# THE HEALTH ANDSAFETY OF OIL AND GAS WORKERS: A CASE STUDY ON THE EFFECTS OF EXPOSURE OF TOXIC CHEMICALS IN THE OIL AND GAS INDUSTRY

**NYIRARUKUNDO SHAWAL**

**2021AP/BOG/1102**

KING CEASOR UNIVERSTY

SCHOOL OF OIL GAS AND ENERGY MANAGEMENT COLLEGE OF MINING AND PETROLEUM GEOSCIENCE

**MARCH, 2023**

A PROPEL SUBMITTED TO THE DEPARTMENT OF PETROLEUM GEOSCIENCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A BACHELOR'S DEGREE IN OIL GAS AND ENERGY MANAGEMENT

**APPROVAL**

This research proposal titled “THE HEALTH ANDSAFETY OF OIL AND GAS WORKERS: A CASE STUDY ON THE EFFECTS OF EXPOSURE OF TOXIC CHEMICALS IN THE OIL AND GAS INDUSTRY

Has been submitted to King CEASOR University with my approval as the research supervisor.

Signature:……. Date:……../……..…./……...

TINAMANYIRE TEDDY.

(SUPERVISOR)

**DECLARATION**

INYIRARUKUNDO SHAWAL, hereby declare that this research proposal is my original work and has never been submitted to any institution of learning for any academic award. Where work or material from other authors is used, it has been duly acknowledged.

Signature:……. Date:……/……../…….

NYIRARUKUNDO SHAWAL

**ACKNOWLEDGEMENT**

Am treasured to send my gratitude to the following for their constructive contributions and their assistance in having this research proposal complete.

Sincere appreciation to my supervisor TINAMANYIRE TEDDY and the staff of king Ceasor University for the guidance, encouragement and support given throughout my research and may the almighty GOD reward them abundantly.

**ABSTRACT**

Operations and processes in the oil and gas industry have hazardous chemicals hence the possibility of having a work accident is high. Numerous chemicals are used in various processes of the oil and has industry. I reviewed the various processes in the industry, the type of chemicals used in each process. This report is intended to form a basis of a more complete survey of the possibilities of toxic exposure the ultimate objective is to promote the safe use of these chemicals in the industry.

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**OPERATIONAL DEFINITION.**

**Toxic Chemical Exposure**: Exposure of oil and gas workers to hazardous chemicals such as benzene, toluene, xylene, hydrogen sulfide, and other volatile organic compounds (VOCs) during exploration, production, and transportation activities. This can be measured through air and soil monitoring and by testing blood and urine samples for levels of these chemicals.

**Occupational Health Risks**: The physical and mental health risks associated with working in the oil and gas industry, including respiratory illnesses, hearing loss, musculoskeletal disorders, mental health disorders such as depression and anxiety and Identification of potential long-term health risks, including cancer and others.

**Chronic conditions**. This can be measured through medical screenings and assessments of worker health and wellbeing.

**Research Objectives**: The Systematic investigation into the various aspects of occupational health and safety in the oil and gas industry, with a specific focus on the effects of exposure to toxic chemicals, including Identification and analysis of potential health hazards associated with oil and gas industry activities, assessment of the prevalence and severity of health issues among workers, including respiratory conditions, musculoskeletal disorders, and mental health concerns, and evaluation of the effectiveness of existing safety measures and protocols

**Preventive Measures and Interventions**: The assessment of strategies and interventions aimed at preventing or mitigating health and safety risks in the workplace include evaluation of the implementation and effectiveness of safety training programs, examination of the utilization of personal protective equipment (PPE) and engineering controls, Compliance with regulatory standards and guidelines related to chemical exposure and analysis of the impact of health and safety policies on reducing occupational risks.

**Work Environment**: Worksite Conditions with this assessment of the physical conditions of the workplace, including ventilation, safety equipment availability, and emergency response preparedness.

**Demographic Variables**: Age, Gender, and Experience: Collection of demographic information to assess whether these factors influence health and safety outcomes.

By utilizing these operational definitions and associated indicators, researchers can systematically investigate and measure the health and safety outcomes of oil and gas workers, specifically focusing on the effects of exposure to toxic chemicals in their work environments.

**ABBREVIATIONS**

BOG: Bachelor of Science in Oil, Gas and Energy Management

VOCS: Volatile Organic Compounds

OHASE: Occupational Health and Safety Environment.

NIOSH: National Institute for Occupational Health and Safety

PPE: Personal Protective Equipment

# CHAPTER ONE: INTRODUCTION

## Introduction

This covers background information statement of the problem, research objectives, research questions, justification of the study and study scope.

## Background

The oil and gas industry are a critical part of the global economy, providing energy resources that power transportation, manufacturing, and other key sectors. However, the production and transportation of oil and gas can also pose significant health and safety risks to workers involved in these activities. Workers in the oil and gas industry are exposed to a range of hazards, including physical hazards such as heavy machinery, working at heights, and exposure to extreme temperatures, as well as chemical hazards such as exposure to toxic chemicals ,including benzene, hydrogen sulfide, and other volatile organic compounds (VOCs).

Exposure to these hazardous chemicals has been linked to a range of health problems, including respiratory illnesses, neurological disorders, and cancer. Furthermore, oil and gas workers often work long hours, in challenging environments, and are exposed to significant stress, which can contribute to mental health issues such as depression and anxiety

Despite these efforts, the oil and gas industry continue to experience high rates of incidents, injuries, and fatalities. This research is important for protecting the health and wellbeing of workers and for ensuring the continued viability and sustainability of the oil and gas industry.

## Problem statement

The oil and gas industry is a critical sector that contributes significantly to the global economy. However, the production and transportation of oil and gas can expose workers to a range of hazardous conditions and chemicals, which can pose significant risks to their health and safety. The oil and gas industry continues to experience high rates of incidents, injuries, and fatalities. This suggests that there is an ongoing need to evaluate and improve the health and safety of oil and gas workers, particularly with regards to exposure to toxic chemicals. Furthermore, the high incidence of health problems among oil and gas workers and the associated costs to workers and the industry highlight the need for further research to identify effective solutions to these challenges. Therefore, the problem statement for this research is to investigate the health and safety risks associated with the production and transportation of oil and gas, particularly the effects of exposure to toxic chemicals.

