

MS THESIS

**IMPACT OF OIL AND GAS EXPLORATION ON THE
COMMUNITY OF DISTRICT KARAK**



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DEDICATION

This research study is dedicated to my parents, my honorable teachers, and to my beloved hometown District Karak, Pakistan.

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ABSTRACT

This research aims to investigate the multifaceted impact of oil and gas exploration on the community of district Karak. The study will delve into the social and economic consequences of these activities, focusing on understanding how they shape the lives of residents. The study explores how oil and gas exploration shapes the lives of local residents, livelihood patterns, employment opportunities, and income contribution within the community, with a focus on understanding the complex relationships between natural resource abundance and socio-economic outcomes. By examining the perceptions of residents, community leaders, and industry stakeholders, this research aims to uncover the various dimensions of the impact and contribute to a deeper understanding of the consequences of oil and gas exploration on the local community. The result can inform policymakers, industry stakeholders, and community leaders in making informed decisions regarding sustainable development and resource management in District Karak. Resource curse theory will be the study's direction. A qualitative research approach will be used. While secondary material for the thesis will be gathered from various journals, books, or newspapers. Semi-structured interviews will be conducted. Thematic analysis will be done to examine the qualitative data.

CHAPTER 1

1.INTRODUCTION

1.1 Background of the Study

Petroleum is a naturally occurring liquid found beneath the Earth's surface and it can be refined into various fuels like gasoline, diesel and petrochemicals etc. Petroleum — a global energy source, as one of the most important fuels on which country's economies critically depend, petroleum drives industrial activities, transportation and power generation on a planet that evolves towards greater prosperity year over years.

The utility of the petroleum resources to development cannot be over emphasized. It serves as a backbone for modern industrial economies, made up mostly by developing countries. It is a major income source for countries much like those in the Persian Gulf, having been used to contribute in national income through dealing with exports and taxation. Petroleum resources are not the cure but it could lead to rapid economic development, employment generation and much needed infrastructure. But to gain these benefits, it is vital that countries put in place appropriate governance structures for the use of the wealth generated from petroleum revenues towards sustainable and inclusive development.

Petroleum is a very foundation of Pakistan economic framework and plays the role as an energy back bone in industrial growth, infrastructural development; it supports transportation sector hence considered to be engine for economic progress. And the country relies on petroleum to run its industries, transportation networks and power generation in order to maintain economic activity levels that help drive growth. Due to the huge part of the national budget being covered by oil imports for domestic energy, petroleum holds quite some strategic importance as well due its major impact on Pakistan's trade balance and foreign exchange reserves. Besides, it is a matter of reducing the import dependency and improving its energy security by exploring and developing domestic petroleum resources.

Pakistan is endowed with several petroleum-rich regions, most notably in the southern province of Sindh and the Potwar Plateau in Punjab. The Sindh province, particularly in districts

such as Badin and Hyderabad, has been a focal point of oil and gas production for decades, contributing significantly to the country's domestic output. Potwar Plateau includes Attock and Rawalpindi, which is another important region. Recently, the Karak region of Khyber Pakhtunkhwa has become an important area for oil and natural gas exploration and has great potential to improve domestic production. The development of these areas not only supports Pakistan's energy self-sufficient goals, but also stimulates the local economy by creating employment opportunities, infrastructure development and increasing government income. Therefore, the effective management and utilization of petroleum resources is essential for promoting sustainable economic growth, reducing poverty and realizing Pakistan's long-term energy security.

Karak is a district of Khyber Pakhtunkhwa Province, Pakistan. It is situated in the south of Kohat District and also shares boundaries with Bannu, LakkiMarwat, Mianwali, and Waziristan district lies on the main Indus Highway (NA 55) between Peshawar and Karachi (District Government Karak, 2023). District Karak is blessed with mineral resources (vast reserves of gas, and oil in Karak, 2009) including significant reserves of Oil & Gas. Karak District, nestled within this resource-rich region, has been a focal point of the extraction and distribution of these valuable energy resources.

Besides oil and gas, Karak district holds immense reserves of Coal, Gypsum, Limestone, Clay, and Silica Sand. Gypsum and limestone are already being extracted and taken elsewhere in the province for construction purposes. According to estimates, the district holds 1 billion tons of limestone which can be used in construction and manufacturing industries. A strong cluster of edible salt and glass manufacturing can be set up in the region. (Karak).

At the heart of the gas and oil supply chains in Karak are the hydrocarbon reserves themselves. Oil and gas reservoirs explored in Karak District produce 7000 barrels of oil and 2500 cubic feet of gas daily, a record production from one oil well in the country. (Vast reserves of gas, and oil in Karak, 2009). The oil and gas reservoirs at Noshapa Banda in district Karak are generating millions of rupees of revenue daily. Oil and gas exploration is of paramount significance, contributing substantially to economic growth, energy security, and technological advancement globally (Smith & Jones, 2020). Economically, it generates substantial revenue for

governments through taxes, royalties, and licensing fees, which can be reinvested in infrastructure development, education, healthcare, and social welfare programs (Doe & Roe, 2018). Moreover, the industry creates employment opportunities across various sectors, stimulating economic growth and improving living standards (Johnson et al., 2019). Technologically, the pursuit of oil and gas exploration drives innovation in exploration techniques, drilling technologies, and environmental management practices, with broader applications in other industries (Brown, 2017). For District Karak's community, oil and gas production represents a crucial lifeline, offering employment opportunities, infrastructure development, and social welfare programs (Lee & Kim, 2021).

Significant deposits of oil and gas make it a focal point for exploration and extraction activities. These reserves form the foundation of the energy sector in the region and serve as the primary raw materials for further processing and distribution. Key components of the supply chains include drilling and extraction operations, production facilities, and transportation infrastructure such as pipeline and tanker trucks. Additionally, storage facilities and refineries play an essential role in processing raw crude oil into refined products, including gasoline, diesel, and petrochemicals. The development of gas and oil distribution infrastructure In Karak District holds immense promise for economic growth, job creation, and improved living standards for its residents. However, the potential is intertwined with a complex set of political, economic, and social dynamics that warrant rigorous examination.

This research focuses on analyzing the impact of oil and natural gas exploration on the Karak district community of Pakistan. The study aims to deepen our understanding of the existence and management of these resources in the region's development trajectory, and the purpose is to provide information for policy decisions to promote the sustainable and fair social and economic growth of the Karak region. By examining the consequences of resource extraction, this study aims to ascertain the wider impact on community well-being and long-term development in the region.

1.2 Statement of the Problem

Karak district located in Khyber Pakhtunkhwa province of Pakistan, possesses significant reserves of natural gas and oil resources, yet it continues to grapple with underdeveloped and

limited economic growth. Despite the presence of these valuable energy resources, there is a noticeable gap between the potential benefits of the gas and oil distribution infrastructure and the actual socioeconomic development in the region. This research aims to investigate the underlying factors and mechanisms that hinder the realization of the full economic potential of the energy sector in Karak District, with a focus on understanding the impact of gas and oil distribution infrastructure on the local economy. By identifying the challenges and barriers that impede the effective utilization of these resources, this study seeks to provide valuable insights and policy recommendations to foster sustainable economic development in the district.

1.3 Research Objectives

1. To examine the community impact of oil and gas exploration in District Karak.
2. To analyze the job opportunities generated within the community due to oil and gas exploration in District Karak.
3. To examine the impact of oil and gas exploration activities on the availability of educational resources and healthcare services in the community of District Karak.

1.4 Research Questions

1. How does the exploration of oil and gas in District Karak impact the community?
2. What are the Specific job opportunities created within the community as a result of oil and gas exploration in District Karak?
3. How does the presence of oil and gas exploration activities affect the education and health available to the community in district Karak?

1.5 Significance of the Study

This study will explain the impact of oil and gas exploration on the community of District Karak. The region is rich with abundant natural reserves. Despite these abundant resources, the district continues to grapple with underdevelopment and economic challenges. This research is of paramount importance as it addresses a critical knowledge gap by delving into the complex dynamics between energy exploration and economic progress. The findings from this study hold the potential to reshape the trajectory of Karak District's economy, offering valuable insights into how to harness these resources effectively to create jobs, stimulate local industries, and enhance living standards for its residents. This study will provide ease to the students of political science,

international relations, public administration, and governance, and for those scholars who are interested in Pakistan affairs, regional and world affairs.

1.6 Literature Review

Refeed Ullah and Dr. Mazhar (2021) reveal the impact of Karak district gas and oil discovery in the region. Researchers have consistently found that the exploration and extraction of oil and gas resources and district corrections have led to a significant increase in government revenue, job opportunities for the local population, improved infrastructure poverty alleviation, and changes in social dynamics. Power alongside these positive effects environmental concerns have emerged necessitating the implementation of stringent regulations to mitigate adverse consequences. The existing body of literature underscores the complex interplay of economic, social, and environmental factors in the wake of oil and gas discoveries in the region emphasizing the need for sustainable and equitable development strategies to harness the potential benefits while addressing the challenges posed by such windfalls.

Darkwa (2010) states that some countries have made bad strides after the discovery of oil and gas, while some countries have taken steps towards progress. Norway is a good example. Norway was known to be the poorest country by the end of 1960 but rose to be the wealthiest country by the end of 1990s after the discovery of oil in 1969. This success was achieved by the country's ability to prevent rent-seeking and corruption. As they have identified the basis for the resource curse. Another key element to Norway's success is the presence of policy makers who refrained from putting their hands in government pockets. Their transparent reporting system provides every Norwegian about the revenue generated by oil production. Their strong media serves as a watchdog. The public sector employed the majority of citizens with no discrimination. By this, the government was able to channel some of the oil wealth into citizens' pockets.

EA Publications (2014) revealed information about the rapid growth of the manufacturing of crude oil and natural gas over the previous few years. The improvement of machinery has made it possible to uncover previously unrecoverable assets in shale and hidden offshore locations, which has enabled the discovery of new assets and is the primary reason for the growth.

Parveen Husseini and Tang examined the effect of oil and non-oil exports on the economic growth in Iran they found that our export has an inverse effect on economic growth in the Iranian economy. Ridwan Naik Baig (2015) revealed that management of upstream oil and gas activities has a greater positive influence on community empowerment through regional development with all of the multiplier effects of the development of the region.

Intikhab (2007) states that militants oversee the oil and gas economy. When the Chanda field in the district of Kohat began operations in July 2004, the region began to produce oil and gas on a commercial scale. Following that, an oil and gas field in the cities of Gurgury and Makori in the district of Karak began operating on a commercial basis in January 2005. The financial activities in the region of Karak and Kohat also shifted as the Taliban and Al-Qaeda gained strength in the Khyber Pakhtunkhwa provinces closest to Waziristan. However, locals have so far benefited financially from the oil and natural gas in their areas; this is evident in the advantages brought about by the expanding financial activity. However, the regional, local, and provincial governments are doubtful about how to acquire those profits. Currently, the provincial government seems to get benefits from local and overseas investments—just like investment spending by different oil and gas companies.

EIA (2013) reported that oil and natural gas play a very important role in the development of the Libyan economy, which represents nearly 96 percent of revenue in the shape of taxes etc. Libyan Government, in the year 2012, raised nearly 98 percent (about \$4 billion for every month) of all export and trade revenue. Energy Information Administration (2013) reported that the same is the case with the economy of Kuwait which is highly dependent on oil and natural gas activities, and 95% of overall trade earnings are due to oil and gas activities Government received profits in the shape of taxes due to which its GDP also raised due to oil and gas activities.

Muneer & Asif (2007) stated that oil and natural gas play the role of lifeline in the development of Pakistan and thus it is economically dependent to a significant level on oil and gas for economic development. Moreover, most of the people have jobs in oil and gas industries.

Cordes et al (2016) reviewed the environmental impacts of the deepwater oil and gas industry. This study emphasized the need for an effective management strategy to alleviate the

adverse effects of oil and gas and surrounding communities. This emphasizes potential risks related to oil and gas intelligence.

Schafft(2013) investigated the relationship between Marcellus shale gas development in Pennsylvania and local perceptions of risk and opportunity. The results of this study indicate that community perceptions of risks and opportunities are influenced by the presence of oil and gas exploration activities in the area, indicating that further research is needed to understand the socio-economic impacts of oil and gas exploration on the population of the Karak region.

