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An Ethical Interrogation of Coal Mining Activities and its Implications
on Women's Health and the Environment in South Africa

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DECLARATION

I, Nondumiso Nqobile Makhanya, declare that:

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3. This thesis does not contain other persons' data, pictures, graphs or other information unless specifically acknowledged as being sourced from other persons.
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NQM

Student's Signature

Date: 28-11-2022

Supervisor's signature



Date: 28-11-2022

DEDICATION

To my dearest daughter, Nompilo Hlelolwenkosi Makhanya.

ACKNOWLEDGEMENTS

I would first like to show gratitude to God for the strength and stamina he gave me on this journey. Without his mercy and love, I would not have come this far.

To my parents, Phumlile Hilda Makhanya and Samuel Mandlenkosi Makhanya, thank you for your love, patience and endless support. You both have been there for me since day one. I have no words to describe how thankful I am for all you have done for me. Thank you for believing in me and giving me the opportunity to fulfil all my academic goals. Your prayers have kept me going. No words can describe how grateful I am for the love and support that you have shown to me and my academic journey.

To my brother, Mongameli Lungelwa Makhanya, thank you for being my number one cheerleader and pushing me to follow my dreams. I appreciate your support.

To my daughter, Nompilo Hlelowenkosi Makhanya, and my niece, Aphelele Makhanya, I hope and pray that you get an opportunity to see the work I have done one day. I hope you read this dissertation and one day be encouraged and be driven to do more and do better than I have done.

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ABSTRACT

Coal mining is one of the earliest forms of economic activity that is still practised today in the majority of African countries, including South Africa. Because it also offers employment opportunities to a large number of individuals, its contribution to the growth of the economy is unparalleled. In spite of the debates around climate change, global patterns of coal consumption have not changed over the past few years. In fact, it has been observed that coal is not even close to being in decline. Coal is recognised as one of the most utilised resources in the world. Even though coal mining helps substantially to economic development, its positive impact on economic growth appears to have outweighed the adverse effects it has on local communities and the environment.

Although debates and discussions have been conducted on coal mining in South Africa, most scholars have not written about how coal mining affects women's health and the environment from an ethical perspective. This study aims to ethically interrogate coal mining activities and their implications on women's health and the environment in South Africa. The study highlights the contribution of coal mining activities towards environmental pollution and how it has affected women's health. Furthermore, coal mining activities have resulted in the displacement of local communities, violence and a violation of human rights. It is through this backdrop that this study, through the lens of ecofeminism and intersectionality, argues that coal mining companies and government in South Africa reconsider their approaches to mining and prioritize women's health and the environment.

Keywords: Coal mining, Environmental pollution, Women's health, Ecofeminism, Human rights.

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ABBREVIATIONS AND ACRONYMS

AMD	Acid Mine Drainage
CO ₂	Carbon Dioxide
CEDAW	Convention on the Elimination of all Forms of Discrimination Against Women
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DMR	Department of Mineral Resources
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
GBV	Gender-Based Violence
GBVH	Gender-Based Violence and Harassment
MHSA	Mine Health and Safety Act
MHSI	Mine Health and Safety Inspectorate
MPRDA	Mine and Petroleum Resources Development Act
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NEMAQA	National Environmental Management Air Quality Act
NEMWA	National Environmental Management Waste Act
NWA	National Water Act
UN	United Nations
UNDHR	Universal Declaration of Human Rights
WHO	World Health Organisation

CHAPTER ONE: INTRODUCTION

1.0 Introduction

This study is an ethical interrogation of coal mining activities on women's health and the environment. Coal mining is known as a key player towards economic development, and an energy source in South Africa. However, local communities and the environment has suffered as a result of mining activities. The study focuses on how coal mining activities have affected particularly women's health and the environment. The study is conducted from the insights of ecofeminism. The study further draws insights from the intersectionality theory and prescribes ideas from an intersectional approach. These ideas are presented in the form of recommendations for ethical mining practices. This chapter introduces the study, and it presents the background as well as the motivation of the study. This is followed by the problem statement, key research questions, objectives, theoretical framework, research methodology and the structure of the dissertation.

1.1 Background to the Study

Numerous nations take part in a wide variety of activities in order to progress their economic standing and level of technological sophistication. Coal mining is just one of several activities available. Mining is a significant economic activity that helps to develop huge areas with the resource and contributes to the development of large areas (Yeboah, 2008). Coal mining is one of the earliest forms of economic activity that is still practised today in the majority of African countries, including South Africa. Mathesane Mphokane (2010) noted that the mining industry has been a crucial component in the development of the South African economy. This industry has been responsible for the growth of the Johannesburg Stock Exchange and has provided employment for more than a million people. Because it also offers employment opportunities to a large number of individuals, its contribution to the expansion of the economy is unparalleled over the years. According to StatsSA (2014), coal contributed R51 billion to the South African economy in 2013, while gold contributed R31 billion.

Coal serves a significant part in meeting the need for a consistent energy source. Coal is the most widely available and economically feasible fossil fuel on the planet that can be used for both power generation and industrial purposes and other uses. Coal has been utilized and ascribed to new technologies that exist in the present day. Coal deposits are a lot more plentiful, huge, and evenly dispersed than other fossil fuel reserves. Although there are debates centred on climate

change, trends of coal consumption globally have remained constant in the recent years and are reportedly far from declining (World Atlas 2015; SACRM 2011, cited in Shongwe 2018). Coal is the primary fuel source for the production and generation of power in South Africa. South Africa generates 94% of its electricity from coal, which means that a large number of coal mining operations are taking place in the country (IEA 2014). The goal of energy generation and production for a good standard of life and economic development leaves an extensive trail of implications on the environment, affecting women and human health in general. As a polluter, coal mining causes environmental degradation, which has detrimental effects on both humans and the environment. Pollution is the primary cause of the degradation of the environment. Air pollution continues to pose severe threats to the environment, which manifests in the health of the local communities and livelihoods, leading to a long-term burden (Shongwe, 2018).

For instance, the health of those who reside in the vicinity of or in close proximity to coal mining sites are at risk of being exposed to contamination sources that have a high level of pollutants (Bryan and Loscalzo, 2017). This contributes to a decline in health, specifically in the form of respiratory disorders, problems with the immune system, and kidney ailments (Sapire, 2012). Exposure to pollutants is a health concern, particularly for women when looking at maternal health. Air pollution has an impact as it causes pregnancy-related complications and miscarriages in women (Chawla, 2021). Another concern is the health of the natural environment, where water pollution affects animals and living organisms. Acidic water that is drained from coal mining sites and into nearby water streams and rivers is one example of this. Acidic water from coal mine drainage (AMD) affects non-living aquatic organisms and may result in their extinction or displacement. Coal mining has resulted in land pollution, as it destroys vegetation, causes soil erosion, and alters microbial communities (Goswami, 2014).

Even though coal is necessary for energy generation and a high standard of living in South Africa, there is growing concern about the environmental and health effects of coal mining. It is indeed essential to note that humans are inextricably linked to their surroundings and that our whole existence is reliant on the use of the environment. For this reason, the study seeks to interrogate the ethical implications of coal mining activities on women's health and the environment in South Africa.

The study contributes to the debate and fills the literature gap by interrogating the effects of coal mining activities on women's health and the environment through the lens of ecofeminism and intersectionality and highlight how patriarchal and capitalist forces keep mining in place.

1.2 Motivation for the Study

A factor that motivated the researcher to undertake this study is the researcher's interest to engage in current debates surrounding issues affecting the environment and women in Africa. One of the areas that sparked my curiosity as the researcher was coal mining activities. Because coal mining contributes to pollution, I was particularly curious to learn how coal mining affects not only the environment but women's health in South Africa. Coal is an essential mineral because it is the main source of energy in the country; it is also a source of economic value. Although coal mining contributes to economic development, its value seems to have outshined all the adverse effects that it is experienced by local communities and the environment. Coal mining, as a human activity contributes to environmental pollution, and it has posed a problem for a long time. The researcher learned that the mining industry has a regulatory framework and policies that guide the industry in protecting the local communities and the environment. To my knowledge, the framework and policies are more theoretical than practical in a sense that mining activities contributes adversely to the health of people and the environment, the practice continues as normal as though it has no effects on people when it actually does. When reading about coal mining and its effects on human health, I also found that there are issues that need to be addressed, issues affecting the health of women and the environment. This is an area where there is minimal focus on women and how they are affected. As far as the researcher is aware, little has been done on coal mining activities and their effects on women's health and the environment from an ethical viewpoint. This issue therefore motivates the researcher to interrogate from an ethical viewpoint how mining activities affects women's health and the environment.

1.3 Research Problem

There are various discussions and studies that have indicated that mining activities affect the environment and human health. In particular, the mining industry has been criticized for its escalation and contribution to environmental problems. This may be due to the investors skewed perceptions of the surroundings and the localities where mining operations activities are carried out. Consequently, mining activities are hazardous (Ssebunya, 2017). This then leaves a threat not only to the environment but to local communities as well. Be that as it may, the way women's health is affected is not discussed enough. The effects of coal mining activities on women's health have not been critically assessed from an ethical viewpoint. Therefore, this study aims to explore

and ethically interrogate coal mining activities and their implications on women's health and the environment in South Africa.

1.4 Key Research Question

What are the ethical effects of coal mining activities on women's health and the environment in South Africa?

1.5 Research Sub-Questions

- What is the nature of coal mining?
- How do coal mining activities affect women's health and the environment?
- How can the ethical theories of ecofeminism and intersectionality respond to the environmental degradation caused by coal mining activities that affect women's health?

1.6 Key Objective

To ethically explore the ethical implications of coal mining activities on women's health and the environment in South Africa.

1.7 Research Sub-Objectives

The objectives of this study are:

- To explore the nature of coal mining.
- To examine the effect of coal mining activities on women's health and the environment.
- To explore the ethical theories of ecofeminism and intersectionality in order to respond to the environmental degradation of coal mining activities and make recommendations that contribute to the health of women and the natural environment.

1.8 Theoretical Framework

The study assumes that coal mining activities have ethical implications not only on the environment but also on women's health, and this has resulted in consequences on the natural environment and society. For that reason, the appropriate theories that will guide the study are the ethical theory of Ecofeminism and Intersectionality.

Ecofeminism is concerned with the freedom of women and the struggle against patriarchy. Françoise d'Eaubonne, a French feminist, is credited with being the pioneer of ecofeminism. Ecofeminism sees male-centeredness as a root of oppression of both women and the environment

(Muthuki, 2006). According to Cenk Tan (2017), there is a major connection between gender and nature, and the connection between women and nature is particularly crucial. Men are the ones who are in the position of making crucial decisions regarding the natural environment, while women are the ones who are impacted by these decisions. The theory highlighted that women are primarily affected by environmental problems and that women's disenfranchisement and oppression are inherently linked to the destruction of the natural world because both stemmed from the patriarchal rule (Regan, 2020). Ecofeminism, according to Giacomini et al., (2018), is based on the belief that capitalists exploit both women and the environment and that ecofeminist activism works to combat this form of exploitation that comes with capitalism.

The second theory that underpins this study from an ethical viewpoint is Intersectionality. Intersectionality consists of overlapping systems, such as patriarchy and capitalism, that can oppress an individual or a group of people. The term 'intersectionality' was developed by Crenshaw (1989). It is a framework for understanding how different identities interact to produce various forms of privilege and prejudice (Copper, 2016). It is based on the need to critically examine these identities that exist in our society which limits our consciousness to the injustices that occur. In the interest of deciphering power, intersectionality directs our attention to gaps, inconsistencies and insists that such omissions be treated as significant and not set aside. The intersectionality of patriarchy and capitalism is relevant because it seeks to reveal these identities and expose the connections between these identities. The theory provides a framework to contextualize the implications of coal mining activities on women's health and the environment. It is, therefore, another appropriate theory that will guide the study.

1.9 Research Methodology

The research of this study engages the desktop research that relies on existing literature. The desktop research method, based on secondary sources, will be used to obtain such literature and information. The researcher intends to use the exploratory design approach to address the study's research questions for the research methodology, which will be further explained below.

Data Method Collection

The study utilizes desktop-based research, which relies on secondary data that has already been collected and is readily available from other sources. Desktop research is a type of social science research that interprets secondary research data and helps understand social life by studying targeted societies (Starman, 2013). This type of data is quick to obtain and available when

primary data cannot be obtained. This study relies mainly on secondary data, having established the key research question and identified the research problem. This study relies on published and unpublished material such as books, articles, dissertations, theses, journals and online papers.

The secondary data that is used in this research will be obtained from search engines via the internet. Much of the secondary data will be gathered through the use of Google Scholar. Google Scholar is a search database that will help locate relevant books and online articles relating to the subject matter researched in this study. The researcher has developed keywords relevant to the study to help generate the appropriate data. Some of the keywords are coal mining, environmental pollution, women's health, ecofeminism and human rights. Apart from Google, the UKZN libraries will be used and accessed through the university's digitized collection. ResearchGate is an online platform where different scholars connect with others by sharing their work. The study will use this platform by downloading articles and publications relevant to this study and finding relevant literature and data. Since the data has already been obtained, cleaned, and placed in a digital format, the researcher can utilize the time to examine and analyze the data. (Boslaugh, 2007).

Research Methodology

The study will use a methodological approach known as the exploratory approach in conducting the research. An exploratory approach is conducted when a research problem has fewer studies to predict an outcome. According to Nancy Burns and Susan Groves (2001), exploratory research is done to attain new understandings, establish multiple insights on a subject or phenomenon, and expand existing knowledge concerning a specific subject. Exploratory research addresses issues on which little or no prior study has been conducted (Brown, 2006). The main objective of such research is to clear uncertainties about a phenomenon. With the exploratory approach, I will be able to provide new information on the topic, bring familiarity and knowledge about the nature of coal mining activities, and explore how it contributes to environmental degradation that affects women's health and the environment in South Africa. The exploratory design will assist in gathering new explanations that have been previously overlooked and explain further the phenomena.

1.10 Aim of the Study

The study aims to explore and interrogate coal mining activities and its implications on women's health and the environment in South Africa from an ethical viewpoint. The purpose of this study

is not to condemn companies for the mining activities but rather explore how their mining activities affect women's health and the environment. This will be done through the lens of ecofeminism and intersectionality as guiding paradigms of the study.

1.11 Structure of the Dissertation

There are five chapters in this study. The following are descriptions of each chapter:

Chapter One: Introduction

Chapter one represents the study's organizational framework. The chapter introduces the topic explored along with the background and research problem, motivation of the study, key questions, theoretical framework, research methodology, and the dissertation structure. This chapter presents an outline of the dissertation and what it entails.

Chapter Two: Literature Review

This chapter presents the literature review by identifying the critical scholars and academic texts that have been written about the topic in focus. By doing so, the study will identify the gap in the literature. This chapter will be presented thematically, which includes the following: history of coal mining in South Africa, an overview of the mining regulatory framework, coal mining methods in South Africa, environmental crisis, environmental pollution, the contribution of coal mining to pollution, and its effects on women's health and the environment.

Chapter Three: Theoretical Framework

This chapter presents the theoretical framework which guides the study. The theories used are the ethical theory of ecofeminism and intersectionality. This chapter will define the theories and discuss different forms or approaches of ecofeminism and intersectionality. The chapter further discusses arguments for and against ecofeminism and intersectionality, as well as the theoretical relevance of the study.

Chapter Four: Analysis

This chapter will provide an analysis of coal mining activities and their implications on the women's health and the environment. This will be done through the lens of ecofeminism and intersectionality. The chapter will highlight the ethical issues that emerge from coal mining activities which affect women's health and the environment.

Chapter Five: Recommendations, Summary and Conclusion

The study comes to a close with this chapter. There are two sections in this chapter. The recommendations are presented in the first section of the chapter, followed by the chapter summaries and study conclusion in the second section.

1.12 Conclusion

The main issues that will be elaborated upon in subsequent chapters were presented in this chapter as an overview and introduction to the study. In the chapter, the background of the study, the research problem, the research's key questions and objectives, the theoretical framework, the research methodology, and the dissertation's organisational structure were all presented. The literature review is covered in the second chapter, which follows.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

The introduction and overview of the study was provided in the previous chapter. It provided the background of the research problem, the key question, sub-questions, as well as the objectives of the study. The chapter also offered a preview of the theoretical framework, methodology and the structure of the dissertation. The current chapter presents the literature review of coal mining activities and their effects on the environment and women's health. This chapter is divided into two sections based on their respective themes. The first section presents the history of coal mining, an overview of South Africa's mining regulatory framework and coal mining methods in South Africa. The second section presents the environmental crisis from an African perspective by looking at the scholar Ogungbemi's understanding of the crisis, environmental pollution, effects of pollution on women's health and the environment. This will be followed by a conclusion.

2.1 The History of Coal Mining in South Africa

Coal mining was first discovered around Fransch-Hoek area of the Western Cape in 1699. Coal mining took place commercially in South Africa and was first documented in 1800; it remained the primary energy source for domestic power generation (Hancox & Götz , 2014). Coal mining is best traced to the start of gold mining, mainly around Witwatersrand, with the first coal being mined on the Highveld coalfield (Minerals Council SA, 2022). Between 1838 and 1859, coal was discovered in the provinces of KwaZulu-Natal and the Eastern Cape. Coal mining activities in the Eastern Cape began in 1864 at the Molteno-Indwe Coalfield. This coal was used to supply the Kimberly diamond deposits (Peatfield 2002, cited in Cobban *et al.*, 2009, CER 2017, see also Jeffrey *et al.*, 2014). The demand for coal increased rapidly in the 1970s, leading to the industry expanding and creating more coal mines (Pone *et al.*, 2007). In 1895, coal mining became a full-time commercial business, and in 1896, the town of Indwe was laid out. Subsequently, good quality of coal was identified in the provinces of Gauteng and Mpumalanga (Cobban *et al.*, 2009). Coal mining in KwaZulu-Natal took place in Northern Natal in 1889 under Dundee Coal Company whose base operations was Dundee with mines in the slopes of Talana Hills, throughout Endumeni and Glencoe valleys. Coal deposits were in different areas including Newcastle, Msinga District, Mvoti and Thukela rivers and at compensation on the coastline north of Durban (Guest 1988, McFadden 2022). In Gauteng, areas such as Springs and Vereeniging

among others, coal was discovered as well. Springs is an area in the East Rand in Gauteng where coal was discovered in the year 1887, three years later the Transvaal first railway was constructed for the purpose of transporting coal from the East Rand all the way to the gold mines of the Witwatersrand.

Vereeniging is a town in Gauteng that lies along the Vaal River, south of the Free State border (Das, 2013). After the discovery of diamonds, there was a demand for coal, and mines were established in Vereeniging in 1879 (Jeffrey *et al.*, 2015). The Voortrekkers discovered the coalfields of the Mpumalanga Province (formerly the Transvaal Province), but it wasn't until the discovery of the Witwatersrand gold deposits in the 19th century that they were mined. Mpumalanga became a significant coal-mining region as the need for electricity and the capacity of power plants increased along with the growth of the gold industry (Peatfield, 2003). Witbank, situated in Mpumalanga, has the most substantial number of coal mines with an estimated 22 operations concentrated around that area; that area has been given a new title, “Emalahleni,” which means place of coal (Bench Marks Foundation, 2014). South Africa has the fifth largest coal deposits located in Mpumalanga, Limpopo, Free State, with smaller reserves in KwaZulu-Natal, Gauteng, Northern Province, and the Eastern Cape (Shongwe, 2018). Notable coalfields are Waterberg Highveld, Witbank, Ermelo, Utrecht, Klip river (Keaton Energy, 2009).

South Africa is ranked as one of the major coal producers. The World Atlas classified South Africa as the sixth-largest coal exporter and seventh largest coal production (World Atlas, 2015). Coal contributes to economic development by producing the highest foreign exchange earnings in the country (XMP Consulting CC, 2017:3). The majority of the coal mined in South Africa is used to generate power, and this is unlikely to shift in the foreseeable future (Statistics South Africa 2005:10, Eskom 2016). Over 80% of coal in South Africa is produced by global companies such as Anglo Coal, Sasol, Exxaro, among many others (Mathu & Chinomona, 2013:347). According to Eskom (2021), the coal industry has produced more than 224 million tonnes of coal reserves in South Africa that can produce energy for the next 200 years.

Nick Middleton (2018) asserted that humans have utilized minerals from the crust of the earth ever since *homo habilis* started making stone tools approximately 2.5 million years ago. Because every mineral-related item in modern civilization is either a direct mineral product or the result of processing with the aid of a mineral product, we are now more dependent than ever on getting minerals from the soil. This claim demonstrates how important mining has been throughout history. This shows how essential human action is to the existence of material things, which are

dependent on minerals. However, these human activities ought to be handled with consideration for the surrounding ecosystem and local populations. This is due to the fact that the minerals are a part of the environment, and if care is not taken during extraction, other elements including the health of people and other animals may be affected.

It is critical and essential to understanding the South African mining regulatory framework when presenting the history of coal mining in South Africa. The following subsection is, therefore, the point of discussion.

2.2 South Africa Mining Regulatory Framework

This subsection discusses the South African Mining Regulatory Framework. First, the Mining Charter is briefly discussed, following this is the government bodies that administer the South African mining industry which is the Department of Mineral Resources and Energy (DMRE), the Department of Environmental Affairs (DEA), and the Department of Water and Sanitation (DWS).

2.2.1 The Mining Charter

For the South African mining and minerals industry, the Mining Charter, also known as the Broad-based Socio-economic Empowerment Charter, was founded on a foundation of injustice and exploitation. It is because of this legacy that the mining charter was drafted; its purpose is to encourage the mining industry's much-needed change (CALSA, 2022). According to Riaan Du Plessis (2022), the South African mining charter was designed to ensure transformation in an industry which has demonstrable historical inequalities and difficulties. It was intended to protect and empower Historically Disadvantaged South Africans and to attract outsider investment into the minerals sector of the country. Listed below are the goals of the Mining Charter:

- (a) The affirmation of the internationally recognised principle of state sovereignty; its right to exercise authority and make laws within its boundaries; over the life of its country including all its mineral wealth;
- (b) To deracialise ownership patterns in the mining industry through redress of past imbalances and injustices;
- (c) To substantially and meaningfully expand opportunities of historically disadvantaged persons to enter the mining and minerals industry and to benefit From the exploitation of the nation's mineral resources;

- (d) To utilise and expand the existing skills base for the empowerment of historically disadvantaged persons;
- (e) To advance employment and diversify the workforce to achieve competitiveness and productivity of the industry;
- (f) To enhance the social and economic welfare of South Africans so as to achieve social cohesion;
- (g) To promote sustainable growth and competitiveness of the mining industry;
- (h) To enable growth and development of the local mining inputs sector by leveraging the procurement spend of the mining industry; and
- (i) To promote beneficiation of South Africa's mineral commodities (Republic of SA Government Gazette, 2018:16).

