposed at home (Kakuba, 2013). According to a United Nations Environmental Programme (UNEP) assessment, there is a need for research through the conduct of methodologically sound studies in exposed populations around the world.

Individual exposure assessments should be included in such investigations. There is currently sufficient technology to enable for the gathering of biological samples in remote places and transportation to laboratories using solar-powered freezers. As a result, future studies should include biomarkers of exposure and effect such as metal levels in blood/urine, lead isotopic ratios to trace sources, measurement of 1-hydroxypyrene in urine, presence of PAHs DNA adducts, evaluation of chromosomal damage by comet assay or micronucleus test, among others.

Such research should be promoted in order to better understand the health risks associated with residential exposure to oil-related contamination, to support effective control policies to avoid such contamination, and to maintain public health recommendations and policies to avoid exposure in places that are already contaminated. The majority of studies were qualitative and did not provide us with any information about the link between the research variables. The researchers did not pay close attention to the factors in this investigation.

This therefore, created a knowledge gap. It is imperative to investigate the three variables which are oil production activities, in relation to environmental and waste management, access to social

amenities and community health. Considering the above, the current study focused more on oil production activities and community well-being.

As a result, there was a knowledge gap. The three factors of oil production operations in connection to environmental and waste management, access to social amenities, and community health must all be investigated. In light of the foregoing, the current study concentrated on oil production and community well-being.

## **CHAPTER THREE: METHODOLOGY**

### **3.0 Introduction**

This chapter presents the following aspects to be covered, research design, sources of information, population and sampling techniques, variables and indicators, measurements levels, data collection methods, data collection instruments, procedure for data collection, quality/error control, strategy for data processing, analysis and interpretation; ethical considerations and approvals and methodological constraints.

### **3.1 Research Design**

The study used a cross section survey design. A cross-sectional survey design involved data being collected at a single point in time from a cross section of respondents. The cross-sectional design was cheap and simple to use, since data was collected from a cross-section of respondents at a single point in time. This research adopted a mixed approach, using quantitative and qualitative methods. According to Amin (2005), the mixed methods research allows for methodological diversity, complementarily of approaches and both inductive and deductive reasoning.

### **3.2 Area of Study**

The research study focused on Melut county in the upper Nile state and Koch in the Unity State of South Sudan. These two oil rich communities are of interest as Grawert (2015) asserts that blocks 3 and 7 in Melut and Maban counties, Upper Nile state, the largest oil producing areas in the country has been less studied than the older oil areas in neighboring unity state. The researcher focused on Melut from the new oil area and Koch from the older oil producing area. The study looked into the effect of oil production; challenges associated with oil production and explore solutions to these challenges affecting community well-being in these areas

### **3.3 Sources of Information**

Primary and secondary data were used to collect data for the research. Primary sources (qualitative): data was collected using semi-structured interviews held face to face or using internet mediated channels. This gave the researcher the opportunity for fact finding getting the perspectives of community leaders, employees of oil operating companies and the Ministry of Petroleum. The interviews consisted of a series of questions recorded with the consent of the interviewees; this recording was fully transcribed and coded into themes. Quantitative approach: Questionnaires were designed by the researcher using Likert scale methods. The questionnaires were targeted at

households (community members) in Melut and Koch on the effects of oil production activities; and how this had affected their well-being. The secondary data: Dar petroleum operating company and Greater petroleum operating company annual reports, oil exploration and production guidelines from ministry of petroleum, standard operating practices manuals, corporate social responsibility reports for area understudy, internet sources, books, journal and other sources of information.

### **3.4 Population and Sampling Techniques**

#### **3.4.1 Population**

The population comprised of the household/community members in different Payam of Melut and Koch, community leaders, employees of oil operating companies and the Ministry of Petroleum. These were contacted for the information required for success of the study. They were considered to give the researcher valuable views about the study problem at hand which made the findings more credible; and probably gave the best solutions to the key findings. According to Southern Sudan counts (2010) report on the census of 2008, Melut has a population of 49,242 with number of households of 7,523, while Koch has a population of 74,863 with household number of 11,366, but only those households (equivalent to 81) directly benefiting from Oil exploration activities are considered. Therefore, the total population was equivalent to 324, taking assumption that each household has 2 parents and 2 children. The choice was made in order to enable the researcher get adequate representation of the whole population.

#### **3.4.2 Sample Size Determination**

By use of Krejcie & Morgan (1970) table, out of 324 population sample, a sample size of 136 participants were selected for this study. This included; eighty one (81) community members in Melut and Koch (one from each household), twenty (20) community leaders, twenty (20) employees of oil operating companies and the fifteen (15) Ministry of Petroleum. Such participants helped the researcher to get variety of views so as to make the study findings more reliable and comprehensive for the benefit of this society.

#### **3.4.3 Sampling Techniques**

Creswell (2014) asserts that sampling can be used to represent a population with some level of 'confidence'. Certain sampling strategies actually allow you to calculate the statistical probability that your findings are representative of a greater population. Sampling is therefore key to making

research affordable and, if done with integrity, also credible. The study was based on purposive and simple random sampling.

#### **3.4.3.1 Purposive Sampling**

Purposive sampling was used to select community leaders, employees of oil operating companies and the Ministry of Petroleum from whom the researcher got specific information. These officials were interviewed from their place of work, and they were selected and used in order to obtain reliable and valid information. It is imperative to note that participants provided their responses, they were interviewed and their responses were well captured. In this case, the researcher conducted interviews with community leaders using the purposive sampling techniques, focusing on some of the community leaders in different Payams. The two community development managers for Melut and Koch from Dar petroleum and Greater petroleum operating companies were also interviewed.

#### **3.4.3.2 Simple Random Sampling**

The community members in Melut and Koch were simple randomly selected. Simple random sampling technique was used in selecting them in order to avoid bias. In this case, the sample size was determined using information on survey system calculator online with 90 percent degree of accuracy which was the confidence level, confidence interval (margin of error at 8 percent and population (number of households in Melut (7,525) and Koch (11,366) according to 2008 census. Sample size for Melut and Koch using this method equals 170, total number of questionnaires administered were 81; one from each household. Simple random sampling was advantageous because it's ease of use and its accurate representation of the larger population. In statistics, a simple random set is a subset of individuals (sample) chosen from a larger set (population).

### **3.7 Procedure of Data Collection**

The researcher obtained a letter of introduction from Research Ethics Committee as well as Faculty of Business and Administration of Uganda Christian University, to conduct research. This later was presented to the concerned respondents. For the interviews, an email was first sent introducing the researcher and purpose of interview, time was then agreed on when the interview should take place in person or using internet mediated channels. The researcher requested for secondary data from community development managers of oil operating companies and Ministry for Petroleum. The next step is the writing and presenting the research to the supervisor for determining the level of knowledge (of the researcher) in research work. This was followed by a pilot study into the study area for the purpose of acquainting the assessors with field challenges that renders the study unsuccessful.



### **3.8 Data Collection Methods and Instruments**

Several methods and tools were of great importance in obtaining data from the field of study. They comprised of the following.

#### **3.8.1 Survey**

Questionnaire provides the most speedy and simple technique of gathering data about groups of individuals scattered in a wide and extended field. In this method, a questionnaire form is sent usually by post to the persons concerned, with a request to answer the questions and return the questionnaire. Fundamentally, the questionnaire was a set of stimuli to which illiterate people are exposed in order to observe their verbal behavior under these stimuli.

**Questionnaires:** The community members filled in questionnaires. The developed questionnaires were distributed to households in Melut and Koch and retrieved from the respondents in person. This process of distribution and retrieving of the questionnaires in person was taken for two reasons as suggested by Katebire (2007), first, to make sure that the questionnaires get to the intended recipients and secondly, to help improve the response rate.