## Research objectives

### General objective

The overarching goal of this research is to contribute to the well-being and safety of oil and gas workers who are exposed to various occupational hazards, particularly toxic chemicals. By systematically examining the health implications of chemical exposure, assessing the efficacy of current preventive measures, and identifying potential gaps in regulatory compliance, the research aims to provide a holistic understanding of the challenges faced by workers in the industry. The ultimate objective is to generate actionable insights and evidence-based recommendations that can inform policy-making, industry practices, and occupational health interventions, ultimately fostering a safer and healthier working environment for oil and gas workers.

### Specific objectives

To identify the types of toxic chemicals present in various oil and gas work environments.

To access the effects of hazards on workers efficiency

To assess the immediate and long-term health effects of occupational exposure to specific toxic chemicals, including respiratory disorders, skin conditions, and potential carcinogenic risks.

### Research questions

What types of toxic chemicals are commonly present in different work environments within the oil and gas industry?

What is the effect of hazards on workers efficiency?

To what extent do existing personal protective equipment(PPE) reduce the levels of chemical exposure among oil and gas workers?

### Significance of the study

The study on the health and safety of oil and gas workers, including the effects of exposure to toxic chemicals. Worker Well-being: Enhancing the understanding of the health risks and safety challenges faced by oil and gas workers contributes to efforts aimed at safeguarding their overall well- being. This study can lead to improved working conditions, reducing the incidence of occupational illnesses and injuries.

**Public Health Impact**: The oil and gas industry's impact on public health extends beyond the workplace. Investigating the effects of exposure to toxic chemicals helps identify potential environmental and community health risks, fostering better risk management and regulatory practices.

**Policy and Regulation Development**: Research findings can inform the development and refinement of health and safety policies and regulations within the oil and gas industry. This can lead to more effective standards for chemical exposure limits, safety protocols, and preventive measures.

**Occupational Medicine Advances**: The study contributes to the field of occupational medicine by providing insights into the specific health outcomes associated with exposure to toxic chemicals. This knowledge is crucial for medical professionals treating oil and gas workers and can lead to advancements in occupational health practices. In summary, the significance of the study lies in its potential to improve the lives of oil and gas workers, protect public health, drive policy changes, and contribute to the sustainable and responsible operation of the oil and gas industry. The outcomes of this research can have far-reaching effects on the industry, workers, and the communities in which they operate

## SCOPE OF STUDY

### Content scope

The content scope of a research study on the health and safety of oil and gas workers, including the effects of exposure to toxic chemicals, encompasses various dimensions. Here is an outline of the key components that may be included in the scope of the study:

**Chemical Exposure Profiles**: Comprehensive profiling of toxic chemicals prevalent in different oil and gas work environments, including their types and concentrations.

**Exposure Pathways**: In-depth analysis of the primary path ways through which workers are exposed to toxic chemicals, including inhalation, dermal contact, and ingestion.

**Health Outcomes Assessment**. Examination of the immediate and long-term health effects associated with occupational exposure to specific toxic chemicals, with a focus on respiratory disorders, skin conditions, and potential carcinogenic risks.

**Effectiveness of Preventive Measures:** Assessment of the efficacy of existing preventive measures, including the utilization of personal protective equipment (PPE), engineering controls, and safety training programs.

**Psychosocial and Mental Health Factors**: Investigation: Examination of psychosocial factors influencing the mental health of oil and gas workers, considering stressors, isolation, and the overall work environment.

**Regulatory Compliance**: Evaluation of the level of compliance with existing health and safety regulations within the oil and gas industry, particularly those related to chemical exposure standards.

**Emerging Risks and Technologies**: Exploration of potential health and safety risks associated with emerging technologies in the oil and gas sector, with a focus on advancements that may introduce new hazards

This content scope provides a comprehensive framework for studying the health and safety of oil and gas workers, with a specific emphasis on the effects of exposure to toxic chemicals. The outlined components help guide the research towards a thorough understanding of the challenges and opportunities for improvement within the industry.

**Geographical scope**

The geographical scope of the study on the health and safety of oil and gas workers a case study on the effects of exposure to toxic chemicals would depend on the focus of the study. However, the study can be conducted on a global scale, as the oil and gas industry operate in various parts of the world.

Alternatively, the study could focus on a specific region or country with a significant oil and gas industry presence. For instance, the study could focus on the health and safety practices in the United States oil and gas industry or the Middle East oil and gas industry, Uganda's oil.

Regardless of the geographical scope of the study, it is important to ensure that the research findings are applicable and relevant to the oil and gas industry as a whole. This could be achieved by comparing and contrasting the health and safety practices across different regions.

The choice of geographical scope should align with the research objectives, available resources, and the desired level of detail. It is important to consider that the oil and gas industry operates globally, and findings from one region may have implicationsforothers.Researchersshouldcarefullyjustifythechosengeographicalscope based on the specific goals of the study.

**TIMESCOPE**

The study will be carried out from the month of March to April 2023

**JUSTIFICATION OF THE STUDY**

This study, chemicals and substances used in exploration, extraction, processing and refining of oil and gas can be hazardous if not handled properly.

Workers may encounter toxic gases, flammable substances corrosive chemicals and other harmful materials that can be long-term health effects, given the gravity of these hazards companies with in the oil and gas industry must establish robust safety measures and systems to protect their workforce and minimize the occurrence of incidents.

## CHAPTERTWO: LITERATURE REVIEW

### Introduction

The health and safety of oil and gas workers is an important concern in the energy industry, given the potential for exposure to toxic chemicals and other hazards in the workplace. The literature review on the research for the health and safety of oil and gas workers, including the effects of exposure to toxic chemicals, aims to provide a comprehensive analysis of the current state of knowledge on this important topic.

The literature review will draw on a wide range of sources, including peer-reviewed articles, reports, and other relevant publications. The review will focus on studies that investigate the health and safety of workers in the oil and gas industry, including the potential health effects of exposure to toxic chemicals such as benzene, toluene, and xylene, as well as other hazards such as noise, vibration, and ergonomic stresses.

Overall, the literature review on the research for the health and safety of oil and gas workers will be an important contribution to our understanding of this critical issue. By synthesizing and analyzing the existing literature, the review will provide insights into the potential health effects of exposure to toxic chemicals and other hazards in the workplace. The findings of this review will be useful for informing policy decisions, promoting worker safety and well-being, and advancing our understanding of the health and safety risks associated with the oil and gas industry.