2.2.2 Department of Mineral Resources and Energy

The Department of Energy and the Department of Mineral Resources were integrated into a single department in 2019, resulting in the establishment of the Department of Mineral Resources and Energy (DMRE). The DMRE aspires in making significant contribution to the transformation of South Africa by fostering growth in the economy and sustainable development in the mining and energy industries. DMRE aims to regulate, change, and promote the minerals and energy sectors by making sure that everyone in South Africa desires long-term benefits from the country's mineral wealth and making sure that sustainable energy is available and affordable. The Mineral and Petroleum Resources Development Act 28 of 2002 and the Mine Health and Safety Act 29 of 1996, as well as the Mine Health and Safety Inspectorate, are all administered by the DMRE.

2.2.2.1 Mineral and Petroleum Resources Development Act 28 of 2002

The Mineral and Petroleum Resources Development Act (MPRDA) 28 of 2002 is an act of the parliament of South Africa. The act was implemented in 2004 by introducing a set of regulations that provide specific guidelines in the mining industry (Sandham *et al.*, 2008) and lead the sector's transformation (Ledwaba, 2017). According to Bench Marks Foundation (2015), the act guides how the prospecting and production process of the natural minerals should take place in South Africa. The acts' objective, among many others, is to support the public's participation by making provisions for equitable access and promote transformation within the mining industry and focuses on developing Black Economic Empowerment (BEE) and black ownership of mines (Diale 2014:21, also see Bench Mark Foundation, 2015). In addition, the MPRDA mandates that

mining organizations carry out public engagement regarding exploration rights, mineral rights, and environmental effects. The MPRDA states the following in Chapter 2, section 2:

- (c)... To promote equitable access to the nation's minerals and petroleum resources to all people in South Africa,
- (d) substantially and meaningfully expand opportunities for historically disadvantaged persons, including women, to enter the minerals and petroleum industries and to benefit from the exploitation of the nation's minerals and petroleum resources,
- (e) promote economic growth and minerals and petroleum resources development in the Republic,
- (f) promote employment and advance the social and economic welfare of all South Africans,
- (i)... Ensure that holders of mining and production rights contribute towards the socio-economic development of the areas in which they operate (Republic of SA Government Gazette, 2002:18).

This shows that the democratic system in South Africa envisioned a mining industry that is socially responsible and acknowledges the rational basis for businesses to pursue profit, and also contributes to the growth of the economy in moral ways to ensure accountability among all companies that are a part of the mining industry and stakeholders.

2.2.2.2 Mine Health and Safety Act 29 of 1996

The Mine Health and Safety Act 29 of 1996 (MHSA) is an act that applies to mines and related fields. The primary aim of MHSA is to prevent injury and disease and govern the health and safety in the mines (Jephson, 2016). Chapter 2 (1) *a* and *b* of the MHSA notes as follows:

- (1) The employer of every mine that is being worked must-
 - (a) ensure, as far as reasonably practicable, that the mine is designed, constructed, and equipped-
 - (i) to provide conditions for safe operation and a healthy working environment and equipment as necessary to achieve those conditions,
 - (b) ensure, as far as reasonably practicable, that the mine is commissioned, operated, maintained, and decommissions so that employees can perform their work without endangering the health and safety of themselves or any other person (Republic of SA Government Gazette 1996:11).

These are the employers' health and safety duties and obligations in the MHSA. Chapter 2, section 5 (1) provides the responsibility to maintain a healthy and safe environment which states the following:

- (1) as far as reasonably practicable, every employer must provide and maintain a working environment that is safe and without risk to the health of the employees.
- (2) as far as reasonably practicable, every employer must-
 - (a) identify the relevant hazards and assess the related risks to which persons who are not employees may be exposed and,
 - (b) ensure that the persons who are not employees but who may be directly affected by the activities at the mine are not exposed to any hazards of their health and safety (Republic of SA Government Gazette, 1996:13, Le Roux, 2011:530).

Chapter 2, section 8 (1) notes that the employer is required to prepare a document outlining its health and safety standards that:

- (a) describe the organization of work,
- (b) establish a policy concerning the protection of employees' health and safety at work,
- (c) establish a policy concerning the protection of persons who are not employees but who may be directly affected by the activities at the mine (Republic of SA Government Gazette, 1996:14).

2.2.2.3 Mine Health and Safety Inspectorate

The Mine Health and Safety Inspectorate (MHSI) is the government agency at the DMRE responsible for the protection and ensuring the safety and well-being of everybody involved in mining operations or who might be affected by them. (Li, 2008:329). The MHSI aims to achieve a healthier and safe mining industry and reduce mining-related injuries deaths by establishing national policy legislation to regulate and enforce health and safety in mines (Li, 2008:330). The objective is to carry out the constitutional obligations of the DMRE to ensure the protection and safeguard the wellbeing and safety of mines employees together with the communities affected by mining operations (DMRE, 2022).

2.2.3 Department of Environmental Affairs

The Department of Environmental Affairs (DEA), also known as the Department of Forestry, Fisheries and the Environment, was established to oversee the conservation, management, and protection of the environment in ways that are sustainable for South Africans including the present and future generations. The DEA's mandate was set out in legislation frameworks and policies, including the NEMA 107 of 1998 (Shaxon, 2015:10).

2.2.3.1 National Environmental Management Act 107 of 1998

The National Environmental Management Act (NEMA) 107 of 1998 is the national environmental framework that enforces section 24 of the Constitution of the Republic of South Africa. NEMA 107 of 1998 emphasizes the necessity of collaborative environmental governance by defining decision-making principles for environmental issues. Moreover, it establishes that it will endorse collaborative governance and guidelines for integrating environmental functions, provide for specific facets of the administration and application of the law governing environmental management, and to provide for matters related in addition (Lemine, 2021:166). NEMA is the primary statute regulating environmental aspects related to mining. NEMA was adopted in 1998 in order to give effect to the environmental rights specified in the Constitution. The act outlines guiding principles that aim to support sustainable development in South Africa and promote the proper utilization of the country's environmental resources (Du Toit, 2016). Furthermore, the act provides the government with the authority to control the use and destruction of the environment by private entities; the regulatory powers were intended to ensure the utilization of the environment by means of conditions that provide for the prevention, reduction, and improvement of adverse effects on the environment. (Blackmore, 2015:4).

2.2.3.2 National Environmental Management Air Quality Act 39 of 2004

The National Environmental Management Air Quality (NEMAQA) 39 of 2004 proposes to “reform the law governing air quality in order to safeguard the environment by establishing appropriate means for the prevention of pollution and environmental degradation, as well as assuring ecologically sustainable development, while supporting legitimate economic and social growth to establish national norms and standards governing air quality monitoring, management and control by all spheres of government as well as to establish specialized air quality measures” (Republic of SA Government Gazette, 2004). Chapter two of NEMAQA 39 of 2004 states the following:

(2) National norms and standards established in terms of subsection (1) must be aimed at ensuring:

- (a) opportunities for public participation in the protection and enhancement of air
- (b) public access to air quality information;
- (c) the prevention of air pollution and degradation of air quality;
- (d) the reduction of discharges likely to impair air quality, including the reduction of air pollution at source,
- (e) the promotion of efficient and effective air quality management;
- (f) effective air quality monitoring;
- (g) regular reporting on air quality; and
- (h) compliance with the Republic's obligations in terms of international agreements (Republic of SA Government Gazette, 2004:14).

Munnik *et al.*, (2010:11) noted that the NEMAQA 39 of 2004 legislation mandates the identification, quantification, and mitigation of significant emissions sources as well as the establishment of ambient air quality targets and public engagement.

2.2.3.3 National Environmental Management Biodiversity Act 10 of 2004

The National Environmental Management Biodiversity Act (NEMBA) 10 of 2004 seeks to provide the conservation and manage biodiversity in South Africa within the NEMA 1998 framework. NEMBA 10 of 2004 functions as follows:

- (i) the management and conservation of biological diversity within the Republic of South Africa and the components of such biological diversity,
- (ii) the use of indigenous biological resources in a sustainable manner and,
- (iii) the fair and equitable sharing of benefits arising from bio prospecting involving indigenous biological resources (Republic of SA Government Gazette, 2004:22).

2.2.3.4 National Environmental Management Waste Act 59 of 2008

By establishing reasonable measures to minimize pollution and environmental harm as well as assuring environmentally sustainable growth, the National Environmental Management Waste Act (NEMWA) 59 of 2008 proposes reforms to the law relating to waste management. The objectives of the Act are as follows:

- (i) minimizing the consumption of natural resources,
- (ii) avoiding and minimizing the generation of waste,
- (iii) reducing, reusing, recycling and recovering waste,
- (iv) treating and safely disposing of waste as a last resort,
- (v) preventing pollution and ecological degradation,
- (vi) securing ecologically sustainable development while promoting justifiable and social development (Government Gazette, 2009:18).

2.2.4 Department of Water and Sanitation

The Department of Water and Sanitation (DWS) is one of the South African government departments responsible for water resources in South Africa by formulating and implementing policies governing the sector (DWS, 2022). It thrives to give all citizens clean water to support social and economic growth. The National Water Act 36 of 1998 is administered by this department.

2.2.4.1 National Water Act 36 of 1998

The use of mining water and the safeguarding of the resource are both regulated by the National Water Act (NWA) 36 of 1998. The following is an excerpt from Section 19, which addresses pollution mitigation and remediation measures:

an owner of the land, a person in control of the land or a person who occupies or uses the land which-

- (a) any activity or process is or was performed or undertaken, or
- (b) any other situation that exists, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing, or recurring (Republic of SA Government Gazette, 1998:32).

Section 2 of NWA 36 of 1998 states, “the purpose of the act is to ensure that the nation’s water resources are protected, used, developed, conserved, managed and controlled, considering the basic human needs of present and future generations, ecosystems and biological diversity” (Pienaar *et al.*, 2007:183).

2.2.5 The Constitution of the Republic of South Africa

The Constitution of South Africa, which establishes the rights and obligations of its people and assigns duties to the several branches of government in the nation, is the supreme law of the Republic. The Constitution establishes responsibilities and duties on people and justice officials for the recognition of the rights conveyed in the Bill of Rights (Muswaka, 2017). Section 24 of the Constitution addresses the efforts to prevent environmental degradation, and pollution, as well as to promote ecological conservation (Nzimande & Chauke, 2012:135). Section 24 of the Constitution states the following:

Everyone has the right to-

- (a) an environment that is not harmful to their health or well-being and
- (b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that-
 - (i) prevent pollution and ecological degradation,
 - (ii) promote conservation and
 - (iii) secure ecologically sustainable development and use of the natural resources while promoting justifiable economic and social development (Constitution of SA, 1996:9).

Other relevant statutes include Mineral and Petroleum Royalty Act 2008, Mining Titles Registration Act 1967, Precious Metals Acts 2005, Diamonds Act 1986, Land use planning regulated by Spatial Planning and Land use Management Act 2013 and the relevant municipal and provincial regulations and bye-laws (Davies *et al.*, 2018).

2.3 Coal mining methods in South Africa

Surface and underground mining methods are employed in the South African extraction of coal reserves (DMR, 2014:2). The mining methods, surface and underground, are discussed below.

2.3.1 Surface Mining

Among the many surface mining techniques, opencast/open-pit mining is the most widely used. According to Anglo American (2021), opencast mining (sometimes referred to as open-pit mining) is a mining method of mineral extraction from an open pit in the ground. The method used to mine coal is determined by the coal deposit geology and based on financial considerations (World Coal Institute, 2009). According to Munnik *et al.*, (2010), approximately 51% of South African coal mines are underground and 49% opencast (or open pit). Open-cast mining consists of stripping away and piling up the top layer of soil (McCarthy & Pretorius, 2009). Before coal

extraction, a significant portion of the coal deposit is uncovered by clearing the overlying rock, also known as the overburden, from the mined region usually using trucks and mechanised shovels or bucket-wheel excavators. Explosives are utilised in order to fragment the overburden of soil and rock before to its removal through draglines, shovels, and trucks, respectively (World Coal Institute, 2009). After the coal seam has been uncovered, it is subsequently drilled, fragmented, and strip-mined systematically (World Coal Institute, 2009). The broken rock is deposited back into the pit, the site is landscaped, the soil is restored, and the grass is planted.

The following are typical processes involved in open-pit coal mining:

clearing the land of trees and vegetation, removing and storing the top layers of the unconsolidated soil, drilling the hard strata over the coal seam, fragmenting or blasting the hard strata with explosives, removing the blasted material, exposing the coal seam, and cleaning the top of the coal seam, fragmenting the coal seam, as required, by drilling and blasting the hard strata (Ramani *et al.*, 2022).

2.3.2 Underground Mining

According to Ramani *et al.*, (2022), the working environment in underground coal mining is entirely confined by the earth's crust, which comprises of the coal seam as well as the layers that lie above and below it. When the coal seams are at a depth that makes removal of the overburden impossible, underground mining is the method of choice (Lloyd, 2002). Underground mining can be done using either the room-and-pillar method or the long wall mining method (World Coal Institute, 2009). The mining method, known as "room-and-pillar", includes cutting into a coal seam to create a sequence of rooms, after which pillars of coal are left behind to support the ceiling of the mine. Long wall mining is a costly method that is used to recover and remove a significant portion of the coal. When it is necessary to completely extract all of the coal from a section of the seam or face, mechanical shearers are put to use.

2.4 Environmental Crisis in Africa

The health of the earth is continuously threatened by the environmental crisis. It is a considerable loss in welfare due to an unstoppable deterioration of the environment. (Taylor, 2009:6). Philomena Aku Ojomo noted “the causes of environmental pollution and degradation, environmental injustice, poverty of effective coping and management strategies in challenging the environmental crisis, and lack of a viable environmental ethics that takes cognizance of the peculiar dynamics of the environmental crisis in Africa are issues worth courting

philosophically” (2011: 572). From this statement, Ojomo asserted that Africa is faced with an environmental crisis; a crisis that needs to be studied and understood philosophically. To learn about the environmental crisis in Africa and have a good understanding from a non-western perspective, the African philosophical thinking about the environmental crisis will be explored by discussing Segun Ogungbemi’s view of the environmental crisis.

2.4.1 African Perspective of the Environmental Crisis

The environmental crisis from Segun Ogungbemi's perspective.

Segun Ogungbemi saw the environmental crisis as one of the most significant challenge in the world (Ojomo, 2010:55). Ogungbemi comprehended the environmental crisis from three different perspectives: ignorance and poverty, science and technology, and political conflicts and international pressures, among others. With the concern regarding ignorance and poverty, the great majority of Africans, according to Ogungbemi, live in traditional rural regions, which are poverty-stricken; these areas lack the essential services such as electricity, sanitation, and clean water. He further argued that poverty and ignorance “do not necessarily exonerate our people from their contribution to environmental hazards” (Ogungbemi,1997:204). People in rural areas burn wood as a means of cooking and have a source of heat, and there are others who use the river for different purposes, which leads to the rivers being polluted as a consequence. The burning of woods leads to air pollution; this therefore supports the above statement. This was Ogungbemi's way of getting the point through to the readers that this behaviour resulted from the delay in service delivery. Ogungbemi (1997) made the claim (about science and technology) that contrary to traditional environmental conservation, the rate at which resources like air, water, and land are exploited. Development in Africa has resulted in the depletion of natural resources, which adds to the environmental catastrophe, attributable to science and technology. In simple terms, Africans do not contribute to the environmental crisis because they want to, but it is because they have no choice since there is no sufficient delivery of services. International pressures have contributed to the crisis in Africa due to the connection of capitalism and pollution that plays a catastrophic part towards environmental degradation (Mwambuzambi, 2010:54). Ogungbemi suggested that the environmental problem in Africa has been caused by the misuse of science and technology by stating:

modern usage of land by our society does not reflect a similar degree of awareness of the importance of forests and trees for the maintenance of environmental values. Many long-held customs have been cast aside in favor of more modern approaches to development, as if progress and modernity were

incompatible with protecting forests and keeping trees healthy. The consequences of this have been a breakdown of environmental stability (2008:322).

Even though Africans contributed to the environmental crisis, Africans lived with nature and respected her. Thomas McGinn (1974) noted that when digging up the dirt to cultivate crops, primitive humans was capable of expressing their regret to mother earth. Because contemporary man adheres to the concept of exploitation, without question, he has lost his sense of respect. Ogungbemi went on to say that the way that natural resources like land, water, and air are used goes against the traditional conservation methods. (McGinn 1974, Ogungbemi, 1997:205).

With regard to the land, development has led to deforestation with adverse effects on erosion, flood, and desertification. Ogungbemi cited David Okali, who noted that our society does not use our land in the same way that shows the same level of awareness of how important forests and trees are to the environment. The drive to develop has led to the complete abandonment of traditional practises and values for managing forests and land, as if development and modernization were incompatible with conserving forests and protecting trees. This has led to a breakdown in environmental stability, which has manifested itself in the form of severe erosion, increased turbidity and silting up of streams, flood disasters, and degradation of forests first into grassland and then into desert (Ogungbemi, 1997). Furthermore, Ogungbemi (1997) stressed that modern-day Africa should be deeply worried about the tremendous rate of forest destruction that is occurring in most sections of Africa's woods, where huge numbers of precious trees are being cut down annually and sold for lumber abroad in other foreign countries. Modern Africa has used some of its most important minerals, such as gold, copper, diamonds, and coal, to try to catch up with developed countries. This has exacerbated an ecological imbalance and environmental problems.

In terms of water, Ogungbemi acknowledged water as a vital natural resource that has been affected by human activities. The author argued:

in our conventional relationship with the environment, both men and women know how important it is to take care of water, land, and air. Nature-based ethics are a moral code for our indigenous peoples, according to our traditional way of life. Earth, forests, rivers, and wind are traditionally seen to be both natural and sacred, which may explain why they are so valued. An environmental philosophy is not necessarily religious, but rather a natural way to protect our planet's resources. The ethics of care is essential to the traditional

understanding of environmental protection and conservation(Ogungbemi, 1997: 204).

Ogungbemi emphasised further “that the rate at which natural resources like as water, air, and land are exploited is contradictory to traditional environmental conservation” (1997: 205). Along these lines, the advancement of science and technology in Africa has resulted in the depletion of natural resources such as trees, which in turn leads to turbidity, desertification, erosion, and flooding. Ogungbemi also stated that the growth in modern Africa's population is an additional issue that has continuously continued to exacerbate the damage to the environment on the continent. The author stressed that traditional African people loved and appreciated nature, and that environmental ethics came easily to them in the sense that they never took more from the natural environment than what they required. This provides a possible explanation as to why traditional beliefs hold that the earth, trees, rivers, wind, and other natural resources are both divine and natural.

Some Africans see some of the resources they have at their disposal as sacred. Gonzalo Oviedo and Sally Jeanrenaud asserted that one can define sacred natural areas as the “natural areas of special spiritual significance to peoples and communities. They include natural areas recognized as sacred by indigenous and traditional peoples, as well as natural areas recognized by institutionalized religions or faiths as places for worship and remembrance” (2007:77). The preservation and care of the natural environment is supported by the fact that such sites in Africa are generally safe from harm and are not subject to damage. The soil, for instance, is revered from the inside out. Ogungbemi (1997: 208) proceeded to ask the following questions: “How do we know how much we need, given the nature of human greed and insatiability? Who judges whether we have been taking more or less than we need from the natural resources? If we have been taking more than we need, what are the penalties and how fair are they?”. These are critical inquiries, and it was from those questions that Ogungbemi derived traditional environmental practise, which considered "ethics of care" to adapt to the contemporary African context. These questions are essential. Ogungbemi established the ethics of nature relatedness, as a result of this, he proposes a number of practical solutions to the crisis that is currently facing the environment. First, he proposed a cost-effective solution to the problem of Africans over reliance on non-renewable energy sources like wood, coal, and gasoline by increasing solar power generation, transmission, and distribution. This was his plan to lessen the dependence that Africans have on these energy sources. Furthermore, in regard to the matter of the significant rise in population, Ogungbemi (1997) remarked by stating; when the population has reached an alarming condition,

nature would invariably apply its break via volcanic eruptions, earthquakes, and so on and have a significant fall in the population growth rate. In addition to this, he advocated for a shift in strategy for African politics, arguing that the continent's governments have to adopt practises that are more sustainable. He went on to offer the recommendation that politicians should have the necessary determination to cut down on the amount of waste produced by agricultural and industrial processes and to properly store such waste in a manner that protects urban, commercial, as well as our more rural areas, from the harmful effects of environmental pollution.

One of the significant issues that relates to the environmental crisis is environmental degradation. The term environmental degradation refers to the destruction of the environment as a result of the consumption and exploitation of natural resources and the general health of the environment. Environmental degradation is known to be a threat that is accelerated by human activity such as coal mining. Coal mining causes pollution that is destructive to both the environment and humanity. In the following section, pollution as a result of coal mining will be discussed.

2.5 Environmental Pollution

Before understanding what environmental pollution entails, it is necessary to discuss the basic understanding of pollution. Environmental pollution is characterized as “the contamination of the physical and biological components of the earth or atmospheric system to such an extent that the normal environmental processes are adversely affected” (Narwaria, 2022). Peirce, Weiner and Vesilind (1998) stated that environmental pollution is the contamination of air water or food in such a manner as to cause actual or potential harm to human health or well-being or to damage or harm non-human nature without justification. This means that the action or decision to conduct an activity that can harm or be harmful to the environment should have justifiable reasons. Whatever the justification should not be acceptable because it is harmful, actions contributing to environmental pollution should be urgently addressed.