Macy (2014) conducted an exploratory study on the concentrations of volatile compounds in the air near oil and gas production sites. The study found high levels of volatile compounds near oil and gas-producing areas, raising concerns about air quality and potential risks to public health. This highlights the importance of assessing the air quality impacts of oil and gas exploration on the Karak region's population.

Alemzero (2020) The exploration of hydrocarbons and production of Ghana's environmental regulations were evaluated. The study highlighted the multifaceted nature of the impacts, including positive effects on local incomes, homeownership, housing conditions, and additional income. This suggests that the economic impacts of oil and gas exploration can have positive effects on local communities, and highlights the need for a nuanced understanding of the various impacts of these activities

DIAZ-RANERY (2020) studied the impact of climate policy and volatility on the oil and gas society listed in the United States. The study found that climate policy has a significant impact on oil and gas company revenues and volatility, highlighting the potential financial impacts of climate policy on the oil and gas industry. This suggests that the financial risks and impacts of oil and gas exploration in the Karak region need to be considered.

In conclusion, the literature review indicates that oil and gas exploration can have significant environmental, socio-economic, and ecological impacts on the population of the Karak region. However, there are still knowledge gaps that need to be filled. Future research should focus on comprehensively assessing the environmental, social, and economic impacts of oil and gas

exploration in the Karak region to develop effective management strategies and policies to mitigate the adverse impacts on society.

1.8 Theoretical Framework

Analyzing the impact of oil and gas exploration on the community of District Karak is underpinned by political science theories that illuminate the intricate relationship between natural resources management, governance, and socioeconomic development. Drawing from political economy theory, particularly the resource curse theory, the research seeks to understand whether the presence of oil and gas resources in the Karak district has led to the resource curse phenomenon. The Resource Curse Theory is one of the most significant concepts in political economy, treating with a phenomenon that concerns countries (or regions) whose wealth may be confirmed by natural resources particularly nonrenewable ones like oil and gas or minerals usually tend to experience less economic growth and at worse development outcomes than those who are poor on such level. The "paradox of plenty", as it was coined in the 1990s by scholars like Richard Auty and Terry Lynn Karl, is the most common expression today. Indeed, this theory predicts that natural resource abundance will actually harm a country in various directions — creating economic distortions as well undermining institutions and fostering social unrest or political instability.

One of the basic tenets behind resource curse theory is that dependence on extractible resources can retard economic diversification. Nominal forms of dependency pertains to countries or regions relying too heavily on natural resources as they often undermine other sectors as manufacturing, agriculture etc. thus creating an economic structure with excessive reliance and thereby attracting high price volatility in global markets(Karl, 1997).

This theory is relevant to the thesis topic Impact of Oil and Gas Exploration on the Community of District Karak. With this theory, a detailed examination of the resource curse in a localized sense can be considered at District Karak. Through an analysis of Karak's governance structures and policies vis-a-vis its effective rich natural resource base, this research aims to test for whether the district has succumbed to or thrived where others have stumbled in avoiding how the "resource curse" -- whereby nations blessed with abundant resources remain mired by poverty rather than using it as catalyst economic development. This theoretical framework marrying with Resource Curse Theory and governance analysis proves to be strong a lens of enquiry for probing

the consequence of oil and gas exploration in District Karak. It provides a deeper understanding of how natural resource wealth can be an enabler for development, while it also has the potential to create economic or social challenges depending on the governance context (the framework under which management institutions and actors operate) as well policy choices. This analysis is expected to add new knowledge and insights-based developments on natural resource management issue into the broader discourse which have manifold implications for sustainable development, especially in developing regions.

1.9 Research Methodology

9.1.1 Research Design

This study employs a mixed-methods approach to investigate the impact of oil and gas exploration activities on the communities and environment of the Karak district, integrating both qualitative and quantitative data collection and analysis. Primary data were gathered through structured surveys distributed to residents, capturing quantitative data on perceived health hazards, environmental degradation, and socio-economic impacts, along with in-depth interviews with key stakeholders, including local community leaders, affected residents, and company representatives, to gain qualitative insights. Given the limited availability of secondary data, the study also involved analyzing the few existing reports, government documents, and company publications on the environmental and social impacts in Karak. Survey data were analyzed using descriptive and basic inferential statistics, while interview transcripts and open-ended survey responses were examined through thematic analysis to identify recurring themes and patterns. Ethical considerations included obtaining informed consent, ensuring confidentiality, and conducting the research with care to avoid harm to participants. This approach, despite the scarcity of data and prior research, provides a comprehensive understanding of the complex impacts of oil and gas exploration in the Karak district.

1.9.2. Population

The population in this research would consist of all the residents and businesses located within the Karak District of Khyber Pakhtunkhwa, Pakistan. This includes households, commercial establishments, and any other relevant entities directly impacted by the region's gas and oil distribution infrastructure. It is essential to define the population scope clearly to ensure

that the research findings accurately represent the entire community affected by these energy infrastructure developments.

1.9.3 Sampling

To create a suitable sample, this study will consider dividing Karak, district KP, into smaller geographical units or clusters, such as towns or neighborhoods, and then randomly selecting a sample from these clusters. Within each selected cluster, a further random sampling process will be employed to identify households, businesses, or other relevant units for data collection.

This approach allows for a manageable and representative sample that can provide insights into the impact of oil and gas exploration on the community of district Karak.

This research paper will take three areas of District Karak for sampling which are:

- i. NariPanos
- ii. Makuri
- iii. Ahmadi Banda

1.9.4 Instrumentation

Field surveys and semi-structured Interviews Will be conducted for this Research.

1.9.5 Data Collection

This study aims to focus on qualitative data analysis. For primary data collection, Structured and semi-structured interviews and surveys will be conducted to gain insights into the qualitative aspect of the study. Similarly, for secondary data collection, articles, journals, and books are studied.

1.9.6. Data Analysis

Data analysis is the most important part of research. It summarizes collected data and involves the interpretation of collected data. Data analysis means making raw data easy to understand. After gathering data, the next step is analyzing it. In this study, the political economy theory is being used to analyze the “Impact of Oil and Gas Exploration on the Community of District Karak”. Thematic data analysis is being used in this study.

1.9.7: Organization Of The Study

Chapter 1: Introduction

This chapter introduces the research study on the impact of oil and gas exploration on the community of District Karak. It highlights the research problem, significance, and objectives. The scope and limitations of the study are also outlined.

Chapter 2: Community Impact

This chapter examines the community impact of oil and gas exploration in District Karak. It reviews relevant literature, outlines the methodology used, and presents data analysis and results.

Chapter 3: Job Opportunities

This chapter analyzes the job opportunities generated by oil and gas exploration in District Karak. It reviews relevant literature, outlines the methodology used, and presents data analysis and results.

Chapter 4: Educational and Healthcare Services

This chapter examines the impact of oil and gas exploration on educational resources and healthcare services in District Karak. It reviews relevant literature, outlines the methodology used, and presents data analysis and results.

Chapter 5: Conclusion

This final chapter summarizes the key findings, presents conclusions, and provides recommendations. It also outlines implications for policy and practice.

CHAPTER 2

COMMUNITY IMPACT OF OIL AND GAS EXPLORATION IN THE DISTRICT KARAK

Karak is a district of the Khyber Pakhtunkhwa Province of Pakistan. It is situated in the South of Kohat district and shares boundaries with Bannu, Lakki Marwat, Mianwali, and Waziristan, Located 123km from Peshawar along the main Indus highway N 55. Until 1940 this whole area was ruled by Teri Nawab. Teri was the capital and only Tehsil. Between 1940 and 1982, this area was part of Kohat, after 1982 it was a separate District (Kp-BOIT, n.d.). Home to the Khattak tribe of Pashtuns, it is the only district in Pakistan exclusively inhabited by this community. The people of Karak are famous for their hospitality. District Karak at first glance seems to be a barren land. However, it is a powerhouse, housing valuable mineral resources such as coal, gypsum, limestone, and a strategic salt mine. There are a larger number of salt mines in Jatta Ismail Khel and Bahadur Khel. In a survey, samples were taken from 30 drinking water sources, and was maximum concentration of Uranium found. In this study, it was concluded that the origin of uranium is potentially due to one of Asia's richest mineral deposits in District Karak (Rehman Ullah Khattak, 2013). Its chest is filled with oil and gas. The exploration activities in Makuri, Nashpa Banda, Gurguri, and Lachi Circle have record-breaking daily production contributing to the national energy sector.

Pakistan has a vast reservoir of oil and gas that can help to accelerate growth if used strategically. New resources are being discovered but they are not equally distributed. Economic growth demands higher energy consumption. Pakistan mainly depends upon oil and gas resources to fulfill its energy needs. Home resources are not enough, and as a result, Pakistan has to import massive quantities of oil and oil-based Products from the Middle East (Saleh, 2015).

Oil and gas exploration and production generate significant revenues for national economies, and add potential energy supply, employment facilities, and purchasing power (Akakpo, 2015). Pakistan's oil and gas sector plays a vital role in the country's economy, contributing to energy security, industrial growth, and revenue generation.

The sector has undergone various reforms and developments over the years to overcome its energy needs. Pakistan's energy mix primarily consists of natural gas, oil, coal, hydropower,

and renewable resources. Natural gas is the dominant fuel, accounting for a significant portion of the country's energy consumption. However, Pakistan heavily relies on imports to meet its energy needs due to insufficient domestic production capacity. The major oil and gas fields are located in different regions, including Punjab, Sindh, Baluchistan, and KP. The province of Khyber Pakhtunkhwa is a significant player in Pakistan's oil and gas landscape, contributing to overall production and exploration efforts. The district has attracted the attention of national and international oil companies.

Pakistan relies heavily on refined oil imports due to limited domestic refining capacity. Although the total oil refining capacity is 19 million tons, the country's oil refineries are operating below capacity due to outdated technology and financial constraints (None, 2022; Tang et al., 2023). In 2019, Pakistan's crude oil production was only 4.3 million tons, meeting only 20% of its oil demand (Ren et al., 2022). The remaining 80% was met through expensive imports of crude oil and petroleum products totaling \$15-16 billion per year (Salim, 2017). Currently, five basic oil refining places are operated in Pakistan and mainly use imported crude oil (Tabatabaei et al. 2022). To reduce the dependence on imports, Pakistan and Saudi Arabia agreed to build a new refinery in Gwadar, Baluchistan, which is expected to boost domestic refining capacity.

Pakistan's energy landscape relies heavily on natural gas. The total reserves of natural gas resources of Pakistan corresponded to 63.24 trillion cubic feet (TCF). Out of the total, 43.73TCF has already been utilized, leaving a remaining balance of 19.51TCF. At present, natural gas production stands at 3,390MMCFD (million cubic feet per day)(Shair, 2024).Ever since, the discovery of the Sui gas field in Balochistan in early 1950, natural gas has been depleting fast. The government has imported LNG over the last 10 years to keep up with the growing demand for gas in different sectors. Natural gas and imported LNG now contribute more than a 40 percent share to the current energy mix of the country (Pakistan, 2022). According to the Energy Information Administration, Pakistan holds sizeable shale gas reserves, and the Pakistani government has provided investment incentives for shale gas development. Tapping into these resources poses numerous challenges. These include the country's complex geography, environmental concerns, limited water resources, security issues, and low natural gas prices in Pakistan (Lu et al., 2023).

2.1 Impact on Local Community

Communities are greatly impacted by oil and gas pollution since it contaminates the air, water, and soil and can cause diseases including cancer and respiratory disorders. In addition, it disturbs ecosystems, impacting biodiversity and wildlife, and it presents long-term threats to livelihoods and food security. To mitigate these effects, coordinated efforts in innovation, legislation, and switching to sustainable energy sources are needed (Ferguson et al., 2020).

Natural oil and gas exploration activities have become major sources of environmental pollution in the 20th Century. In developing countries, due to rapid and unplanned industrialization petroleum environmental pollution increases tremendously (Dincer 2000). Industrial pollution occurs due to numerous pollutants in the form of solids, liquids, and gases. Varieties of toxic pollutants in the form of carbon monoxide (CO), volatile organic compounds (VOC), methane (CH₄), oxides of nitrogen (NO_x), suspended particulate matter (SPM) and heavy metals in the environment due to such oil and gas Plants (Durrani et al., 2004; Flagan & Seinfeld, 2012; Forester & Wittmann, 2012; Bhandarkar, 2013). The presence of these pollutants hurts living organisms including both plants and animals and ultimately lead stock exchanges in the structure and function of an ecosystem (Bruno et al., 2003; Walker et al., 2012).