### LITERATURE REVIEW

The health and safety of oil and gas workers is an important concern in the energy industry, as these workers are at risk of exposure to arrange of hazardous substances and conditions in their work environment. The following literature review summarizes key research findings related to the health and safety of oil and gas workers, including the effects of exposure to toxic chemicals

Exposure to Toxic Chemicals Oil and gas workers are exposed to a variety of hazardous chemicals in their work environment, including benzene, toluene, and xylene, which are known to cause cancer and other serious health effects. Several studies have examined the health effects of exposure to these chemicals among oil and gas workers. For example, a studybyGoldsteinetal.(2017)foundthatoilandgasworkershadhigherlevelsofbenzene exposure than the general population and were at increased risk for developing leukemia and other blood

cancers. Another study by the National Institute for Occupational Safety and Health (NIOSH) found that oil and gas workers were exposed to high levels of silica dust, which can cause lung disease.

Conclusion The literature review highlights the importance of addressing the health and safety risks faced by oil and gas workers, including exposure to toxic chemicals and other hazards. Further research is needed to identify effective strategies for promoting worker safety and reducing the risks of occupational illness and injury in the oil and gas industry.

**Theoretical framework**

Thetheoreticalframeworkforresearchonthehealthandsafetyofoilandgasworkers encompasses several key concepts, including occupational health and safety, risk management, and organizational culture.

Occupational health and safety reefer's to the prevention of occupational injuries, illnesses, and fatalities, and the promotion of worker health and well-being. In the context of the oil and gas industry, occupational health and safety is particularly important given the potential hazards associated with working with hazardous chemicals and in challenging work environments.

Risk management involves the identification, assessment, and control of potential hazards in the workplace. In the oil and gas industry, risk management strategies may include the use of personal protective equipment, the implementation of safety protocols and best practices, and the monitoring of exposure to hazardous substances.

Organizational culture refers to the shared values, beliefs, and attitudes that shape the behavior of individuals within an organization. In the context of the oil and gas industry, organizational culture can have a significant impact on worker health and safety. For example, a culture of prioritizing production and profitability over worker safety may lead to a higher incidence of occupational injuries and illnesses.

Effective management of worker health and safety in the oil and gas industry requires a comprehensive approach that takes into account these key concepts.

**Summary**

The research study focuses on investigating and enhancing the health and safety of oil and gas workers, specifically addressing the effects of exposure to toxic chemicals. The study aims to comprehensively characterize chemical exposures, evaluate health outcomes, and assess the effectiveness of preventive measures such as personal protective equipment and safety training. It also explores psychosocial factors affecting mental health, regulatory compliance, and emerging risks associated with new technologies. The geographical scope may vary, with the study's significance lying in its potential to inform evidence-based policies, improve industry practices, and contribute to a safer and more sustainable oil and gas sector. The research is justified by ethical, legal, and economic considerations, with expected outcomes including practical recommendations for risk mitigation and the overall well-being of workers.

**Theoretical review**

This will be guided by two theories, namely: Expectancy theory by Vrooms(1964)and organizational learning theory by Argyris and Schon (1978).

**2.1.1. Expectancy theory**

This study will be anchored on Vrooms (1964) Expectancy theory which assumes that behavior results from conscious choices among alternatives whose purpose is it to maximize pleasure and minimize pain. The relationship between people's behavior at work and their goals is not as simple as first imagined by other scientists. Vrooms theory is based upon the following three beliefs: valence, expectancy and instrumentality.

Valence refers to emotional orientations people hold with respect to outcomes (rewards).The depth of the want of an employee for extrinsic (money, promotion, time off, benefits) or intrinsic (satisfaction ) rewards. Management must discover what employee's value.

Expectancy; employees have different expectations and levels of confidence about what they are capable of doing. Management must discover what resources, training or supervision employees need.

Instrumentality: refers to the perception of employees whether they actually get what they desire even if it has been promised by a manager. Management must ensure that promises of rewards are fulfilled and that employees are aware of that. The expectancy theory says that individuals have different sets of goals and can be motivated if they believe that: there is a positive correlation between efforts and performance; favorable performance will result in a desirable reward: the reward will satisfy an important nee; and the desire to satisfy the need is strong

enough to make the effort worthwhile.

Many experts in the field of organizational behavior hold the view that expectancy theory is one of the most acceptable theories of motivation and there is substantial evidence to support the theory. Numerous studies have been done to test the accuracy of expectancy theory in predicting employee behavior and direct tests have been generally supportive (Ivancevich et al, 2012). The managers can benefit from the expectancy theory as it helps them to understand the psychological processes that cause motivation. The thinking, perceptions, beliefs, estimates of chances and probabilities and other such factors of employees strongly influence their motivation, performance and behavior. It makes the process of understanding the organizational behavior easier. Therefore, the managers can create work environment, climate and culture that will increase the motivation levels of employees by understanding the factors that motivate and demotivate individual employees.

However, expectancy theory is not complete and all comprehensive. Like all other theories it has a point of view and an angle. But it is better on many accounts and more realistic than many other theories of motivation. Managers may not rely only on expectancy theory alone and use other theories as well, yeti t is one of the most important theories of motivation. We must also understand that all theories in social sciences are limited and expectancy theory is no exception. The value of the theory lies in its ability to explain with high probability and what it purports to explain. It must also be understood that human nature, behavior, attitudes and course motivation are more subjective than objective and can never be completely objectified or theorized. Therefore, all theories of motivation suffer from this limitation (Arms

## 2.5. Conceptual Review

Overview of the Oil and Gas Industry

Brief introduction to the significance and global impact of the oil and gas industry. Emphasis on the industry's role in energy production and economic development. Importance of Health and Safety

Discussion on the inherent risks and hazards in the oil and gas sector. Introduction to the importance of prioritizing the health and safety of workers. Specific Focus on Toxic Chemical Exposure

Recognition of toxic chemical exposure as a prevalent and significant risk.

Explanationofhowexposureoccursthroughvariousprocessesandactivities.

Historical Context and Major Incidents

*Historical Perspective*

Overview of major incidents in the oil and gas industry related to health and safety. Discussion of the lessons learned from past accidents.