2.5.1 Classification of Pollution

According to Ramamohana Appannagari environmental pollution is classified as either natural or man-made (2017). Natural pollution is the outcome of the natural environment being polluted by natural events, whereas man-made pollution is the effect of human activity polluting the natural environment. Natural pollution is pollution that happens naturally and has the capacity to regenerate itself, thus it does not pose an unacceptable risk to human life. In contrast, man-made pollution is the result of humans engaging in activities, and as a result, it is more difficult to

combat. Examples of natural pollution include animal defecation, volcanic dust from volcanic eruptions, decay of organisms which results in fossil fuels, acidic rainwater, which naturally occurs due to carbon dioxide (CO₂) present in the atmosphere (Pollution Solutions, 2016). Examples of man-made pollution include the burning of oil, coal, gasoline and other fossil fuels, power plants, factories, vehicles emitting CO₂ and other industrial processes. Furthermore, contaminated matter or substances that may cause harm to humans, as well as living and nonliving species located within the environment, can be regarded to be pollutants that can contribute to the pollution of the environment.

2.6 Coal Mining and its Contribution towards Pollution

As previously noted, there are two types of environmental pollution: natural pollution, which is brought on by natural occurrences, and man-made pollution, which is brought on by human behaviour (Appannagari, 2017). Within these classifications of pollution, there are several types of pollution. This section will look at the contribution of coal mining activities on pollution. Coal as a source of energy in South Africa has improved the country's economy. The environment and human health, however, have both been put at danger as a result of coal mining.

2.6.1 Air Pollution

Air pollution refers to the contamination of air by the actions of humans, which are detrimental to the well-being of humans themselves and the planet in general (Mackenzie *et al.*, 2021). The combustion of fossil fuels for energy generation and transportation is the primary source of change in atmospheric composition. According to Marilena Kampa and Elias Castanas (2008:362), there have been reports on the various air pollutants each with its own chemical makeup, reactive capabilities, emission, and environmental permanence on human health. Because of coal mining, heavy metals, gaseous pollutants, and particulate matter are the pollutants released into the air.

The release of pollutants or contaminated sources into the air results in bad air quality. The mining activities contribute to the issue of air pollution directly and indirectly (Bauldaut, 2001). Air pollution as a result of coal mining is "due to the emissions of particulate matter and gases such as methane, sulfur dioxide, nitrogen oxide as well as carbon monoxide" (Das Sharma, 2009). Air pollution is caused by operations including blasting, drilling, and coal transportation; even the emission of coal dust into the atmosphere contributes to such (TERI, 2013; Higginbotham *et al.*, 2010:260, Katoria *et al.*, 2013:247).

Because South Africa produces almost 224 million tonnes of coal annually and is one of the largest and well recognized exporters of coal, coal mining and combustion are responsible for high levels of air pollution (Eskom, 2016, DEAT, 2005). This revealed that the health of people has been affected by the toxic pollutants that have been discharged into the environment over time, especially to those who reside near coal mining sites and where the power plants are situated (Wright *et al.*, 2011). When coal mining takes place, greenhouse gases are produced. Included among these gases that trap heat are CO₂, methane, nitrogen oxide, and others. Once emitted, these gases linger in the atmosphere for an extended period of time (Lockwood *et al.*, 2009, Hertwich *et al.*, 2010). In South Africa, Emalahleni, Mpumalanga, is a prime example of a heavily polluted environment. The number of hazardous pollutants in the air is highest in Emalahleni, and the air in that area is also the most polluted worldwide (Maya *et al.*, 2015, Munnik *et al.*, 2010, News24, 2013). The Department of Environmental Affairs (DEA) designated this area as a Highveld priority under the National Environmental Management Act 39 of 2004 (DEA 2011, Munnik *et al.*, 2010).

When it comes to air pollution, opencast coal mining is worse than underground coal mining. People who work in underground coal mines are exposed to coal dust, which is bad for their health. Open-pit mining, on the other hand, makes the air quality worse by a lot in terms of gases and small particles. It makes the air dirty in the mining area and in the nearby residential area, where the air quality is already bad. Gaseous emissions contribute to climate change and put people's health at risk, but high concentrations of particulate matter in the air make it more likely that people will get lung diseases like asthma and chronic bronchitis. Up to 85% of the dust that comes from opencast coal mines is caused by the movement of vehicles on haul roads. This is the main source of fugitive dust emissions (Singh, 2008). One of the main contributors to air pollution in South Africa is the need for and ongoing usage of coal for energy production. Bonisile Shongwe stated:

air pollution has been associated with spontaneous combustion of coal waste dumps in KwaZulu-Natal and Mpumalanga (Witbank, Sasolburg, Highveld, Klipriver coalfields). The air pollution caused by spontaneous particulate matter emissions and toxic gases, including CO₂, contributes to climate change. It may lead to acid rain, which causes soil acidification and formation of Acid Mine Drainage (AMD), which pollutes water sources (2018:20).

According to data from the World Health Organization (WHO), CO₂ emissions from outdoor air pollution are thought to be responsible for 1.3 million deaths (Morakinyo *et al.*, 2016). Coal dust

reduces oxygen available to humans, animals, aquatic life, and CO₂ emissions lead to climate change that can alter ecosystems and cause mass species extinction.

2.6.2 Water Pollution

Water pollution is recognized as the contamination of water due to human activities. These human activities contaminate the water, which negatively affects the environment, human health, and its legitimate uses (Sperling, 2007). When dangerous substances pollute water bodies, the water's quality is reduced, and it becomes toxic to both humans and the environment. This is known as water pollution (Denchak, 2018). Olaniran defined water pollution as the excessive presence of pollutants in water such that it is no longer suitable for domestic use, such as drinking and cooking (1995). Water pollution comes from various sources. The most common type is chemical pollution; chemical contamination can infiltrate underground water and surface water, metals from industrial sites also contribute (Envirotech, 2020). Water pollution has become rampant due to coal mining activities (Mishra *et al.*, 2020). Due to this, water is unfit and unsuitable for domestic use and drinking. Water is polluted by releasing obnoxious substances such as acids, ash, and oil that contaminate the water quality of mining regions (Reza and Singh, 2010). Coal mining activities are well known to contribute to water pollution. Coal mining can pose significant threats to the quality of surface and subsurface water, which can have an effect on the availability of freshwater resources in many mining regions. Water reacts both physically and chemically to its surroundings. The physical effect is a reduction in water volume due to silting. Coal mining can exacerbate AMD due to chemical exposure. The most significant concern relating to water pollution is Acid Mine Drainage (AMD).

AMD occurs when the oxidation of sulfide minerals such as pyrite occurs (Acharya 2020, Ochieng *et al.*, 2010:3352). As a result, acidic and iron-rich water is produced, and other heavy metals, which eventually flow into water streams and thus pollute water (Du Toit, 2018). AMD is the formation and movement of extremely acidic water that comes from the chemical reaction between surface water and shallow subsurface water with rocks that contain sulfur-bearing minerals, which results in sulfuric acid (U.S. Environmental Protection Agency, 2021). It refers to the broad category of waste products that result from the weathering and leaching of sulphide minerals in coal and surrounding strata. AMD contains heavy metals such as mercury, copper, lead, which become pollutants (Vyawahre and Rai, 2016) that end up in water bodies. AMD forms when water mixes with coal and other rocks unearthed (Dontala *et al.*, 2015). In addition to this, Terence McCarthy and K Pretorius, claim the following:

Under normal circumstances, the process is prolonged and other equally slow reactions completely neutralize the acid. Nevertheless, mining breaks down the rocks, enabling water to flow freely, and the acid-producing chemical reactions happen quicker than the acid can be neutralized. Aluminium and heavy metals such as manganese, iron and others are among those that dissolve in acidic water, which is hazardous to most plant life and animals (2009).

An often-cited example of AMD is from abandoned mines in the West Rand of Gauteng, where it started to decant from closed flooded underground mines into near water streams (Davies *et al.*, 2010:661). In the Witbank Coalfields located in the Mpumalanga Province, AMD is a significant issue that affects multiple mines. In some instances, it was discovered that AMD originated from opencast workings that had been backfilled and had made its way to the natural water streams that were located in the surrounding area. The effects of AMD on the environment are widespread and range from water contamination to decreased reproductive success in aquatic animals and plants. The adverse effects of coal mining on the environment have led to significant ecological problems, and mining near rivers puts South Africa's source of fresh water at jeopardy (Geldenhuis, 1998, McCarthy, 2008 cited in Tutu, 2012:360) Since AMD is acidic water discharged by mines, it is associated with surface and groundwater pollution, leading to the degradation of soil quality degradation of aquatic habitats. Acidic mine drainage allows heavy metals to seep into the environment (Davies, 2010). Polluted water can damage aquatic flora and fauna and other plant types that may not withstand the elevated levels of toxins (Mashudu, *et al.*, 2018:3). In addition to harming aquatic life and rendering water nearly useless, AMD also causes a significant decrease in water quality. Coal mining causes disturbance of agricultural resources including farmlands, river pollution, the pollution of drinking water, death of non-human bodies living in water, loss of species, and an interruption of aquatic habitats (Olufemi *et al.*, 2018). Human activity is the primary and significant contributor to water pollution; water is essential as we cannot survive without it.

2.6.3 Land Pollution

Land pollution refers to “the introduction of contaminants into the environment and the degradation of the earth’s surface, caused by an abuse of resources and disposal of waste” (Preston, 2017). It occurs when human activity takes place, such as deforestation, landfills, and illegal dumping of waste and mining activities. Land pollution, according to Kaberi Murmu (2020), is the degradation and contamination of land caused by humans' direct and indirect actions. It is the deterioration or damage of the soil and surface of the earth brought on by human

activity, primarily coal mining. Mining in South Africa is done on the surface and underground. Surface mining includes “the occupation of large farming areas needed for excavation and dumping operations, alteration of land morphology, disturbance of native fauna and flora, modification of surface and ground water balance, resettlement of residential areas, roads, the release of air, liquid and solid pollutants and noise pollution” (Goldan *et al.*, 2020:41). Coal mining as a direct activity that results in land pollution causes a change to the landscape. Clearing trees, plants, and top soil from coal mining sites destroy habitats for forests and natural wildlife (Global Energy Monitor, 2021). Land is essential to all aspects of our well-being as it provides life resources and a foundation of our economy by being the primary factor of production in society. Whatever human activities and decisions that take place affect not only the land, it also affects water, air, and life that the environment supports.

2.6.4 Noise and Thermal Pollution

Noise pollution is one of the most serious issues brought on by mining activities. Noise pollution refers to distressing and undesirable sound which disturbs, threaten or cause harm on humans or wildlife (Jain, 2016). The unpleasant noise discharged within the atmosphere causes an unwanted effect on the environment. There are two types of noise pollution: industrial and non-industrial. Noise pollution from coal mining is an example of industrial noise, which is produced by large machines operating at high speeds and intensities (Mishra & Pandey, 2015:3). When coal mining takes place, noise occurs due to the blasting and drilling of the coal. Vehicles, bulldozers, and excavators all contribute to noise pollution, as does blasting with explosives to extract rocks from mines. While this happens, noise pollution occurs near the coal mining sites. Primarily because of “surface or opencast mines, the noise comes out at the time of blasting and removal of overburden. The mining related activities result in the emission of loud noise, which then disrupts citizens from surrounding communities and has reduced the quality of life” (Mishra & Das, 2017:2, Saviour, 2012:126). The mining industry faces a significant problem with noise pollution. This is especially the case with more complex operations involving blasting, crushing, draglines, conveyors, and processing plants. Multiple undesirable outcomes result from blasting operations, including ground vibration, air blast, pollution emissions, and more. When all mining activities are combined, they create a great deal of noise and vibration that may be felt across the mining area and is a source of interruption. The usage of large, high-capacity pneumatic drills and the blasting of hundreds of tonnes of explosive are two examples of activities that are known to generate much noise. Mobile crushers and large capacity materials handling devices are being

installed as part of in-pit crushing systems to expedite the processing of massive volumes. All of these processes contribute significantly to the ambient noise and vibration levels at and around mining facilities. The ground absorbs the impact of the blast, and the vibration waves travel through the layers of soil and rock to the basements of neighboring structures (ERM, 2013). Large open-pit mining operations can cause significant vibration, which can weaken or even destroy homes, schools, and other types of infrastructure in the area. Animals in captivity and in the wild are both affected.

There is no doubt that noise pollution affects human health. The undesirable noise from mining activities may result in the general reduction of the quality of life, stress and may lead to loss of hearing (Singh and Davar, 2004:184). Thermal pollution refers to the degradation of water quality by a process where human activities causes an abrupt change in the temperature of the natural body of water (Rinkesh, 2022). This arises when the temperature of water changes which affects aquatic life. Thermal pollution results from natural causes and human activities. The sources of this type of pollution include the use of water as a cooling agent in industrial plants, soil erosion, volcanoes, deforestation, and other natural causes.

While coal mining provides coal as a good source of energy and contributes towards a good standard of life, it results to health issues towards people and the biodiversity within the South African territory (Nkambule & Blignaut, 2012). Ever since the establishment of mines and the rise of technology in South Africa, the nation is posed with the threat of environmental degradation from the pollution that affects humans and the environment. This is further confirmed by Nkambule & Blignaut (2012), who stated that coal mining is associated with dire effects on the environment and human health; this affects mineworkers and the surrounding communities. The connection between the environment and human health has been acknowledged, and the impacts of coal production primarily manifest in environmental damage, which has led to implications on human health (Morrice & Colagiuri, 2013). It imposes many costs on its surroundings and people near coal mines.

2.7 Effects of Pollution on the Environment

2.7.1 Climate change

Climate change refers to the heating of earth's climate system due to human activities as the primary driver of long term shifts in weather and temperature patterns. The leading cause of climate is the greenhouse effect. Some human activities such as the production and consumption

of fossil fuels and other industrial activities have increased greenhouse gases into the atmosphere, which leads to climate change (Kweku, *et al.*, 2018). In South Africa, climate change affects every element of life. The nation has the greatest per capita emissions in the developing world, attributable to its domestic economy's reliance on coal reserves to produce power and liquid fuels. "Climate change is already a measurable reality, and along with other developing countries, South Africa is especially vulnerable to its effects" (DEA 2011:20). With regards to climate, South Africa is already living on the edge and is experiencing climate change. If emissions of greenhouse gases continue to rise worldwide, the country's climate is expected to deteriorate further.

Climate change worsens existing vulnerabilities and adds to the pressures on the environment and natural resources on which many South Africans rely on (Mwambari, 2009). Climate change occurs when the greenhouse gases trap heat and warm the earth; the greenhouse effect acts as a glass in a greenhouse. Other greenhouse gases include nitrous oxide, methane, fluorinated gases, which are man-made gases used mainly in an industrial setting (Western Cape Government, 2018). Ecosystems are being destroyed by climate change and environmental destruction, which has negative effects and implications towards development, health, and production of food. (Norwegian Foreign Ministry, 2022). Climate change drives terrestrial biodiversity loss and affects ecosystems. The ocean has already absorbed a large portion of the CO₂ produced by human activities, which has slowed the atmospheric CO₂ rise. The ocean becomes more acidic as carbon dioxide dissolves in the seawater and generates carbonic acid. Over time, ocean acidification would most likely do some harm to marine organisms.

In South Africa, climate change is predicted to result in more frequent and severe storms and flooding, which will have an effect beyond mere mortalities. They consist of ailments spreading throughout society, injuries, and a lack of access to food and water (Pohl *et al.*, 2017; Metras *et al.*, 2008; Redding *et al.*, 2017:372). Robert Scholes and Francois Engelbrecht noted the following:

there is no specific doubt that the climate of Southern Africa is becoming warmer, the atmospheric concentration of greenhouse gases is increasing, and the sea level surrounding the continent is rising. Human activities are by far the largest cause of these changes are the global burning of fossil fuels and the transformation of the global land surface from natural vegetation to croplands, pastures and human settlements (2021:1).

Because of South Africa's mining resources and the exploration of them, the country is thought to be a substantial source of global emissions.

2.7.2 Acid Rain

Acid rain is the biggest concern from mining activities. Acid rain, also known as acid deposition, is a broad term that refers to any precipitation that is composed of acidic substances, such as sulfuric acid or nitric acid. Ahmad Ashfaq and Pratiksha Sharma noted “sulphur dioxide and nitrogen oxides react with water in the atmosphere producing sulfuric acid and nitric acid. These acids come down along with rain. This is known as acid rain. The pH of acid rain ranges from 3 to 6. Its adverse effects on the environment include respiratory and skin disorders, the productivity of plants by damaging the leaves, soil, which enters the water and harms aquatic life” (2012:1).

Furthermore, Goswami (2013) noted that the major pollutants generated during coal combustion are carbon dioxide (CO₂) and nitrogen oxide (NO₂), both of which oxidise to variable degrees in the atmosphere. The result is a rise in the acidity of precipitation. The continuation of coal combustion contributes to acid rain, which has adverse effects on the forest, water, damaging buildings and human health. Damage to ecosystems and human health can result from acid rain, which is a consequence of air pollution. Acid rain is the result of combustion gases combining with oxygen in the air and water vapour. When the pH of the Earth's surface water and soil drops too low, it has a devastating effect on ecosystems and threatens all forms of life on Earth.

2.7.3 Land Degradation

Land degradation is characterized as the loss in the ability of land to deliver valued environmental goods and services as a result of modifications to the vegetation cover or topography, as well as the physical, biological, and chemical deterioration of the soil. Land degradation refers to “a decline in the capacity of the land to provide valuable goods and services (including environmental services) and may involve changes in vegetative cover or topographical features as well as physical, chemical or biological degradation of the soil” (Scherr & Yadav, 1996, cited in Ssebunya 2017:89). Activities such as coal mining destroy landscapes, forests, plants, and top soil. This results in soil erosion and the destruction of land (Dontala *et al.*, 2015). According to a guideline developed by the DEA, DMR, Chamber of Mines, South African Mining & Biodiversity Forum, and the South African National Biodiversity Institute titled “*Mining and Biodiversity Guideline*” (2013), the extraction of coal has caused irreversible ecological changes,

the spread of invasive alien species, and the alteration or depletion of natural resources. Deforestation and erosion as part of the making coal mine is another effect; the trees and plants are scraped away. This results in the pollution and degradation of land and soil erosion. A landscape can be harmed by mining in ways that extend far beyond the actual mining site because it is an inherently aggressive practice (Massachusetts Institute of Technology, 2021). Even after a mine has closed, the repercussions of this harm, which also include the release of greenhouse gases, the extinction of flora and wildlife, and habitat erosion, can last for years. Antonie Mulaba-Bafubiandi and Bhekie Mamba argued:

In addition to causing unsafe pits and ditches to be built close to residences, land degradation also causes deforestation, the loss of fertile soil, decreased agricultural output, and the destruction of scenic areas and prime real estate for future development. Mining scars, sometimes of great stretch and depth, are problematic in urban areas such as is the case in and around Johannesburg at present. Deforestation reduces plant and animal biodiversity, resulting in a decrease in the availability of medicinal plants used by local herbalists for treatment of a variety of ailments. Moreover, a large problem, since most African people depend on subsistence farming for their basic nutritional needs, is the special loss of fertile land to these mining activities, as well as associated pollution and soil erosion. Also, the blasting vibrations from mines can cause damage to land and housing structures (2009:9).

2.7.4 Depletion of the Ozone Layer

The depletion of the ozone layer describes the gradual but constant destruction of the ozone layer in Earth's upper atmosphere brought on by the creation of chemical compounds containing gaseous chlorine or bromine in industry and other human activities (Wuebbles, 2022). In accordance with the findings of Ashfaq and Sharma (2012), the ozone can be found in the stratosphere of the atmosphere (O₃). Because the ozone is able to absorb the ultraviolet (UV) rays that are produced by the sun's radiation, it shields us from the potentially damaging effects that UV rays can have. However, hydrocarbons like chlorofluorocarbons (CFCs), which are a type of hydrocarbon, are responsible for the depletion of the ozone layer because they destroy ozone molecules. There have been discoveries of ozone holes in the atmosphere, which allows ultraviolet rays to penetrate to the surface of the earth.

When the ozone layer is absent, the globe gets warmer, causing the polar ice caps to melt because it is no longer shielding the world from solar heat. In his article "*A Perfect Moral Storm, the Ethical Tragedy of the Climate Change*", Stephen Gardiner (2011) makes the case that climate

change needs to be viewed as a moral issue. Climate change is partly because of the depletion of the ozone layer. The increase in the heating of the globe results in the melting of the polar ice caps and this leads to the rise of sea levels.

2.7.5 Wildlife

Pollution contributes to the effect of wildlife species resulting in habitats being destroyed. Coal mining contributes to such by forcing wildlife to move their natural habitat to others that are already occupied by other species. In this context, wildlife that is displaced is forced into a competition of available resources, which leads to the survival of the fittest (Jahsan, 2015:03). Wildlife is also vulnerable to the exposure of toxic elements in the air; it can cause animals to suffer from pulmonary issues and the dysfunction of the mucous membrane. Colin Ruggiero further stated that the contamination of water from increased sediment loads can cause a decrease in “aquatic oxygen content and light penetration, reducing the growth of aquatic plants and resulting in the direct mortality of fish and other marine species dependent on the plants as a food source” (2022:03). Many species are threatened by human pressures and activities.

In Southern Africa, biodiversity is threatened by climate change, poaching, hunting, illegal trade of certain species such as rhino horns (De Beers *et al.*, 2003). Wildlife is vulnerable to the burden of toxic pollutants that come from the air, soil, and water systems; this can result in animals developing difficulties with health once subjected to prominent amounts of contaminants. Other issues include reproductive failure and congenital disabilities. Animals, just like humans, experience health issues when exposed to any form of pollution.

2.8 Effects of Environmental Pollution on Health

The most significant cost imposed on human health in general and the environment is pollution. Katie Altieri and Samantha Keen (2019) pointed out that South Africa and other nations that rely on fossil fuels suffer from high levels of air pollution, which causes death and reduces productivity. According to WHO, being exposed to elevated levels of contaminated air, short term or long term has adverse effects on human health. Short term (acute) exposure to polluted air results in eye discomfort and irritation, respiratory tract inflammation which leads to coughing, bronchitis, and asthma (Goudarzi *et al.*, 2016, see also WHO, 2016). Long term (chronic) exposure to contaminated air may lead to lung and bronchus cancer.