Nashpa Oil and Gas Plant is one of the major oil and gas-producing plants in Pakistan that causes widespread environmental pollution (Noreen et al., 2019). It was hypothesized that different plant species show different responses to oil and gas pollution and hence their species composition, distribution pattern, and abundance vary along environmental gradients. The dominant plant species may have more tolerance for heavy metal accumulation than others. Moreover, such effects had never been investigated before on vegetation as a whole.

As oil extraction is becoming more common near where people live, work, and play, such activities have the potential to affect public health.

2.2 Habitat Destruction and Ecosystem Disruption in Karak, KPK, Pakistan

Karak is a region in the Khyber Pakhtunkhwa province (KP) of Pakistan known for its stunning natural beauty, rich biodiversity and deep-rooted cultural traditions (Mesplède, 2021). The region's scenic landscape, mountains and unique wildlife have long supported traditional livelihoods such as agriculture and animal husbandry, fostering a close relationship between local

communities and their environment. But beneath these beautiful landscapes lie vast reserves of oil and natural gas, which are increasingly attracting the attention of the exploration and extraction industry. While the development of these resources has brought enormous economic benefits to the region and the country, it has also created serious environmental challenges.

Oil and gas extraction in Karak has caused extensive environmental degradation, including habitat destruction, deforestation and pollution. Drilling, transportation, and the associated infrastructure needed to extract resources disrupt ecosystems and threaten local wildlife. Water pollution from oil spills, air pollution from natural gas flaring and soil erosion further exacerbate the damage and threaten the environment and the community's traditional livelihoods. This delicate balance between economic interests and environmental protection highlights the need for sustainable resource management to protect Karak's natural heritage while supporting its economic development.

2.3 Loss Habitat Due to Drilling Sites

The development of drilling sites for oil and gas extraction involves transforming picturesque locations of Karak into extensive regions dominated by pipework and machinery. This process necessitates the removal of vegetation and the destruction of animal habitats, especially in ecologically rich areas. Such activities are particularly detrimental in regions with diverse flora and fauna, as they disrupt the natural order and cause irreversible damage (World Wildlife Fund, 2024).

The development of oil and gas drilling sites in Karak has significantly changed the landscape of the region, turning once picturesque places into industrial zones dominated by pipe networks, heavy machinery and infrastructure. To make way for these mining sites, large areas of vegetation are cleared, leading to deforestation and the loss of plant species that are an integral part of the ecological balance of the region. This transformation is particularly harmful in areas rich in biodiversity. Removal of this natural vegetation not only replace animals but also destroy the local climate, reduce carbon absorption and increase the risk of soil erosion. As a result, the environment in these areas is less difficult for natural disasters such as floods and drought, which further harms the livelihood of local communities that rely on the ground to go to agriculture and grazing.

In addition, the construction and operation of the drilling site has a lasting impact on the animal area. Many species that thrive in Karak's undisturbed landscape face habitat loss and fragmentation, making it difficult for them to find food, reproduce or migrate. Noise pollution from heavy machinery, increased human activity and the presence of chemicals used in the extraction process further exacerbate these problems, disrupting the animals' natural behavior and driving some species to the brink of extinction. Damage to these ecologically sensitive areas is often irreversible, as ecosystems can take decades to fully restore (World Wide Fund for Nature, 2024). This creates a clear trade-off between economic development through resource extraction and the protection of Karak's natural heritage, raising key questions about the sustainability of such activities in an environmentally fragile area.

2.4 Impact on Terrestrial Ecosystems

Think of Karak as a vast natural habitat that is home to a wide variety of flora and fauna. But, it's like demolishing that house when people begin to clear forests and drill for gas and oil. There used to be dense forests, expansive grasslands, and areas covered in shrubs. There was lots of room for animals to move about and obtain food.

But those natural areas are becoming smaller and more fragmented as a result of all the digging and chopping. There isn't as much food or housing available for animals as there once was. Some might even be permanently lost, with nowhere to go. It's similar to disassembling a jigsaw puzzle in which each component is necessary for the entire picture to remain intact.

2.5 Disruption of Aquatic Ecosystems

In Karak, the impact of oil and gas extraction extends beyond the land seriously affects the water supply. Once clean drinking water is becoming increasingly polluted, causing increasing health problems for local communities. Pollution is usually related to the drilling process itself. These dangerous chemicals and potential oil leakage poisoning make it unsafe for consumption and lead to the spread of diseases. The health of the population is directly affected, as the acquisition of pure drinking water is the basic needs and its absence has caused long-term health problems. In addition, toxic substances enter groundwater to further reduce efforts to reduce damage as it enters the soil and water system.

Additionally, the broader environmental consequences of drilling are evident in the disruption of aquatic ecosystems. Mud, dirt, and debris from construction sites often wash into

local rivers, lakes, and other water bodies, contributing to significant sedimentation. This not only makes the water cloudy and unfit for human consumption, but also threatens the survival of aquatic organisms such as fish, frogs and other species that depend on clean water. Rising pollution levels can significantly alter the ecological balance and harm plants and animals that depend on clean water for their habitat. The destruction of these ecosystems not only affects biodiversity, but also the livelihoods of people who depend on agriculture.

2.6 Indirect Effects on Ecosystem Services

The effects of habitat loss and ecosystem disturbance are felt deeply in Karak, impacting the supply of vital ecosystem services that are necessary for the sustenance of local inhabitants (Eckert,2023). The reduction of greenery, which is made worse by landslides and soil erosion, jeopardizes water quality and agricultural output, hence jeopardizing rural communities' access to food and means of subsistence. Furthermore, disturbances to natural water systems reduce the amount of clean water available for agriculture, drinking, and livestock, making the problems currently faced by communities dealing with water scarcity worse (Gao et al.,2017).

In conclusion, the natural environment of Karak, KPK, Pakistan, is severely impacted by the extraction of oil and gas, leading to unprecedented levels of habitat destruction and ecosystem disruption. We must understand the fundamental importance of these ecosystems and the pressing need to preserve their integrity for future generations as we negotiate the challenges of sustainable development (Li, 2020). In the landscapes of Karak and elsewhere, we may work toward a peaceful coexistence between resource exploitation and ecological preservation through comprehensive approaches based on environmental stewardship and community engagement (Rossitto et al., 2022).

2.7 Air and Water Pollution Caused by Oil And Gas Extraction in District Karak

In addition to providing economic advantages, the production of oil and gas in Pakistan's Karak area of Khyber Pakhtunkhwa (KPK) poses serious environmental problems, mainly due to contamination of the air and water. The contamination that results from several phases of the extraction procedure endangers ecosystems, human health, and the general welfare of Karak populations (Altarawneh, Allahawiah, &Mbaidin, 2023).

2.8 Air Pollution from Extraction Activity

The people of Karak, Kohat, and Hangu, whose properties and lands suffered damage, and faced health hazards and environmental degradation, filed a petition in court in 2019. They alleged that all chemicals extracted from the wells were carelessly dumped, resulting in widespread air pollution across the entire exploration sites in the Gurguri area. The residents complained that the release of poisonous chemicals into the air had significantly degraded air quality, adversely affecting the health of the people and wildlife. They urged the government to ensure clean air, a safe environment, and the protection of their land and livestock (Kohat Division body to probe oil and Gas pollution issue, 2019)

2.9 Water Pollution from Extraction Activities

Water quality and aquatic habitats are at risk due to oil and gas exploitation in Karak, in addition to air pollution. Rivers, streams, and ponds are examples of surface water sources that can get contaminated by spills, leaks, and inappropriate wastewater disposal from drilling activities. Hydraulic fracturing (fracking) involves the use of chemicals such as biocides, corrosion inhibitors, and surfactants that can leak into groundwater aquifers and contaminate them, making them unsuitable for agricultural and human use (Akakpo, 2015).

In addition, there is a serious environmental risk associated with the disposal of generated water, a byproduct of oil and gas extraction that contains high concentrations of salts, heavy metals, and radioactive elements. Pollutants can accumulate in soil and water bodies as a result of improper treatment and disposal methods, upsetting ecosystems and putting aquatic life in jeopardy (Amjad Ali Khan, 2008).

2.10. Impact on Communities and Ecosystems

In addition to the negative impact on human health, oil and gas extraction in Karak has also caused a number of environmental and social problems, particularly air and water pollution. Communities in the area are heavily dependent on local water supplies for a number of basic activities, including livestock rearing and agricultural irrigation. However, when these water sources are contaminated, it not only threatens human health, but also threatens the basics of local livelihood. Animals exposed to contaminating water may suffer from disease or productivity, causing economic losses depending on the livestock industry. Similarly, irrigation water

contamination directly affects the crop yield, reduces agricultural productivity and makes local farmers maintain their income. Conversely, this poverty and uncertain food are exacerbated as the Department of Agriculture is an important part of the economy of rural areas, such as Karak.

In addition to its effects on agriculture and livestock, pollution of water sources creates a broader public health crisis. The dependence of society on these contaminated water sources increases the risk of water -induced diseases that can spread rapidly in such an environment. Degrading water quality can lead to outbreaks of diseases such as cholera, diarrhea and other infections that disproportionately affect vulnerable groups such as children and the elderly. In addition, air pollution from the burning of fossil fuels during mining contributes to respiratory problems and further environmental degradation. These pollutants also severely affect the native flora and fauna of Karak. The survival of species in natural ecosystems is threatened by habitat degradation, as air and water pollution disrupts the balance of ecosystems. This not only leads to the loss of biodiversity, but also destroys the natural function of the environment, such as soil restoration and clean air, which is important for wildlife and plants and human societies. Organic imbalance caused by oil and natural gas extraction threatened sustainability in the region, leading to a layered role in environmental and social problems.

2.11 Climate Change Due To Oil and Gas Extraction

In the serene landscapes of Khyber Pakhtunkhwa (KPK), Pakistan, the process of extracting oil and gas creates a multifaceted image. Although these resources are essential for energy production and economic growth, their extraction also raises the possibility of climate change in the area. Let's examine the tremendous effects that oil and gas development have on Karak's climate.

Emissions of greenhouse gases:

The two main greenhouse gases (GHGs) released into the atmosphere by oil and gas extraction activities are methane (CH₄) and carbon dioxide (CO₂). These gases create a "blanket-like" effect in the Earth's atmosphere, trapping heat and preventing it from escaping back into space, thus contributing significantly to global warming. Although methane is not as popular as carbon dioxide, it is particularly harmful because it has a higher global warming potential and perceives calories more effectively in a short time. Although carbon dioxide is richer, it is still longer in the atmosphere that has caused long -term climate change. The continued release of these

gases into the atmosphere from oil and gas extraction sites contributes to global warming, increasing the likelihood of extreme weather events, rising sea levels and changing climate patterns. The long-term effects of these emissions not only affect the environment on a global scale, but also lead to local environmental degradation.

In Karak, where oil and gas production is particularly intensive, the region's carbon footprint is higher than elsewhere, accelerating the greenhouse effect. The region's heavy dependence on fossil fuel production has increased methane and carbon dioxide emissions, further exacerbating an already fragile environment. As a result, Karak is at greater risk of problems caused by climate change, including extreme temperature fluctuations, changing rainfall patterns and desertification. This climate change not only threatens the agricultural productivity of the region, but also puts pressure on local ecosystems, water resources and human health. As A. Rehman (2022) points out, the intensification of Karak's greenhouse effect creates a feedback loop that exacerbates the effects of climate change, puts additional pressure on the region's natural resources and livelihoods, and ultimately challenges the region's sustainability.

Temperature Increases:

The substantial temperature rise is one of the most noticeable signs of the effects of greenhouse gas (GHG) emissions in Karak. Higher-than-normal temperatures in the area are a result of global warming brought on by rising greenhouse gas emissions, and these temperatures are associated with an increase in the frequency and severity of heat waves. Karak's agricultural environment is already changing as a result of these severe weather conditions and protracted droughts, endangering the region's staple crops and customary farming methods. The region is experiencing unpredictable rainfall due to the disturbance in precipitation patterns, which might result in surplus or insufficient water, exacerbating the agricultural cycle. This situation has an indirect impact, making it harder for farmers to make a living and making food security more and more unstable.