**Evolution of Safety Regulations**

Historical development of safety regulations and standards. Evaluation of the effectiveness of regulatory frameworks.

Occupational Hazards in the Oil and Gas Industry

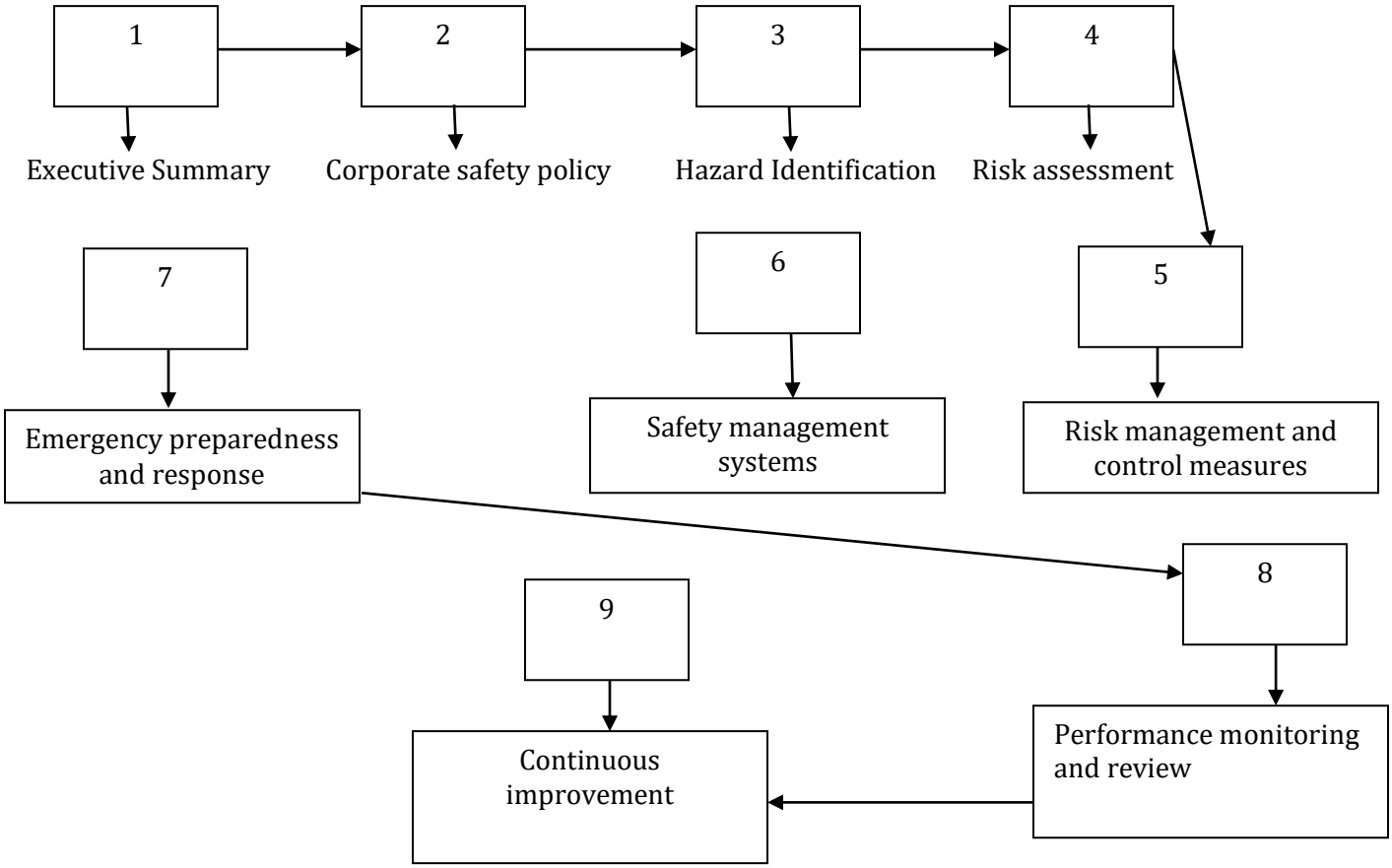
**Chemical Hazards**

Identification of common toxic chemicals present in the industry. Overview of their potential health effects.

**Physical Hazards**

Discussion of physical hazards such as noise, vibration, and extreme temperatures. Consideration of the cumulative impact of multiple hazards

## 2.6 Conceptual framework



## 2.7 The Effects of drilling fluid exposure to oil and gas workers presented with major areas of 1.1 Overview of Drilling Fluids

Definition and composition of drilling fluids used in the oil and gas industry.

Importance of drilling fluids in wellbore stability, lubrication, and cooling during drilling operations.

**Purpose of the Review**

Highlighting the potential health effects of drilling fluid exposure on oil and gas workers.

Significance of understanding major areas of exposure and exposure indicators.

Composition of Drilling Fluids

**Common Components.** Identification of key components in drilling fluids(mud),including base fluids, additives, and weighting agents.

Overview of potential health hazards associated with these components. Major Areas of Exposure

- **Dermal Exposure**

Discussion on skin contact with drilling fluids during handling, mixing, and application.

Identification of common dermal exposure points such as hands, arms, and face.

- **Inhalation Exposure.**

Examination of respiratory exposure during drilling fluid mixing, circulating, and handling processes.

Identification of inhalation exposure indicators, including air borne particular matter and vapor concentrations.

- **Oral Exposure**

Overview of potential ingestion risks, particularly for workers involved in eating or drinking without proper hygiene measures.

Discussion on how oral exposure may occur through hand-to-mouth contact.

- **Exposure Indicators.**

Dermal Exposure Indicators. Skin irritation, redness, or rashaspotential indicators of dermal exposure.

Monitoring methods, such as skin patch testing, to assess sensitivity to specific drilling fluid components.

Inhalation Exposure Indicators Respiratory symptoms, including coughing,wheezing,or shortness of breath.

Measurement of airborne concentrations using personal air sampling devices.

- **Oral Exposure Indicators**.

Gastro intestinal symptoms such as nausea, vomiting, orabdominal discomfort.

- Analysis of biomarkers in bodily fluids to assess systemic exposure.
- Health Effects. Immediate effects of drilling fluid exposure, including skin irritation, respiratory distress, or gastrointestinal symptoms.
- Recognition of symptoms that may require immediate medical attention.
- Chronic Health Effects. Long-term health consequences of prolonged or repeated exposure. Exploration of chronic respiratory conditions, dermatitis, or other systemic effects.