2.8.1 Respiratory Disorders

According to Nada Voca (2014), CO₂ together with other pollutants lead to reduced lung functioning which ultimately leads to lung cancer, irritability of the eyes, nose and mouth, respiratory symptoms such as coughing and wheezing, interference with the immune and reproductive systems and untimely deaths. With regards to short term exposure that leads to acute respiratory effects, there is an association between increased pollutant levels as a result of coal mining and an increased number of individuals with respiratory disease (Santos *et al.*, 2021). The effects of chronic exposure are associated with increased mortality from respiratory disease and increased incidences of asthma, lung cancer and a deficit in lung development during childhood. “Children are vulnerable to air pollutants because their immune system is still developing. They have a faster breathing rate resulting in inhalation of higher doses of air pollutants than adults” (Gilliland, 2009:123). Coal dust inhalation has an adverse effect on the lungs. Another study done with coal miners demonstrated that exposure and inhaling coal can lead to silicosis, mixed dust pneumoconiosis, and chronic obstructive pulmonary disease, including emphysema and chronic bronchitis (Laney & Weissman, 2014, Perret *et al.*, 2017). Chronic obstructive pulmonary disease, a chronic inflammatory lung condition that results in obstructed airflow from the lungs, is one of the diseases that is influenced by coal pollutants. (Lockwood *et al.*, 2009). According to Neil Overy (2020), research has shown that about 1.6 million South Africans who live within 2 kilometres of a mine or a mine dump have worse respiratory health because of it. Members of the community are more likely to have chest wheezing, rhinoconjunctivitis, chronic coughs, pneumonia, and chronic bronchitis. The results of a study done by the South African Medical Research Council and the University of Pretoria in 2015 are especially worrying. The study found that there are a lot of chronic respiratory diseases and symptoms in older people who live near mine dumps. Olufemi *et al.* noted that Mpumalanga is recognized as a province where air quality is a problem...the province is declared the worst air quality problem globally (2018). People living near coal mines are exposed to health issues due to air pollution. According to Nkosi *et al.* (2017), the hazardous byproducts of coal mining cause a wide range of health concerns, including cancer, cardiovascular problems, respiratory disorders, asthma attacks brought on by pollutant exposure, and even fatalities. Lockwood *et al.*, (2009) noted that children who are minors and live close to this type of industry are particularly vulnerable and may experience effects that result in intellectual impairment and a lower intelligence quotient (IQ).

2.8.2 Neurological and Cardiovascular Disorder

Other studies suggest that exposure to various air pollutants may lead to an increase in neurological and mental illnesses such as memory loss, dementia, stress, depression, schizophrenia among others (Kim *et al.*, 2020). The toxic pollutants within the atmosphere affect the nervous system, which leads to psychiatric and neurological impairment. By-products of coal combustion can also cause cardiovascular illnesses such as heart attacks. Heart attacks occur due to blockages of the artery; the heart may be damaged due to the deprivation of oxygen. If continuous exposure to any pollution happens, it may aggravate these issues, which is not ideal for human health.

2.8.3 Ingestion of Contaminated Water

Consuming contaminated water that contains harmful substances affect human health. It leads to digestive issues, neurological system abnormalities, reproductive problems, and chronic diseases including cancer (EPA, 2022). Consumption of water that has been exposed to chemicals can cause severe problems to the nervous system and long term conditions; contaminated water is linked to diseases such as diarrhoea, cholera, dehydration and even death.

2.8.4 Health Problems Associated with Noise

Noise pollution, as a result of human activity, affects human health. Issues such as hearing impairment annoyance, displeasing social behaviours, and the disturbance of spoken communications are issues among others that affect human health and social interactions with others. These issues that arise from noise pollution are briefly discussed below.

2.8.4.1 Hearing Impairment, Annoyance and Displeasing Social Behaviours

Hearing impairment is the abnormality of the ears that leads to hearing loss. Noise pollution affects that includes tinnitus and impaired speech result from the exposure of noise (Jariwala *et al.*, 2017). The exposure of noise also results to annoyance which leads to displeasing social behaviours. Annoyance refers to the unpleasant feeling that leads to irritability. Noise pollution contributes to annoyance and unwanted sound. Beutel *et al.*, (2016) noted that although it is common for people to become accustomed to the exposure of noise, the degree of customization varies greatly from person to person. Negative health effects may occur if noise exposure persists and exceeds a specific threshold. The danger of hearing loss due to noise exposure is, of course, the most noticeable effect of noise pollution. Furthermore, noise has detrimental effects on

several elements of health, reduces workplace productivity, and impedes the ability to communicate effectively. The forest's wildlife, along with that of nearby mines and industrial sites, is also negatively impacted by noise. It is well-known that animals are more sensitive to noise and vibrations than humans are (Singh, 2008).

2.8.4.2 The Disturbance of Spoken Communication

The exposure of noise makes it difficult to understand spoken language and can result in a variety of problems; physical impairments and changes in behaviours (Basner *et al.*, 2014, Jariwala *et al.*, 2017). These issues consist of exhaustion, uncertainty, issues with concentration, reduction in work capacity and disturb interactions with others and stress.

2.9 Coal Mining and Women

The effects of coal mining are experienced by all women. Women working in the mines and those who live in communities near the coal mines are vulnerable to health issues that result from pollution produced by coal mining activities. The following subsection presents the effects of pollution on women's health.

2.9.1 Effects of Pollution from Coal Mines on Women's Health

The effect of coal mining activities on women's health remains visible as women are understood to be closer to nature due to their social responsibilities. It is essential to address women's health as human health, in general, depends on investing in the well-being of women since they are connected to nature. Women's role in social reproduction means they deal primarily with the damaging effects of air, water pollution and extreme weather events linked to climate change (Falcier & Cock 2018).

Women are affected by coal mining not only as individuals; it affects them as workers, family, and community members. Women experience the exposure of environmental effects of coal mining in different ways that includes being exposed to polluted air within and outside the mines, exposure to polluted water, soil, consuming contaminated water, plant food, fish, or wildlife. The effects of mining activities are more pronounced for women as compared to men.

2.9.2 Respiratory Impairment

Women who are involved in the secondary works of the mines and those in neighbouring communities are constantly exposed to various respiratory illnesses due to the inhalation of coal

particles, which results in the malfunctioning of lungs. The common disease suffered by women is TB, bronchial asthma, severe bronchitis, pneumoconiosis (Pramanik, 2020). The reasons for this are because of the dust and contaminated air, due to dust generation in the mine, which releases particulate matter. When inhaling this polluted air, it triggers respiratory illness that compromises the functioning of the lungs and the nervous system. Furthermore, coal mining puts women at an elevated risk of thyroid and colorectal cancer. When contaminants are released into the atmosphere, it harms both human health and the environment. Akinlabi *et al.*, (2013) and Munnik *et al.*, (2010) postulated that mining operations generate dust which leads to air pollution, resulting in a hazard to the environment in general and human health. Women who live near mining sites and belong to families that depend on mining for a living are vulnerable to health issues. Coal contains traces of mercury that enter the environment when it is burned and can affect the neurological system and result in cognitive decline (Lopatto & Ostrow 2013).

2.9.3 Exposure through Water

Communities near the coal mines often do not have a water alternative; they are exposed to water that is contaminated with pollutants that seep into the soil and groundwater. Women are susceptible to water pollution due to their role in the family. Women undertake domestic tasks with water that includes washing clothes and dishes, bathing children. The contaminated water is consumed by crops that women farm in order to feed children and family; this affects the health of not only women but also children, infants and the elderly.

2.9.4 Physical Stress

Within the mines, women are expected to go through rigorous tests and perform the work that is done by men, to which women are more likely to express fatigue quicker than men as a result of the aerobic capacity of women being an average of 15% to 30% lower than the male (Matshingane, 2017). This affects women psychologically; they may feel that they are less incompetent and not worthy enough to do tasks that are given to means the mining sector is driven by productivity. Pramanik (2020) noted that women who work in the coal mines experience muscular disorders due to the nature of the mine work, but they often hide their orthopaedic issues. Another chronic problem faced by women who work in the mines is the development of muscular and back pains, arthritis, fatigue, and a general physical incapacity.

2.9.5 Pregnancy

The primary concern with women is their pregnancy. The following are the physical hazards that female coal miners face within the workplace.

Table 1: Physical hazards for pregnant women	
Hazard	Possible risks
Dust exposure	The health of the foetus may be affected indirectly by poor lung function and breathing.
Climbing ladders	Due to poor balance and ergonomics, the risk of falling is particularly significant, which might result in pre-term labour.
Bacteria and viruses	There is a chance the foetal growth may be delayed, and there is a chance the pregnancy could end in a miscarriage.
Vibration and mechanical shock	Premature labour is a risk.
Extreme cold	Hypertension poses a risk to the foetus, as does the possibility of preterm labour.
Extreme heat	Hypertension poses a risk to the foetus, as does the possibility of preterm labour.
Noise	Complications can be experienced by the child once the child is born.
Physical strain (such as lifting heavy projects)	Risk of impaired foetal growth and higher risk of carpal tunnel syndrome.
Prolonged sitting and standing	Venous, spinal, and foot issues, as well as the risk of preterm labour and cervical insufficiency.
Stooping and bending below knee level	Ergonomics, vascular, falling, balance, cervical insufficiency.

Source: (Mokobolo, 2009)

The table above shows the hazards and risks that pregnant women miners face. The risks they face are similar as the one's pregnant women from local communities' experience. "Maternal exposure to air pollution is a risk factor known for adverse neonatal and obstetric outcomes that

include foetal growth restriction, gestational maturity, hypertensive disorders of pregnancy and gestational diabetes mellitus” (Melody *et al.*, 2020). Studies suggested that pregnant women who live near coal mines or who are near them run a significant risk of having children with chromosomal or congenital disabilities. (Cortez-Ramirez *et al.*, 2018). The long term exposure to harmful elements may affect the next generation as well as themselves (Sen *et al.*, 2015; Appleton *et al.*, 2017). Women within and outside the mine as well as children are exposed to various respiratory illnesses due to the inhalation of dust particles. Air contamination can alter women’s maternal and reproductive health, it is seen through the changes in the menstrual cycle and length of its phases, and there is a risk of miscarriage (Gasparatto & Martinello 2021). Furthermore, the extent of health effects of women is elaborated by Theo Davies and Humbulani Mandulamo (2010) as cited in Musawenkosi Nxele (2017) suggested that other geology and medical investigations provide a connection of contaminated water from mines and nutrient deficiency and soil contamination, which is passed through the food chain; this in turn has effects on osteoarthritic diseases that affects many women in the area known as Maputaland, KwaZulu-Natal.

2.10 Other Issues affecting Women and Local Communities

2.10.1. Displacement

The physical removal and displacement of huge numbers of people due to mining activities being conducted in their residential regions is one of mining's most significant negative effects. The protection of human rights is severely threatened, and there is a significant social concern. Women suffer more when a community loses environmental resources since they are primarily responsible for providing the basic food, fuel, and fodder that support the family's general way of life. The takeover of these resources by the mining companies and the dispossession of these company assets are challenging to evaluate in economic terms; a feminist framework is necessary. In indigenous communities and traditional families, the status of women is not equal to their male counterparts. However, they continue to be in charge of gathering the necessities for sustaining life (Argawal, 1992). Women are still more dependent on the resources provided by the environment as a result of this gender disparity. Women suffer not just in terms of health and nutrition, but also in terms of being able to create a stable future for their families, especially children. Displacement denies their children and themselves access to healthcare, education and the services concerned with basic needs.

Displacement from original habitats entails more than the physical relocation, it entails the loss of supportive means that are centred on sustenance resources offered by the local environment for survival and livelihood (Ahmad & Lahiri-Dutt, 2006). People who are forcibly removed from their homes and surroundings and deprived of their land, which serves as their main point of economic, social, and cultural reference, are said to be displaced (Chakroborty & Narayan 2014). When whole communities are forced to move, they not only lose their homes, but also their land and their ways of making a living. Most of the time, displaced communities are moved to places that don't have enough resources or are close to mining operations that pollute and contaminate the area. For indigenous communities, forced resettlement can be especially bad because they have strong cultural and spiritual ties to the land and forest of their ancestors. If these ties are broken, it may be difficult for them to stay alive (Singh *et al.*, 2015). The International Institute for Environment and Development (IIED) noted:

The displacement of settled communities can be a significant cause of resentment and conflict associated with large-scale mineral development. Communities may lose their land, and thus their livelihoods, also disrupting community institutions and power relations. Entire communities may be forced to shift into purpose-built settlements, into areas without adequate resources. They may be left near the mine, where they may bear the brunt of pollution and contamination. Involuntary resettlement can be particularly disastrous for indigenous communities with strong cultural and spiritual ties to the lands who may find it difficult to survive when these are broken (IIED, 2002:202).

Communities can suffer a significant loss of power and stability when land and livelihoods are taken away. Involuntary relocation might have a devastating effect on communities. Traditional values and ways of life may be lost as a result of displacement and the transition from a cash-based economy to a traditional subsistence economy. This has the potential to lower women's formal status in society, especially in situations where newly established gender roles highlight women's domestic work and undermine their productive and leadership roles. Lahiri-Dutt (2015) asserted that some of the previous cultural norms that would have given some authority and power to women have been lost or changed as a result of the loss or changes to traditional culture. As a result, the loss of older values disproportionately affects women, as seen by the devaluation of women's productive work at home and the erosion of their role as decision-makers and landowners.

2.10.2 Conflict

Conflict is another concern that affects communities in areas where large scale mining activities takes place. Conflict occurs between the local communities and the traditional leadership, the local residents and the mining firms and government (Ssebunya, 2017). A study by Yolandi Meyer (2021) found that conflicting views exist in South Africa regarding the effects of mining on rural communities. The engagement of communities in mining choices on their land is also a subject of concern. Disputes develop when people's social, economic, and cultural rights must be protected while mining profits are sought. For others, the land is an essential source of food and wealth, while for others, it is an important element of their cultural identity. The major source of conflict in communities near/around mining sites is the locals and traditional authorities being at odds with one another. This is because locals are in the dark about the mining ventures taking place in their midst, and only those in positions of power are reaping the rewards. Johannes Muntingh (2011) asserted that most conflicts arise from the unfavourable effects mining has on local people, although competition within local factions for a cut of the benefits can also be a source of conflict. Llewellyn Leonard noted:

Some traditional leaders have been accused of trading the rights of communities for personal benefits and/or shares in mining companies. Although social and labour mining plans are designed to benefit local communities, many South African communities have complained that they are denied the right to decide on mining development in their communities and that plans are agreed to without their participation by traditional leaders. Generally rural communities complain that they are kept in the dark about deals made between traditional leaders and/or politicians as to who benefits from mining. Activists, who reject mining on what they consider their ancestral land have been forced into hiding by death threats and intimidation (2019:291).

Leonard further argued:

The corruption that was then part of the Somkhele community now operates with...some traditional leaders benefiting, with the majority of people particularly those who have lost their land to the mine being really tragically disadvantaged and much poorer than they had ever been before, with very little prospects of improving their lives because there must be lands... it happens in all of these places where the traditional leaders end up being bribed quite substantially by the mining companies (2019:291).

Traditional leaders, tasked with advocating for their communities, often fail. Others prevented community engagement and decision-making. Some have settled with mining companies for personal gain without local consent. Conflicts are perpetuated by those who benefit from corruption, as stated in the above quoted argument, as they show no concern about the welfare

of the community or its oppression. The countless conflicts typically have this as their primary cause. People who believe those who are leaders in their communities make selfish, self-serving and corrupt decisions, often disregarding or going against community sentiment, have experienced heightened tension and frequently violent conflict.

The detrimental effects of mining have intensified the underlying tensions between corporations and locals, and these tensions have shown themselves in conflicts. When this occurs, tensions have likely been building for some time.

2.10.3 Agricultural Production

Apart from health, mining activities affect the livelihoods of humans by having effects relating to crop production and livestock. “Coal mining has adverse effects on crops and livestock farming due to reduced access of agricultural land, a decline in soil productivity and crop quality, as well as livestock fertility” (Shongwe, 2018). Traditional subsistence farming, which is a source of income for women, is affected by mining. According to Tatenda Muponde (2021) mining activities pose a great risk to the availability of agricultural land that women need to feed their families hence their livelihood is affected when agricultural production does not take place. Some small farmers within the Mpumalanga coal mining region of South Africa converted the land they own to truck stops because of the issues of losing valuable international clients from Europe as the result of the effects of reduced quality of the irrigation water on crops (Benchmark Foundation, 2014).

As discussed above, under the water and land pollution sections, the pollution of land along with the water resources and AMD create an unfriendly environment for plants as well as aquatic life to a point where crop production is threatened and reduced due to coal mining activities. Mining activities are often associated with pollution and loss of soil fertility which poses a threat to food security if not managed (DMR, 2014). Mining activities dents the livelihoods of the local people because these activities and operations take place in areas, often rural, where people depend on crops such as maize as their staple food and other products that are produced from these crops (Tsebe, 2018). Since women are burdened with the responsibility of farming, they are mostly affected as their livelihood depends mostly on farming, if deprived they have little to no alternatives.

2.10.4 Poverty

While the mining industry continues to dominate the economic development space, there is little evidence that shows how communities' benefit from coal mining operations. Instead, they are subjected to consequences of environmental degradation, displacement, forced relocation, resettlement and packages that have no concern on land and crop production. These consequences are mostly faced by women. Women are mostly affected as they are burdened with domestic responsibilities and subsistence farming while men are given more employment opportunities in the mines over women. This leaves women economically dependent on men which undermines their status in a traditional setting. When mining damages and degrades the environment, women's ability to provide food and water is undermined. This therefore heightens exposure to malnutrition and inadequate food supply, affecting their health and leaving them in a vulnerable state of famine. Over some time, communities face problems such as unemployment, disorganization of family structures, sex work and sexual abuse that is experienced mostly by women. Mining benefits the multinational mining companies and corporations at the expense of local people. This is mainly due to the perceived exploitation of mineral resources, which do not benefit the people and may result to poverty (Oxfam, 2009).

2.10.5 Sexual Violence in Mining

Despite the fact that sexual harassment can affect both men and women, studies suggested that women are most likely to be harassed compared to men (Wharton, 2009). According to Pons and Deale (2010), sexual harassment is unwanted behaviour that is of a sexual nature and may occur in the form of offensive physical, verbal, or nonverbal behaviour. In South Africa, various researchers and institutions revealed that there are severe occurrences of sexual harassment such as whistling, use of derogatory language, physical contact that ranges from touching to sexual assault and rape in the mining workplace (Botha, 2016, BenchMark Foundation cited in Kolver, 2013). "Traditional ways of livelihood and women's responsibilities within households and communities have been completely destroyed as a result of mining....they are forced menial and marginalized forms of labour as maids, servants, construction labourers or prostitutes, positions that are highly unorganized and socially humiliating" (Bhanumathi, 2009:21). The influx mostly from male labourers who has aggravated the situation leave their families behind, which leaves mining communities more likely to experience sex work, sexual assault, and the spread of AIDS.

Although both sexes are affected, women are more likely to be victims of sexual abuse and harassment due to their society's perception that they are acting in violation of gender standards. It is essential to highlight the role that mining companies play in inciting confrontations that are

violent in nature, maintaining a violent and intimidating culture, and disregarding the violation of human rights (Earthworths & Oxfam America, ActionAid, 2008). It is unacceptable for men to engage in sexual harassment of women while receiving no protection from mine owners and authorities (Mwakamanya, 2016).

Sex work, trafficking and other forms of abuse are actively promoted by the collective forces of men in the community, mine workers; they make it impossible for women to get any justice (Bhanumathi, 2002). Several elements combine and lead to the vulnerability of women and children to violence in mining sites; these factors include gender ratios, high levels of alcohol abuse and socio-economic exclusion of women due to the entrenched patriarchy (Hlanganisa Institute, 2022). Globally one in three women have experienced violence in their lifetime (Steele *et al.*, 2019; WHO, 2021). Carolyn Butler (2021) stated that Gender Based Violence and Harassment (GBVH) within the mining business was driven by a range of complicated political, social, and economic reasons. It was added that because underground mines are dark and isolated, GBVH was more prevalent, monitoring and supervision of miners, as well as evidence gathering, was more difficult. The dominant patriarchal societal norms in South Africa are worsening reporting barriers by fostering a culture of silence and victimisation, as well as women's economic dependence on men. Women working in a numerically and culturally field that is driven by male dominance are outnumbered and are treated as second-class citizens in terms of personal safety and professional advancement. Some business practises in the mining industry are putting the health and safety of women at risk. For example, outsourcing the hiring of women puts them at risk of being sexually exploited by people in charge of getting good jobs. Also, not designing and placing facilities like bathrooms, locker rooms, bus stops, and elevators so that they are accessible to women leaves them open to abuse and harassment (Butler, 2021; Lawyers for Human Rights and Solidarity Center, 2021).

Nxele forwarded claims relating to the mining activities that affect women and men. The study forwarded the following claims:

1. Mining contributes to the spread of HIV/AIDS.
2. There are casual links between HIV/AIDS, Tuberculosis, and the reliance of mining on a highly mobile migrant labour system.
3. Women suffer losses of livelihoods, marginalization, and loss of identity problems as a direct and indirect consequence of mining activities.

4. Mining damages the water quality, which results in health and livelihood problems.
5. Mining activities contribute to bad air quality that results in respiratory problems.
6. Mining leads to overall development problems of communities in whose land the mining activities take place.
7. Mining communities are yet to benefit from the mining operations, as unemployment and poverty levels remain high.
8. There is a strong gender bias in the industry, with a lack of employment opportunities for women.
9. The mining companies do not provide levels of environmental; income, health and safety standards equal to that of their operations in the developed world (2017:23).

These assertions serve to frame the narrative at communities' level and the effects of mining activities. This shows great concern for the mining activities and their environmental, health and social consequence on society. Coal mining companies and corporations create patterns of gender through patriarchal capitalist forces. They contribute to the marginalization of women and the environment, environmental exploitation for capital gain and degradation through air, water pollution and loss of land, the capitalism subject to exhaustive cheap labour and hardships for women. Women who work as coal miners and those from neighbouring communities, their health and well-being are affected.