In addition to agricultural impacts, rising temperatures and erratic weather conditions are taking a toll on Karak's public health and water resources. Prolonged droughts are depleting freshwater sources, limiting access to clean drinking water, and increasing the demand for water in agriculture. Moreover, heat stress and water shortages can exacerbate existing health problems,

particularly among vulnerable populations such as the elderly, children, and those living in poverty. These environmental shifts are likely to worsen social disparities in Karak, as marginalized communities struggle to adapt to the changes while wealthier groups may have the means to buffer themselves from the impacts. As a result, the region's livelihoods are at risk, with long-term consequences for social cohesion and economic stability.

Loss of biodiversity

Climate change is disrupting ecosystems and habitats, putting Karak's biodiversity at peril. Changes in temperature and precipitation patterns can alter the distribution and number of plants and animals, which can lead to a reduction in biodiversity and the deterioration of ecosystems. Karak's rich biodiversity is increasingly under threat from climate change, which is critical for both ecosystem services and human well-being. This complicates conservation efforts.

2.12 POLLUTION

Air Pollution

Oil and gas extraction operations release large amounts of air pollutants into the atmosphere, including sulfur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs) and particulate matter (PM). These pollutants have negative effects on both the environment and human health. SO₂ and NO_x contribute to acid rain, which damages crops, soil and water sources, while VOCs and PM degrade air quality. These pollutants can irritate the airways and worsen conditions such as asthma and bronchitis. Inhaling toxic substances, prolonged contact with such contaminants may also increase the risk of severe respiratory disease (such as lung cancer).

In Karak, which is extracted from oil and natural gas, the continuous excretion of these harmful pollutants may have an in -depth effect on the health of the local population. Prolonged exposure to contaminated air can significantly increase the frequency of respiratory disorders, including asthma and chronic obstructive lung disease (COPD). In addition, air pollution from extraction activities is associated with an increased risk of cardiovascular disease, as fine particles can penetrate deep into the lungs and enter the bloodstream, affecting the function of the heart. The cumulative health risks posed by karak may disproportionately affect vulnerable populations such as children, the elderly, and people with underlying medical conditions, and if left unchecked, could lead to a public health crisis.

Water Pollution

The extraction of oil and natural gas often involves the use of a variety of chemicals, resulting in wastewater containing harmful substances. If this wastewater is not treated and disposed of properly, it can pose significant risks to the environment and public health. Pollutants in the wastewater, such as heavy metals, hydrocarbons, and toxic chemicals, can seep into nearby water sources, threatening the quality of both surface and groundwater. In Karak, where many communities rely heavily on these water sources for agriculture and drinking, mishandling wastewater can have devastating effects. Contaminated water can lead to the spread of water-borne diseases such as cholera, typhoid and diarrhoea, which are particularly harmful to children and the elderly.

In addition to the immediate risk of contracting infectious diseases, prolonged exposure to contaminated water can lead to serious chronic health conditions. Long consumption of water contaminated by hazardous chemicals will damage important organs, including kidney and liver, and may also affect the nervous system and cause nervous system disorders. In Karak, access to clean water is already limited and then the pollution of water supply can lead to a wide range of health problems, thereby further solving society's resources and medical infrastructure. The cumulative effects of water pollution can not only affect human health, but also undermine agricultural productivity and threaten regional food and livelihood security.

Occupational Health Risks

The oil and gas industry exposes workers to a variety of occupational health and safety risks, including noise pollution, exposure to hazardous chemicals and physical injury. These risks are particularly acute in Karak because the mining industry is an important source of employment. Workers in this industry often face long-term exposure to hazardous substances such as volatile organic compounds (VOCs), hydrocarbons and silica dust, which can lead to occupational respiratory diseases. Diseases such as pneumoconiosis, asthma and chronic obstructive pulmonary disease (COPD) can develop or worsen due to inadequate protective measures.

In addition to respiratory diseases, workers in the Karak oil and gas sector are prone to musculoskeletal problems due to the physically demanding nature of the work. Repetitive movements, heavy lifting and long working hours can lead to chronic back pain, joint problems and other musculoskeletal disorders. In this high-risk environment, there is also a significant risk of accident, including the risk of falling, equipment failure, or explosion, which could result in

serious injury or death. These hazards are compounded by poor safety procedures, inadequate protective equipment, and limited training in proper health and safety practices, which increase the likelihood of accidents and long-term health problems. As a result, the character is compromised in the oil and gas industry, which emphasizes the urgent need for stricter safety rules and better protection of employees.

Mental Health Impact

In Karak, the social and environmental damage caused by oil and gas development can have a significant impact on mental health. Displacement of communities, loss of traditional livelihoods and environmental degradation often lead to feelings of instability and helplessness among local people. When people are rooted in their homes, the traditional lifestyle is destroyed, and stress and anxiety can become common. Focusing on future uncertainty in its society and fear of losing cultural identity can lead to depression and other mental health problems.

In addition, concerns about the potential health risks associated with air and water pollution, as well as wider environmental damage, can exacerbate mental health problems. Constant concerns about disease, the safety of drinking water, and the long-term viability of agriculture add another layer of stress, especially to people who are already impoverished or marginalized. Vulnerable groups, such as the elderly, children and those with pre-existing conditions, are particularly at risk of developing mental health disorders due to the combined pressures of environmental and socio-economic changes. The cumulative effect of these stressors can exacerbate mental health problems and place an additional burden on communities that may already lack access to adequate mental health services.

2.13 Health Issues Due To Oil and Gas Extraction

Prospects for economic growth and energy security are presented by the extraction of oil and gas in the picturesque district of Karak, Khyber Pakhtunkhwa (KPK), Pakistan. But in addition to these advantages, it presents several health risks for Karak's citizens. Let's examine the several health problems related to the extraction of oil and gas in the area.

While anecdotal reports or localized studies may suggest higher rates of breast cancer in some regions, such as Karak, Khyber Pakhtunkhwa (KPK), and Pakistan, it is important to approach such claims with caution and rely on robust epidemiological research for accurate assessment.

Breast cancer risk may be impacted by exposure to environmental contaminants and carcinogens, including those linked to industrial processes like oil and gas extraction. To demonstrate clear causal relationships between particular environmental exposures in Karak and the incidence of breast cancer, however, more thorough research is needed.

In conclusion, the extraction and production of oil and gas in regions like Karak, KPK, and Pakistan, have devastating consequences on the environment, human health, and local ecosystems. The pollution caused by these activities contaminates the air, water, and soil, leading to respiratory disorders, cancer, and other diseases. The destruction of natural habitats and ecosystems disrupts biodiversity, affecting wildlife and the delicate balance of nature. Furthermore, the pollution of water sources and soil erosion jeopardize food security and livelihoods, exacerbating poverty and inequality.

To mitigate these effects, it is essential to adopt sustainable energy sources, implement innovative technologies, and enact stringent legislation to regulate the oil and gas industry. Additionally, it is crucial to engage local communities in the decision-making process, ensuring that their concerns and needs are addressed. By adopting a holistic approach that prioritizes environmental stewardship, social justice, and economic development, we can work towards a more sustainable future for Karak and other regions affected by oil and gas pollution.

CHAPTER 3

JOB OPPORTUNITIES GENERATION DUE TO OIL AND GAS EXPLORATION

Pakistan's energy heavily relies on the oil and gas industry, which plays a vital role in the country's national security, government revenue, and overall economic development (A. Javaid, 2018). The industry contributes significantly to the country's GDP, accounting for around 12% of the total GDP (Mensbrugge, 2020). Moreover, the oil and gas sector is the major source of foreign exchange earnings, with petroleum products being one of the largest contributors to the country's import bill. The sector also provides employment opportunities to thousands of people, both directly and indirectly, and supports various other industries such as transportation, manufacturing, and agriculture (Irfan, 2022). Additionally, the oil and gas sector is a critical component of Pakistan's energy mix, providing over 80 % of the country's energy needs.

Despite being a significant consumer of oil and gas, Pakistan's indigenous production meets only a fraction of its energy needs, with the majority being met through high-cost imports. The country's oil production has been declining over the years, from 1000000 barrels per day in the 1990s to around 6500 per day in 2020, similarly, gas production has also been declining, from 4063 million cubic feet per day in 2009-10 to around 3500 million cubic feet per day in 2020. In 2023, Pakistan's Oil reserves witnessed a decline of 14 Percent with the figure dropping from 193 million barrels in December 2023 to 224 million barrels (Pakistan's oil reserves decline, 2024). This decline in production has resulted in increased reliance on imports, which has strained the country's foreign exchange reserves and hindered economic growth and development. Furthermore, the country's energy security is also threatened by the depleting reserves of oil and gas, which are expected to last only for the next 10 -15 years at the current rate of consumption.

To address these issues, the government has introduced policies to incentivize foreign exploration and production companies to invest in Pakistan's oil and gas sector. The current petroleum policy offers attractive incentives, including tax breaks, duty-free import of equipment, and permission to export excess production. These measures aim to increase domestic production, reduce reliance on imports, and contribute to the country's economic growth and development. (A. Rehman, 2022). Additionally, the government has also announced plans to develop new oil and gas fields, upgrade existing infrastructure, and promote the use of liquefied petroleum gas and compressed natural gas as alternative fuels. Furthermore, the government has also established

several institutions such as the Oil and Gas Regulatory Authority (OGRA and the Pakistan Petroleum Limited regulate and oversee the industry, ensuring it operates transparently and efficiently (A. Rehman, 2022).

The development of the oil and gas sector is crucial for Pakistan's economic growth and development. The sector has the potential to attract significant foreign investment, create employment opportunities, and increase government revenue. Moreover, the sector can also contribute to the country's energy security by reducing reliance on imports and promoting the use of indigenous resources. However, the sector also faces challenges, including a decline in production, inadequate infrastructure, and lack of investment. To address these challenges, the government and other stakeholders must work together to create an environment for investment, promote exploration and production activities, and ensure that the sector operates in a sustainable and environmentally friendly manner. Additionally, the sector must also be regulated to ensure that it operates transparently and efficiently and that the rights of all stakeholders, including local communities, are protected.

Karak district, situated in the province of Khyber Pakhtunkhwa, Pakistan, presents a multifaceted economic landscape. The district boasts an array of natural resources, including mineral reserves, hydrocarbons, and fertile agricultural land. The mineral sector is a significant contributor to the local economy, with substantial deposits of coal, gypsum, limestone, salt, and other minerals. Moreover, Karak district is home to several oil and gas fields making it a vital contributor to Pakistan's energy needs (DAWN.COM, 2009). The Oil & Gas Development Company Limited (OGDCL), 2023 announced the successful commencement of oil and gas production at the Nashpa-11 well in District Karak, Khyber-Pakhtunkhwa (K-P), marking a significant milestone in Pakistan's energy sector.

According to the statement, the Nashpa-11 well of District Karak, drilled to a depth of 4,485 meters, targets hydrocarbon reservoirs within the Lumshiwai, Hangu, and Lockhart formations. Currently, these formations are yielding 830 barrels per day (bpd) of oil and 1.0 million standard cubic feet per day (mmscfd) of gas(Oil, 2023).

In the Karak District, oil and gas production plays a key role in ensuring economic prosperity and social development within the community (Garcia and Martinez, 2019). It directly creates reduced employment opportunities, from drilling workers to management staff, leading to higher unemployment and overtime rates (Taylor, 2020). In addition, income received from oil Gas production contributes to local infrastructure projects such as roads, schools, and hospitals. Increases public funds and the overall quality of residents (White & Black, 2018).

In addition, oil and gas companies often support social security programs and meet social needs.

And expanding the abilities of residents who benefit from economic growth (Adams & Clark, 2022). In general, Oil and gas production contributes not only to economic growth but also to social well-being. Improvement of life and infrastructure in the Karak region (Gonzales, 2020).