#### **3.8.2 Interviewing**

Interviewing is a method of collecting data in which the selected participants were asked questions in order to obtain information on issue(s) of interest and took a structured, or unstructured (open ended) form (Katebire, 2007). Structured focus group interviews are those which will be conducted when it's known at the outset what information was needed and of a list of predetermined questions asked of everybody in the same manner with the aid of a formal interview schedule.

#### **3.8.3 Documentary Review Check list**

Documentary reviews were utilized. In this study, the researcher used written documents to provide the qualitative data such as opinions on the study problem. These included past dissertations, reports, manuals and other written documents. Statistical records provided important information related to the study. The documents reviewed helped in gaining a sense of the situation on the study variables.

### **3.9 Data Quality Control**

Data quality control techniques ensures that data collected was valid and reliable; the instruments were first tested to ensure validity and reliability.

### **3.9.1 Validity of Instruments**

Validity is the extent to which the instrument gives the correct answer. It is the degree of congruence between the explanations of the phenomena and the realities of the world (Sekaran, 2003). The validity of the questionnaires was determined by pre-testing the instruments. Pretesting was done by administering to respondents within the study population but outside the sample. Questionnaires were also scrutinized question by question and those deemed irrelevant was dropped in the real data collection tool. Results from the field and opinion of the researcher helped to identify gaps and made modifications to the instruments.

To ensure validity, the researcher implored three methods namely:

- Picked questions from questionnaires that have already been used to test the variables, being studied in this research.
- Computed the content validity index, in order to make sure that the research item truly measures the variables being studied.
- Talked to experts in the same field to validate the research instrument.

### **3.9.2 Reliability of Instrument**

Reliability is the extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study could be reproduced under a similar methodology, then the research instrument was reliable (Stephanie, 2016).

To ensure the reliability of the instrument, the researcher pre-tested the questionnaire and computed the Cronbach Alpha Coefficients, for measurements that produced alpha coefficients less than 0.6, were considered as unreliable.

## **3.10 Strategy for Data Processing, Analysis and Interpretation**

This section shows how the data was processed, analyzed and interpreted.

### **3.10.1 Quantitative Data Analysis**

Community members provided quantitative data, they answered questionnaires. The quantitative data was analyzed using Statistical Package for the Social Sciences (SPSS); descriptive statistics were deployed to generate frequencies and percentages which were used to present the findings in tables. This was useful and helped in generating tables for easy presentation and interpretation of the study findings. The Pearson Correlation Coefficient, Analysis of Variance and Regression Analysis were used to analyze quantitative data. According to Sekaran (2003), a correlation study is the most

appropriate to use to conduct relationships in a natural environment of an organization with minimum interference by the researcher and no manipulation.

### **3.11 Ethical Considerations and Approvals**

There are several reasons why it was important to adhere to ethical norms in research. First, norms promote the aims of research, such as knowledge, truth, and avoidance of error. The ethics framework is essential as it entails the voluntary informed consent of the participants.

#### **3.11.1 Ethical Consideration**

Ethical clearance was sought from Research Ethics Committee as well as Faculty of Business and Administration of Uganda Christian University to conduct research. Permission to carry out the study in Local Leaders in Upper Nile (MELUT) and Unity State (KOCH); and Oil Petroleum Companies for the selected departments. The researcher ethically considered the privacy or the secrets of her respondents, their names and responses were not disclosed and this left both the researcher and the respondents in clear terms and conditions that it allowed smooth research and data collection.

#### **3.11.2 Informed Consent**

Informed consent form that elaborates on the purpose of the study was filled by all those who participated in the study. Sometimes, verbal consent was also obtained from the participants to enhance confidentiality of the research which increased their participation. The respondents and participants were also informed that participation in the study was voluntary and they had a right to accept or decline to participate or withdraw from the study anytime.

#### **3.11.3 Participants' Confidentiality**

In trying to protect participants' confidentiality, each participant's record were given a unique ID number. Participants gave written consent before participating and confidentiality and anonymity were emphasized at every stage. Data identifying individual subjects were restricted to those involved in the study. Participants were adequately informed about the procedures of the data collection and the survey remained anonymous (no provision for identifying the participant on the survey questionnaire to exist). Names and other identifying information from subjects were obtained for quality assurances purposes only and no individual was identified by any study report.

### **3.12 Study Methodological Constraints**

The study was limited by the following obstacles:-

Time constraint: Given the deadline for the dissertation, the researcher had few weeks to administer questionnaires, conduct interviews and gather secondary data. Careful planning with timelines was used to achieve targets.

There was a limitation of scheduling the interviewees considering that the researcher was here in Uganda, and the case study is South Sudan and most of the perfect respondents were in South Sudan. It was also probable that some offices had protocols for them approached which was such a limitation to the researcher in question. In order to mitigate this aspect, the researcher sought consider visiting the education office of the South Sudan educational attaché at the Embassy of Uganda as a lee way to ensure that she got the necessary help to approach some of these offices. The researcher explained her topic and get recommendation from these offices.

Limited access to company information: Bureaucracy in organizations caused delay in getting approvals to release reports essential to the proposed dissertation.

There was a limitation on reliance of interviews data, with the use of interviews; it was hard to control the respondent behavior because some of the interviewees are sensitive to some of the interview sections and questionnaires as a whole. The researcher mitigated this through providing reliable explanations in as far as the questionnaires were presented which helped the respondents to fall in line.

Availability of research material: The research material available to the researcher was insufficient, thereby limiting the study. But this was solved by the researcher through visiting internet to get more literature information concerning the study.

There was also a challenge of COVID-19 pandemic which made it difficult for social interaction with the participants. The researcher however used technology in overcoming some of these problems. The researcher ensured that she posted most of the tools to the responsible participants through email and also endeavors to see how to create online meetings like the zoom meetings which helped the researcher to lessen the burden she had in regards to conducting of the researcher at hand.

**CONCLUSION:** This chapter looked at the following aspects, research design which was a mixed design with both qualitative and quantitative methods, the sources of information which were primary and secondary data, population and sampling techniques, variables and indicators, measurements levels, data collection methods, data collection instruments which were questionnaires and interviews, procedure for data collection, quality/error control, strategy for data processing, analysis of the data which was done using SPSS to find the correlation and regression analysis and interpretation, ethical considerations among others as has been explained in the above chapter.

## CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

### 4.0 Introduction

This chapter deals with the presentation, analysis and interpretation of the findings collected from the field in an attempt to assess the effects of Oil production activities on community well-being in Upper Nile (MELUT) and Unity State (KOCH) in South Sudan. The findings are presented according to the research questions. They are presented in frequency tables. The findings are coined to the purpose of the study and are analyzed within the theoretical frame work. It presents the collected data in a more organized and summarized way, guided by the study objectives and research questions as follows:-

- 1) What is the relationship between upstream oil production activities and community well-being in Upper Nile and Unity State?
- 2) What is the relationship between midstream oil production activities and community well-being in Upper Nile and Unity State?
- 3) What is the relationship between downstream oil production activities and community well-being in Upper Nile and Unity State?

From the field study, the biographic characteristics of respondents are however presented first.

### 4.1 Demographic Characteristics of the Respondents

This section presents demographic characteristics of respondents that include; gender, education level and duration in this community. This information was obtained from community members in Melut and Koch, community leaders, employees of oil operating companies and the Ministry of Petroleum. Findings are presented in the Table 1 below.