2.11 Conclusion

Coal mining activities contribute to the adverse effects on women's health and the environment; documented data was presented to support this. The published literature provides substantial evidence that shows a connection between environmental degradation from mining activities and its implication on women and local communities and the environment in the surrounding vicinities of coal mines. This chapter has presented South Africa's coal mining history and has given an overview of the regulatory framework of South Africa's mining industry. The chapter has also presented the African perspective of the environmental crisis by discussing Ogungbemi's perspective relating to the environmental crisis. Furthermore, the chapter covered environmental pollution as well as the effects of pollution on the environment and women's health. It indicated that due to women's role in social reproduction, women are exposed to environmental effects of coal mining in different ways that include exposure to polluted air and water which leads to

respiratory impairment and maternal health issues. The following chapter, chapter three, presents the theoretical framework of the study. The ethical theories ecofeminism and intersectionality will be discussed. Both theories are used as a guiding paradigm in interrogating and exploring coal mining activities and their implications on women's health and the environment.

CHAPTER THREE: THEORETICAL FRAMEWORK

3.0 Introduction

The preceding chapter presented the literature review of the study. Continuing from the preceding chapter, the current chapter presents the theoretical framework of the study. The chapter focuses on two theories, the ethical theory of ecofeminism and intersectionality. These theories are used to guide the study. The ethical theory of ecofeminism will be discussed in the first section, which forms the basis of the study since the study aims to ethically explore how coal mining activities affect women's health and the environment. The second section discusses intersectionality theory. Both theories are utilised to describe the situation women and the environment face due to coal mining activities and the patriarchal capitalist forces that keep coal mining in place. The third section discusses the theoretical relevance of ecofeminism and intersectionality. The final section follows with a conclusion.

According to Estelle Freedman (2007), feminism is a complicated concept that has been reinterpreted throughout history and is still disputed in the present day. The common thread that runs through the different types of feminisms is the fact that they all arose from patriarchal settings and from the background of women experiencing patriarchal oppression in their cultures and society. Lindiwe Zungu noted that "feminism is defined as the belief that women are distinct individuals with distinct health requirements" (2011:04, cited in Mokotong, 2016:21). This suggests that, despite their differences and particular requirements, women are entitled to the same rights as men. Feminist concepts such as ecofeminism come from a similar background, in addition to viewing the environment as having the same problems as women in terms of oppression and exploitation from human activities. Thus, the following section aims to present and discuss ecofeminism. In discussing ecofeminism, the section seeks to define and highlight the various scholarly perspectives of those who have contributed to drawing the meaning of ecofeminism. Subsequently, it presents arguments for and against ecofeminism.

3.1 The Ethical Theory of Ecofeminism

"Women must see that there can be no liberation for them and no solution to the ecological crisis within a society whose fundamental model of relationships continues to be one of domination" (Reuther, 1975:204).

This quote by Reuther (1975) has been able to articulate the essence of ecofeminism; hence the quote is often cited in the literature related to ecofeminism.

3.1.1 Definition of Ecofeminism

Ecofeminism, also known as environmental feminism or ecological feminism, is one of the subdivisions of feminism that considers the connection between women and the environment in its theoretical and practical considerations (Zein & Setiawan, 2017). Ecofeminism refers to a broad range of ideologies that focus on the relationship between the exploitation of women, people of colour, traditional societies, and the impoverished and the exploitation of nature (Warren 2000). Silvia Lozeva and Dora Marinova stated the following, “ecofeminism looks at the special connections between women and nature that have developed largely through the background of patriarchy, it argued that the patriarchal tradition often exacerbates dominance over the environment similarly dominance over women” (2008:02). As one of the branches of feminism, ecofeminism is concerned with the struggle for women’s freedom and liberation against the patriarchal world order. Ecofeminism establishes a link between women and nature, asserting that patriarchy oppresses both women and nature. As a result, ecofeminism integrated feminism and environmentalism.

The term 'ecofeminism' was developed by French feminist Francoise d'Eaubonne in 1974. The author argued that women and the environment have been intertwined throughout history, and this has been at the foundation of both the environmental problem and women's subjugation around the world. Sherilyn MacGregor (2011) noted that the term was also established in response to the realisation that women's ecological understanding and connection to the environment are crucial to addressing both the environmental catastrophe and the culture of hegemonic masculinity that fostered it. Laila Zein and Adib Setiawan further asserted that ecofeminism:

Examines the cultural, religious, literary, and iconographic connections between women and nature, drawing an analogy between the oppression of nature as well as the oppression of women. Viewing women and nature as possessions, seeing men as cultural curators and women as natural curators, and males dominating women and humans dominating nature are just a few of the analogies and connections (2017:14).

The above suggests that in ecofeminism, women and nature are exploited by the dominant male system; as the patriarchal order proceeds to exploit nature, discrimination against women will endure; similarly, if sex segregation endures, the exploitation of the environment will continue (Ozturk, 2020). Warren (2000) also viewed ecofeminism as an umbrella for various positions concerned with the link between women's oppression and nature's oppression. Greta Gaard asserted the following:

The main concept of ecofeminism, which draws on the discoveries of ecology, feminism, and socialism, is that the ideology that authorises oppressions such as those based on race, class, gender, sexuality, physical ability, and species is the same ideology that sanctioned nature's oppression. Ecofeminism advocates for the abolition of all oppressions, saying that no attempt to liberate women (or any other oppressed group) will be successful until an equal effort is made to liberate nature. Its theoretical foundation is a notion of self that is most typically expressed by women and diverse non dominant groups—a self that is interrelated with all life(1993:45).

Ecofeminism suggested that all forms of oppression are connected and must be confronted fully. Warren (2015) characterises ecofeminism as encompassing the following:

- 1) Investigates the nature of the unwarranted dominance of women and the natural environment,
- 2) Critiques the male-biased western traditional philosophical ideas (ideas such as assertions, conceptions, claims, differences, viewpoints, and theories) concerning women and culture, and,
- 3) Provides alternatives and answers to male-biased views.

According to Lilian Siwila (2014) ecofeminism is a challenging, multifaceted structure that confronts class, race, and patriarchy systems. The scope of cultural criticism is widened by ecofeminism, which incorporates different but profoundly related components. Ecofeminism is not an environmental concept that reflects strictly on feminine perspectives because of the women who lead or contribute to it, but because of its basic similarities between the status of women and the environment in the present world. The idea of ecofeminism is concerned with the fight for the equality of women and the planet against the exploitation and oppression from patriarchal systems that are usually male dominated. Chandra Mondal & Palash Majumder asserted that

ecofeminists examine the effect of gender categories in order to demonstrate the ways in which social norms exert unjust dominance over women and nature. The philosophy also contends that those norms lead to an incomplete view of the world, and its practitioners advocate an alternative worldview that values

the earth as sacred, recognizes humanity's dependency on the natural world, and embraces all life as valuable. The central tenet of ecofeminism is that social and environmental issues are not separate, that the causes for the mistreatment of women, people of color and the environment stem from the same place. Therefore, from an ecofeminist perspective, it is best to view all of these issues collectively (2019:482).

Janet Muthuki (2006) further asserted that ecofeminism sees male centeredness as a root of oppression of both the environment and women. Therefore, ecofeminism establishes four principles:

1. Emphasizing the link between women's oppression and environmental oppression,
2. The significance of understanding the nature of these links,
3. Feminist thought, and practice must take into account environmental concerns, and
4. Feminist viewpoints must be included in environmental solutions.

3.1.2 Pillars of Ecofeminism

3.1.2.1 Patriarchy

Ecofeminism sees patriarchy as a construct that is responsible for the oppression that women face, along with the oppression of marginalized groups and the environment. In a broader definition, patriarchy is "the manifestation and institutionalisation of male dominance over women and children in the family and the extension of male dominance over women in society in general" (Sultana, 2010:3). Patriarchy is driven by male centeredness, dominance and it limits women through male domination. Patriarchy is a social structure that discriminates women, and it transcends to the natural environment (Maseno & Kilonzo 2011, cited in Wood 2019). In general, patriarchy treats women unfairly, this treatment is similar to the way in which the environment is treated. Ecofeminism views patriarchy as a structure that oppresses women and the nature, while male dominance persists through the oppressive nature of patriarchy.

3.1.2.2 Women-Nature Oppression

The natural environment is a major concern in ecofeminism. Environmental degradation is a major ecofeminist concern because the comprehension of environmental issues helps with knowing how and why the oppression of women is connected to the unfair dominance and the exploitation of nature (Warren, 2015). Women and the environment have a connection. This

connection is seen through the oppression of women and the oppression of nature. Women and the environment are oppressed by a society centred on male dominance and patriarchy.

3.1.2.3 Sexism

Sexism is another pillar that ecofeminism is concerned with. Discrimination towards women that is based on sex and gender is known as sexism. The notion of sexism is the idea that one gender is superior to or more important over the other. It establishes boundaries on what males can and must do, in addition to what women can and must do (Masequesmay, 2022). The victims of sexism in society who are most usually targeted are women and girls. The purpose of sexism is to preserve patriarchy and the dominance of men through oppressive practices of individuals and institutions that oppress and discriminate women. This kind of oppression is seen through economic exploitation and social domination. Sexist behaviours reinforce gender stereotypes based on biological sex.

3.1.2.4 Classism

Classism, also known as class exploitation, is the most oppressive instrument and another pillar that ecofeminism is concerned with. Classism is the belief that individuals from a certain class are superior to others, it is a discriminatory belief based on economic or social class. It consists of beliefs and methods designed to favour the wealthy/upper class at the cost of the lower classes. Erin McKelle (2014) argued that classism works together with sexism, women with lower socio-economic status have less control and autonomy in all aspects of their lives. To meet their financial demands, women become more reliant on their relationships and social structures. Women are not valued enough, societal expectations of women based on their biological sex is linked to classism (McKelle, 2014). McKelle (2014) further argued that classism is closely connected to patriarchy, particularly capitalist patriarchy. Patriarchy maintains classism by allowing individuals who have power to continue exercising power while those on the margins remain marginalized.

3.1.3 Different Approaches to Ecofeminism

3.1.3.1 Liberal Ecofeminism

Liberal ecofeminism is rooted in liberalism, a philosophical belief that individual freedom should be a basis of a just society; it views humans as rational individuals who are capable of maximising their productive potential; whatever is appropriate for each person is also beneficial for society at large (Merchant, 2005). Liberal ecofeminists hold the belief that environmental problems are caused not only by the rapid increase of natural resources but also by the incapacity to control environmental pollution effectively. Furthermore, if equal opportunities are provided for women, men will be able to engage in and contribute to environmental improvement, conservation, and human life quality. As a result, women can overcome the social stigma associated with their biological makeup and collaborate with men in achieving the goal of preservation of the environment (Merchant, 2005).

3.1.3.2 Radical Ecofeminism

There are two distinct types of radical ecofeminism that is natural and radical ecofeminism. Natural ecofeminists hold that women are more in tune with nature than men because of their biological and spiritual ties to the wild world; radical ecofeminists argue that patriarchal gender norms and roles are at the basis of women's oppression (Berman, 1993). The elimination of patriarchal structures and male dominance over women's bodies and the planet is where radical ecofeminism sees the path to women's emancipation and the nonhuman world, according to this ideology (Berman, 1993). Miles (2018) stated that radical ecofeminism argued that the dominant patriarchal society equates nature and women to degrade both.

3.1.3.3 Cultural Ecofeminism

Another subset of ecofeminism, cultural ecofeminism, places focus on the fundamental disparities between the sexes that stem from men and women's differing reproductive capacities. Cultural ecofeminism stated that women have an intimate relationship compared to men due to their gender roles, such as being providers of food, family nurturer and reproductive capacity, as mentioned above. Carolyn Merchant (2005) argued that cultural ecofeminism emerged in response to the widespread perception that western societies have unfairly devalued women and the environment. Furthermore, Merchant noted that cultural ecofeminism “celebrates the relationship between women and nature through the revival of ancient rituals centred on spirituality, goddess worship, animals and female reproductive systems” (2005:198).

Cultural ecofeminism suggests that reducing natural resources affects gender differently due to structural inequalities. As a cultural phenomenon, women are far more in tune with environment

and the natural resources because they have traditionally served as managers of these areas. As a result, women are disproportionately affected by environmental exploitation (Chakrabarty, 2021). Greta Gaard (1993:10) noted that “as the human species approaches the capability of annihilating all life on the planet, it is critical that we confront both the ideological assumptions and the hierarchical systems of power and dominance that serve to oppress the vast majority of the world's people”.

3.1.4 Arguments supporting Ecofeminism

Jessica Schmonskey (2012) asserted that ecofeminism encouraged interconnection with the environment and addresses the oppression of women and marginalised people as a means of thinking and organising ourselves. Categorizing women and marginalised people with the environment offers a distinct view on environmental injustices, allowing unity to take place. Ecofeminists seeks to articulate this challenge. Ecofeminism is both a critique of patriarchal power structures that oppress women and a call for a new ethical framework that does not discriminate against women or the environment on the basis of gender. It does not only acknowledge but also centralizes the many voices of women who are situated differently by race, class, age, and ethnicity. Ecofeminism looks at the role of male dominance in the exploitation of women and nature from a broader perspective. It does this by building on the different points of view of people whose ideas are usually overlooked or ignored in dominant discourses. As a result, an ecofeminist approach is structurally pluralistic, inclusive, and contextualist, emphasising the importance of context in understanding sexist and naturist behaviour through real instances (Warren, 1991). Ecofeminism is essential in raising the issues of exploitation and mistreatment of both women and the environment and eliminating such injustice.

3.1.5 Arguments against Ecofeminism

The common critique of ecofeminism is the idea that women are more in tune with nature compared to men. According to Anne Archambault this claim “merely perpetuates the notion that biology determines the social inequalities between men and women (1993:21).” Archambault (1993) further asserted that the idea of women being close to nature confines them to the nurturing role, and no freedom is transcending it. Marion Hourdequin (2015) argued that since ecofeminism focuses strongly on the connection between nature and gender, it suggests that both nature and gender oppressions are inseparable, meaning that each can be addressed only in light of the other.

Nature and gender should be addressed separately, even though they are considered relational. Ecofeminism depicts the experiences of women and nature as relational; both are seen as victims in the concept of development. Jamie Thompson argues:

It would be a mistake to claim that only women can experience a deep connection with nature and then say that women are the only group capable of leading an environmental restoration movement. This falls into the wrong way of thinking that women possess traits of empathy, nurturing and tenderness that men do not have, and men possess traits of strength and boldness that women do not have (2017:4).

Feminine or masculine traits are human traits. Ecofeminism demonstrates adherence to strict contrast between men and women. According to Zein & Setiawan (2017:7):

Ecofeminism shows that it believes in the strict separation of men and women, among other things. Some ecofeminist critics say that the difference between women and men and between nature and culture creates a strict dualism that focuses on the differences between women and men. In this way, ecofeminism ties the social status of women too closely to the social status of nature, instead of taking the non-essentialist view that both women and nature have masculine and feminine qualities and that, just as feminine qualities have often been seen as less important than masculine ones, nature is also seen as less important than culture.

This suggests ecofeminism exacerbates gender inequality by fostering a binary that highlights women's and men's differences. This distinction between the sexes is evident in ecofeminism, as is the non-essentialist belief that both women and nature possess feminine aspects.

Scholars such as Cecile Jackson, Meera Nanda, Janet Biehl and Bina Argawal argued that ecofeminism is “ethnocentric, dogmatic, blind to class, ethnicity, and other distinguishing social inequalities, historically inaccurate, and completely ignores the material domain” (Jackson, 1993:398, cited in Aziz 2021:25). Ecofeminism has been criticised by Janet Biehl (1991) for its mystical view of women's relationships with nature, which, according to Biehl, ignores the lived experiences of most women. Rather than making progress, ecofeminism is limited because it focuses solely on gender and the environment, ignoring the intersectional approach. Janet Muthuki stated, “critics of ecofeminism say that ecofeminism essentializes women by presuming that the relationship between women and nature is natural. The link of women with nature is perceived as oppressive and not freeing since it promotes patriarchy” (2006:11). This suggests that some who oppose ecofeminism believe that the theory reinforces patriarchy in a sense that it is not liberating but rather oppressive.

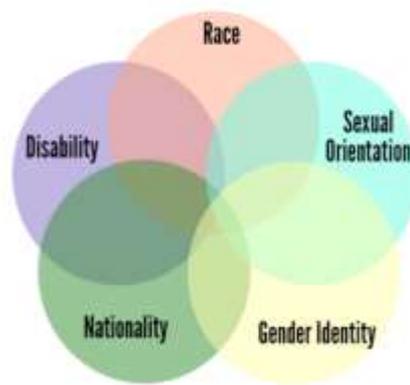
3.2 Intersectionality

Intersectionality, also known as intersectional feminism, focuses on the voices of individuals that face different types of oppression at the same time in order to comprehend the depth of inequalities and their relationships in every given environment (UN, 2020). Patricia Collins defined intersectionality by stating:

Intersectionality refers to a certain manner of conceptualising social location in terms of overlapping and intersecting forms of oppression. It is an analysis that proposes the notion that different social systems, such as race, social class, gender, sexuality, ethnicity, nation, and age, all form mutually constructing aspects of social organisation. These aspects of social organisation, shape the experiences of women of colour, and in turn are shaped by women of colour (2000: 99).

Intersectionality is an approach to conceptualizing how multiple forms of oppression interact with one another to shape an individual, a group, or a societal issue. The complexity of prejudice is understood by considering people's different identities and life experiences (Boston, 2017). Anna Carastathis (2014: 307) noted that “intersectionality insists that multiple, co-constituting analytic categories are operative and equally salient in constructing institutionalised practices and lived experiences”. Additionally, the emphasis of this theory is on how people and groups concurrently experience privilege and oppression, which is determined by their contextual position. Intersectionality considers the different identities an individual may hold at once, leading to discrimination of various forms such as sexuality, culture, religious background, and race. It pays attention to patriarchy and oppression at each intersection (Camacho, 2022). It is a concept that expresses how women are affected by discrimination and barriers that go beyond their gender. Figure 1 below illustrates the intersectionality theory in the form of a venn diagram showing the intersection of different identities.

Figure 1: Intersectionality Theory



Source: (Boston, 2017)

The venn diagram above illustrates what intersectionality entails. Intersectionality asserts that individuals are often oppressed on the basis of numerous characteristics, including race, class, gender identity, sexual orientation, religion, and other identity markers Intersectionality is a framework that takes into account the power structures that women face and that create experience-based marginalisation. Intersectionality is a term developed by Kimberly Crenshaw in 1989. Crenshaw used the following metaphor to explain intersectionality:

Discrimination is similar to traffic flowing in opposite directions, resulting in an accident. The cars approaching from many directions or from one direction can cause an accident. Similarly, if a black woman is injured while crossing an intersection, her injuries could be caused by sex or race discrimination. It is sometimes difficult to tell which driver caused the damage because the skid marks and injuries appear to have happened at the same moment (Crenshaw, 1989).

It is for this reason that intersectionality has come to be the term used to describe the study of several identities and the various forms of oppression, dominance, and discrimination that each one can lead to. (Alok, 2017). Intersectionality is not something flowing from one point and ending at another; instead, it shows how gender, class, race, and other identities intersect and overlap (Crenshaw, 2020, cited in Roy 2021), creating experience-based discrimination. The concept of intersectionality emphasised the value of individuals who hold several identities. These identities exist simultaneously, and each of their manifestations faces discrimination (Goose, 2018). Power relations arise when one of these identities is analysed collectively. Anna Carastathis noted that, “intersectionality insists that multiple, co-constituting analytical categories are operative and equally salient in constructing institutionalised practices and lived experiences” (2014:307). In addition, Truth (2007) asserted that intersectionality recognises the

need to assess all facets of an individual's identity as continuously interacting with one another to shape their privilege and social standing.

3.2.1 Different forms of Intersectionality

The intersectionality theory takes different forms known as structural, political, and representational intersectionality. These forms are discussed below.

3.2.1.1 Structural Intersectionality

The experience of people within a given identification category might differ qualitatively from one another. This is known as structural intersectionality (Crenshaw, 1991; Cole, 2008). Structural intersectionality was further defined by Crenshaw (1991) as the manner in which black women dealt with complex and routine forms of oppression. The emphasis of structural intersectionality is on the unique experiences of various individuals at the meeting point of several identities. Silke Roth defined structural intersectionality as “a concept that focuses on the effects of multiple subordination and informs positionality or how participants experience their social status, for example class, race, gender, sexuality” (2021:3).

3.2.1.2 Political Intersectionality

Political intersectionality refers to the “perspectives and experiences of numerous advantaged groups that determine the development of collective identities and how they influence agenda framing and strategy selection” (Crenshaw, 1991; cited in Roth, 2021:3). By recasting identity categories as axes of different forms of inequality, political intersectionality allows one to get above the level of individual inquiry (Cole, 2008). Crenshaw introduced the concept of political intersectionality in order to demonstrate how inequalities and their interconnections influence the policies and political actions of individuals with several subordinate identities.

3.2.1.3 Representational Intersectionality

Representational intersectionality explores the way in which different identities are linked and enforce oppressive stereotypes about women in various forms of media. Representational intersectionality analyses the broader cultural discourse to show how sexist representation of women serves to perpetuate and marginalise them further (Crenshaw, 1991; cited in Gueta, 2020:3). Representational intersectionality advocated for imagery that supports women of colour,

and it goes against the sexist marginalisation of women. It also demonstrated how vital it is for women of colour to be represented in the media.

3.2.2 The Intersection of Patriarchy and Capitalism

Patriarchy cannot be seen as independent from capitalism. Patriarchy is conceptualised and understood as a construct that affects all aspects of life, a construct centred on male domination, oppression and exploitation of women. Since patriarchy affects all aspects of life, the economic factor cannot be life aside. Capitalism is a social construct based on domination and exploitative relations. Capitalism perpetuates gender oppression (Aruzza 2014; cited in Bruneau, 2018:6). Capitalism without gender oppression has never existed, and it continues to dispossess women (Bruneau, 2018). Capitalism penetrates norms to its advantage. Capitalist systems, together with economic forms of oppression, are prone in reinforcing patriarchy; the two systems feed off each other. Patriarchy and capitalism are two distinct concepts that intersect and mainly affect women. Capitalism, through patriarchal structures, has thrived to advance its dominance in the world as it values profit above everything else. Furthermore, Farah Daibes (2021) noted that patriarchal capitalist forces have determined the values of everything within the socio-economic system, placing profit and masculinity on top.