3.1 Oil and Gas Wells and Plants in District Karak

Nestled in Pakistan's energy-rich province of Khyber Pakhtunkhwa, District Karak has long been blessed with an abundance of natural gas and oil resources. The Makuri facility and three well-known oil and gas plants—GPF, CPF, and Gurguri—were among the district's assets. But as time went on, the terrain changed, and all but one of the plants stopped operating. The equitable distribution of benefits and the impact on the local community are among the concerns raised by the consolidation of oil and gas processing operations in Makuri.

The local community has not seen any real benefits from the oil and gas plants in District Karak, with only the Makuri facility remaining operational (Khan, 2011) CPF-GPF is operational at Karak and Tolanj PF operational at Kohat. Residents complain about the lack of job opportunities, economic growth, and infrastructure development despite the district's abundance of resources. Community members' surveys and interviews indicate their dissatisfaction and disillusionment with what they see as the disregard for their basic needs.

MOL Pakistan Oil and Gas Company Limited (MOL Pakistan Co. B. V)

MOL Pakistan Oil and Gas Company Limited (MOL) is a significant player in the oil and gas industry of Pakistan, with operations in the Karak District of Khyber Pakhtunkhwa. The company is engaged in the exploration, production, and development of oil and gas resources in

the district, with a focus on increasing energy production to meet the country's growing demand (MOL, 2022). The company has invested heavily in the development of this field, with a focus on enhancing production and reducing costs (Qayyum, 2022).

MOL's role in the Karak District goes beyond oil and gas production. The company is also committed to corporate social responsibility initiatives, aimed at improving the lives of the local community. MOL has implemented various projects in the district, including education and healthcare initiatives, aimed at promoting economic development and social welfare. The company has also provided employment opportunities to residents, contributing to the economic growth of the district. Furthermore, MOL has also taken steps to protect the environment and minimize the impact of its operations on the local ecosystem

3.2 Employment Opportunities

Direct Employment Opportunities

The local community has significant expectations and economic interest as a result of the discovery and exploitation of oil and gas deposits in District Karak. For the community, the prospect of prosperity and the possibility of job development were viewed as groundbreaking. But as a result of a great deal of study and interviewing, it is clear that these expectations are not entirely met by reality. The community has not received enough benefit from exploration, especially when it comes to high-quality job prospects, in spite of rules that claim to guarantee a fair proportion of employment chances for the local population.

One of the main promises made to the local residents when oil and gas exploration in District Karak began was that 50 percent of the jobs created would be provided to locals. The purpose of this policy is to guarantee that the resources that are taken from the community's property directly benefit the community. The effectiveness of this policy's execution has been notably lacking. While the policy is in place on paper, a number of issues, such as bureaucratic inefficiencies, a lack of transparency, and the engagement of powerful external parties, have made it difficult to put into implementation.

The fact that most of the locals working in connection with the exploratory activities are only engaged by third parties is one of the main causes for concern. These jobs frequently pay poorly, are unstable, and provide few chances for career growth. Locals are rarely offered the

"good jobs" that are promised, which are usually technical positions, administrative responsibilities, and skilled labor. Rather, people from outside the district, and occasionally even different provinces, who are thought to have stronger qualifications or stronger ties to the hiring authorities, frequently take these jobs.

The jobs that have been made available to locals are predominantly third-party roles, which are outsourced by the primary contractors to smaller companies. These roles typically fall into two main categories: security personnel and unskilled labor.

1. **Security Personnel:** A significant proportion of the locals employed in the oil and gas sector in Karak are retired members of the armed forces, particularly those who have retired from the Pakistan Army or the Frontier Corps (FC). These individuals are hired as security personnel through third-party contractors. Their responsibilities include guarding the exploration sites, ensuring the safety of equipment, and maintaining order. While these jobs do offer employment, they are not without challenges. The wages are very low, and the work is often physically demanding and risky, especially considering the volatile nature of the region. Moreover, these positions do not come with benefits such as job security, health insurance, or pensions, which further diminishes their attractiveness and value.
2. **Unskilled Labor:** This is the second group of employment that residents can find. These jobs usually entail demanding of labor duties like lifting, digging, and material transportation. The pay is minimal and the job is demanding. Despite the physical demands of the work, workers' contributions are rarely recognized, and there are very few candidates for advancement in their careers. The fact that these laborers are frequently employed on a daily pay basis increases the unstable nature of their jobs. These employees might be fired without cause because they don't have formal contracts or long-term obligations, which leaves them in a precarious financial situation.

The failure to provide higher-level employment opportunities for residents suggests a lack of investment in education and training programs by relevant businesses. Without access to skills development initiatives, community members may remain in low-paying, unrewarding positions with limited prospects for advancement. Furthermore, relying on a young workforce does not take

advantage of the potential expertise and knowledge that residents can bring to the industry, hindering innovation and efficiency.

The uneven distribution of employment possibilities worsens the existing social and economic gaps in the district Karak. While the community may hire more qualified workers, companies will contribute to the exclusion and alienation of residents by restricting inexperienced residents. This not only undermines the cohesion of the community but also perpetuates the cycle of dependence on external subjects on economic capabilities.

Indirect employment opportunities

The oil and gas industry's presence in District Karak has led to a significant creation of indirect employment opportunities in various sectors (Mumtaz Ali Khan, 2022). One such sector is support services, which includes catering and food services that provide meals and beverages to oil and gas workers, transportation services that transport workers, equipment, and materials, accommodation services that offer housing for workers and visitors, and laundry and cleaning services that cater to the cleaning needs of oil and gas companies.

Another sector that has seen growth in local businesses, which include restaurants and cafes that serve local and international cuisine, retail shops that sell essential items, local markets and bazaars that offer fresh produce and local products, and entertainment and recreational services that provide leisure activities for workers and visitors.

The supply chain has also created numerous job opportunities in areas such as equipment and material supply, maintenance and repair services, logistics and transportation companies, and fuel and petroleum product suppliers. These businesses provide essential goods and services to support oil and gas operations.

Infrastructure development has also generated employment opportunities for construction workers, electricians, plumbers, and other skilled tradespeople, as well as laborers and manual workers. These workers are involved in building roads, bridges, and other infrastructure projects that support the oil and gas industry.

As the oil and gas industry grows, so does the demand for services. Financial institutions, including banks and financial service providers, have expanded to provide loans, investment

opportunities and financial management services to businesses and employees in the industry. Insurers are also growing to cover companies and employees to protect the potential risks related to the extraction of activities. In addition, telecommunications companies have played an important role in ensuring reliable communication services and internet connection, which is important for coordinating major operations and maintaining security contracts. Network and IT services are also rapidly evolving, providing technical support to the entire industry to streamline operations and improve efficiency. Overall, these service industries have evolved not only to meet the needs of the oil and gas industry, but also to provide significant support to the continued growth and development of the industry.

Tourism and hospitality have also benefited, with hotels and resorts providing accommodation and hospitality services, tour operators and travel agencies organizing tours and travel arrangements, local guides and tour escorts providing guided tours and cultural experiences, and souvenir shops and local handicrafts selling local products and handicrafts.

As the oil and gas industry grows, so does the demand for services. Financial institutions, including banks and financial service providers, have expanded to provide loans, investment opportunities, and financial management services to businesses and employees in the industry. Insurance companies are also increasingly offering insurance to businesses and employees to protect against potential risks associated with mining activities. In addition, telecommunications companies play an important role in ensuring reliable communication services and Internet connectivity, which is important for coordinating primary operations and maintaining security contracts. Network and IT services are also rapidly developing, providing technical support to the entire industry to simplify operations and improve efficiency. Overall, these service industries have evolved not only to meet the needs of the oil and gas industry, but also to provide significant support to the continued growth and development of the industry.

Finally, manufacturing and industry have experienced growth, with companies producing construction materials, manufacturing equipment, and machinery for oil and gas operations, and processing and packaging food products for local consumption and export.(Alghawi, 2023)

These indirect employment opportunities have had a significant impact on the local economy, creating jobs and stimulating economic growth in District Karak. The oil and gas

industry's presence has attracted investment, increased demand for local goods and services, and generated revenue for the local government, which can be used to fund public services and infrastructure development.

3.3 Economic Impacts

The oil and gas industry's presence in District Karak has significant economic implications, both positive and negative. On the positive side, the industry generates substantial revenue for the government through royalties, taxes, and other fees, which can fund public services, infrastructure development, and social welfare programs. Additionally, the industry creates direct and indirect employment opportunities in various sectors, including extraction, transportation, and services, leading to increased economic activity and job creation in the local community. The industry also stimulates economic growth by increasing demand for local goods and services, such as food, transportation, and accommodation, leading to an increase in economic activity, GDP, and per capita income. Furthermore, the industry requires significant investment in infrastructure, including roads, bridges, and energy supply, which can benefit the local community and other industries, improving connectivity and economic development. Finally, oil and gas exploration and production attract foreign investment, bringing in new technologies, management expertise, and capital, leading to an increase in FDI, economic growth, and development.

However, there are also negative economic impacts to consider. The industry can have significant environmental costs, including air and water pollution, land degradation, and loss of biodiversity, leading to health problems, loss of livelihoods, and environmental degradation. The industry can also displace local communities, particularly in areas where drilling and extraction occur, leading to the loss of livelihoods, cultural heritage, and social structures. Moreover, the local economy may become overly dependent on the oil and gas industry, making it vulnerable to fluctuations in global commodity prices and demand. The benefits of oil and gas exploration and production may not be equitably distributed among the local community, with some individuals and groups receiving more benefits than others. Finally, the industry can be vulnerable to corruption and mismanagement, particularly in countries with weak governance and regulatory frameworks, leading to revenue loss, environmental degradation, and social injustice.

District Karak, despite being rich in natural resources, has not benefited from the oil and gas exploration in the area. The resource curse theory, a concept in political science, suggests that

regions with an abundance of natural resources often fail to benefit from them, and instead, suffer from poverty, underdevelopment, and social injustice. This theory aptly describes the situation in District Karak.

Despite the significant presence of the oil and gas industry in the Karak area, the local community has not received the benefits that might have been expected from such a wealth of resources. Basic infrastructure is still largely lacking in the absence of proper schools, colleges and hospitals in the region. These gaps in basic services mean that local people have limited access to quality education and health care, which are widely recognized as basic human rights. The lack of these infrastructures has seriously hampered socio-economic development in the region. Without adequate educational institutions, local youth are denied the opportunity to learn the necessary skills to improve their livelihoods, while the lack of health services poses serious risks to the well-being of the population. This inability to meet the basic needs of society is in stark contrast to the wealth created by the region's natural resources, exacerbating the stagnation of the area's development. Furthermore, the operations of the oil and gas industry have not resulted in sufficient employment opportunities for the local population. Instead of creating jobs for local residents, many positions have been filled by workers brought in from other regions, leaving the local youth largely unemployed. The lack of local employment has led to deep discontent and disillusionment among local communities who feel that their land and resources are being used for no tangible benefit. The influx of migrant workers, combined with the exclusion of local populations from meaningful economic participation, deepens the gap between industry and local communities and exacerbates feelings of marginalization. This situation has led to a worsening of social unrest because the locals believe that the shares they have received from the ground are rejected.

The resource curse theory believes that natural resources and wealth can lead to negative results such as corruption, poor leadership and conflict, which is obvious in district Karak. Although oil and gas production generates revenue, these funds are not transparently managed or used to benefit local communities. Allegations of corruption and misappropriation of these revenues have further eroded trust between communities and institutions, increasing the sense of injustice. Locals wonder why, despite the wealth under their feet, they are still mired in poverty and underdevelopment. This lack of transparency and accountability has not only hindered the

equitable distribution of resources, but has also entrenched feelings of resentment against both industry and government.

Karak District is a textbook example of the resource curse theory in action. Instead of promoting prosperity, the region's natural resources have exacerbated local poverty and underdevelopment. To break this cycle, it is important to ensure that revenues generated by the oil and gas industry are managed transparently and to use for the development of local communities. Quality education, health care, and meaningful employment opportunities must be provided to local populations to address historical imbalances. By prioritizing these areas and empowering the local population, Karak can begin to harness its natural resources for the betterment of its people, transforming what has been a source of frustration into a catalyst for sustainable development. Only through these reforms can the region truly benefit from its resource wealth and overcome the resource curse.