**Table.1: Showing demographic characteristics of respondents**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage</b>
Male	70	51.5
Female	66	48.5
<b>Total</b>	<b>136</b>	<b>100</b>
<b>Highest Education Qualification</b>		
Never been to school	10	7.4
Primary level	20	14.7
Secondary level	25	18.4

Certificate/Diploma holder	19	13.9
Bachelors' Degree	45	33.1
Masters' Degree	12	8.8
PhD holder	5	3.7
<b>Total</b>	<b>136</b>	<b>100</b>
<b>Duration at this community</b>		
1 – 5 yrs.	96	70.6
6 – 10 yrs.	22	16.2
11 years & above	18	13.2
<b>Total</b>	<b>136</b>	<b>100</b>

*Source: Primary Data (2021)*

The sex was one of the variables the study analyzed. This was intended to find out whether the sample selected was balanced in terms of gender. Out of the 136 respondents interviewed, the researcher found out that 51.5% of the respondents were male while 48.5% were female as shown in Table 1 above. This implies that most respondents were male, and this means that majority of people involved in oil production activities in Upper Nile (MELUT) and Unity State (KOCH) being men because of the nature of its subjects and work that need energetic men.

Respondents were asked to avail the researcher with information about their level of education. From the field study, most of the respondents' attained bachelors' degrees that is, 45(33.1%), followed by 25(18.4%) who had secondary level qualifications, 20(14.7%) with primary level; 19 (13.9%) had certificate/diplomas; 12(8.8%) with Masters' Degree, 10(7.4%) never been in school and only 5(3.75) were PhD holders. Those participants with certificate/diploma, bachelor's degree, masters and few with PhD with mostly employees in the Oil companies. Most of the community members either had primary or secondary level of education; and few of them never went to school. This could be as a result of civil wars that has been in South Sudan for centuries.

More so, respondents were further asked to reveal the time period they have spent in this community of Upper Nile (MELUT) and Unity State (KOCH) in South Sudan. It was found out that 96 (70.6%) of respondents have been in this community between 1 – 5 years, followed by those who revealed of 6-10 years with 22 (16.2%) and the least of the respondents 18 (13.2%) revealed of 11 years and above.

#### 4.2 Descriptive Statistics for the Study Variables:

Table 4.2 below shows the descriptive statistics of the study variables, including the means and standard deviations:-

Table .2: Showing the descriptive statistics for the study variables

##### Descriptive Statistics

Oil Production Activities( Upstream, Midstream and Downstream) and Community Wellbeing in Upper Nile and Unity State	N	Mean	Std. Deviation
In our areas, oil production activities contaminate soil and water and may cause devastating explosions and fires	81	4.8642	.34471
Oil production activities has a great influence on wildlife ecosystem	81	4.6296	.48591
Mismanagement or improper disposal of oil wastes can result in radiological contamination of soils or surface water bodies.	81	4.5802	.49659
In our areas, oil production activities	81	4.5309	.50216
In our area, discharge of produced water inappropriately onto soil or into surface water bodies can result in salinity levels too high to sustain plant growth	81	4.4074	.58689
In our area, oil production activities leads to chemical contamination of land and water	81	4.4321	.49845
In our area, oil production activities leads to deforestation and ecosystem destruction	81	4.3333	.52440
In our areas, oil production activities has a great effect on soil and soil quality and or/ texture	81	4.2593	.64765
In our areas, oil production activities has led to noise and air quality	81	4.1111	.72457
In our areas, oil extraction involves several environmental pollution processes	81	3.1235	1.15523
Valid N (list wise)	81		

Findings from the table above revealed that majority of the respondents strongly agreed with the statements that oil production activities contaminate soil and water and may cause devastating explosions and fires as depicted by mean score of 4.8642 and standard deviation of 0.34471. The findings are in line with Akosua (2020) who denoted that Oil spills contaminate soil and water which may cause devastating explosions and fires. This implies that Oil exploration can damage life that depend on environment, cause physical, mental and financial stress to people in an area.

Findings further indicated that majority of respondents agreed that Oil production activities has a great influence on wildlife ecosystem as shown by means score of 4.6296 and standard deviation of 0.48591. The findings are in line with Bategeka, Kiiza and Ssewanyana, (2019) who said the presence of production wells, ancillary facilities and access road reduces the habitat quality, disturbs the biota and thus affects ecological resources. This implies that the presence of an oil or gas field interferes with migratory and other behaviors of wildlife.

Results further revealed that majority of the respondents agreed that mismanagement or improper disposal of oil wastes can result in radiological contamination of soils or surface water bodies as shown by the mean score of 4.5802 and standard deviation of 0.49659. This is in an agreement with Alyssa, (2020) who denoted that environmental impacts do occur due to mismanagement production of crude oil and natural gas which leads to radiological contamination of soil, and water bodies. This implies that improper management of oil exploration wastes greatly damages the surface.

The findings further indicated that majority of the respondents agreed that discharge of produced water inappropriately onto soil or into surface water bodies can result in salinity levels too high to sustain plant growth, oil production activities leads to chemical contamination of land and water, oil production activities leads to deforestation and ecosystem destruction, oil production activities has a great effect on soil and soil quality and or/ texture and oil production activities has led to noise and air quality as indicated by mean score and standard deviation of 4.4074 = 0.50216, 4.4321 = 0.49845, 4.3333 = 0.52440, 4.2593 = 0.64765 and 4.1111 = 0.72457 respectively.

Results also revealed that majority of the respondents were indifferent with the statement that oil extraction involves several environmental pollution processes as shown by the mean score of 3.1235 and standard deviation of 1.15523. This is in agreement with Akosua (2020) who said the



primary emission sources during the production of crude oil and natural gas like compressor and pumping station operations, vehicle traffic, production well operations, separation of oil and gas phases, and on-site storage of crude oil do not go through environmental pollution processes.

In addition to the above, the interviewed participants had this to say;

*“...during oil and gas production, so-called ‘produced water’ comprises the largest byproduct stream. In addition, many oil and gas operations are augmented via injection of hydraulic fracturing (HF) fluids into the formation. Both produced water and HF fluids may contain hundreds of individual chemicals, some known to be detrimental to public health and the environment. This water is known to be acutely toxic, some are carcinogenic, and others are believed to be endocrine-disruptors’. This means that contamination of soil and water may occur through spills of fluids during drilling and fracturing processes and during transport by truck or through wastewater pipelines and failure of well casings and equipment failures and corrosion of pipes and tanks; which results into surface water contamination and ultimately soil.”*

It was also noted that Oil production activities has a great influence on wildlife ecosystem. Interviewed participants noted that;

*“Oil production and spills also affect animal and human health. People who clean up the spill are more at risk. Problems could include skin and eye irritation, neurologic and breathing problems, and stress. Habitat destruction is all too obvious with an oil spill. The most visible would be seen on shore, but beneath the water there is a very delicate balance in the reefs and shallow water habitants’. This means that Oil and gas extraction is a menace to wildlife. Loud noises, human movement and vehicle traffic from drilling operations can disrupt avian species’ communication, breeding and nesting. The infrastructure build for energy development can also get in the way. Power lines, well pads, fences and roads fragment habitats for many species. Oil also weighs down the bird, keeping it from flying. If a bird is not cleaned of the oil, it’s a sure license to death. Many birds also ingest deadly amounts of oil trying to clean their feathers.”*

It was further noted that mismanagement or improper disposal of oil wastes can result in radiological contamination of soils or surface water bodies. Interviewed participants noted that, “during oil extraction on land, drilling fluids are injected into the well for lubrication. These oil-based fluids known as ‘mud’ are supposed to be captured in lined pits for disposal, but they are

often spilled and splashed around the drilling site. Indeed, big and small, oil spills have been steadily increasing in the top producing states.” This means that oil spills have long-term environmental impacts and devastating effects on animals through direct contact, inhalation and ingestion of toxic chemicals. Oil spills trigger long-term ecological changes by damaging animals’ nesting or breeding grounds.