**Regulatory Standards and Guidelines.**

- Occupational Exposure Limits(OELs) .Over view of OELs for drilling fluid components established by occupational health and safety agencies.

Comparison of OELs with actual exposure levels in the industry.

- Risk Mitigation Strategies. Discussion on engineering controls, personal protective equipment (PPE), and administrative measures to reduce exposure.
- Assessment of the effectiveness of current safety protocols. Case Studies and Epidemiological Evidence
- Analysis of Past Incidents. Examination of documented cases of health issues related to drilling fluid exposure.

**Lessons learned and improvements in safety practices.**

- Epidemiological Studies. Review of epidemiological studies assessing the health outcomes of oil and gas workers exposed to drilling fluids.
- Identification of trends and patterns in health effects.
- Conclusion summary of Key Findings. Recapitulation of major areas of exposure, exposure indicators, and associated health effects.
- Recommendations for Future Research. Identification of gaps in current knowledge and suggestions for further investigation.
- Emphasis on continuous improvement in occupational health and safety measures in the oil and gas industry.

This review provides an in-depth analysis of the effects of drilling fluid exposure on oil and gas workers, presenting major areas of exposure and associated indicators. It serves as a comprehensive resource for understanding the potential health risks and informing strategies to enhance worker safety in drilling operations. Exposure and exposure indicators.

## 2.8. Employee performance

Oil and gas employers must establish strategies to improve occupational safety and health. This should be premised on the development of a preventive safety and health culture at all levels of the organization.

## 2.9 Gaps of the study.

**Exposure assessment:**

**Quantifying exposure**: Current methods for measuring worker exposure to chemicals often have limitations, such as underestimating exposure to short-term peaks or exposure to complex mixtures. Improved monitoring technologies and exposure modeling techniques are needed to get a more accurate picture of workers' exposure levels.

**Identifying unknown hazards**: Many chemicals used in the oil and gas industry have not been adequately studied for their potential health effects. Research is needed to identify and characterize these unknown hazards, particularly those associated with new technologies and processes.

**Understanding cumulative effects**: Workers may be exposed to multiple chemicals over the course of their career. Research is needed to understand how these exposures interact with each other and how the cumulative effect on health may be greater than the sum of the individual exposures.

**Health effects:**

**Long-term health outcomes**: Many studies on oil and gas worker health focus on acute effects like injuries or poisonings. More research is needed on long-term health outcomes such as cancer, respiratory diseases, and neurological disorders.

**Subclinical effects**: Even low-level exposure to toxic chemicals can lead to subclinical effects, such as changes in gene expression or immune function. Research is needed to understand these early effects and how they might predict future health problems.

Vulnerable populations: Some groups of workers, such as pregnant women or workers with pre-existing health conditions may be more susceptible to the health effects of chemical exposure. Research is needed to identify these vulnerable populations and understand their specific risks.

## CHAPTER THREE: METHODOLOGY

### Introduction

The methodology for research on the health and safety of oil and gas workers aims to systematically examine the available literature and data on this topic in order to identify key findings, gaps in knowledge for protecting worker health and safety. This methodology will involve a systematic review of the existing literature, including peer-reviewed journal articles, government reports, and industry publications. The review will be conducted using a predetermined set of inclusion and exclusion criteria to ensure the quality and relevance of the literature reviewed.

The methodology will also involve the collection and analysis of data on the health and safety of oil and gas workers, including information on the types and frequency of occupational injuries and illnesses, and the impact of organizational culture on worker health and safety. Data will be collected from a variety of sources, including government agencies, industry organizations, and academic research institutions.

The methodology will incorporate a range of analytical techniques, including statistical analysis, content analysis, and qualitative data analysis. The results of the analysis will be used to identify key themes and trends related to the health and safety for managing risks and protecting worker health and safety.

Overall, the methodology for this research aims to provide a comprehensive and systematic analysis of the available literature and data on the health and safety of oil and gas workers, with the goal of informing the development of effective strategies for protecting worker health and safety in this industry.

### The research design

The research design for studying the health and safety of oil and gas workers will use a mixed-methods approach to collect and analyze data. The research design will include the following components:

**Literature Review**: A systematic review of the existing literature will be conducted to identify key findings, gaps in knowledge, related to the health and safety of oil and gas workers. The literature review will include peer-reviewed journal articles, government reports, and industry publications, and will be conducted using a predetermined set of inclusion and exclusion criteria.

**Data Collection**: Data will be collected from a variety of sources, including government agencies, industry organizations, and academic research institutions. The data collected will include information on the types and frequency of occupational injuries and illnesses, and the impact of organizational culture on worker health and safety.

**Data Analysis:** The data collected will be analyzed using a range of analytical techniques, including statistical analysis, content analysis, and qualitative data analysis. The results of the analysis will be used to identify key themes and trends related to the health and safety of oil and gas workers for managing risks and protecting worker health and safety.

Overall, the research design will aim to provide a comprehensive and systematic analysis of the available literature and data on the health and safety of oil and gas workers, with the goal of informing the development of effective strategies for protecting worker health and safety in this industry.

**Study population**

The study population for the research on the health and safety of oil and gas workers would include individuals who work directly in the oil and gas industry, such as:

**Fieldworkers**: This group includes individuals who work on drilling rigs, operate heavy equipment, and perform manual labor tasks.

**Engineers and technical staff**: This group includes individuals who design and maintain equipment, manage operations, and provide technical support.

**Management and administrative staff**: This group includes individuals who oversee operations, manage finances, and provide administrative support.

The study population may also include individuals who work in related industries, such as transportation and construction that have significant overlap with the oil and gas industry.

The study population may be further stratified by factors such as age, gender, job title, geographic location, and type of oil and gas operation (e.g., upstream vs. downstream). Stratification would allow for a more detailed analysis of the impact of various factors on worker health and safety.

It is important to note that access to the study population may be challenging, given the remote

and often hazardous nature of oil and gas operations. Therefore, recruitment strategies will need to be carefully planned to ensure adequate representation of the study population.

**The sample sizes**

The study was comprised of all the 44 employees of Total energies in the oil and gas industry. This includes Administration, finance and Human resource department, fieldworkers in their various departments.