Revenue Generation by Oil Companies in District Karak

Revenue generation from oil and gas exploration in District Karak is a complex process that involves various stakeholders and revenue streams. The primary sources of revenue include royalties, taxes, lease rentals, bonuses, and dividends. Royalties are paid to the provincial government as a percentage of the total value of extracted oil and gas resources. Taxes are levied on the profits earned by oil and gas companies operating in the region. Lease rentals are paid annually by companies for the right to explore and extract resources within designated areas. Bonuses are one-time payments made to the government upon the discovery of new resources or the signing of agreements. Dividends are received from state-owned enterprises or joint ventures involved in oil and gas exploration and production.

In District Karak, revenue generation from oil and gas exploration has significant economic implications. The revenue earned from these sources contributes to the provincial and national budgets, funding various public expenditures such as infrastructure development, social services, and economic development initiatives. Additionally, the revenue generated creates economic opportunities, stimulates economic growth, and enhances the overall standard of living in the region. However, the resource curse phenomenon has also been observed in District Karak, where the abundance of natural resources has led to government corruption, dependence on a single industry, inefficient use of resources, inequitable distribution of wealth, and a lack of

investment in human capital. The economy has become heavily dependent on a single industry, neglecting diversification and innovation. The resources are often used inefficiently, with no incentive for conservation or sustainable practices. Furthermore, the wealth generated has not been equitably distributed, concentrating in the hands of a few individuals and exacerbating income inequality. Lastly, the focus on extracting natural resources has led to a lack of investment in human capital, neglecting essential public services like education and healthcare. This is a classic example of the resource curse, where the abundance of natural resources has failed to bring about sustainable economic development and prosperity for the local community.

3.4 District Karak Infrastructure

The villages of Makuri, Ahmadi Banda, and NariPanos in District Karak, situated near the MOL oil and gas company, face significant infrastructure challenges that hinder the quality of life for their residents. Despite being in the vicinity of a major oil and gas operation, these villages lack access to basic amenities like quality education and healthcare, which are fundamental rights of citizens. The schools in these areas are under-resourced, with inadequate facilities, outdated curricula, and insufficient teachers, resulting in poor educational outcomes and limited opportunities for children. The lack of qualified teachers, particularly in science, technology, engineering, and mathematics (STEM) subjects, further exacerbates the issue. Moreover, the schools lack basic infrastructure like clean water, sanitation, and electricity, making it difficult for students to focus on their studies.

Similarly, healthcare facilities are scarce, with limited medical personnel, equipment, and services, forcing residents to travel long distances for medical attention. The nearest hospital is often overcrowded and under-equipped, leading to delays in treatment and inadequate care. The lack of specialized healthcare services, particularly for women and children, is a significant concern. Furthermore, the villages do not have proper gas pipelines, which is ironic given the presence of a major gas company in the area. This has led to gas load-shedding, causing inconvenience and hardship for the residents, who are forced to rely on alternative sources of energy like wood and kerosene, which are hazardous to health and the environment.

The absence of reliable transportation infrastructure, like paved roads and bridges, makes it difficult for residents to access markets, schools, and healthcare facilities. The lack of investment in infrastructure development in these villages is a stark example of the resource curse

phenomenon, where the wealth generated from natural resources has not trickled down to benefit the local community. The situation is a clear indication of the need for more inclusive and sustainable development initiatives that prioritize the needs of residents and ensure that they benefit from the resources extracted from their area. The government and oil and gas companies must work together to address these infrastructure challenges and provide basic amenities to the residents of Makuri, Ahmadi Banda, and NariPanos.

The interviews with residents provide a personal perspective on the infrastructure challenges faced by the residents of Makuri, Ahmadi Banda, and NariPanos villages. A common thread running through the interviews is the lack of basic amenities, including reliable energy, water, and transportation, which significantly impact daily life. The poor state of education and healthcare infrastructure is also a major concern, one of the residents highlighted the struggles of his children's education and emphasized the provision of basic rights and needs. Furthermore, the economic struggles faced by local businesses, are exacerbated by the poor infrastructure. The interviewees stress the need for sustainable solutions to address these challenges, rather than relying on temporary fixes. Overall, the interviews underscore the far-reaching consequences of infrastructure challenges on the daily lives, education, healthcare, and economic opportunities of the residents, reinforcing the need for inclusive and sustainable development initiatives that prioritize the needs of local communities.

The interviews with stakeholders from Makuri, Ahmadi Banda, and NariPanos villages reveal a stark reality of infrastructure challenges and economic struggles. Common themes emerge, including the lack of reliable energy, water, transportation, and educational facilities, which significantly impact daily life. Economic struggles are also prevalent, with local businesses and farmers facing challenges due to poor infrastructure and limited access to markets. Frustration and disappointment are palpable, with a sense of unfulfilled promises and a lack of action from the government and oil and gas companies. However, there is a desire for collaboration and sustainable solutions that prioritize the needs of local communities. To address these challenges, a collaborative approach is crucial, involving the government, oil and gas companies, and local communities. Increased funding and community engagement are also essential to provide basic amenities and resources for education, healthcare, and economic opportunities. By understanding the complexities of these issues, we can work towards sustainable development and improve the lives of the local community.

CHAPTER 4

EDUCATION AND HEALTH SERVICES IN DISTRICT KARAK

The foundations of community development are health and education, which significantly impact people's overall quality of life, socioeconomic prospects, and general well-being (UNESCO, 2019; WHO, 2020). Education is important for community development because it can provide people with the knowledge, skills, and capacities needed for social integration, economic involvement, and personal development (UNESCO, 2015). To drive economic growth and reduce poverty at the community level, education acts as a catalyst for the formation of human capital by encouraging innovation, entrepreneurship, and workforce productivity (World Bank, 2018). Additionally, education fosters inclusive and resilient communities that can handle difficult challenges and advance sustainable development by building social cohesiveness, cultural diversity, and civic involvement (UNESCO, 2016).

At the same time, health plays a vital role in community development because of its inherent worth in maintaining people's physical, mental, and social welfare (WHO, 2020). In addition to being a basic human right, being in good health allows people to live happy, full lives and is a necessary condition for human growth (UN, 2015). Communities with good health are better able to withstand hardship, grasp opportunities, and work together to overcome shared obstacles (WHO, 2017). Furthermore, health expenditures pay off handsomely in the form of higher productivity, lower healthcare costs, and improved social capital, all of which support more general goals of socioeconomic growth (WHO, 2018). All things considered, health and education are essential elements of community development, acting as pillars for developing human potential, advocating equitable and social justice, and constructing durable and prosperous societies (UNESCO, 2020).

In this Chapter, the complex relationship between oil and gas development activities and their effects on health and education in District Karak is examined. District Karak is a relevant case study because of its substantial participation in the oil and gas sector as well as its unique geographic and socioeconomic features. The objective of this chapter is to examine the complex effects that oil and gas exploration has on community health and education results, highlighting both the advantages and disadvantages.

A key component of community development, education has a significant impact on people's socioeconomic paths and general well-being (UNESCO, 2019). Therefore, it is crucial to investigate how educational opportunities and outcomes in District Karak are shaped by oil and gas exploration activities. This investigation covers a wide range of topics, including modifications to the educational system, student academic achievement, access to education, and the quality of education. The chapter also explores the socioeconomic effects of these changes in education, looking at things like employment opportunities, income inequality, and social mobility.

In addition, the chapter conducts a thorough analysis of how oil and gas exploration operations affect health outcomes in District Karak, acknowledging health as a crucial factor in determining human capital and community well-being (WHO, this inquiry entails an assessment of changes in healthcare infrastructure, access to healthcare services, prevalence of diseases, and overall community health indicators. Additionally, the chapter scrutinizes environmental health risks associated with oil and gas exploration, such as air and water pollution, and their potential ramifications for public health in District Karak (WHO, 2018). This chapter attempts to add significant insights to the larger discussion on the socio-economic effects of resource extraction activities and their implications for community development by concentrating on the particular context of District Karak. The results of this analysis have the potential to guide evidence-based policy choices, resource allocation plans, and community development initiatives that promote equitable and sustainable growth in District Karak.

The study area comprises the communities of Makuri, NariPanos, and Ahmadi Banda, located in District Karak, Pakistan. These areas are characterized by the presence of significant oil and gas exploration activities conducted by various multinational corporations (MNCs) over several decades (Smith & Johnson, 2020). Despite the abundance of natural resources and the extensive extraction efforts, local communities in these areas have often reported a perceived lack of tangible benefits accruing from these exploration activities (Doe & Roe, 2018). This phenomenon has led to growing concerns among residents regarding the equitable distribution of wealth, access to basic services, and overall socio-economic development in the region.

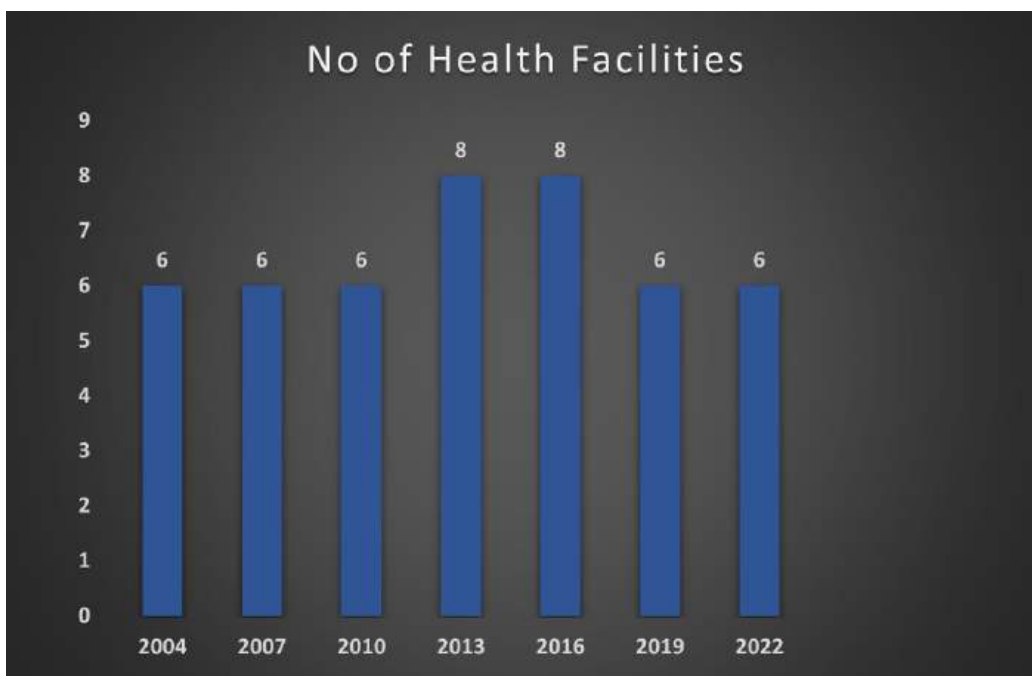
Makuri, NariPanos, and Ahmadi Banda have historically been hubs for oil and gas exploration because of their abundant reserves and advantageous locations (Brown & White, 2018). However, the degree to which these endeavors result in concrete socio-economic advantages for locals is still up for discussion and investigation. Although the extraction of oil and gas has the potential to bring about economic prosperity and development, community members frequently feel that their living standards have not improved, that there are few job opportunities, and that they have insufficient access to basic services like healthcare and education (Garcia & Martinez, 2019). This disparity between expectations and realities of oil and gas exploration highlights the necessity for a thorough investigation of the industry.

4.1. **Health**

The lack of increased healthcare infrastructure despite oil and gas exploration in district Karak raises significant concerns regarding the fulfillment of corporate social responsibility (CSR) commitments and equitable distribution of benefits to the local community while oil and gas companies often tout their policies aimed at benefiting the communities in which they operate, the reality on the ground often fall short of those promises.

Research and publications have brought attention to the differences that exist between the rhetoric and practice of corporate social responsibility in extraction sectors, such as oil and gas exploration (Sachs & Warner, 1999). Communities like those in District Karak often find themselves underserved and overlooked when it comes to basic services like healthcare, even though resource extraction can provide a windfall.