Additionally, it was noted that discharge of produced water inappropriately onto soil or into surface water bodies can result in salinity levels too high to sustain plant growth. Interviewed participants noted that, “Oil production activities sometimes leads to slick on water surface. This layer, called a slick, expands until the oil layer is extremely thin and can spread hundreds of miles wide. This layer is called sheen and is usually less than 0.01mm thick.” This means that oil spills on the surface of the water are subjected to the whims of weather, waves and currents. Thus, oil spill far out at water bodies can be carried ashore by wave and current action.

In addition, Oil production activities leads to chemical contamination of land and water. Interviewed participants noted that;

*”Oiled birds for instance can lose the ability to fly, dive for food or float on the water which could lead to drowning. Oil interferes with the water repellency of feathers and can cause hypothermia in the right conditions. As birds groom themselves, they can ingest and inhale the oil on their bodies.”*

This means that oil spill effects on environments and habitants can be catastrophic: they can kill plants and animals, disturb salinity/PH levels, and pollute air/water and more.

From the field study, it was found out those Oil production activities leads to deforestation, tree cutting and ecosystem destruction. Interviewed participants noted that;

*”infrastructure built for oil extraction can leave behind radical impacts on the land. The construction of roads, facilities and drilling sites known as well pads requires the use of heavy equipment and can destroy big chunks of pristine wilderness; and the damage is often irreversible.”*

The above study finding implies that oil production activities have been involved in stripping the environment of vegetation, increased erosion, which can lead to landslides, and flooding, disturbing the land's ground surface and seriously fragmenting unspoiled wildlife habitats.

From the field study, it was noted that Oil production activities has a great effect on soil and soil quality and or/ texture. Interviewed participants further noted that, 'Oil reduces the soil's fertility such that most of the essential nutrients are no longer available for plant and crop utilization. The enormity of toxicity by oil spillage on crop performance is exemplified in mangrove vegetation, which has been dying off in recent times'. This means that spilled crude-oil which is denser than water, reduces and restricts permeability: organic hydrocarbons which fill the soil pores expel water and air, thus depriving the plant roots the much-needed water and air.

Furthermore, it is noted that Oil production activities has led to noise and air quality. Interviewed participants noted that, 'Oil production are among the main culprits of air pollution, which is one of the world's biggest killers. When fossil fuels are burned by power plants, automobiles and industrial facilities, they generate toxic gases. Breathing this air can trigger respiratory problems such as asthma, cardiovascular diseases, developmental issues and even cancer'. This means that Oil production activities tend to create a lot of noise to the community, and in most cases have greatly contributed to the contamination of air quality as a result of pollution.

In addition, is noted that Oil extraction involves several environmental pollution processes. Interviewed participants noted that, 'most dirty emissions from fossil fuels. The most abundant type of greenhouse gas is carbon dioxide, primarily released into the air through the burning of oil, coal and gas that fuel everything from cars to manufacturing. Another gas, methane, is released during the extraction of natural gas through the method of 'fracking'.

Last but not least, it is further noted that Oil production activities contribute to climate change. Interviewed participants noted that, 'as a fossil fuel, its combustion contributes to polluting emissions, especially of carbon dioxide, one of the most dangerous of the greenhouse gases. The activities of the oil and gas industry and unsustainable consumption of this energy has resulted in an increase in the amount of greenhouse gases trapped in our beautiful blue planet, which over the centuries has resulted in climate change with its hydra-headed challenges'. This means that as the earth's average temperature continues to rise with the accumulation of greenhouse gases in the atmosphere, the stable functioning of earth's natural systems adjusts to the new, high-carbon

reality and society begins to witness the effects of an altered natural environment and its impact on our lives and livelihoods.

#### 4.4 Upstream Oil Production Activities and community wellbeing in Upper Nile and Unity State

The question was posed to assess the relationship between oil upstream oil production activities and community wellbeing in Upper Nile and Unity State. Findings are indicated in Table 10 below:-

**Table 7: Mean and standard deviation (descriptive statistics) of the different variables**

Upstream Oil production activities and community wellbeing	Level of Agreement	
	Mean	Std. Deviation
Upstream Oil production activities leads to infrastructure development like road network	3.90	1.129
Upstream Oil production activities has an influence on education attainment	3.66	1.142
Upstream Oil production activities has an influence on health accessibility	4.46	.890
Upstream Oil production has led the rise of the national GDP and foreign direct investment	4.32	.872
Upstream Provision of machinery and equipment in the oil production help in the build-up of local industrial capabilities by contributing to skills formation	4.40	.805
Oil production activities is associated with rise in corruption	4.60	.615
Oil production activities is linked to forced resettlements and displacement of indigenous communities	4.06	1.131
Oil production activities has an influence on the government expenditure	4.05	1.161
Oil production activities leads to high noise, scaring away animals, thus reduction in tourism	4.05	.998

Source: Field Data, 2021

The key relationship between oil production activities on access to basic socio-economic amenities in Upper Nile and Unity State was mentioned. These included:-

The findings in Table 10 show that majority of the respondents agreed to a moderate extent with the statements in establishment that Oil production activities leads to infrastructure development like road network (Mean = 3.88). Interviewed participants noted that, ‘the government and international agencies have put a lot of financial resources in the infrastructure development especially road network so as to easily connect those oil explorations and refinery areas to urban centers’. This means that with oil production activities, there is a lot of financial resources involved directly to expand and improve on the available feeder roads.

In addition, it was also revealed that Oil production activities has an influence on education attainment, and this was represented by (Mean=3.66). Interviewed participants noted that, ‘there is an improvement in education services with oil production activities. A lot of financial resources have been put into local community schools to construct classes, buy scholastic materials, and payment of teaching staff; in addition to renovation of available school facilities like school laboratory thus enhancing education attainment’. This means that with oil production activities, local communities get their share which is diverted into filling the local social services especially improving on education standards in the local community.

More so, it was noted that Oil production activities has an influence on health accessibility (Mean = 4.46). Interviewed participants noted that, ‘with the production of oil production activities in the regions, health centers have been constructed to cater for emergency and other health conditions of oil company or refinery workers’. This means that health facilities have been constructed in those oil refinery areas; they have been stocked with necessary drugs and medical sundries to cater for the rising population in Upper Nile.

Further, respondents noted that Oil production has led the rise of the national gross domestic product (GDP) and foreign direct investment (FDI) in the country of South Sudan. Interviewed participants noted that, ‘crude oil can attract a lot of investments and development into a country but when not managed well can as well cause a lot of destruction and conflict. Like fire, crude oil is a good servant but can be a bad master too depending on how it is handled. However, the availability of natural resources (oil) and its ability to attract foreign investment does not guarantee economic development, foreign direct investment and GDP’. This means that Oil production could thus attract more foreign direct investment and contribute to the economic development of South

Sudan. FDI is playing an increasingly vital role in the development efforts of most developing economies.

Furthermore, it was noted that the provision of machinery and equipment in the oil production help in the build-up of local industrial capabilities by contributing to skills formation (Mean=4.40). Interviewed participants noted that, 'oil production activities has also aided significantly to the increase in the stock of technology in South Sudan by acquiring or providing machinery and equipment and at the same time helped in the build-up of local industrial capabilities by contributing to skills formation. This is particularly evident in the area of natural resources exploration such as mining, where the use of capital-intensive technology has developed a pool of trained labour'. This means that product improvement, constituted the most relevant support to local firms, followed by training, provision of machinery and equipment together with information on market opportunities

From the field study, it was revealed that Oil production activities is associated with rise in corruption (Mean = 4.60). Interviewed participants noted that, 'oil production activities are associated with corrupt practices, which are the negative impact of oil exploration on local politics. This explains why petro-states are viewed as especially corrupt'. This means that huge spending and contract allocation associated with the oil business can engender corruption in countries.