3.2.3 Arguments supporting Intersectionality

The notion of intersectionality, as expressed by Nupur Alok (2017), allows us to pay attention to multiple facets of power, including the methods in which authority is maintained and restricted to specific social classes and genders, as well as the mechanisms by which oppression is carried out. Intersectionality recognises that minority voices should be included and acknowledged. Without an understanding of intersectionality, social movements run the risk of accidentally or purposefully excluding the most disadvantaged and marginalised groups of people. (Sullivan 2020). Examining the different processes through which society structures create and sustain oppression and power, as well as bringing attention to how current views produce knowledge that frequently serves to appropriate such dynamics, are all part of intersectionality's effort to bring about liberation (Carbodo *et al.*, 2013). Julia Maj argued that “intersectional work shows the way in which different areas of feminist thought can cooperate, but also how this cooperation can be mutually beneficial. Intersectionality shows that problematizing women’s identities and experiences does not have to take place at the expense of preserving women as a social category”

(2013:4). Intersectionality is essential because it helps to understand that all women experience a greater degree of intersecting identities that lead to discrimination.

3.2.4 Arguments against Intersectionality

According to Elina Sullivan (2020), intersectionality creates a hierarchal structure of victimhood in which people who experience the most oppression is given the majority of attention, while those who have experienced minor oppression receive little or no attention. In focusing on the experiences of those who were affected by discrimination and oppression, actions of those behaviours that sustain discrimination and oppression are often left unaddressed. Jibrin and Salem (2015) argued that intersectionality has unclear aspects on whether it is a theory, metaphor, or paradigm, “it lacks clear cut definition, or even specific parameters have enabled it to be drawn upon in nearly a context of inquiry”. Alice Ludvig (2006) argued that the social world is complex, and the contrasts in the social world position intersectionality as problematic and weak. The author further argued that it is not possible to consider all the differences at a given time. It is impossible for a woman to discern whether she is marginalised because of her gender or because of her skin colour (Ludvig, 2006; Carastathis, 2016).

The intersectionality approach lacks the analysis of the mutual construction of the categories themselves. This comes to form the questions of the theory’s assumptions that different identities usually interconnect only in a specific moment. Alba Angelucci (2017) argued that intersectionality focuses on disadvantaged groups; it does not pay attention to the privileged ones. It can be helpful to explicitly consider privileged groups and their intersection with the underprivileged in unveiling hidden processes of oppression One of the key concepts of intersectionality is that social identities and categories are dynamic and continually changing depending on the place, social constructs, time, and power. Hence, intersectionality in one community is unlikely to be relevant for another community despite similarities between populations. It is, therefore, essential to look at intersectionality according to specific historical, social, political, economic, and cultural contexts (CSA *et al.*, 2018). Intersectionality is commonly criticised because it is seen as a concept that lacks methods that are associated with it or methods that we can draw from (Phoenix & Pattynama 2006; Nash 2008). Nevertheless, due to its innate open-endedness, the framework establishes a path of exploration that can't last indefinitely but ensures that fresh, thorough, and insightful knowledge will be gained. (Davis, 2008).

While these critiques are substantial to a certain degree, it is essential to note that some criticism comes from a limited understanding of the framework itself. The identities that intersectionality highlights are continuously circulating, affecting our lives. Intersectionality helps understand social complexity diversity in different settings.

3.3 Theoretical Relevance to the Study

Ecofeminism and intersectionality are theoretical frameworks employed in the study. Both frameworks have a connection. Ecofeminism relates to the exploitation of women and nature, while intersectionality looks at multiple identities that intersect and affect women through marginalisation and oppression. Because the intersectional framework is also used, identities such as patriarchy are analysed to illustrate how these forces from mining institutions affect women and the environment. These identities are explored in a way that provides knowledge of how they intersect to inform experiences that women and the environment face. Both theories are concerned with oppression experienced by women and the environment, and they challenge the actions that leads to the oppression. Because the theories are similar, they work best together and they will be utilized in collaboration as a guiding paradigm of the study.

3.4 Conclusion

In this chapter, the theoretical framework that underpins the study namely the ethical theory of ecofeminism and intersectionality was presented. In the first section, the definition and pillars of ecofeminism was discussed, namely patriarchy, women-nature oppression, sexism and classism. The different forms of ecofeminism; liberal, radical, and cultural ecofeminism was also discussed. Thereafter, arguments for and against ecofeminism were presented. The concept of intersectionality, also known as intersectional feminism, was discussed in the second section. In doing so, different forms of intersectionality were presented, which are structural, political, and representational. In addition, arguments for and against the theory of intersectionality were presented. In the final section of the chapter, the study presented the theoretical relevance of ecofeminism and intersectionality. The next chapter presents the analysis. Here, ecofeminism and intersectionality will be used as the lens for the ethical interrogation of coal mining activities and their implications on women's health and the environment.

CHAPTER FOUR: COAL MINING ANALYSIS THROUGH THE LENS OF ECOFEMINISM AND INTERSECTIONALITY

4.0 Introduction

The preceding chapter presented the theoretical framework, which focused on two ethical theories: ecofeminism and intersectionality. The chapter provided a detailed explanation of ecofeminism and intersectionality theory and how it will guide the current study. The current chapter will ethically analyze the effects of coal mining activities on women's health and the environment through the lens of ecofeminism and intersectionality. There are two sections to the chapter. The first section examines coal mining through the lens of ecofeminism which was covered in the preceding chapter. Furthermore, the researcher will contend that the mining regulatory framework needs to be strictly enforced so that the coal mining activities take action towards their contribution to pollution, which primarily affects women's health and the environment. In the second section, the study will examine the effects of mining through the lens of intersectionality, and the researcher will focus on different identities that intersect and affect women mineworkers and women from local communities. A conclusion follows and ends the chapter.

4.1 Analysis of Coal Mining in South Africa through the Lens of Ecofeminism

This section focuses on coal mining in light of ecofeminism. The study will examine coal mining's contribution to pollution and how it has affected women's health and the environment. In Chapter Three, we learned that ecofeminism investigates not just how women relate to the environment, but also how the treatment of women and the natural world are quite similar (Zein & Setiawan, 2017). Chapter Two's examination of South Africa's mining regulatory framework reveals that, despite the framework's stated goal of promoting ecologically sound mining practises that enhances economic development and benefits all citizens, this is very different from reality. There are several environmental and social challenges in the mining industry that affect women's health and the environment itself. In ecofeminism, there are two components, the environment and women. When mining occurs, the environment is affected, which also affects women. The relationship between women and mining or resource extraction is complicated, historically mining has been patriarchal in nature and centred deeply on masculinity (Seck & Simon, 2019). Just like many other country that engages in mining, coal mining in South Africa is characterized by air, water and land pollution, along with other issues such as biodiversity loss, exploitation of natural resources, and land degradation. The

environment is overexploited and damaged. Because women are affected by environmental pollution, this indicates that their rights to good health and a clean environment are violated and abused. They are also subjected to displacement, violence, poverty and many other issues that affect local communities. When both components of the environment and women connect, poor transparency, accountability, and poor business practices are visible from companies within the mining industry. The following subsection looks at patriarchy and how it has affected women and the environment.

4.1.1 Patriarchy and its Effects on Women

As mentioned in Chapter Three, patriarchy is the “manifestation and institutionalization of male dominance over women and children in the family and the extension of this dominance over women in society” (Sultana, 2010:03). Furthermore, “patriarchy shamelessly upholds women’s dependence on and subordination to men in all spheres of life” (Sultana, 2010:7). Patriarchy does not only exist in households, but rather it extends and is seen beyond society. A patriarchal culture exists not only in society but also in the mining industry. The industry is known for creating and reproducing patriarchal environments. This is seen through the male dominance associated with mining and workers (Lahiri-Dutt & Macintyre 2006). The industry has produced hierarchal dynamics between men and women on the basis of “ethnicity, income, employment, as well as race and class intersecting with gender, defining the roles of both women and men in the mines and local communities near the mines” (Lahiri-Dutt, 2013; cited in Bradshaw *et al.*, 2017:445). Patriarchy from mining companies has led to marginalization and oppression of women, violence and harassment in and around mining areas. In the case of the mining industry, the industry is driven by capitalist patriarchal practices that undervalue the essence of women and nature. Men are the ones who make critical decisions; in return, women and nature are the ones affected by those decisions (Tan, 2017). Because both stem from a patriarchal culture in which men hold all the power, the oppression of women together with the abuse of nature are very similar. The mining activities have also contributed to the pollution that affects women’s health and the environment. Issues affecting women and the environment are discussed below.

4.1.2 Marginalization of Women

One of the issues that emerged from the study of coal mining activities is the marginalization of women miners and women from local communities due to their social responsibilities and roles. As noted in Chapter Two, women are exposed to the effects of coal mining, including environmental effects (exposure to polluted air and water) that affect health, loss of livelihoods,

marginalization, and identity loss as both a direct and indirect repercussions of coal mining activities (Nxele, 2017). This illustrates that the mining companies have a patriarchal pattern of pursuing wealth and profit at the expense of environmental resources, affecting women on the other end. The fact that coal mining continues to take place without concern for local communities' lives, especially women's health, is a manifestation of patriarchal capitalist attitudes that lead to women's marginalization and oppression. "There is nothing that can be done to prohibit someone from destroying and depleting the environment and its natural resources if they live simply on the basis of self-interest" (O'Neill, 1998:162). So long as these patriarchal attitudes are not addressed and the mining business continues, as usual, women will continue to suffer.

4.1.3 Women's Poor Health as a result of Coal Mining

Women remain the most disadvantaged from the effects of coal mining. While both men and women experience health problems due to the pollution caused by the mines, the overall effect is experienced by women through health and their weaker position in homes and society. This subsection focuses on poor health as a result of coal mining, particularly women mineworkers and women from local communities.

4.1.3.1 Occupational Hazards and Illnesses

Occupational hazards and illnesses have a long history of being prevalent among mineworkers. Because the physical requirements align with men's physical ability, women mineworkers are subjected to a higher risk of illnesses and injuries. The Mining Safety report stated:

In South Africa, the difficulties experienced by women mineworkers are due to ergonomic problems and the working conditions. Risk factors such as musculoskeletal risk, head injury, and others are the hazards that may occur. This occurs as a result of the sort of environment in which the work is performed, the interaction that takes place between female mineworkers and the work station, as well as the length of time that the work is performed. Tools and machinery are designed in a way that is fit for men and their physicality. When women mineworkers work in the same conditions, utilizing the same tools and machines can lead to musculoskeletal disorders. The conditions that women work in affect women more than it affects men due to women generally having less muscular power than men (2021:1).

The aforementioned working conditions of women mineworkers as well as the conventional daily responsibilities and domestic duties of women in households and within communities contribute

to higher stress levels, more exhaustion and further escalates the hazards for women in mining. Coal mineworkers are exposed to heat, coal dust and poor air quality. Heat exposure refers to the direct interaction between an individual and an interior or outdoor environment that raises the risk of body core temperature, leading to discomfort. Mineworkers, particularly those who operate underground, are subjected to intense heat. The environment in the underground setting is dark and humid with a temperature gradient that increases with depth (Singer 2002, cited in Botha & Cronje 2015:662). High levels of heat exposure result in a variety of health issues such as heat stress, drowsiness, exhaustion, reduced work capacity, impaired judgement as well as heat stroke, which often leads to death (Schutte, 2000). “The extraction, storage, transportation and utilization of coal produces dust which poses a significant risk to human health and the environment” (Miller 2011, cited in Finkelman, 2021:100). This statement illustrates that coal mining generally affects human health and the environment. Exposure to coal mine dust results in lung disorders such as coal miners’ pneumoconiosis (also known as black lung disease) and chronic pulmonary disease. Coal dust causes scarring in the lungs, which makes it harder to breathe and can be worsened by prolonged exposure. It is considered an occupational lung illness, and it is most prevalent among those who work in coal mines. In addition, coal mineworkers are subjected to crystalline dust, which leads to silicosis and other lung diseases (Attfield *et al.*, 2011). Chronic pulmonary disease, also known as emphysema or chronic bronchitis, leads to persistent coughing, typically accompanied by phlegm, fatigue, breathlessness, or difficulty in breathing (WHO, 2022). Women mineworkers exposed to the health issues mentioned may be deemed incapable of working in the mine. Their physical stamina may be questioned when compared to their male counterpart, triggering oppression which deems men capable, and women unfit to work in the mine.

As previously noted in Chapter Two, effects of pollution of women’s health, the common disease suffered by women is TB, bronchial asthma, severe bronchitis, pneumoconiosis (Pramanik, 2020). The reasons for this includes dust and contaminated air, due to dust generation in the mine when mining activities take place. Women mineworkers who are continuously exposed to diseases such as TB or a disease that affects the lungs may end up affecting their children at home and families, the health of families is at risk. This reinforces the suffering that women experience. According Cossa *et al.*, (2022), children’s exposure to the poor environmental conditions affects their cognitive abilities, respiratory function and nutritional status in the long run. Respiratory diseases become a burden not only on women but on children and families, it contributes to emotional instability for families and delayed development for young children (Chanda-Kapata,

2020). It has been reported that there are 94 680 cases of asthma symptoms per year in young children aged 5 to 12 years, 2781 cases of chronic bronchitis experienced by adults while children between 6 to 12 years cases of bronchitis sits on 9533 per year (Groundwork, 2018). Because there are inadequate health services near mining communities, women who are single parents or the breadwinners and home makers are forced to take care of their families. This creates additional work and burden because they work at home by taking care of their children without any help and they also work at the mines under hazardous conditions, which increases the risk of them being exposed to occupational hazards.

4.1.3.2 Respiratory Impairment and Reproductive Health

Air pollution as a result of coal mining is a problem that has interfered with the air quality that has affected women's health. Polluted air triggers respiratory illnesses and an increased risk of colorectal and thyroid cancer. Colorectal is a type of cancer that is characterized by abdominal pain; it triggers weight loss, diarrhoea and blood in the stool. Thyroid cancer is characterized as having glands in the neck, making it difficult to swallow, shortness of breath, discomfort when moving the neck or head, and persistent cough (Markman 2022, Jaffe & Clayman 2021). Common diseases suffered by women are tuberculosis, bronchial asthma, severe bronchitis and pneumoconiosis (Pramanik, 2020). The reproductive system of women is affected by poor air quality, which can alter women's reproductive health. "Changes in the menstrual cycle and the length of its stages, as well as the risk of miscarriage, show a link between women's reproductive health and air pollution; low birth weight and preterm birth have also been linked to the exposure to air pollution" (Mahalingaiah *et al.*, 2016, cited in Gasparotto & Martinello 2021:116).

4.1.3.3 Consumption of Contaminated Water

The pollution of water, as a result of coal mining, has led to poor water quality available for consumption (Ana & Dewi, 2019). As previously noted in Chapter Two, AMD is the most significant issue linked with water pollution in the mining industry. When AMD contaminates drinking water sources there is a risk of consuming affected biotas such as fish and heavy metal sources from sediments commonly associated with the waste of mining (Butler, 2006; cited in Finkelman *et al.*, 2021). The poor water quality directly affects women because they are primarily responsible for domestic roles such as collecting water. Consumption of contaminated water results in high blood pressure, cancer, kidney and liver damage and deterioration of the nervous system (Earth Science Australia, 2022). Women are burdened with the lack of clean, safe

drinking water since they must consider ways in which they can provide safe water for their children and families. Indirectly, this adds to the implications of using unclean water.

4.1.3.4 Mental Health

Mental health is defined by Rowling et al. as “the degree to which an individual or group is able to engage in social and environmental interactions that foster subjective well-being, the optimal development and use of cognitive, affective, and relational abilities, and the achievement of individual and collective goals consistent with justice” (2002:13, cited in Leighton & Dogra 2009:9). According to Krrish Chawla (2021), it has been discovered that long-term exposure to pollution may lead to mental health problems, poor air quality has been observed to cause people additional anxiety and potentially an increase in suicide rates in women. There is a growing link between specific pollutants and a variety of mental health issues such as depression, dementia and anxiety among others. Stress and anxiety are often symptoms of feeling helpless and out of control, which has been related to mental health problems (Sharma & Rees 2007). These health issues are experienced by women miners and women in local communities near mines.

4.1.3.5 HIV/AIDS

Mining communities are currently characterized by a heavy reliance on money and there is a lack of activities that aid in generating the income that is needed to sustain themselves as community members and families. As a result, poverty levels in a community are determined by the employment status of its residents. According to Cronje *et al.*, (2013) unemployment is prevalent in mining communities. Women, in particular, are the ones who are mostly affected. While others rely on subsistence farming, other women are forced into sex work, making them vulnerable to the spread of HIV/AIDS. Women’s opportunities in mining communities are limited. Some women resort to sex work to supplement their income and provide for their families (Cronje *et al.*, 2013). For several reasons, unemployed women are vulnerable to HIV transmission. As wives, women are frequently financially reliant on their husbands and hence find it difficult to enforce condom use or deny sex. “Those who are not married have described being forced into marriages by their poor socioeconomic situations in order to provide financial assistance for their families” (Cronje *et al.*, 2013:5). Women in this regard are exposed to HIV/AIDS, which further marginalizes them because of their background of not being employed and working towards a

life with an income that will sustain themselves and their families. The adverse effects of mining on women's health are disproportionately seen within mining areas.

Through the lens of ecofeminism, the issues discussed place women in a marginalized position where their human dignity is undermined, and their health rights are ignored and violated. Human dignity is undermined when human rights are violated. In the context of the South African mining industry, women's rights that have been abused will be discussed in the following subsection.

4.1.4 The Violation of Rights

In discussing the coal mining activities and their effects on the health of women and the environment, the concern that emerges is the violation of the rights of women. Acknowledging and respecting the rights of women is good business practice for mining companies, and it echoes what the movement of ecofeminism stands for. With regards to the South African mining industry, exploitation and extraction of minerals have resulted in the abuse and violation of rights; women miners and women from local communities experience the violation of their human rights. Ingrid MacDonald and Claire Louise Rowland (2002) stated that governments were viewed as the bearers of legal duty and responsibility when it came to human rights; as of late, non-state groups have taken on such responsibilities. The prosecution of wrongdoings against humanity has been based on an individual basis which suggests companies are not ethically and socially accountable for their actions, despite the notion that they are viewed as future responsible social organs. According to Margaret Ssebunya, “the environmental and societal cost and degradation are downplayed by the mining companies” (2017:208). This roots in the exploitative and oppressive attitudes that mining companies adopt, where women's health and the environment are disregarded due to the pursuit of profit and development. Coal mining companies should pursue their business objectives in ways that attempts no violation towards the rights of women. Human rights cannot be violated in order to attain these objectives. They have a responsibility to ensure that the rights of women are respected and safeguarded. They also need to ensure that their mining operations and activities do not oppress women. The mining activities should instead provide benefits to women and local people.

4.1.4.1 The Right to Good Health

Women are prone to sickness and danger to their health when they are exposed to an environment that is polluted. Their right to health is violated and undermined. In South Africa, Mpumalanga, women from the town known as Phola are affected by coal mining. Phola is close to numerous

large coal mines, including the Klipsruit mine operated by an entity known as South Africa Energy Coal (ActionAid, 2018). ActionAid (2018) further stated in their report that living next to the mine makes women from this town experience chronic health issues and terminal illness from environmental pollution and food insecurity. Ahmed *et al.*, (2005:2) argued that many major human illnesses and disabilities are caused by extremely polluted and deteriorating surroundings in urban and rural areas across many developing regions. Furthermore, many illnesses induced by environmental causes can be avoided. Multiple health problems are caused by pollution in the environment. The health of women is an essential factor in society's overall well-being for the present and future generations. Safe environments that promote the health of women and the community at large are needed; the prevention of environmental degradation and the contamination of air, water and land will benefit society.

Women's health is acknowledged as a global issue; it is critical to address health concerns. Coal mining companies must take preventative measures to ensure that communities, especially women, are not exposed to harmful environmental conditions that affect health. The preventive measures must also guarantee environmental protection and conservation; the right to health is dependent on proper environmental protection. The African Charter on Human and Peoples rights (1986:5) stated that "every individual has the right to enjoy the best attainable state of health". To ensure the best attainable state of health, mining companies and government bodies that regulate mining must make more effort to protect women from harmful effects of environmental degradation due to mining activities.

4.1.4.2 The Right to a Healthy Environment

Human beings are dependent on the environment. A clean and healthy environment is integral to the full enjoyment of human rights. Human rights and the environment are intrinsically intertwined. As mentioned above, a healthy environment is essential to our human rights. An unclean, polluted environment violates our human rights (Geneva Environment Network, 2022). In South Africa, the right to a healthy environment is violated through environmental pollution that results from mining activities.

ActionAid (2017) reported that in Silobela Township in Carolina in Mpumalanga, coal mining in the area changed the landscape and the realities of the communities; their water is contaminated. The community no longer has access to clean water due to contamination and restriction by the mine. Furthermore, ActionAid found that in the Springs area, situated in Ekurhuleni Gauteng the biggest issue is air pollution as a result of mining. The air is described

as dangerous and toxic. Children were sick with illnesses that included severe chest pains, tuberculosis, and asthma. One of the community members interviewed stated they inhale something they do not know, which affected their health, and the soil is contaminated as they cannot grow crops. Environmental pollution and the damage to the environment affect both human health and the environment itself, as discussed in chapter two. According to the United Nations (2012), women (including girls) are primarily responsible for water and hygiene. When water sources are polluted, they are at greater risk of exposure to environmental contaminants. This is further echoed by Owren *et al.*, (2012) who stated women play an important role in managing natural resources at the family and community levels, and they are disproportionately affected by environmental deterioration. The aforementioned duties of women leave them vulnerable to the exposure of poor environmental conditions, which may affect their health. According to the constitution of South Africa, section 24, everyone has the right:

- (a) to an environment that is not harmful to their health or well-being,
- (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that
 - (i) prevent pollution and ecological degradation,
 - (ii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development” (Constitution of South Africa, 1996).