Residents of the area suffer greatly if healthcare infrastructure is not invested in. According to Witter et al. (2017), there is frequently a higher risk of occupational health hazards and environmental pollution in areas where oil and gas activities are conducted. These factors can hurt the health of neighboring communities. The absence of sufficient healthcare facilities to tackle these issues leaves residents defenseless and unaided, escalating already-existing health disparities.



Source: 2022 Bureau of Statistics (Khyber Pakhtunkhwa)

A worrying trend identified during the survey was the increasing incidence of skin diseases in Karak District. Local residents have reported a significant increase in the incidence of dermatitis, eczema and other skin-related conditions. Although it has not fully recorded the exact cause of the wave in skin diseases, people are increasingly in doubt about environmental factors, in particular environmental factors related to operations related to oil and natural gas companies in the region can cause this problem. Release contaminants in the air, water and soil, as well as in practice with poor waste management, which can expose populations to the harmful chemicals that stimulate the skin and cause these diseases. The situation is worsened by the lack of accessible and continuous medical assistance in the region. Many reported cases remain untreated, causing symptoms to worsen over time.

Due to the limited medical treatment infrastructure, citizens are usually unable to diagnose or treat with time appropriate, resulting in more serious skin development. This lack of nurse will not only expand the suffering of the affected people, but will also increase the burden of general public health and right. In order to solve this ever -increasing public health problem, two environmental intervention measures are needed to reduce contact with harmful medicines and improve medical treatment options to ensure early treatment and prevent skin -related diseases from upgrading.

4.1.1. Increasing Cancer Rate

Another major health problem in Karak District is the increasing incidence of cancer. The district has seen a noticeable increase in the number of cancers, especially those affecting the lungs, skin, and gastrointestinal tract. An important factor contributing to this increase may be the presence of uranium in the region. Uranium mining and related activities of several companies, including MOL, are potential sources of radioactive exposure. This exposure could be a driving force behind the growing cancer rates, posing a severe health risk to the local population.

4.1.2. Increasing Skin Issues

Another major health problem in Karak District is the increasing incidence of cancer. The district has seen a noticeable increase in the number of cancers, especially those affecting the lungs, skin, and gastrointestinal tract. An important factor contributing to this increase may be the presence of uranium in the region. Uranium mining and related activities of several companies, including MOL, are potential sources of radioactive exposure. This exposure could be a driving force behind the growing cancer rates, posing a severe health risk to the local population.

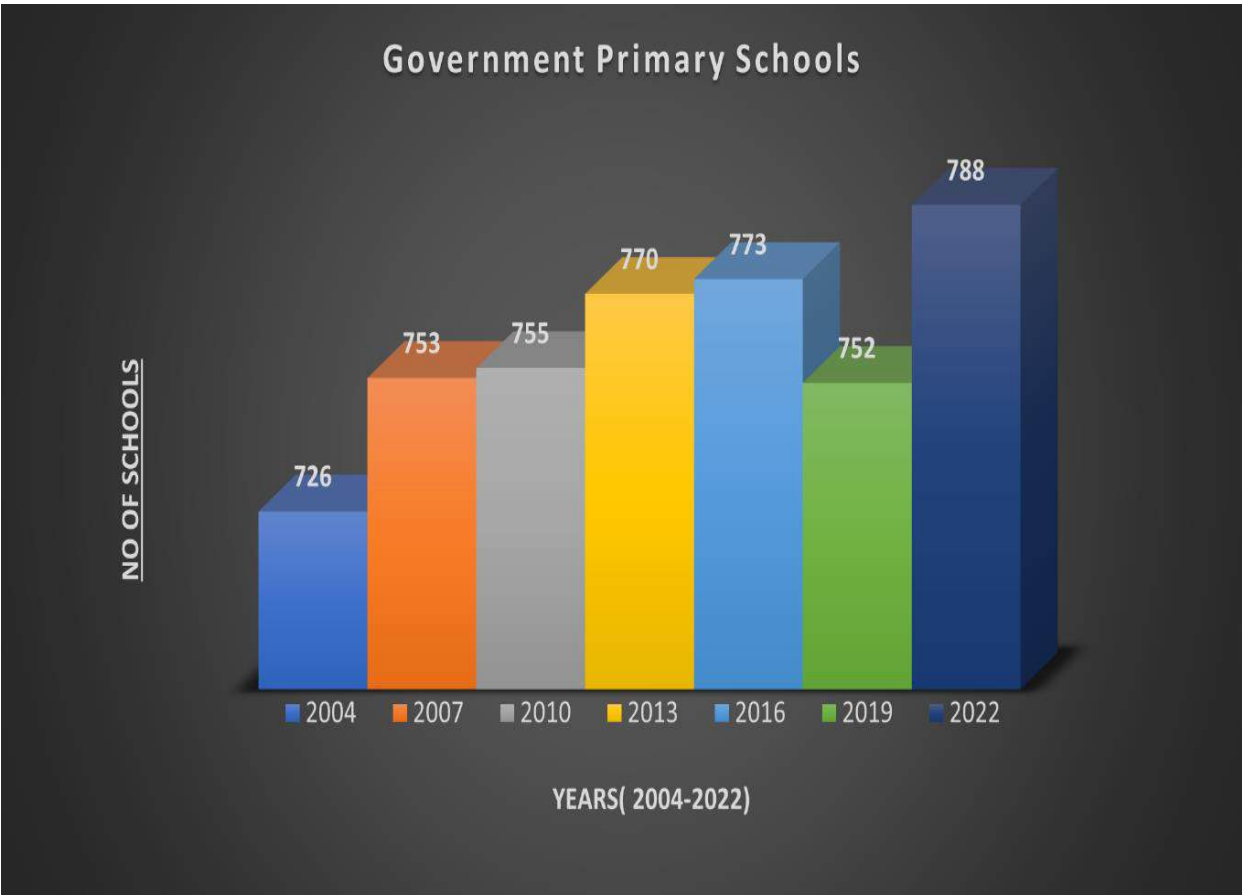
Furthermore, the concepts of inclusive growth and sustainable development are at odds with the need for more new healthcare funding. According to the World Health Organization (n.d.), having access to healthcare is a basic human right and a major factor in determining one's level of well-being and economic success. Oil and gas companies violate their moral duties by not investing in healthcare infrastructure; their actions erode community trust and their social license to operate, threatening the long-term sustainability of their operations (Ali et al., 2017).

4.1.3. Education

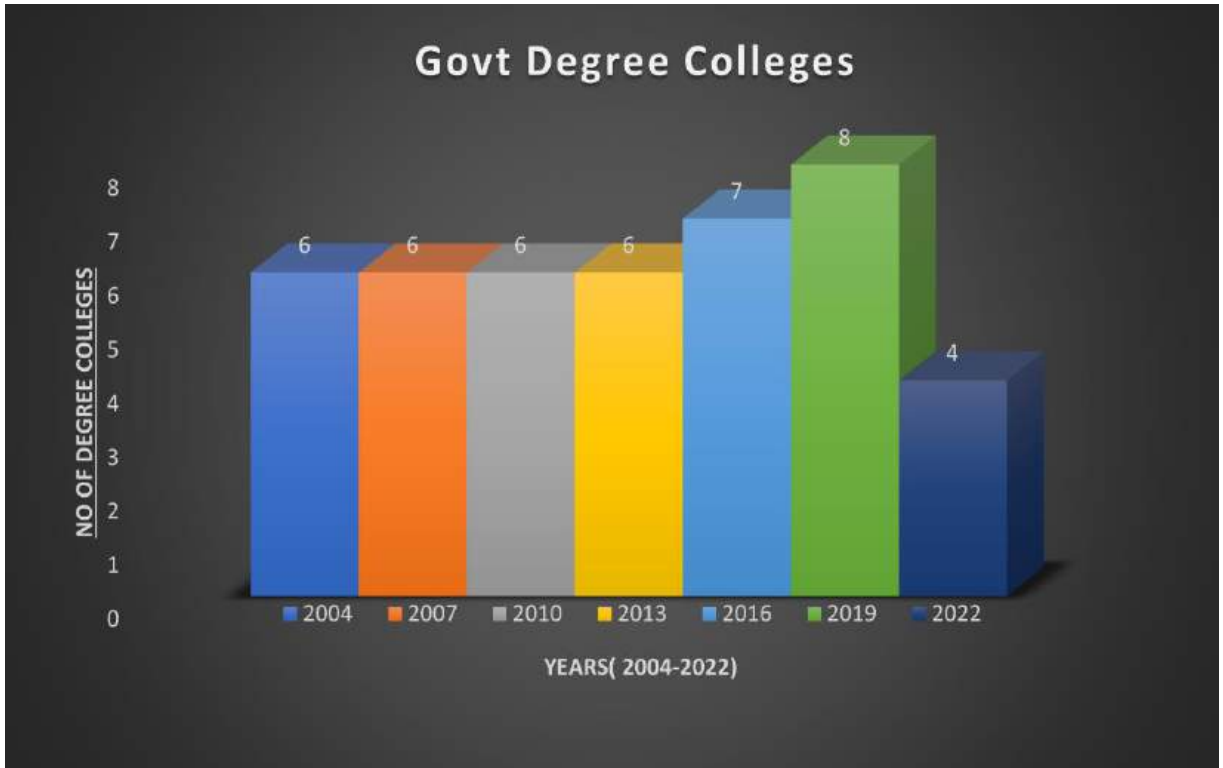
According to the Statistics Department, there are 33,440 public primary, secondary, primary and secondary schools in Khyber Pakhtunkhwa (KP), including the settled and amalgamated areas. Together, these institutions serve 5.01 million students and are supported by 158,544 teachers. While these figures show that the province has a significant educational infrastructure, there is considerable variation in enrollment rates. The Primary Net Enrollment Rate (NER) for boys is 75% and for girls it is much lower at 55%. This gender gap in education

points to the ongoing challenge of ensuring equal access to education for boys and girls in Khyber province, where socio-cultural and economic factors likely contribute to the disparity.

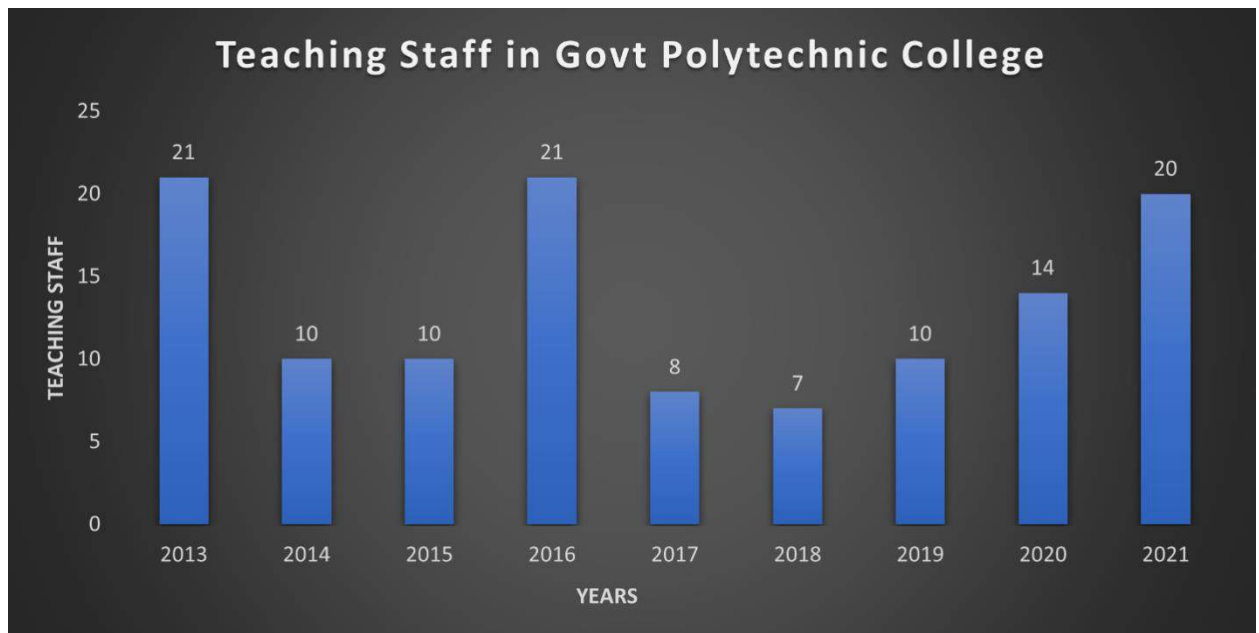
Khyber Pakhtunkhwa has made great strides in adult literacy. According to the Economic Survey of Pakistan, the province's literacy rate for people aged 10 and over has risen to 55.3%, representing an 18 percentage point increase over 1998 levels. This improvement is encouraging, indicating that efforts to promote literacy and access to education have had a positive impact. However, with nearly half the population still lacking basic literacy skills, there remains an urgent need for additional investment in education programs, particularly in rural and underserved areas of the province, to close the literacy gap and ensure continued progress.