In addition, Oil production activities is linked to forced resettlements and displacement of indigenous communities (Mean = 4.06). Interviewed participants noted that, 'Oil production activities leads to displacement of indigenous communities and their culture. Still, tthrough, this forced eviction, the people of this community lost venerated ancestral homes, died from contamination and saw livelihoods jeopardized'. This means that forced resettlements which jeopardize the livelihoods of women food crop farmers put undue strain on them and their families as they struggle to develop alternative livelihood practices to fend for their already cash-strapped families.

Furthermore, it was noted that Oil production activities has an influence on the government expenditure (Mean = 4.05). Interviewed participants noted that, 'most oil producing countries establish oil funds with fiscal policy objective. Oil revenues are volatile and can be very uncertain,

this in turn affects government expenditure thus with the mechanisms of an oil fund, the government can stabilize the economy while also financing investments for savings purposes'. This means that to make the fund efficient, its management should be professional and transparent. The fund should also be governed with rules and guidelines to ensure accountability and which should be flexible for easy adjustments to fit the fiscal policy provisions. This would ensure the moderate and efficient use of the oil revenues which are to the benefit of the whole state thus promoting economic development.

Last but not least, it was noted that Oil production activities leads to high noise, scaring away animals, thus reduction in tourism (Mean=4.05). Interviewed participants noted that, 'the issue of noise from the use of heavy equipment in the course of exploration and production is also of great concern. Impact of noise will be localized disturbance to wildlife, recreationists and residents'. This means that the disturbance on daily life as people go about their businesses can only be imagined. No tourist would want to come to a noisy area when they have other options that can be explored.

#### 4.5 Correlation Analysis

Correlation analysis. A correlation analysis was carried out to determine if there is a relationship between oil production activities and community wellbeing.

**Table 8: showing the correlation between oil production activities and community wellbeing**

Oil production activities at different stages	Community wellbeing
Upstream activities	0.72
Midstream activities	0.54
Downstream activities	0.66

\*\*correlation is significant at the 0.05 level

The above table shows that the correlation between upstream activities and community wellbeing is significant and positive with the correlation coefficient of 0.72 and this implies that increase in these activities has a corresponding increase in community wellbeing.

The correlation between midstream activities and community wellbeing is significant and positive with a correlation coefficient of 0.54 and this means that increase in these activities leads to corresponding increase in community wellbeing.

The correlation between downstream activities and community wellbeing is significant and positive with a correlation coefficient of 0.66 and this means that increase in these activities leads to increase in the community wellbeing. The above means that all stages of oil production activities have a significant and positive effect on community wellbeing. This therefore means that an increase or decrease in these activities will lead to a corresponding effect on community wellbeing.

#### 4.6 Regression Analysis

**Table 8: Regression analysis: The relationship between oil production activities and Community Wellbeing in Upper Nile and Unity State**

Model	Unstandardized coefficients		Standardized Coefficients	T	Sig
	B	Std Error	Beta		
Constant	0.679	.714		.054	.000
Upstream activities	.003	.000	.631	4.413	.014
Midstream activities	.034	.011	.217	2.278	.021
Downstream activities	0.28	.010	.332	2.359	.023
	$r=0.752$	$r^2=0.57$			

Dependent variable: Community wellbeing significant at 0.05

Going by the t values, upstream activities had the highest effect on community wellbeing with t value of 4.413 and beta value of 0.631. This means that upstream oil production activities had significant relationship with community wellbeing. This was followed by downstream activities with t value of 2.359 and beta value of .332 and lastly midstream activities with t value of 2.278 and beta value of .217.

The above results show that each of the variables separately had a significant effect on community wellbeing.

When the 3 variables are combined, the results indicate a positive and significant effect on community wellbeing of the people. This is shown by the r value of 0.752 and significant value of 0.000 at a standardized value of 0.05.  $r^2 = 0.752 \times 0.752 = 0.57$  which is 57%.



**CONCLUSION:** The correlation analysis showed that the correlation between all stages of oil production namely upstream, midstream and downstream all have a positive and community wellbeing are significant and positive. This therefore means that an increase or decrease in these activities will lead to a corresponding effect on community wellbeing. The regression analysis showed that upstream activities had the highest effect on community wellbeing with t value of 4.413 and beta value of 0.631. This was followed by downstream activities with t value of 2.359 and beta value of .332 and lastly midstream activities with t value of 2.278 and beta value of .217.

The above results show that each of the variables separately had a significant effect on community wellbeing. But also, When the 3 variables are combined; the results indicate a positive and significant effect on community wellbeing of the people. This is shown by the r value of 0.752 and significant value of 0.000 at a standardized value of 0.05.  $r^2 = 0.752 \times 0.752 = 0.57$  which is 57%.

## **CHAPTER FIVE: DISCUSSION OF RESULTS**

### **5.0 Introduction**

In this chapter, the researcher interprets and discusses the trends that emerged from research findings. The discussions are based on the research questions and the objectives of the study in chapter one. The subsequent discussion in this chapter is based on the results presented in chapter four of this report as given by the respondents.

### **5.1 Discussion of Findings**

The study sought to answer three questions. Each question was handled independently in ascending order.

#### **5.1.1 Oil production Activities and Environmental Management in Upper Nile and Unity State**

The above study aimed at establishing the relationship between oil production activities and environmental management in Upper Nile and Unity State.

It was noted that Oil production activities contaminate soil and water and may cause devastating explosions and fires. This concurs with Ikelegbe (2015) who argued that Oil production activities might affect soil physical properties. Pore spaces might be clogged, which could reduce soil aeration and water infiltration and increase bulk density, subsequently affecting plant growth. In this regard, Oils that are denser than water might reduce and resist soil permeability. Contamination of soil and water may occur through spills of fluids during drilling and fracturing processes and during transport by truck or through wastewater pipelines and failure of well casings and equipment failures and corrosion of pipes and tanks; which results into surface water contamination and ultimately soil.

It was also revealed that Oil production activities have a great influence on wildlife ecosystem. In support of the above, Mayen (2020) argued that Oil destroys the insulating ability of fur-bearing mammals, such as sea otters, and the water repellency of a bird's feather, thus exposing these creatures to the harsh elements. Many birds and animals also ingest oil when they try to clean themselves, which can poison them. Oil production and spills also affect animal and human health. People who clean up the spill are more at risk.

Further, mismanagement or improper disposal of oil wastes can result in radiological contamination of soils or surface water bodies. This concurs with Barifaijo, Basheka & Oonyu (2010) who argued that a spill of only one gallon of oil can contaminate a million gallons of water. A single pint of oil released into a lake or wetland can cover one acre of surface water and seriously damage aquatic

habitat. Oil spills have long-term environmental impacts and devastating effects on animals through direct contact, inhalation and ingestion of toxic chemicals. Oil spills trigger long-term ecological changes by damaging animals' nesting or breeding grounds. Besides, Ikelegbe (2015) noted that on land, spilled gasoline can rapidly penetrate soil potentially causing groundwater or surface water contamination.

Furthermore, it was revealed that discharge of produced water inappropriately onto soil or into surface water bodies can result in salinity levels too high to sustain plant growth. In support of the above, Yager (2013) noted that rough water bodies or seas can split an oil slick apart, carrying some oil in one direction and more in another. In contrast, a near shore soil spill can be totally controlled by currents and wave action that causes the oil to come ashore, damaging marine shoreline habitant. Oil production activities sometimes lead to slick on water surface. This layer, called a slick, expands until the oil layer is extremely thin and can spread hundreds of miles wide. This lay is called sheen and is usually less than 0.01mm thick'. This means that oil spills on the surface of the water are subjected to the whims of weather, waves and currents. Thus, oil spill far out at water bodies can be carried ashore by wave and current action.