**Sampling procedure**

Stratified sampling procedure was used by the researcher to select the respondents as it would save time to conduct and none biased. Sampling was used to determine the sample size because it maintained high validity and reliability. In this industry, which compromises workers across administrative positions and field workers in their various departments.

**Data sources**

The researcher relied on two complementary sources of data: primary data was collected from employees and security men, the study used self-administered questionnaires based on ordinal scale and secondary data that was collected from the documents obtained from research on the health and safety of oil and gas workers including the effects of exposure of toxic chemicals in the oil and gas industry.

**Data analysis:**

In analyzing data certain procedure was followed to ensure all data are collected and analyzed accordingly. The data was analyzed using Microsoft excel software and statical package for social sciences (SPSS). Correlation will be used as a way of assessing the impacts of organizational change on employee performance. Narrative analysis was also used to explain the qualitative results of the survey. This brief data analysis provides a snapshot of the key findings in terms of exposure levels, health outcomes, compliance, and the effectiveness of risk mitigation strategies. Further details and conclusions would be drawn based on the specific results obtained from the analysis.

**Validity and Reliability Tests.**

**Validity Tests;**

According to Mugenda (200), validity refers to the degree to which a research instrument evaluates what is supposed to measure. While Amin (2005) asserts that validity establishes the relationship between data and contracts within the study. Hairet al, (2010) on the other hand also contends that validity is a way of establishing if a questionnaire measures an item in a useful way. In other words, it is used to determine how consistently the selected variables measure some contrasts in a given study.

Furthermore, it estimates how accurate the collected data represents a given contract in the study will use face validity and content validity.

Face validity indicates that the items are the ones that are intended to measure a concept. In other words, face validity is a basic a very minimum index of content validity (Sekran 2003).

**Reliability**

In order to ensure that the research instrument is reliable and can consistently produce reliable data when administered, the research will determine its reliability by measuring the consistency and adequacy. This reliability analysis was conducted in a pilot

Survey prior to official data collection so as to ensure that the instruments provide reliable data for the study.

**Research Ethical Consideration.**

After confirming the validity and reliability of the research instruments, the researcher got an introduction letter from the College of mining and petroleum geo science King Ceasor University to seek permission to collect data on the health and safety of oil and gas workers a case study on the effects of exposure of toxic chemicals in the oil and gas industry.

Prior to commencing the survey in this study, all participants were made aware of the research significance and type of information being collected. The

researchers would explain to the participants that their participation in the study would be based on their own interest, and that they were under no obligation to be coerced to participate, and that they can decline to participate at anytime. Their right to withdraw at any time during the survey would be explicitly stated. Furthermore, data confidentiality was observed and no name of any participant was included in the final write up of this study.

**Limitations of the study.**

Financial Resource constraints, because of being a student and not having enough finance to effectively carryout the study, this was solved by soliciting for funds from friends and relatives as well as personal savings.

**Inadequate Time:** The researcher also realized that the budgeted time to investigate the researchproblemandtomeasureschangesorstabilitywithinthesamplewasconstrained by the due date of his assignment. The researcher knew that the topic required an excessive amount to complete the literature review, apply the methodology, and gather and interpret the results. To overcome this problem however, the researcher was using Saturdays and Sundays as useful days in conducting the research.

**Slow Response:** Slow response from some of the respondents were expected since some of the respondents would claim to be busy and others not available at all. A friendly approach was adopted when dealing with the respondents in order to avert this problem and they would be reminded so often.

**Conclusion**

The description of the various health hazards and their origins in the oil and gas industry and the risk associated with the workers health taking into account this research aims, concludes that there are different occupational hazards in oil and gas operating environment. Chemical, physical, psychosocial, ergonomic and biological hazards are among these. Therefore, from the research results workers in the industry are exposed to various hazards resulting in different health challenges.

# CHAPTER FOUR

# DATA ANALYSIS, FINDINGS AND DISCUSSION

## Introduction

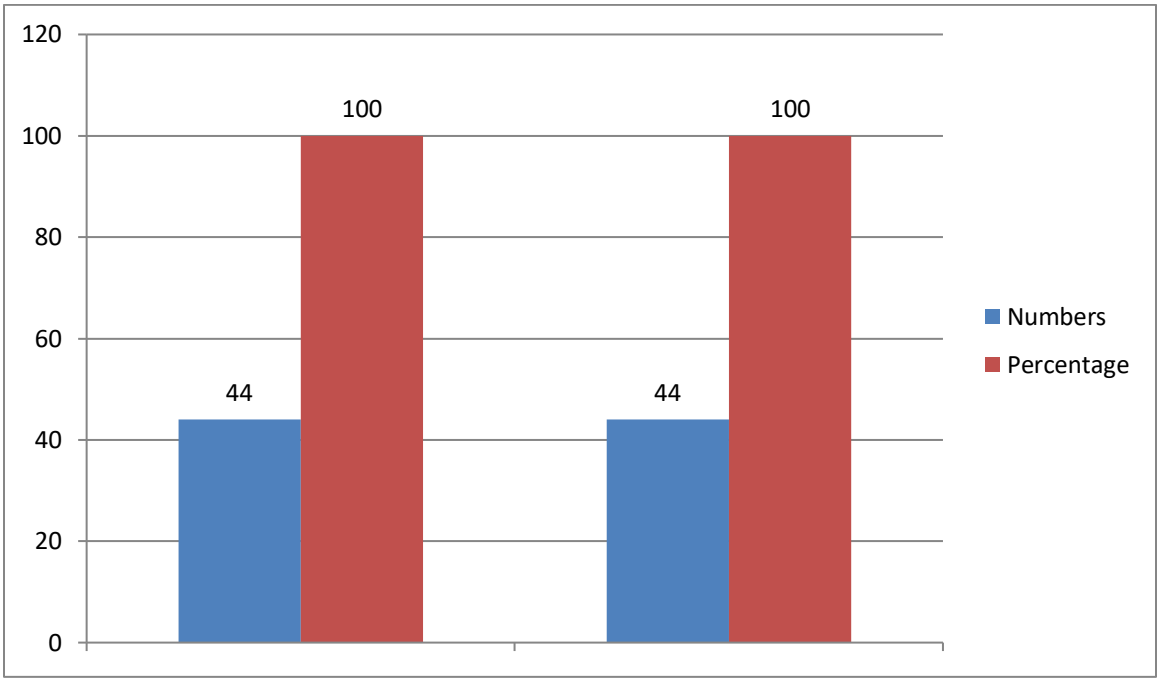
This chapter provides the data analysis, description of the study findings and discussion of the nature of work in this industry exposes workers to various occupational hazards, including the potential exposure to toxic chemicals. Ensuring the health and safety of oil and gas workers is paramount, as their well-being directly impacts both individual workers and the industry's overall productivity. This research focuses on the data analysis, findings, and discussion regarding the health and safety of oil and gas workers, with a particular emphasis on the effects of exposure to toxic chemicals. The analysis and the study findings have been organized, presented and discussed into various categories. The first part is the analysis of the Data collected from the field. The second part is the presentation of findings and analysis of the personal/demographic of the respondents which included sex of the respondents, educational level of respondents and work experience of respondents. The third part is the analysis, presentation and discussion of the findings of the knowledge and understanding of the health and safety of oil and gas workers including the effects of exposure of toxic chemicals in the oil and gas industry.