Ahmed Karim (2003) claimed that in some parts of the world, environmental and public health concerns due to sudden and rapid development are now seen as a threat to human rights. The environment’s health is affected when air and water are contaminated, and land is damaged. This affects humans, especially women’s health. It is clear that South African mining companies compliance two environmental regulations. It remains a questionable issue and a great concern to the health of women and the environment.

4.1.4.3 The Right to Clean Water and Food

The right to clean water and food is another violation of women’s rights. Coal mining contributes to pollution, which affects the atmosphere and water. As noted in Chapter Two, water pollution happens when harmful substances contaminate water bodies, which degrades the water quality, rendering it toxic to humans and the environment (Denchak, 2018). The AMD from abandoned coal mines in the West Rand, Gauteng, is an example of this. The AMD flows into surrounding water sources from these abandoned coal mines. The pollution of water has also resulted in

illnesses and the loss of aquatic species. Chapter Two of the Constitution of South Africa noted that “*everyone has the right to have access to sufficient water and food*” (Constitution of South Africa, 1996). In light of this provision, there has been no guarantee to clean water which is safe for consumption and domestic use. The National Water Act 36 of 1998 stated, every person in control of the mine or activity must take reasonable measures to:

- (a) prevent water containing waste or any substance which causes or is likely to cause pollution of a water source from entering any water resource, either by natural flow or by seepage, and must retain or collect such substance or water containing waste for use, reuse, evaporation or for purification and disposal (Republic of SA Government gazette, 1999:57).

Even with these provisions for the state and mining companies, water is still polluted. People will not be able to survive without clean water. “Access to proper water and sanitation services has an impact on one’s health, longevity, and happiness” (WHO, 2005; UNICEF, 2005:10). This shows that clean water is essential for our well-being and women’s health.

The right to food is undermined in some communities near coal mines, mainly where farming is done to produce food. In Somkhele, KwaZulu-Natal, local residents voiced their concerns about the Tendele Coal mine near their area has contributed to environmental pollution, water and the air quality is poor due to contamination and noise pollution. They further stated that dust is another grave issue which affects them and their livestock, affecting their livelihoods and access to food (ActionAid, 2018). This leads to famine and widespread hunger in the local communities when they are denied land to farm. It also violates the right to food for women’s livelihood, and their families are dependent on subsistence farming for food. Mining companies should address this problem and assist local communities with producing crops.

4.1.4.4 The Right to Information

Through the lens of ecofeminism, an important aspect that surfaces is women’s right to information. Women from local communities have a right to know what mining companies are doing. Section 32 of the South African constitution states, “*everyone has the right to access to any information held by the state, and any information that is held by another person and that is required for the exercise or protection of any rights*” (Constitution of SA, 1996:13). Because local communities lack accurate data on the mining activities occurring in their areas, the right to information in the South African mining industry remains unfulfilled. Women have a right to environmental information; their right depends on it, as they need to be aware of what is affecting

their health and the environment. Government and mining companies should provide this information. In order to protect human rights and environmental rights, every individual has the right to seek and receive information. Principle 10 of the Rio Declaration stated that each individual shall have proper access to environmental information held by public agencies, including information on hazardous materials and activities in their localities, at a national level...by making information readily available, states may help and encourage public knowledge and involvement (UNCHR, 1994). Communication is essential; until citizens can engage with mining companies and government bodies about issues that affect them, their right to information will be acknowledged.

4.1.4.5 The Right to Effective Remedy

Every person has the right to an effective redress when their rights are violated. “The right to effective remedy includes an individual’s right to have human rights breaches probed thoroughly, to have equal and effective access to justice, and to have effective remedies, including restitution” (Roht-Arriaza, 1990:474; cited in Ssebunya, 2017:219). The South African government is responsible for serving and protecting women from human and environmental rights abuse in businesses. This can be done by taking appropriate measures within its jurisdiction to guarantee that those who have been affected by the abuse have access to effective remedies, which can be in the form of legal administrative and legislative processes, or other appropriate channels. (Ruggie, 2008). Consistent with human rights commitments is the practice of taking into account the needs and aspirations of women who live in areas that are affected by mining activities, as well as monitoring mining practices to ensure that women's rights are not undermined. (Oxfam, 2016). This suggests that the South African government must enforce the constitution and laws on mining companies to end human rights abuse.

4.1.5 Patriarchy and the Environment

Mining, in general, is an industry dominated by males. The industry values above everything else profit through mineral exploitation. Patriarchy is seen by the placement of masculinity and profit on top. Because mining activities are driven by patriarchal forces, it affects not only women but also the environment as well. Mining activities are environmentally harmful, “mining activities have led to significant environmental degradation as well as pollution” (Dhar & Ahmad 1993, cited in Ahmad *et al.*, 2014:81). As noted in Chapter Two, coal mining has resulted in pollution, land degradation, wildlife and habitat loss.

4.1.6 Environmental Pollution

In South Africa, the extraction of coal and the burning of fossil fuels are the primary contributors to the rising air pollution levels. With an annual output of almost 224 million tons, the country is a major exporter of coal (Eskom, 2016, DEAT, 2005); therefore, coal mining contributes to air pollution. The biggest contributor to air pollution is the burning of fossil fuels for the generation of energy and the operation of transportation systems. There are various air pollutants that contribute to air pollution. According to Kampa and Castanas (2008), these pollutants include heavy metals, gaseous pollutants, particulate matter, and persistent organic matter.

- Heavy metal bands include Mercury and Lead, to name a few. They are naturally occurring components of the earth's crust. Heavy metals can be transferred through the air, water and food.
- The combustion of fossil fuels is the primary source of gaseous pollutants, which have a substantial influence on changing the composition of the atmosphere (Katsouyanni, 2003; cited in Kampa & Castanas 2008).
- Particulate matter is made up of a variety of diverse and variable particle combinations that are released into the air (Poschl, 2005),
- Persistent organic pollutants (POPs) are a hazardous class of chemicals. They remain in the environment for an extended period, and their effects become more pronounced as they rise in altitude (Kampa & Castanas 2008).

Surface and underground coal mining both contribute to air pollution. Surface mining, on the other hand, lowers air quality significantly more since it produces gaseous pollutants and dust. It pollutes the air not only in the mine but also in the surrounding areas, degrading the quality of the air. Gaseous emissions contribute to global warming while putting people's health at risk (Singh, 2008:10). When coal is mined, greenhouse gases such as CO₂, methane, nitrogen oxide, and other heat-trapping gases are created, which stay in the atmosphere for a long time after they are released (Lockwood *et al.*, 2009; Hertwich *et al.*, 2010). These affect the air quality available for animals, trees, plants and humans.

Another issue that coal mining contributes to is water pollution. In South Africa, water pollution is one of the many pressures affecting freshwater systems and resources (Jarvis & Younger, 2001). As previously mentioned in chapter two, under the subsection titled water pollution, AMD is the most serious issue when it comes to water pollution. When sulfide minerals, such as pyrite,

oxidize, AMD results (Acharya, 2020; Ochieng *et al.*, 2010). As a result, acidic and iron-rich water, as well as other heavy metals, are created, which eventually run into water streams and contaminate the environment (Du Toit, 2018). The pollution of water can harm aquatic flora and wildlife, as well as other plant species that are unable to withstand high levels of toxins (Mashudu *et al.*, 2018). Coal mining activities deplete agricultural resources such as land for crop production and farming, contaminate rivers and drinking water, harm non-human aquatic life, lead to species extinction, and alter aquatic habitats (Olufemi *et al.*, 2018). The mine water affects the water environment negatively; the overall consequence of mine water is the decrease in the quality of water in many different water sources, which may have an impact on users in the residential, agricultural, and industrial areas. (Wamsley & Mazury 1999; cited in Ochieng *et al.*, 2010). Water is an essential element for the environment and humans. From the lens of ecofeminism, when water is contaminated, and the air is polluted through activities characterized by masculinity or patriarchy, the environment is further oppressed.

4.1.6.1 Land Degradation

Land degradation is an environmental concern that results from the activities of coal mining. When surface mining takes place, the following happens, the existing flora is destroyed, the genetic soil profile is destroyed, species and habitat are displaced or destroyed, current land uses are impacted, and the basic topography of the mined region is permanently altered. According to Mark Squillace (1990), adverse effects on geological features of human interest are possible in coal strip mines, mining without regard for the environment has the potential to harm land features, as well as valuable scenic resources. Soil erosion is exacerbated by blasting, ripping, and extracting coal, resulting in the destruction or removal of vegetation cover. Increased dust levels near mining sites are caused by the removal of vegetative cover and coal transportation. Dust pollutes the air in the surrounding area, harming plant life, animals, and the environment as a whole.

4.1.6.2 Wildlife and Habitat Loss

The most direct impact on wildlife is the extinction or displacement of species in areas of mineral extraction. In coal mining areas, the majority of wildlife species are not able to obtain food or shelter; these species and animals end up leaving these areas. The population of microorganisms and nutrient-cycling activities are disrupted when soil is moved, stored, or redistributed. Wildlife is prone to hazardous pollutants from the air, soil, and water systems, which can cause health

problems in animals when they are exposed to high quantities of toxins. Other concerns include infertility and congenital disabilities in animals. Animals, like humans, suffer from health problems when they are exposed to pollution. The significant deterioration of the environmental elements mentioned exacerbates health issues for women, and it places the environment in a harmful state. From the ecofeminist lens, this shows the connection between the oppression of the environment as a result of coal mining activities. Both women and the environment are marginalized and oppressed by coal mining activities.

4.2 Analysis of Coal Mining in light of Intersectionality

The following section analyses coal mining through the lens of intersectionality, as discussed in the previous chapter. Intersectionality helps address how patriarchal and capitalist forces of coal mining companies intersect to oppress women.

Intersectionality takes into account the different identities an individual may hold at once that may lead to discrimination of different forms, and it pays attention to patriarchy and its oppression on each intersection (Camacho, 2022). In the context of coal mining, patriarchy and capitalism are two distinct forces that primarily affect women. With regards to the mining companies, patriarchal capitalist forces are evident, discrimination and marginalization from companies at large. From the study, it has come to light that mining activities affect poor local communities. These effects are felt generally by women. This reflects self-interest from the companies backing the patriarchal capitalist forces that keep mining in place. Companies driven by these forces show no concern for the well-being of women and the environment but rather for their own. The attitude of controlling and exhausting natural resources manifests a lack of concern.

4.2.1 Violence and Harassment

The intersectional analysis reveals that women working in mines and women in the community are subjected to violence, including gender-based and sexual violence. A report by Fredd Kockett (2020) stated that in KwaZulu-Natal Province, unknown assailants fatally shot a 65-year-old woman who was known as a prominent critic of the Tendele coal mine and its intended expansion. The woman was murdered at her home near the Tendele coal mine, which borders the Hluhluwe-iMfolozi wildlife park. No arrests or suspects have been identified. The woman was part of a group that filed a lawsuit to stop the mine from expanding because its operations violated environmental and other laws. An act such as this indicated violence and intimidation towards

women who are trying to speak up about the unpleasant effects of mining. Muponde (2021) noted that heightened insecurity and violence was likely to be experienced by women living near mines. Violence is a pandemic in the mining industry which is well known. Women are subjected to discrimination, harassment, risky and physically challenging work with the aim of getting access to mining occupations, which would allow them to ensure that they can provide for their families and children in a better and comfortable life (Botha, 2016). It is not only local women outside the mines who experience discrimination; female coal miners are also discriminated against.

The South African mining charter of 2002 established quotas in the mining industry, requiring them to employ at least 10% female miners. Women's participation in underground mining is relatively new. The South African Minerals Act, which had previously barred women from working in underground environments, was annulled and substituted for the MPRDA in 2002. The MPRDA, in collaboration with the MHSA, lifted the ban on women working underground. Despite the fact that this was intended to improve gender equality, women miners are a minority group, and as a result of lack of gender transformation, they are constantly the victims of gender discrimination, harassment, and sexual violence. Inappropriate sexual behaviours, harassment and discrimination of women is evident, miners who are males make obscene or offensive gestures to women, they fail to acknowledge and respect women and their capabilities (Center for Applied Legal Studies, 2015, Mining Safety, 2021). Similarly, domestic violence against women is known.

Many reasons contribute to this, including the disruption of customary property ownership, an increase in male migration to communities near mines, and economic uplifts that disproportionately benefit men (Cox, 2022). According to Katy Jenkins (2014), women are left at home in places where migrant workers stay to support families and manage the land, which is critical to the household economy. Domestic and sexual violence incidences have increased; however, these incidents are rarely discussed. Because men in the community can access more considerable sums of money by working for mining corporations, there is a tendency for this to transfer into increased alcohol use and, as a result, more domestic violence. An inflow of male migrant workers who do not bring their families exacerbates the problem, often generating increase in sex work and escalating social conflict in traditional rural communities.

Kalluri Bhanumathi (2002) noted that the social and behavioural deviants and mining towns that result from mixed and external populations invading communities that have a strong cultural link where companies have done precious little to curb these trends have placed women into

completely unfavorable circumstances. The state's lack of dedication to investigating atrocities against women has emboldened mining companies and communities to mistreat women with impunity. The reality is that mining companies are insensitive toward these concerns and they show no concern on how these issues can be prevented for women and society at large.

4.2.2 Displacement

In some mining areas, local communities have been displaced and dispossessed from their land. This goes against their human rights and is a violation of the constitutional provision. As mentioned in chapter two, being moved and displaced from original habitats or land leads to a loss of traditional values and a way of life, diminishing women's formal status in society. The ActionAid Mining Report stated the following:

Maria Khumalo, the 39-year-old female, recalls how happy she was growing up on a farm with her family. The family lived in a ten-room house with a huge field where they grew food and raised livestock. Her house is now nothing but memories. Maria's livelihood has been harmed by mine operations in the area, which have taken up enormous swaths of land once utilized for agriculture and cattle production. "My parents gave me a hundred cattle, but today I only have two." She now sells poultry for a pittance and uses the money to buy coal and food. On what is now designated mine property, community members are no longer permitted to hunt or harvest wood (2017:23).

According to the South African Constitution Chapter 3, Section 25 (5), "*the government must take reasonable legislative and other measures, within its available resources, to foster conditions which enable citizens to gain access to land on an equitable basis*" (Constitution of South Africa, 1996). The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) explicitly recognizes women's land rights. CEDAW Article 14 stated:

State parties shall take into account the particular problems faced by rural women and the significant roles which rural women play in the economic survival of their families, including their work in none monetized sectors of the economy, and shall take all appropriate measures to ensure the application of the provisions of the prison convention to women in rural areas, (2) state parties shall take all reasonable efforts to provide and ensure women the right to have equal treatment in land and agrarian reform as well as lunch resettlement schemes" (UN Women, 1979: 6).

Land rights are intricately linked to the right to a clean and healthy environment. Land rights are affected when activities such as coal mining occur and produce environmental harm. These

activities can trigger land pollution and affect women and their families that depend on that land to live.

The Framework Principles on Human Rights and the Environment, Principle 15 noted that, States should ensure that they comply with their obligations to indigenous peoples and members of traditional communities, including by:

- (a) recognizing and protecting their rights to the lands, territories and resources that they have traditionally owned, occupied or used,
- (b) consulting with them and obtaining their free, prior and informed consent before relocating them, taking or approving any other measures that may affect their lands, territories or resources,
- (c) respecting and protecting their traditional knowledge and practices in relation to the conservation and sustainable use of their lands, territories and resources,
- (d) Ensuring that they fairly and equitably share the benefits from activities relating to their lands, territories or resources (UN, 2018:22).

4.2.3 Exclusion of Women from Participating in Negotiations and Decision-Making Processes

The Constitutional Court of South Africa has ruled that public engagement must be conducted in good faith to endeavor, to find an accommodation, a standard that is consistent with the country's international human rights commitments. Unfortunately, in South Africa, public consultation processes rarely match the Constitutional Court's or international requirements and are often little more than tick-box exercises for mining companies. The Constitution of South Africa, section 152, chapter 7 objectives states the following with regards to public participation:

- (a) to provide democratic and accountable government for communities,
- (b) to ensure the provision of services to communities in a sustainable manner,
- (c) to promote social and economic development,
- (d) to promote a safe and healthy environment,
- (e) to encourage the involvement of communities and organizations in matters (Constitution of South Africa, 1996; cited in Adams & Adeleke, 2016:81).

Women are discriminated against in such a way that they are excluded from decision-making related to human and environmental health as a result of mining activities. According to Ssebunya "when the local community does not participate in decisions concerning mining projects in areas

where they reside, their needs become threatened” (2017: 204). For mining companies, the inclusion of women in decision-making and participation is an ongoing challenge. Women are not represented in decision-making structures that relate to mining. Oxfam Australia noted that “the grievances voiced by women from mine-affected communities and women working in the mines revealed that the failure to consult with women when negotiating a community’s free, prior, and informed consent to develop a mining project disempowers women and undermines women” (2009:7). Decision-making often excludes women; some realities are not considered.

According to Samantha Hargreaves (2016), women in the Sokhele community in KwaZulu-Natal, who live near the Tendele coal mine, have tried to bring their worries about water to traditional elders, but they have largely been ignored. Instead, women have been fined for breaking the rule that women are not allowed to present issues to male traditional leaders. A significant element experienced by women is the large exclusion from negotiations concerning benefits from mineral development (Connell & Howwit, 1991). Hipwell *et al.*, (2002) asserted that the male domination in the mining companies has shattered the traditional power of women. The result is that the voices of women are marginalized in negotiations. They are not given a chance to voice their concerns and participate in decision-making. Ellen-Rose Kambel (2004) referred to cases that document the exclusion of women from negotiations and decision-making processes relating to their land and environment because of the erroneous assumption that it is a man’s task. Despite their legal right to receive information and participate in decision-making, women’s opinions are rarely heard. Susan Hemer asserted that “as members of the community, women have been viewed as suffering the cost of negative effects of mining, with little to no contribution in discussions between the mining companies and communities” (2012:3). They have little influence over mining companies, organizations, and governments that make mining-related decisions. Susanne Bonnell stated that, “all negotiations and decision-making regarding mining development have been made by men... agreements between the mine developer, local, provincial, and national government, and landowners’ association, they are all men” (1998:3). This further shows how women are excluded and undermined.

The International Council on Mining and Metals (ICMM) and the International Union for the Conservation of Nature (IUCN) noted that a case where a mining project proceeded with the traditional ownership of land was vested in women. However, women were not included in negotiations and received no benefits (ICMM and IUCN 2008:10). Furthermore, Eftimie *et al.*, (2009) asserted that women are not included in consultations and decision-making between mining companies and communities. There has been a case where the company asked for a public

official who was frequently male to convene the community gathering. However, only men are invited, or women are invited but not given the opportunity to speak. This shows that women are undermined, and they are not presented with a platform to speak up. The study of Eftimie *et al.*, further stated the following in a meeting about the development between a community and a mining company, “Men came to promote road construction ideas, while ladies were more interested in discussing their health and nutrition concerns. We are still witnessing the same levels of misery five years later, after pouring money into the infrastructure sector, perhaps the women were correct” (2009: 21).

Patriarchal capitalist forces drive the mining industry; they affect both companies and women. However, companies can put their interests first and proceed to solve their problems with little concern for the environmental issues they contributed in. The South African mining regulatory framework and constitution need to be enforced so that companies do not conduct their business in a manner that harms their environment, women’s rights, and health. From the above, many of these issues are not addressed; therefore, the regulatory framework must be enforced to ensure that coal mining activities are done in a way that eliminates harm to women’s health and the environment. The government must also adopt international frameworks within its jurisdiction to help enhance and improve the existing regulatory frameworks and environmental laws.

4.3 Conclusion

The effects of coal mining activities on both the environment and women demonstrated the weak institutional capacity of coal mining companies and the government bodies overseeing this industry to enforce environmental laws. The nature of coal mining is not environmentally friendly. This suggests that the mining companies undermine the voices and participation of locals, especially women, in decision-making related to mining activities and development. It also shows the tendency of patriarchal behaviours in the industry. In light of ecofeminism, mining companies and government bodies that regulate the industry need to be addressed by looking at environmental and social concerns emphasizing women’s health and environmental health. This chapter has analyzed coal mining activities in South Africa through the lens of ecofeminism. The chapter has observed a lack of concern for women’s health and the environment. Mining companies are not taking enough measures to reduce the pollution they cause the remaining activities. They are not responsive towards how their actions affect women and the environment. the chapter has also noted that coal mining companies have led to the violation of women’s constitutional and human rights. The rights violated include the right to good health, the right to

a healthy environment, the right to clean water and food, , the right to information and the right to effective remedy. The chapter also revealed that women are not given a chance to participate in decision-making; there is a failure to provide information about the mining activities and accurate information on how these activities affect the environment and human health. The next chapter, the concluding chapter of this dissertation, presents the recommendations, summary and conclusion of the study.

CHAPTER FIVE: RECOMMENDATIONS, SUMMARY AND CONCLUSION

5.0 Introduction

The preceding chapter presented the analysis of the study. The analysis revealed the high tendency of patriarchy in South Africa's mining sector. It further revealed that issues affecting the environment and women, particularly women's health, are ignored. Mining companies, government bodies and males who participate in mining development have all perpetuated oppression and abuses of women and the environment. The present chapter seeks to prescribe ideas that can improve the framework in South Africa's mining industry based on an intersectional approach. To achieve this, the first section will discuss and prescribes ideas for ethical mining practices from an intersectional approach. These ideas are presented in the form of recommendations. The necessity for ethical mining practice will also be discussed. The second section provides the summary of chapters and the conclusion of the study.

The recommendations seek to create awareness in which the mining companies and the industry itself ensure that the health of women and the environment are not threatened. Similarly, the recommendations advocate for an intersection ethic in which the coal mining companies, government and the industry as a whole recognize that women's health, the environment and other marginalized groups must be treated with care when pursuing or engaging in mining activities.

The findings of the study revealed that coal mining contributes to environmental pollution that affects women's health in local communities and the environment. This issue needs to be tackled and dealt with. From an intersectional approach, the following ideas draw attention to the intersecting aspects which affect women that are largely ignored and not investigated enough. These ideas are presented as recommendations to companies in the mining industry and government.