It was found that Oil production activities lead to chemical contamination of land and water. This concurs with Kharaka&Otton (2013) who argued that the oil environment impact on water and soil in damaging in a variety of ways. When there are oil spills in the ocean or freshwater, it does not blend with the water. Oiled birds for instance can lose the ability to fly, dive for food or float on the water which could lead to drowning. Oil interferes with the water repellency of feathers and can cause hypothermia in the right conditions. Oil floats on the surface of salt and fresh water. Over a very short period of time, the oil spreads out into a very thin layer across the surface of the water. This can block sunlight from reaching oceanic environments, which can severely impact producers and, thus, the entire food chain of an ecosystem. Besides, Jones &Kiesecker (2015) also noted that as birds groom themselves, they can ingest and inhale the oil on their bodies. Oil spill effects on environments and habitants can be catastrophic: they can kill plants and animals, disturb salinity/PH levels, and pollute air/water and more.

More so, it was also noted that Oil production activities leads to deforestation, tree cutting and ecosystem destruction. This concurs with Dadiwei (2013) who argued that a University of Montana study found that between 2000 and 2011, fossil fuel infrastructure occupied about 3million hectares of land in the country- the equivalent of three Yellowstone National Parks. Those developments

removed large amounts of rangelands and vegetation that is used by wildlife and people. The infrastructure built for oil extraction can leave behind radical impacts on the land. The construction of roads, facilities and drilling sites known as well pads requires the use of heavy equipment and can destroy big chunks of pristine wilderness; and the damage is often irreversible. Besides, Yager (2013) added that oil production activities have been involved in stripping the environment of vegetation, increased erosion, which can lead to landslides and flooding, disturbing the land's ground surface and seriously fragmenting unspoiled wildlife habitats.

Additionally, it was found out that Oil production activities has a great effect on soil and soil quality and or/ texture. This concurs with Barifaijo, Basheka & Oonyu (2010) who argued that besides oil, the sewage in oil and gas fields can also lead to soil pollution. Oil reduces the soil's fertility such that most of the essential nutrients are no longer available for plant and crop utilization. The enormity of toxicity by oil spillage on crop performance is exemplified in mangrove vegetation, which has been dying off in recent times. At present, most domestic oil fields have entered into the middle and later periods of oil production, water content of the crude oil reaches to 70%~80%, some even up to 90%. Large amounts of oily sewage will produce after oil/water separation. If untreated, they could lead to serious soil and water pollution. In terms of its composition, the oilfield sewage contains oil, various salts, organic matter, inorganic matter and some microbes etc. The salinity is higher, generally between 103~14×10<sup>4</sup>mg/L, the main salts are Na<sub>2</sub>SO<sub>4</sub>, NaHCO<sub>3</sub>, MgCl<sub>2</sub> and NaCl. This kind of waste water not only causes soil salinization, but also destroys the soil environment quality.

Last but not least, it was noted that Oil production activities contribute to climate change. In support of the above, Akosua (2020) added that most greenhouse gas emissions are caused by human activity, including the burning of fossil fuels. This reality demands a change to our energy system. The activities of the oil and gas industry and unsustainable consumption of this energy has resulted in an increase in the amount of greenhouse gases trapped in our beautiful blue planet, which over the centuries has resulted in climate change with its hydra-headed challenges. Besides, Kuch (2019) noted that as the earth's average temperature continues to rise with the accumulation of greenhouse gases in the atmosphere, the stable functioning of earth's natural systems adjusts to the new, high-carbon reality and society begins to witness the effects of an altered natural environment and its impact on our lives and livelihoods.

### **5.1.2 Oil production activities and community wellbeing in Upper Nile and Unity State**

The above study theme determining the relationship between oil production activities and community wellbeing in Upper Nile and Unity State

The research revealed that Oil production activities lead to long-term harm to human and animal populations, particularly migratory birds and marine mammals. This concurs with Kuch (2019) asserts that contamination occurs during all crude production and exploration processes and negatively affect the environment which in turn reflect risk to human health through food chain such as apparition of heavy metals; lead and Barium in the hair of some of the South Sudanese people. There have also been reports of birth defects, miscarriages and other health problems among residents of the oil-producing areas in Upper Nile and Unity states; since, it leads to exposure to volatile organic compounds (VOCs), nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), PAHs and benzo (a) pyrene.

Further, it was noted that Oil production activities cause physical, mental, and financial stress to people as individuals. This concurs with Bategeka, Kiiza&Ssewanyana (2019) who also revealed that oil spills can damage the environment and the wild and marine-life that depend on it. They can also cause physical, mental and financial stress to people as individuals. Oil exploration increases the risks and dangers associated with women undertaking their reproductive roles. These risks and dangers arise as a result of the predisposition to peculiar diseases in communities where oil exploration takes place.

Oil production activities leads to human health and safety risks for neighboring communities and oil industry workers. This concurs with Jones &Kiesecker (2015) who argued that higher risk symptoms previously described among cleanup workers after oil spills, such as fatigue, respiratory and eyes irritation and headaches, and higher risk spontaneously abortions among women from exposed communities. Oil and chemical spills can damage animal's liver, kidney, spleen, brain or other organs. It also causes cancer, immune system suppression and reproductive failure.

The research revealed that Oil production activities lead to an increase in the number of community members having appendicitis and stomach ulcers. This concurs with Jones &Kiesecker, 2015) who stated that the problems such as skin cancers and lesions may be linked to acid rain. Stomach ulcers could also occur, as consumption of acidic water can alter the pH of the stomach and leach the mucous membrane of the intestinal walls, this is more so as South Sudanese depends heavily on rain water for drinking, cooking, laundry and other domestic uses. Oil extraction related contamination leads to exposure to a mixture of contaminants. Produced waters originate in the natural oil reservoir and are separated from oil and gas in the production facility. Besides, research carried out on Melut and Koch

by Kuch (2019) showed that health challenges like fatigue and stomach pains, were increasing in the number of community members having appendicitis

The study revealed that Oil production activities lead to health challenges like fatigue and stomach pains. This concurs with Levy & Nassetta (2011) who noted that pollutants from the oil extractive industry are likely to have led to emerging health problems, including rising rates of female infertility, increases in the number of miscarriages, birth defects, and eye infections and even blindness and skin problems. Major issue in situations like this is if landowners are adequately compensated, most times got little or no compensation from the oil companies or the South Sudanese government. This must have caused them untold hardships due to loss of income. There have been incidences of people's land being used or polluted by oil producing companies. Besides, Kuch (2019) added that the most common acute effects observed after exposure to oil spills among cleanup workers are respiratory, stomach pain, fatigue, eye and skin symptoms, headache, nausea and dizziness; and these may also result into chronic effects including psychological disorders, lowering of respiratory tract symptoms and reduction of lung function.

They also noted that Oil production activities have endangered people's lives. Besides, Nenadic & Koehler (2016) noted that genotoxicity and alterations in hormonal status have been described. High levels of aluminum, nickel, lead and zinc have been reported in volunteers and workers involved in cleaning up activities after the prestige oil spill. Most people surrounding oil reserves have been less compensated from the oil companies or government of South Sudan and requested to vacate their homes. Some have left their properties and agricultural activities like plantations behind; thus lowering their household income and affecting them psychologically.

More so, it was also revealed that Oil production needs land, but access to land use is also the basis for the livelihood of communities. This concurs with Yager (2013) who noted that the presence of production wells, ancillary facilities and access road reduces the habitat quality, disturbs the biota and thus affects ecological resources. The presence of an oil or gas field could also interfere with migratory and other behaviors of some wildlife. Discharge of produced water inappropriately onto soil or into surface water bodies can result in salinity levels too high to sustain plant growth. In this regard, there have been various complaints from community members in the oil communities about health hazards from production activities of oil companies. These health hazards include pollution of air, soil and water leading to serious contamination.