The fourth part is the analysis, presentation and discussion of the findings of the effectivenessoforganizationalchangeduringitsconduct.Thefifthpartistheanalysis, presentation and discussion of the findings of regulatory compliance, risk mitigation strategies, health surveillance programs, collaborative efforts. The conclusion and recommendations are in the fifth chapter.

## Summary of data collected from Questionnaire

The sample size from different departments was 44 respondents representing the population used for this study. The researcher distributed a total of 44 questionnaires to the staffs; all of them (equal to 100%) were answered and returned to the researcher.

**Figure 4.1:A graph showing the distribution of questionnaires to the respondents**




**Summary of data collected from documentary review**

In order to get other information from various sources, including occupational health and safety records, incident reports, and medical records of oil and gas workers, were collected and analyzed. The data encompassed a range of factors, such as the types of chemicals encountered, exposure levels, frequency of exposure incidents, and health outcomes.

Statistical methods were employed to identify patterns, correlations, and trends in the data, providing a solid foundation for drawing meaningful conclusions. From those documents, the researcher successfully found particular information relating how such an activity was undertaken, how many barriers has it faced. So, documentary review was success fully done by the researcher.

**Demographic analysis**

This subsection presents an analysis and presentation of the findings of the personal/demographiccharacteristicsoftherespondentswhichincludedsexof respondents, educational level of respondents and the work experience of respondents.

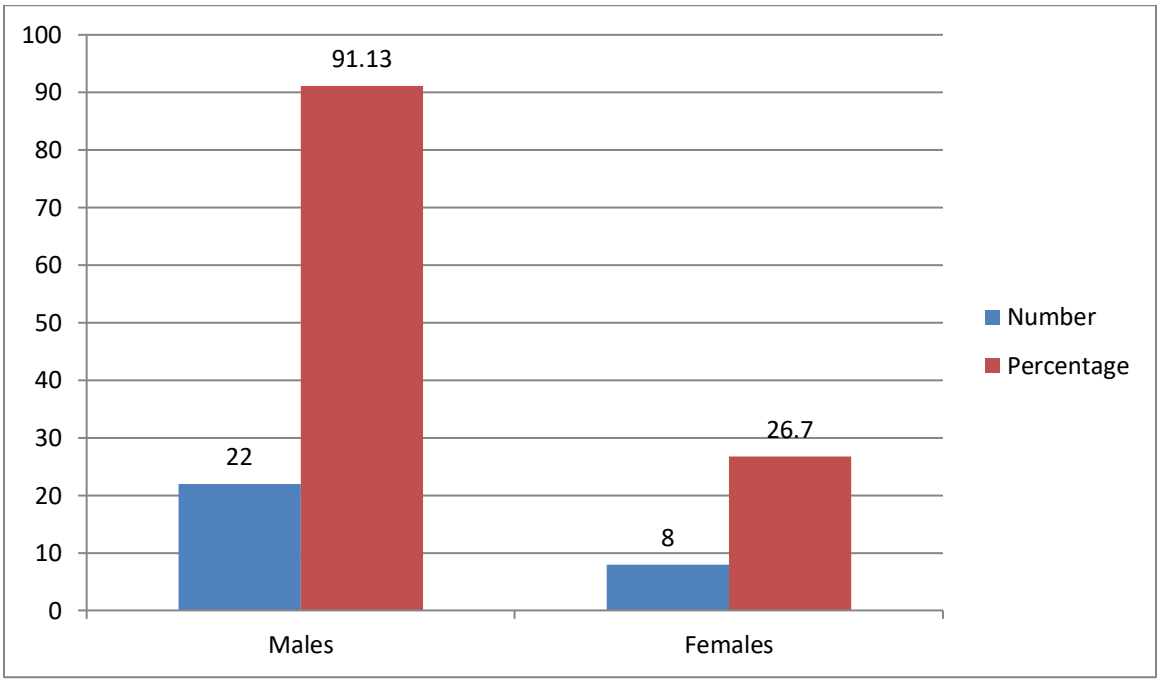
**Distribution of respondents by sex**

The respondents were asked to disclose their sex in order to determine the sex which was dominant in the industry.

The simple random technique that was used to collect data, gave equal chance

To both male and female to be chosen for the study. The findings revealed that out of the 44 respondents, 22 were Males with 91.13% and 8 were females with 26.7%. This finding indicates that the oil and gas industry was mainly dominated by male than female.