5.1 Recognition of Patriarchy in the Mining Industry

In order to improve the state of the mining industry in South Africa, the industry must recognize and acknowledge that mining development is driven by patriarchy, that is, capitalist patriarchy. As noted in the previous chapters, capitalist patriarchy undervalues the essence of women and the environment. Mining is a male-dominated activity that thrives and continues to take place because it brings wealth and profit above everything else. Mining activities have led to

environmental degradation and pollution. These activities affect women as they are closely connected to the environment; the environment itself is also affected. The oppression of women and the oppression of the environment are similar because it comes from a patriarchal setting dominated by men. From the analysis of the previous chapter, it was found that women from local communities are subjected to the effects of coal mining, such as pollution that affects their health, this forms part of marginalization. The way in which women are marginalized is the same way mining marginalizes and exploits the environment. This calls for all mining companies, government and the industry to recognize that patriarchy exists, and patriarchal attitudes towards women miners and women in local communities must be eroded. The mining companies need to work towards being sensitive to issues affecting women. Women must be seen as equals to men regardless of their social status and roles. The mining companies must work towards building healthy power relationships that empower women.

5.2 Prioritize Women's Rights as Human Rights

In chapter four, the study indicated that mining companies are responsible for a number of violations of women's rights. Many of these violations result from environmental pollution that results from coal mining. The lack of respect for women's rights, therefore, calls for recognition of women's rights as human rights. Mining companies and the government overseeing the industry have a responsibility to respect and uphold women's rights. Government must direct all government officials, particularly those in departments responsible for regulating mining or protests, to comply with South Africa's domestic and international obligations to respect, protect, and promote all human rights activists across the country, including community rights defenders in mining-affected communities, to freedom of expression, association, peaceful assembly, and protest, as well as the rights to health and a healthy environment. The government must also provide these officers and departments with all resources they need to execute their responsibilities under the South African Constitution and International Human Rights Legislation.

Women's rights are human rights and the government must make it mandatory that mining companies respect human rights placing women at the forefront. Ssebunya (2017: 239) noted that "when the government is serious about upholding human rights, it will take steps to safeguard its citizens from harm, violence, and abuse produced by mining". Women will be protected from abuse and exploitation when human rights are acknowledged and respected. Women, along with the community, will also be able to stand up for themselves and claim their rights. Therefore, it

is recommended that the South African mining regulatory framework and constitution recognize women's rights.

It is recommended that policymakers of this industry should highlight women's rights. The implementation of policies looking at specifically women's rights must be done. This will assist in recognizing and emphasizing the importance of protecting and respecting them. This will also help in ensuring that mining companies who disobey the laws and violate women's rights face the consequence of punishment. The government has a responsibility to serve and protect its people. While it encourages development in the mining industry at the same time, it must demand that mining companies to respect human rights.

5.3 The Mining Companies and Government must stand against Acts of Violence and Harassment of Women

In chapter four, the intersectional analysis indicated that women miners and women in local communities are subjected to violence and harassment. This issue intersects or is instead considered as a form of marginalization. The mining companies and government need to stand up against the marginalization of women. Mining companies can contribute by developing policies and procedures in line with the current legislation highlighting preventative measures that will protect women miners and women from local communities near the mines. Government must make it mandatory for mining companies to conduct risk assessments relating to any form of violence and end abuse that women experience in the mines. Similarly, the government must delegate representatives who will investigate the acts of violence and harassment that women experience in local communities at the hands of men. This will help ensure that there is zero-tolerance for all acts of violence and that those who engage in such acts face the consequences of not protecting women.

5.4 Community Education on Violence against Women

Education on violence against women is necessary for the communities near mining areas. Education on the violence against women will assist in educating community members, particularly men, and help them understand how violence affects women. This type of education must be conducted by the mining companies and the government. Doing so will enable community members to stand up against the perpetrators of violence and assist the victims who are women. When this type of community education takes place, the mining companies, together with the government, must provide services such as counselling, medical attention, and mental

health intervention. Education will assist in reducing violence resulting in behaviour changes and attitudes that may lead to abuse (SVRI, 2017) A more engaged and well-informed community can contribute to an even more responsible, proactive society. Questioning and engaging in societal norms, beliefs, attitudes and actions, educating the community attempts to prevent violence and harassment against women and prevent other crimes that contribute to various forms of abuse.

5.5 Awareness of the Importance of Women's Health

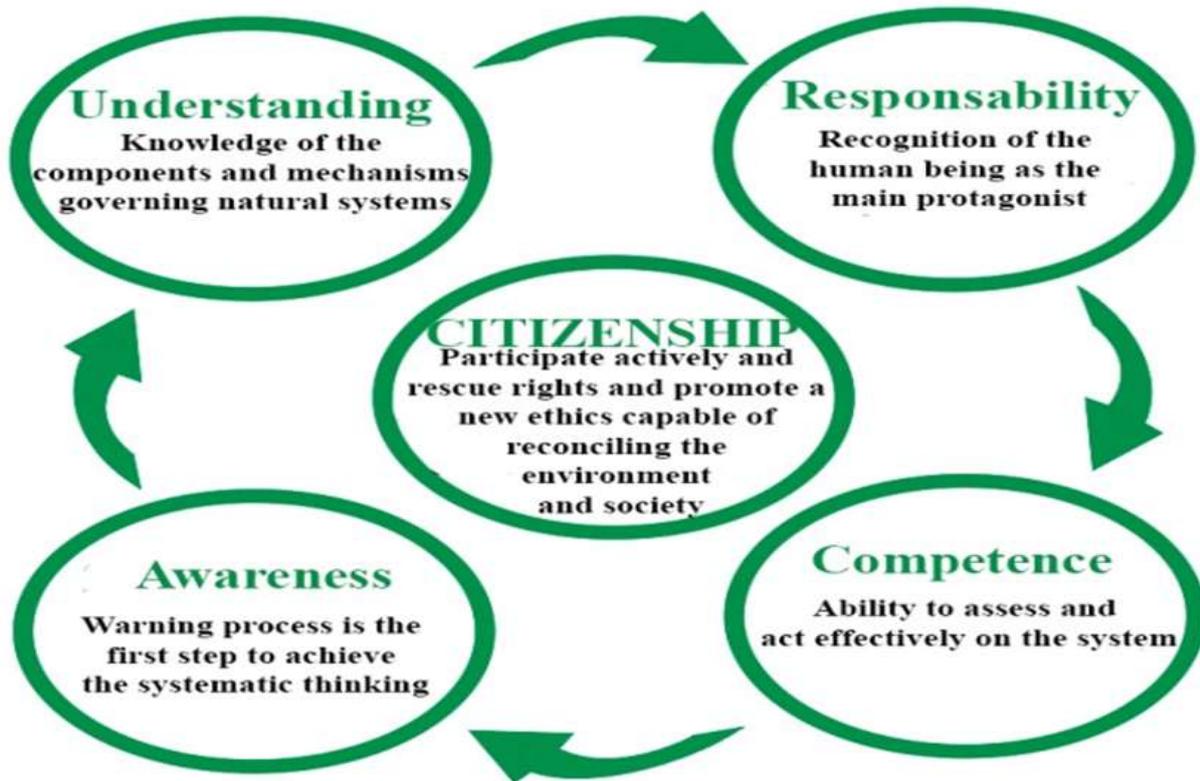
It is recommended that awareness about the importance of women's health is carried out. Women are the backbone when it comes to the general health of families and communities. It is therefore essential to ensure that women's health is good for the benefit of children as well as families and communities. Awareness can be done by women who are advocates or activists of women's health together with men who have been affected by coal mining. The awareness can be done through groups involving men, representatives from coal mining companies and the government involved in policy-making so they can learn about the importance of Women's Health and act towards prioritizing women's health in local and national mining policy. Women themselves need to be educated about the health risks they are exposed to around mining areas so they can work towards improving their health. Devoting attention to women's health and marginalized groups, such as girls and young children, is necessary because it enables government and mining companies to consider the effects of mining on women's health and marginalized groups. It increases the performance of mining by establishing measures that will not harm Women's Health and their communities. Awareness will also help in changing practices and behaviours that are harmful to women's health.

5.6 Environmental Education and Awareness Programs

Environmental education is essential. It is recommended that mining companies and government should work together in implementing programs and campaigns in order to educate and pass down knowledge about the importance of the environment. Environmental education is necessary because it will help women and local communities as a whole develop a deeper comprehension of environmental issues surrounding them and what steps they need to take. Environmental education enables awareness about the environment and its challenges, environment-conscious behaviours and attitudes to enhance and maintain environmental conservation, and the ability to recognize and assist in the resolution of environmental issues. Awareness programs will assist in

educating people affected by mining activities about laws concerning the environment and their health. People must be educated so that they can understand what happens when mining occurs in the areas they reside in.

Figure 2: Principals of Environmental Education



Source: Amorim et al., (2017)

5.6.1 Awareness

Environmental education enables awareness and knowledge of what is happening to the environment. It allows people to understand the natural environment and the importance of conserving and protecting it for the sake of current and future generations' survival. Being aware of environmental surroundings means understanding how our human activities and behaviours affect the environment and making changes to human activities to protect it.

5.6.2 Understanding

Environment education provides an understanding and knowledge about major environmental concepts, how the environment works and interacts with humans, and the environmental issues created by human activities. An understanding of the environment enables us to come up with solutions to environmental issues.

5.6.3 Responsibility

Environmental education encourages the responsibility of people and business entities to take responsibility for the natural environment. Having environmental responsibility means that humans are aware that every human activity impacts the environment, and this calls for responsible actions and taking care of the environment and promoting eco-friendly behaviours.

5.6.4 Competence

Environmental education encourages good interaction between humans and the environment. It enables people to access the environment and act effectively towards mitigating environmental problems by making use of the knowledge and skills they have obtained through environmental education.

5.6.5 Citizenship

Participating in environmental conservation and promoting eco-friendly practices is good citizenship. Environmental education encourages good citizenship by enabling people to exercise environmental rights and fulfil environmental duties and have a willingness and the competence to address critical engagements concerning environmental issues.

Implementing these awareness campaigns can be done in collaboration between mining companies, government and community leaders. Community leaders must consist of 50% women so that women have representation. Environmental education and awareness campaigns can be done through the indigenous knowledge system. The indigenous knowledge system is how African people traditionally passed down knowledge. Knowledge was passed down and shared through storytelling, folktale, and proverbs. Knowledge is passed down through the language commonly used by that community, making it easier for them to grasp the knowledge they receive. Using this method as a way to educate communities may be helpful because both the younger and older generation will be equipped with knowing the importance of the environment. In addition to this, the study recommends that mining companies and government must have

focus groups consisting of both women and men, including girls so they can be educated on the environment in general and how environmental pollution affects their health.

Focus groups with women and girls are essential because women can share their in-depth experiences and more knowledge with the young girls. It can also be treated as a way of counselling. Focus groups may be beneficial in encouraging and sharing valuable ideas on how women can tackle environmental issues and what efforts mining companies and government can take to help women affected by mining activities. Issues that were not recognized may surface and focus groups.

Women and men from local communities must be educated; they need to receive environmental education and learn about environmental degradation and the pollution that affects women's health. They need to be educated about the safety measures they can take to protect themselves and their families; it is their right to explicitly know what they are experiencing rather than be in the dark and fight the unknown. Education plays an essential part in the emancipation of women, the protection of women and children from unjust, hazardous work and sexual exploitation, the advancement of human rights and democracy, the preservation of the environment, and the management of the increase of the world's population (CESCR. 1999). Environmental education is essential because it brings awareness and informs people about the environment and the responsibilities everyone has towards it.

5.7 Participation of Women in Decision Making

It is recommended to permit women from local communities to participate in negotiations and decisions that affect their well-being. A way in which this can be done is by enabling them to participate in analyzing the mining proposals presented by mining companies before their proposed mining activities take place. Allowing women to participate is crucial because they are hit hardest by the adverse effects of mining activities on their health; they are exposed to environmental damage, which sometimes can be permanent, as well as high socio-cultural costs. Including women in decision-making may be beneficial, men and women working together to make decisions broadens viewpoints, diversifies the pool of talents and competencies, decreases conflict, and improves the decision-making process (Asuako, 2020). With this recommendation, the South African government should put in place strict rules that mining companies need to adhere to. This is to ensure that they consult and involve local residents in mining communities to give their consent before starting projects that affect their land. Pursuing profit and

development, projects without the participation of local communities' input and approval is not ideal, and it can lead to unwanted conflicts.

Mining companies must ensure that communities have access to all relevant information on all adverse environmental and social hazards associated with mining, as well as the freedom to make their own decisions in accordance with South African law. Make such information, including important summaries, available in local languages and in various formats, such as print, online, and on the walls of public buildings, so that both literate and non-literate community members may access it. Information about the environment and all relevant information on mining activities must be made available to residents so that they can make sound judgments and decisions. Activities that the mining companies intend to undertake, the effects on the environment and human health, the well-being of community residents, plans on mitigating harmful effects and the manner in which the communities will benefit should be included in this information. When consultation takes place, the decisions of local residents must be free of government, companies' pressure and intimidation (Ssebunya, 2017). This will allow local communities to participate in decision-making; it will also help reduce disagreements between local communities and the mining companies. In this approach, the government and mining companies will thereby help protect local communities to free prior and affirmative consent to mining and development initiatives.

Furthermore, the government must obligate companies to conduct human rights assessments so they can analyze and evaluate the impact of their intended operations on local communities. Government must ensure that proposed mining developments and activities do not harm health, particularly women's health or escalate gender inequality. Government should ensure the likely effects that mining activities have on women's health when determining the profitability of mining operations. Impact assessments are required and necessary for proposed mining projects to ensure that the mining companies and government personnel evaluate the effects mining activities have on women. It makes it simpler to evaluate and establish methods to ensure that women benefit from mining development in their local communities. Assessments should enable companies to detect any future potential risks of human rights abuse while also devising mitigation strategies and solutions. These assessments should be carried out before mining activities occur in consultation with local communities. A report should be shared and made available to the local community as well as the government following each assessment. It is necessary to assist the local communities in comprehending the findings of the report. There may be fewer occurrences of the violation of human rights against women from local communities,

those who are female minus and those who are residents) if mining companies integrate that business conduct with human rights standards. This may be the first step to genuine development. The Legal Resource Centre asserted that “participation assists the community in understanding the mining companies’ plans to mine in the region, how to mitigate environmental damage and what benefits the community will acquire for accepting the risk” (2016:15). Participation is vital because it draws attention to various needs of the community and encourages active participation in decisions that affect them. It also allows the process to be transparent and provides them with a tool to track the progress and stay informed about what is being planned and scheduled.

The mining industry, along with the companies within the industry and the government, must address these issues; they must encourage meaningful participation of women.

5.8 Adopt an Eco-Health Approach

The adoption of an eco-health approach will assist in encouraging positive environmental action. The environment is essential because it supports our lives. It has been noted in the study that coal mining activities have resulted in a number of health issues and environmental problems. This calls for mining companies to adopt an eco-health approach. The health of people and the environment is essential for development, integrating human health considerations into environmental assessments will help in more equitable mining development (Mergler, 2003). Understanding the effects of coal mining activities on women from local communities necessitates considering factors such as the ability to attain knowledge and their capacity to participate decision making concerning mineral development within their local communities. Local participation is fundamental because it assists in identifying the needs of the community, but it also supports the necessary response to the challenges identified by the communities themselves. This is the essence of an eco-health approach.

5.9 The Necessity for Ethical Mining Practices

The mining industry in South Africa is a fundamental component that has shaped and contributed to the economy’s growth and provided employment opportunities for many people. Regardless of its positive attributes, mining activities have affected women’s health and the environment, as noted in the previous chapter. The coal mining companies, and government have shown disregard for issues affecting women and the environment. These issues include women’s health, violation of rights, violence and harassment, displacement, and exclusion from participating in negotiations and decision-making. The issues relating to the environment include environmental

pollution, land degradation, wildlife and habitat loss. These issues, along with many other issues, highlight the need to change South Africa's mining industry into one that is ethically driven and responds swiftly to issues affecting women and the environment.

5.10 Summary of Chapters

This section summarises the significant findings of each chapter of the study.

Chapter one provided an introduction to the study and background. The desire to participate in the current debate about coal mining activities and how it affects women and the environment motivated the researcher to pursue this study. The study's key question stated: what are the ethical effects of coal mining activities on women's health and the environment in South Africa? The chapter comprises research questions, objectives, theoretical framework and methodology. This study used the exploratory research design and the desktop method to respond to the study's key research questions and vital areas.

Chapter two discussed the literature review. The chapter highlighted the history of coal mining in South Africa, followed by an overview of South Africa's mining regulatory framework. The framework comprises laws that were proposed to keep mining environmentally viable and less harmful to citizens and the environment. The chapter further presented environmental pollution, the contribution of coal mining to pollution and its effects on women's health and the environment.

Chapter three discussed the theoretical framework that guided the dissertation. The theories discussed were the ethical theory of ecofeminism and intersectionality. The chapter started by discussing the definitions of ecofeminism. The different approaches to ecofeminism, including liberal ecofeminism, radical ecofeminism, and cultural ecofeminism, were discussed. Ecofeminism presented the relationship between women and the environment. The chapter also discussed intersectionality, also known as intersectional feminism. It provided different forms of intersectionality that is structural intersectionality, political intersectionality, representational intersectionality, and the intersection of patriarchy and capitalism. Arguments for and against intersectionality were discussed. The final part of this chapter discussed the theoretical relevance of the study.

Chapter four provided the analysis. The chapter ethically analysed and examined coal mining activities and their effects on women's health and the environment. This was analysed through

the lens of ecofeminism and intersectionality, as discussed in Chapter Three. It helped to achieve the research objectives. To reiterate, the objectives of this dissertation were as follows:

1. To explore the nature of coal mining
2. To examine the effects of coal mining activities on women's health and the environment
3. To explore the ethical theories of ecofeminism and intersectionality to respond to the environmental degradation of coal mining activities and make recommendations that contribute to the health of women and the environment.

The chapter was divided into two sections. The first section analysed coal mining in South Africa through the lens of ecofeminism. Through ecofeminism, it was found that the mining industry in South Africa is characterized by patriarchy which marginalizes and oppresses women and the environment. Patriarchy in the mining industry is seen through the marginalization of women and women's poor health as a result of coal mining. It was also discovered through the lens of ecofeminism that mining activities have led to the violation of women's rights, which includes the right to good health, the right to a healthy environment, the right to information and the right to an effective remedy. The environment is also affected because coal mining contributes tremendously to the pollution of air, water and land, as well as the exploitation of natural resources, loss of biodiversity and land degradation. This affects residents, primarily women's health. The second section analysed coal mining through the lens of intersectionality. It came to light that women are marginalized; they experience violence, harassment and exclusion from participating in decision-making processes.

The section showed that there is a lack of concern for the livelihoods of both women in local communities and women mineworkers, and they have no voices to speak out about how mining activities affect their health. These issues intersect with the problems found in the previous analysis in light of ecofeminism. The oppression of women and their health, the violation of rights, violence, harassment and the environmental degradation that results from mining activities demonstrate that patriarchal capitalist forces in the mining industry are present. With the failure of mining companies and government bodies overseeing the industry to protect women and the environment, the drive for wealth and development of the economy is far greater.

Chapter five presented the recommendations, summary and conclusion of the study.

5.11 Conclusion

This chapter provided the summary and recommendations on how the effects of coal mining activities on women's health and the environment must be addressed. The study recommended that mining companies and the government collaborate to develop and implement environmental education, awareness initiatives, and campaigns. Environmental education is recommended and essential because it will help women and local communities better understand the environmental concerns they face and the activities they need to take in order to address them. As a result of the lack of respect for women's rights, human rights must be recognized. Mining companies and the government overseeing the industry must respect and uphold women's rights. It is recommended that mining companies recognize human rights. Participation of women in decision-making is recommended. Allowing women to participate is critical because they are adversely affected by the negative health impacts of mining activities; they are also exposed to environmental degradation, which can be irreversible in some cases. Communities must have access to all necessary information on all adverse environmental and social dangers associated with mining and the ability to make their own decisions per South African law. Adopting an eco-health approach was recommended; adopting an eco-health strategy will help to promote positive environmental activities, the health of humans and the environment are critical for development.

The study has interrogated and analyzed coal mining activities and their implications on women's health and the environment in South Africa. The study has shown that coal mining contributes to pollution, affecting women's health and the environment. The study further looked at this phenomenon from an ethical perspective by using the ethical theory of ecofeminism and intersectionality. Analyses using these theories highlighted that the mining companies and government do not recognize the issues affecting women. The study discovered that the lack of concern for health, violence, and women's exclusion from decision-making is a violation of human rights. There is no doubt that managing the mineral resources remains a difficult task.

There is a problem of communities having no access to information relating to mining development, mining companies have failed to protect women's health and the environment, and the companies have not been disciplined for their failure. Exclusion of women from participation in decisions that affect them, and the violation of human rights are other problems that surfaced. These challenges must be addressed, and necessary steps must be taken to achieve eco-friendly development that does not harm women's health and the environment.

The study encourages mining corporations to reconsider their approaches to mining efforts and prioritize women's health and the environment. The goal of this research was to contribute to the process of critically rethinking current mining practices that harm women and the environment, not only in the mining industry but also in other industries, in order to achieve genuine and friendly development that does not harm humans, particularly women's health.

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APPENDIX 1: PROOF OF EDITING LETTER

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18 September 2022

To Whom It May Concern

I, the undersigned and behalf of and representing, G 9NTY CONSULTANTS PVT LTD, in my capacity as a Research Associate hereby confirm editing the thesis entitled “An Ethical Interrogation of Coal Mining Activities and its Implications on Women’s Health and the Environment in South Africa.” The author of the research is Nondumiso Nqobile Makhanya (215014542). Edits done to the dissertations includes but not limited to the following.

- Checking and correcting grammar, phrases and spelling;
- Formatting (margins, line spacing etc.);
- Consistency of Tables/ Figures and Table of contents;
- Flow of narratives;
- Similarity flagging;
- En Dash or Unnecessary Spacing and
- Capitalization of Phrases and Headings.

Yours Sincerely

Mr. T.T Muchuwa



Research Associate

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