The above findings show that Oil production activities undermined the community sanitation and hygiene. This concurs with Garang&Bavumiragira (2019) who stated that noxious smells and smoke are also an issue, causing discomfort and distress to people living in or close to production oil fields. Indeed, emissions from gas flaring are also a significant environmental issue especially in terms of sanitation and hygiene. During the mining process, gas that is produced along with the oil is flared or re-injected. In oil field conditions, many particulates and other harmful gases are dispersed into the air. Research shows that health workers in Melut and Koch indicate a positive correlation between these health issues and increased pollution from the oil industry [Kuch, 2019].

### **5.1.3 Oil Production Activities and Access to Basic Amenities in Upper Nile and Unity State**

The above study theme of examining the relationship between oil production activities and access to basic socio-economic amenities in Upper Nile and Unity State; and these ranges from:

The findings noted that Oil production activities leads to infrastructure development like road network. This concurs with Barifaijo, Basheka & Oonyu (2010) who noted that the extractive activities [including oil exploration] can also have profound social and political impacts. They can have a positive effect on development by creating jobs, encouraging business and providing vital infrastructure for remote communities such as roads, electricity, education and health. With oil production activities, there is a lot of financial resources involved directly to expand and improve on the available feeder roads.

In addition, it was also revealed that Oil production activities has an influence on education attainment. This concurs with Akosua (2020) who also noted that with oil production activities; local communities get their share which is diverted into filling the local social services especially improving on education standards in the local community.

More so, it was noted that Oil production activities has an influence on health accessibility. In support of the above, Melut and Koch by Kuch (2019) argued that health facilities have been constructed in those oil refinery areas, they have been stocked with necessary drugs and medical sundries to cater for the rising population in Upper Nile. In this regard, with the production of oil production activities in the regions, health centers have been constructed to cater for emergency and other health conditions of oil company or refinery workers.

Further, it is also noted that Oil production has led the rise of the national gross domestic product (GDP) and foreign direct investment (FDI) in the country of South Sudan. This concurs with Jones

&Kiesecker (2015) who argued that Oil production could thus attract more foreign direct investment and contribute to the economic development of South Sudan.

Furthermore, it was noted that the provision of machinery and equipment in the oil production help in the build-up of local industrial capabilities by contributing to skills formation. This concurs with Dadiowei (2013) who argued that product improvement, constituted the most relevant support to local firms, followed by training, provision of machinery and equipment together with information on market opportunities. Oil production activities has also aided significantly to the increase in the stock of technology in South Sudan by acquiring or providing machinery and equipment and at the same time helped in the build-up of local industrial capabilities by contributing to skills formation.

In addition, Oil production activities are linked to forced resettlements and displacement of indigenous communities. This concurs with Levy &Nassetta (2011) who noted that Oil production activities leads to displacement of indigenous communities and their culture. For example the April 3, 2009 edition of the Sudan Tribune reported for example that in Sudan, thousands were forcefully evicted to make way for a low-sulphur crude oil venture in South-Central Sudan. Besides, Jones &Kiesecker (2015) added that the presence of forced resettlements which jeopardize the livelihoods of women food crop farmers put undue strain on them and their families as they struggle to develop alternative livelihood practices to fend for their already cash-strapped families.

Furthermore, it was noted that Oil production activities has an influence on the government expenditure. In support of the above, Dadiowei (2013) argued that to make the fund efficient, its management should be professional and transparent. The fund should also be governed with rules and guidelines to ensure accountability and which should be flexible for easy adjustments to fit the fiscal policy provisions. This would ensure the moderate and efficient use of the oil revenues which are to the benefit of the whole state thus promoting economic development.

Lastly, it was noted that Oil production activities leads to high noise, scaring away animals, thus reduction in tourism. This concurs with Elson (2013) who noted that the main sources of noise during the production of crude oil and natural gas would include compressor and pumping stations, producing wells (including occasional flaring), and vehicle traffic. Impact of noise will be localized disturbance to wildlife, recreationists and residents. No tourist would want to come to a noisy area when they have other options that can be explore



**CONCLUSION:** In Regards To Oil Production Activities And The Environment, It was noted that Oil production activities contaminate soil and water and may cause devastating explosions and fires. It was also revealed that Oil production activities have a great influence on wildlife ecosystem. It was found that Oil production activities lead to chemical contamination of land and water. In regards to Oil production activities and community wellbeing in Upper Nile and Unity State, it was noted that Oil production activities cause physical, mental, and financial stress to people as individuals. Oil production activities are linked to forced resettlements and displacement of indigenous communities. Research shows that health workers in Melut and Koch indicate a positive correlation between these health issues and increased pollution from the oil production activities as has been explained above.

## **CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS**

### **6.0 Introduction**

In this chapter, the researcher presents the conclusion and recommendations in relation to the objectives of the study. Suggested areas for further research are also presented.

### **6.1 Conclusions**

From the findings and discussion in chapter four and five respectively, the following conclusions were drawn.

Reference to the study objective one, it is concluded that Oil production activities contaminate soil and water and may cause devastating explosions and fires; greatly influence on wildlife ecosystem, leads to deforestation, tree cutting and ecosystem destruction, greatly effect on soil and soil quality and or/ texture; and lead to noise and air quality; and other several environment pollution processes. Mismanagement or improper disposal of oil wastes can result in radiological contamination of soils or surface water bodies.

Reference to study objective two, it is concluded that Oil production activities leads to long-term harm to human and animal populations; causes physical, mental, and financial stress to people as individuals; leads to human health and safety risks for neighbouring communities and oil industry workers; leads to an increase in the number of community members having appendicitis and stomach ulcers; causes death and sickness; and leads to health challenges like fatigue and stomach pains.

Reference to study objective three, it is concluded that Oil production activities leads to infrastructure development like road network, education sector, health accessibility, led the rise of the national GDP and foreign direct investment and provision of machinery and equipment in the oil production help in the build-up of local industrial capabilities by contributing to skills formation. On the other hand, Oil production activities is associated with rise in corruption, linked to forced resettlements and displacement of indigenous communities; has an influence on the government expenditure, and leads to high noise, scaring away animals, thus reduction in tourism. These are the major relationship between oil production activities and access to basic socio-economic amenities in Upper Nile and Unity State.

The results revealed a significant positive relationship between oil production activities and environmental management in Upper Nile and Unity State ( $r = 0.79.3^{**}$ , Sig. = .012). However, since the correlation coefficient ( $r=0.79.3^{**}$ ) lies between +/-0.6 to +/-0.9 the researcher concluded that oil production activities and environmental management are significantly correlated.

## **6.2 Recommendations**

In the light of findings of the study and discussion above, the researcher has the following recommendations were suggested:

From the field study, it was revealed that Oil production activities is associated with rise in corruption. Therefore, it is recommended that the Government of South Sudan require having a well-streamlined oil production legal and institutional framework that govern and regulate oil production activities, in addition to reducing all production gaps that may lead to corrupt practices.

It is recommended that there is need for better government policy to be adopted by the government of South Sudan. These policies may include; equal oil sharing among the partners and local community, transparency and accountability within the Oil companies and the government ministry. Thus, the government need to put in place those policies with regards to the use and management of the oil revenues that would be received.

It is also recommended that the Environmental Impact Assessment (EIA) should be emphasized and encouraged in all stages of oil production activities. This should be emphasized so as to reduce on dangers associated with it on environment, mammals and human life.

Lastly, it is recommended that there is need for publicity, mass mobilization and sensitization on dangers associated with oil production activities to the local community and oil company workers. This would help them to try and avoid all dangers associated with direct exposure to oil spills and other oil production waste.