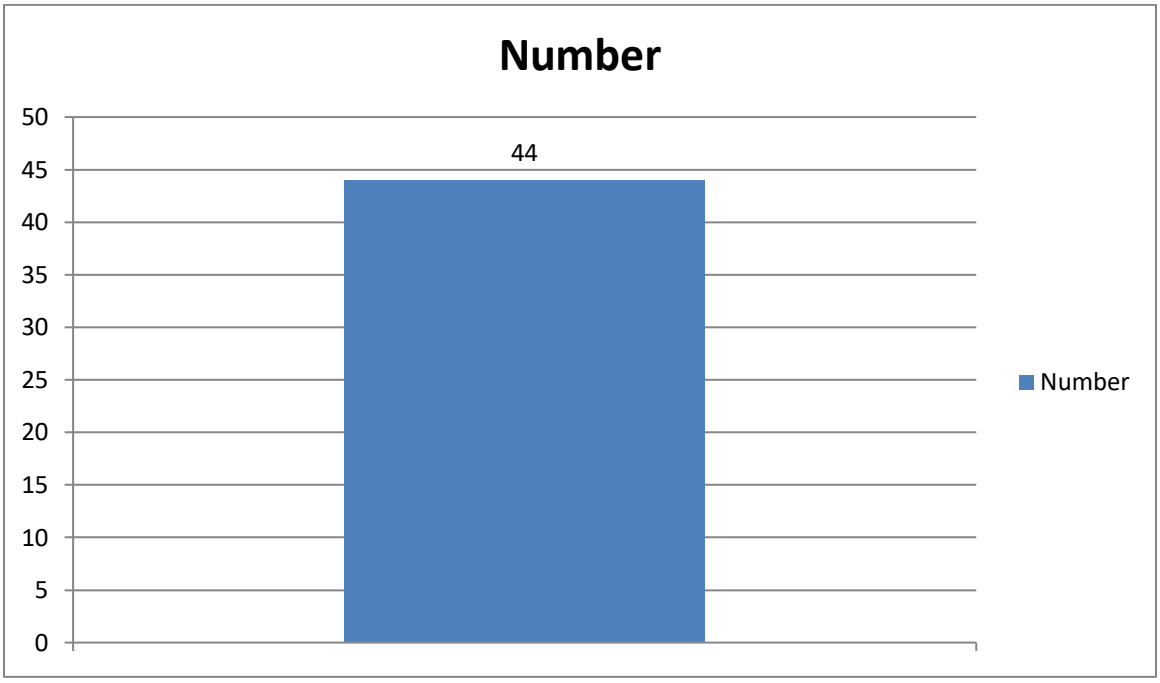
**Figure 4.2: A graph showing the distribution of respondents by the sex.**




**Distribution of respondents by level of education**

The respondents were asked to disclose their level of education in order to determine the education status and qualifications possessed by employees. It was found that out of all 44 respondents who submitted back their questionnaires.

**Figure 4.3: A graph showing the Distribution of respondents by level of education**




**Worker characteristics**

This study is based on several characteristics that are likely to affect exposure. It is known from previous studies that smoking, age, type of task, PPE use, exposure duration, regulations, hand washing habits length of exposure and nutritional status.

Table 1

| **Characteristics +/-** | **Oil refinery** |
|---|---|
| Smoking + | 17,19,20,21,22 |
| - | 27,28 |
| Age + | 21,22 |
| - | 20 |
| PPE use + | 22,23 |
| - | |
| Type of task + | 34 |
| - | 30 |
| Duration exposure + | 21,39,40 |
| - | 27,28 |
| Regulations + | |

| | |
|---|---|
| - | |
| Hand washing habits + | |
| - | |
| Length of Exposure + | 39,40 |
| - | |
| Nutritional status + | 21 |
| - | 27 |

Positive (+): effect

Negative (-): No effect

**4.5. Specific findings on the health and safety of oil and gas workers.**

Specific findings involved all findings which have been gathered on the basis of questions which have been intentionally set by researcher in the questionnaires as the way of either respondingtospecificresearchquestionsorachievingthespecificobjectivesofthisstudy. Under this study, researcher has analyzed the health and safety of oil and gas workers including the effects of exposure of toxic chemicals in the oil and gas companies basing on the independent variables; such as including occupational health and safety records, incident reports, and medical records of oil and gas workers. Narrative notes were used to explain the information summarized in percentages.

**Table 1; an information and management control system that provides a snapshot and up-to-date image of the company's staff**

| Response | Number of respondents | Percentage (%) |
|---|---|---|
| Yes | 44 | 100 |
| No | 0 | 0 |

The above percentages depict that of course the effectiveness of internal control is noticed where oil companies have information and management control system that provides a snapshot and up-to-date image of the company. Thus, it is clear based on the findings from the above table where all the 30 respondents with 100% have been ready to reveal it out.

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**APPENDEX 1 QUESTIONNAIRE**

Dear respondent,

I am NYIRARUKUNDO SHAWAL from King Ceasor University doing are search study on the impacts of organizational change in oil and gas companies. The information given will be entirely for study purpose and will be treated with utmost confidentiality. By answering all the questions in this questionnaire correctly, you will have greatly contributed towards the success of this research study.

Instructions.

Don't write your name (s)anywhere on the questionnaire.

Endeavor to answer all the questions correctly to ensure accuracy and quality.

Indicateyourresponseintheboxprovidedagainsteachquestionorwriteyouranswerin the space provided.

**SECTIONA: BIODATA PLEASE TICKASDEEMEDAPPROPRIATE OPTION**

Sex:

| | |
|---|---|
| Male | |
| Female | |

**SECTION B: GENERAL INFORMATION.**

Pleaseindicateyouranswerbywritingthechosenoptionintheboxprovided.

| Exposure of toxic chemicals | **YES** | **NO** |
|---|---|---|
| PPE | | |
| The employer must ensure that all workers have protective equipment including personal PPE for eyes ,face ,head and extremities, protective clothing, respiratory devices and protective shields and barriers. | | |
| All employees should be given proper health and safety training during the induction process | | |
| Safe handling of hazardous materials including falammable liquids, storage and handling of liquefied petroleum gases. | | |

| | | |
|---|---|---|
| Emergency action plans and fire prevention plan | | |
| Any oil and gas operations require on emergency action plan which addresses emergencies that the employer may reasonably expect in the work place for example fire, toxic chemical releases, hurricanes, tornadoes, bizzards, floods and others. | | |
| Inspection, maintenance and repair | | |
| The employer must ensure walking working surfaces are inspected, regularly and as necessary and maintained in a safe condition and that hazardous conditions on walking surfaces are corrected | | |
| The international labour organization (ILO) has long recognized that the protection of workers from hazardous chemicals in essential to ensuring healthy population as well as sustainable environments. | | |
| Demonstrate safety precautions that should be taken by workers and employers to minimize exposure to chemicals | | |
| Demonstrate safe storage, transport and disposal practices for hazardous chemicals. | | |
| Describe appropriate response actions in the event of a chemical incident. | | |