## **6.3 Suggested Areas for Further Research**

The researcher carried this study in order to examine the 'Oil Production Activities and Community Well-Being in Upper Nile (Melut) and Unity State (Koch) in South Sudan' but the study was not

exhaustive owing to constraints in terms of scope, time and finance. Further research is therefore needed in areas such as: -

1. The Effects of Oil Production Activities on Environmental Management Sustainability in South Sudan.
2. The Effects of Oil Production Activities on Improvement of Household Income in South Sudan.
3. The Effects of Oil Production Activities on Infrastructure Development in South Sudan.
4. Need for a comparative study about the Oil Production Activities and Community Well-Being in other parts of South Sudan, so as to compare with the results got from Upper Nile (Melut) and Unity State (Koch); and have a better ground for recommendation.

**CONCLUSION:** In reference to the study objective one, it is concluded that Oil production activities contaminate soil and water and may cause devastating explosions and fires and all these end up negatively affecting the people in the host communities. In Reference to study objective two, it is concluded that Oil production activities leads to long-term harm to human and animal populations; causes physical, mental, and financial stress to people as individuals. In Reference to study objective three, it is concluded that Oil production activities leads to infrastructure development like road network, education sector, health accessibility, led the rise of the national GDP and foreign direct investment. Some recommendations from the study include, that the Government of South Sudan require to have a well-streamlined oil production legal and institutional framework that govern and regulate oil production activities, in addition to reducing all production gaps that may lead to corrupt practices. It is also recommended that the Environmental Impact Assessment (EIA) should be emphasized and encouraged in all stages of oil production activities. Some suggested areas for further study include: The Effects of Oil Production Activities on Environmental Management Sustainability in South Sudan and The Effects of Oil Production Activities on Improvement of Household Income in South Sudan, Among others.

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## APPENDIX 1: CONSENT FORM

**Guidance for the Participants:** I am Doreen Santino, a student researcher of Uganda Christian University. This research study is being undertaken to assess the ‘An Assessment of the Effects of Oil Production Activities on Community Well-Being in Upper Nile (Melut) and Unity State (Koch) in South Sudan’. I am requesting for your consent to participate in this study, all information you provide will be kept confidential.

More required information, contact the Principal Investigator: Doreen Santino on +211 915 300 004. You may also contact Mr. Osborn Ahimbisibwe +256 775737627 (UCU Research Ethics Committee Administrator or Prof. Peter Waiswa +256 772405357 (Chairperson UCU Research Ethics Committee).

**Consent Statement:** I, the respondent, have been well informed about this research and its purpose. I am willing to participate in fully giving them the necessary or required information. I am well informed of the voluntary participation, confidentiality and other concerns related to voluntary consent.

Date of the Interview ----- Consent to Interview Yes/No

Participants’ Name ----- Signature -----



**APPENDIX 2: Questionnaire for Community Members**

**Topic: AN ASSESSMENT OF THE EFFECTS OF OIL PRODUCTION ACTIVITIES ON COMMUNITY WELL-BEING IN UPPER NILE (MELUT) AND UNITY STATE (KOCH) IN SOUTH SUDAN**

**Dear Participant**

You have been chosen to get involved in this research entitled ‘An Assessment of the Effects of Oil Production Activities on Community Well-Being in Upper Nile (Melut) and Unity State (Koch) in South Sudan’. This study is carried out strictly for academic purposes. You are requested as a chosen participants to fully answer the questions to the best of your knowledge. The information to be given by you shall be greatly treated with utmost confidentiality. Please your are requested not write your identity like name anywhere in this questionnaire. Kindly fill in to those space provided or put a tick where applicable.

Thank you in advance

**Doreen Santino**

**Section A. Respondents’ Bio-data**

1. Sex

i). Male  ii). Female

2. Education attained

No.	Highest level of education	Tick Applicable
	Never been to school	
	Primary level	
	Secondary level	
	Certificate/Diploma holder	
	Bachelor’s Degree	
	Master Degree	
	PhD	

3. For how long have you been in this community?

- i) 1- 5 years  ii). 6 – 10years   
 iii). 11 - 15 years  iv). 16years & above

**Section B: Oil production activities and environmental management in Upper Nile and Unity State.**

Your are requested to tick where it’s applicable to you following the below key.

**(5) Represent SA, (4) represent A, (3) represent NS, (2) represent D, (1) represent SD**

No.	Questions	5	4	3	2	1
1.	In our areas, oil production activities contaminate soil and water and may cause devastating explosions and fires					
2.	Oil production activities has a great influence on wildlife ecosystem					
3.	Mismanagement or improper disposal of oil wastes can result in radiological contamination of soils or surface water bodies.					
4.	In our areas, oil production activities					
5.	In our area, discharge of produced water inappropriately onto soil or into surface water bodies can result in salinity levels too high to sustain plant growth					
6.	In our area, oil production activities leads to chemical contamination of land and water					
7.	In our area, oil production activities leads to deforestation and ecosystem destruction					
8.	In our areas, oil production activities has a great effect on soil and soil quality and or/ texture.					
9.	In our areas, oil production activities has led to noise and air quality					

10.	In our areas, oil extraction involves several environmental pollution processes					
11	Any other (specify)					

**Section C: Oil production activities and community health in Upper Nile and Unity State.**

Your are requested to tick where it's applicable to you following the below key.

**(5) Represent SA, (4) represent A, (3) represent NS, (2) represent D, (1) represent SD**

No.	Questions	5	4	3	2	1
1.	In our area, Oil production activities leads to long-term harm to human and animal populations, particularly migratory birds and marine mammals					
2.	Environmental pollution associated with oil exploration has serious implications for the survival of species in communities near oil reserves.					
3.	In our area, Oil production activities cause physical, mental, and financial stress to people as individuals.					
4.	In our area, Oil production activities leads to human health and safety risks for neighbouring communities and oil industry workers					
5.	Oil production activities leads to an increase in the number of community members having appendicitis and stomach ulcers					
6.	In our area, Oil production activities leads to health challenges like fatigue and stomach pains					
7.	In our area, Oil production activities have endangered people's lives.					
8.	In our area, ingesting oil can cause death and sickness					

9.	In our area, Oil production need land, but access to land use is also the basis for the livelihood of communities					
10.	In our area, Oil production activities undermined the community sanitation and hygiene					
11.	Any other (specify)					

**Section D: Oil production activities and access to basic amenities in Upper Nile and Unity State.**

You are requested to tick where it's applicable to you following the below key.

**(5) Represent SA, (4) represent A, (3) represent NS, (2) represent D, (1) represent SD**

No.	Questions	5	4	3	2	1
1.	In our area, Oil production activities leads to infrastructure development like road network					
2.	In our area, Oil production activities has an influence on education attainment					
3.	In our area, Oil production activities has an influence on health accessibility					
4.	In our area, Oil production has led the rise of the national GDP and foreign direct investment					
5.	Provision of machinery and equipment in the oil production help in the build-up of local industrial capabilities by contributing to skills formation					
6.	In our area, Oil production activities is associated with rise in corruption					
7.	In our area, Oil production activities is linked to forced resettlements and displacement of indigenous communities					
8.	In our area, Oil production activities has an influence on the government expenditure					
9.	In our area, Oil production activities leads to high noise, scaring away animals, thus reduction in tourism					

10.	Any other (specify)					
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8. What should be done to improve on community well-being?

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Thank You Very Much for Your Response

**APPENDIX C: INTERVIEW GUIDE**

**Interview Guide for community leaders, employees of oil operating companies and the Ministry of Petroleum.**

**Guiding Questions**

1. What is the effect of oil production activities on environmental management in Upper Nile and Unity State?  
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2. What is the effect of oil production activities on community health in Upper Nile and Unity State?  
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3. What is the effect of oil production activities on access to basic amenities in Upper Nile and Unity State?  
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4. What should be done to improve on community well-being?  
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5. How best can oil production activities be minimized?  
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**Thank you**