Source: 2022 Bureau of Statistics (Khyber Pakhtunkhwa)



Source: 2022 Bureau of Statistics (Khyber Pakhtunkhwa)



Source: 2022 Bureau of Statistics (Khyber Pakhtunkhwa)

Despite its policy commitments, the oil and gas industry has failed to significantly improve education in District Karak. This raises important questions about the effectiveness of CSR

initiatives and the equitable distribution of resources. Even though oil companies frequently claim to be committed to community development, the actual situation presents a different image, one filled with promises violated and opportunities lost.

A comprehensive examination of the scenario identifies several important problems. First, disparity in access to high-quality education is maintained by the absence of long-term educational initiatives. Communities in District Karak still struggle to get access to quality education and opportunities for vocational training, even though oil and gas revenues have the potential to pay for educational infrastructure and initiatives.

Furthermore, the short-lived ownership of a school by an oil company is one example of how the transient nature of certain educational interventions compromises the sustainability and long-term effects of these initiatives (Dahan et al., 2010). To secure long-term benefits for future generations, sustainable development necessitates a comprehensive strategy that places a high priority on institutional strengthening, capacity building, and community ownership (Elkington, 1998).

Moreover, the lack of vocational training institutions robs the community's citizens of chances to gain useful skills and improve their employability both within and outside the oil and gas industry. Oil companies lose out on a chance to develop regional talent, encourage economic diversification, and provide communities the tools they need to engage actively in the workforce by not funding vocational education (Hassan, 2015).

This gap between words and deeds when it comes to CSR is not specific to District Karak; rather, it is a reflection of larger issues facing the extractive industries. Extractive industries have the potential to bring in large sums of money, but because of poor governance, corruption, and a lack of transparency, communities frequently do not benefit from the wealth created by their natural resources (Humphreys, 2001).

Overall, the failure of the oil and gas sector to considerably improve education in District Karak highlights the necessity of a more thorough and inclusive approach to community development. Oil companies can support the long-term prosperity and well-being of the communities in which they operate by investing in vocational training, encouraging community ownership, and giving priority to sustainable educational initiatives.

CHAPTER 5

Findings and Recommendations and Conclusion

5.1 Findings

Following are the findings of the research conducted:

- i. It was observed that oil companies operating in the region, has made limited contributions to the health sector. Specifically, MOL's involvement is restricted to conducting periodic free medical camps. However, these medical camps are infrequent and insufficient to meet the healthcare needs of the local population. The sporadic nature of these camps means that many residents are left without regular access to necessary medical services. This lack of sustained healthcare support highlights a significant gap in the company's corporate social responsibility (CSR) initiatives, particularly in the health sector.
- ii. In contrast, the Oil and Gas Development Company Limited (OGDCL) has made some efforts to support healthcare in the area by providing ambulances. However, the research revealed that only two ambulances have been made available for the entire union council and village council. Given the population size and the geographic spread of the communities, these two ambulances are grossly inadequate. This limited provision results in delays and difficulties in accessing emergency medical services, thereby adversely affecting the health and well-being of the residents.
- iii. The insufficient healthcare initiatives by both MOL and OGDCL have serious implications for the local population. The rarity of MOL's medical camps means that ongoing and preventative care is largely unavailable, which can lead to the exacerbation of health issues that might otherwise be manageable. Additionally, the inadequate number of ambulances provided by OGDCL severely restricts access to urgent medical care, increasing the risk of complications and mortality in emergencies.
- iv. This lack of adequate health services from the companies operating in the region underscores the need for a more robust and sustained approach to healthcare provision. It

also raises questions about the extent to which these companies are fulfilling their social responsibilities to the communities in which they operate.

- v. An alarming trend identified during the research is the increasing incidence of skin diseases in the district of Karak. Residents are reporting a significant increase in conditions such as dermatitis, eczema, and other skin-related ailments. The exact cause of this increase has not been fully documented, but it is suspected that environmental factors (perhaps related to the activities of oil companies) may have played a role. The situation is worsened by the lack of ongoing medical care, which leaves many cases untreated and worsening over time.
- vi. Another major health problem in Karak District is the increasing incidence of cancer. The district has seen a noticeable increase in the number of cancers, especially those affecting the lungs, skin, and gastrointestinal tract. An important factor contributing to this increase may be the presence of uranium in the region. Uranium mining and related activities of several companies, including MOL, are potential sources of radioactive exposure. This exposure could be a driving force behind the growing cancer rates, posing a severe health risk to the local population.
- vii. The petroleum policy of the government of Pakistan, that is allocating 50% of employees from the local community, theoretically this policy provides a large number of local employment, but is inefficiently implemented. The purpose of the policy is to promote economic growth and development in society by providing employment opportunities directly to the population. However, the practical implementation of this policy reveals significant differences. Despite the promise of local employment, most of these job opportunities are limited to level 4 positions with unskilled or semi-skilled workers.
- viii. Most locals employed by oil companies in the district Karak are limited to lower-grade jobs, such as maintenance, security, and manual work. These positions, while providing a certain level of employment, do not offer the same advantages, opportunities for work safety, or career progression as a higher degree position. Such restrictions hinder the

economic progress of local workers by excluding them from more lucrative and skill-enhancing positions in companies.

- ix. Restricting local workers to lower-level jobs has wider economic consequences for local communities. Low-quality work usually provides lower wages and low benefits, limiting the economic stability and growth potential of local families. In addition, the lack of opportunities to obtain parental work means that local labor has not developed in the future or has the skills and experience he needs to promote more complex and qualified industries.

5.2 Recommendations

Following are some recommendations:

- i. Given the long history and influence of oil companies such as MOL in Karak District and BD Shah, their community development plans should provide a holistic outlook. It includes a detailed comparison of the company's initial state with its current state, highlighting the changes and developments that the company's operations have contributed to. Short-term, medium-term, and long-term plans should be developed to ensure sustainable community development, including health care, education, infrastructure, and environmental sustainability. Cooperation with the government and continued community education is essential to ensure that these initiatives are implemented effectively and benefits are equitably shared.

Short-term plans (1-5 years):

Immediate establishment of well-equipped pharmacies and water filtration facilities.

Regular medical camps and mobile health units.

Implementation of training and career development programs for locals.

Mid-term plans (5-10 years):

Expansion of health care facilities in hospitals T.H.Q and D.H.Q.

Construction of educational institutions and provision of scholarships. Start local plantation activities on a large scale.

Establish a cancer hospital.

Long-term plan (10-15 years):

Develop comprehensive community infrastructure projects.

Continuously monitor and reduce the company's CO2 footprint. Create a strong framework for environmental sustainability.

- ii. Oil companies operating in the region, such as MOL and OGDCL, should take an active role in addressing the increasing medical problems related to the digestive system and skin. Given the increasing prevalence of these conditions, these companies must invest in comprehensive healthcare solutions. This includes setting up well-equipped dispensaries in union councils and district councils. These dispensaries should be staffed by qualified doctors and provided with the necessary medical supplies to ensure effective treatment of digestive and skin diseases.
- iii. Tehsil Headquarters (T.H.Q) and the District Headquarters (D.H.Q) need to be significantly improved to manage oil and natural gas-borne diseases. This includes not only the improvement of the physical infrastructure of these hospitals, it also training medical care professionals to identify and treat the situation that may be related to the activities of the oil and natural gas industry. Specialized departments should be established in these hospitals to focus on diseases prevalent in the region and ensure timely and effective medical intervention.
- iv. In light of the alarming rise in cancer cases in Karak District, oil companies need to be thoroughly investigated to find out the link between their operations and the rise in cancer incidence. The purpose of this study is to identify specific carcinogens associated with oil and gas operations and to develop strategies to mitigate these risks. In addition, the oil companies should invest in the creation of cancer hospitals in the region. The facility will provide advanced diagnostic and treatment services to make cancer care accessible to residents.
- v. To continue to support local communities, oil companies should put in place mechanisms that promote ongoing health care and provide ongoing support to the population. This includes the creation of the Mobile Health Department, which can reach remote areas organize normal health camps, and provide financial assistance for treatment. By creating a strong medical network, oil companies can ensure that the health needs of the local population can be met.

- vi. To promote economic growth and ensure fair employment practices, the 50% quota for local employment should apply to all job levels, not just Grade 4 positions. This policy adjustment would provide equal opportunities for residents to obtain higher-quality positions that offer better pay, job security, and career opportunities. Ensuring that residents have access to ample job opportunities can significantly improve their economic well-being and contribute to the overall development of society.
- vii. Oil companies should establish comprehensive training and career development programs aimed at equipping residents with the skills needed for higher-quality jobs. These plans should focus on technology and professional skills, covering engineering, management, health, and safety, as well as environmental sustainability. By investing in local education and development, the company can set up a qualified group of candidates to prepare for a higher level of role in the organization.
- viii. In addition to formal training programs, oil companies should offer mentoring and apprenticeship opportunities to local workers. Combining experienced professionals with local workers can provide valuable on-the-job training, foster skills development, and help residents gain hands-on experience in their field. This hands-on approach to learning can accelerate career development and increase the likelihood that locals will land higher-quality positions.
- ix. A key area where efforts are currently lacking is education. Oil companies should take a proactive role in educating communities about the land acquisition process, their rights, and the benefits that come with it. This education can help demystify the process, reduce resistance, and encourage more constructive public engagement. In addition, companies should support local education initiatives, for example by funding schools, providing scholarships, and organizing educational seminars.
- x. To promote economic capabilities, oil companies should establish a comprehensive skills development plan for men and women in society. These plans should provide education in various industries and majors in the local and later industries, including technical skills, business management, medical treatment, and environmental management. For women in

particular, these programs should focus on providing opportunities that lead to economic independence and greater participation in the local economy.

- xi. Given the unique challenges women face in many communities, programs tailored to their specific needs and circumstances are especially important. These could include vocational training in areas such as tailoring, handicrafts, IT skills, and small-scale entrepreneurship. Providing childcare facilities and flexible training schedules can further encourage women's participation in these programs.
- xii. Oil companies should use the land acquired for their operations to initiate a community mega plantation drive. This initiative would help counter environmental issues such as deforestation and air pollution, contributing to the overall ecological balance of the region. By allowing local communities to participate in this motivation, the company can promote environmental management and ensure the benefits of broad sharing of plantations.
- xiii. To establish a permanent relationship with the local community, oil companies should establish a special social development department. The department should focus not only on solving the problem of land acquisition and the provision of fair wages but also on actively interacting with the public to meet its broadest needs. By creating confidence and maintaining open communication paths, the company can better understand and meet the expectations of the locals.
- xiv. Beyond addressing immediate health and environmental concerns, oil companies should expand their development initiatives to promote long-term societal growth. This includes investment in infrastructure projects such as schools, hospitals, and roads, as well as support for local businesses and entrepreneurship. These efforts will contribute to the overall socio-economic development of the region and create a more prosperous and sustainable society.
- xv. Oil companies should regularly evaluate the region's environment and health impact. This includes visits to regular health care professionals and environmental experts to assess the quality of air and water, assess the effectiveness of existing sanitary plans, and determine

the advanced areas. These evaluations should be transparent and the results should be shared with the public to keep them informed and engaged.

- xvi. To ensure a safe and sufficient supply of drinking water, oil companies should invest in water filtration equipment in the area. Access to clean drinking water is a basic need, and by providing filtration equipment, companies can significantly improve the health and well-being of residents. These facilities must be strategically located to serve the maximum population and regularly maintained to ensure consistent water quality.
- xvii.** In addition to setting up filtration facilities, oil companies must implement comprehensive water quality monitoring systems. Water sources should be regularly tested for pollutants and contaminants to ensure that the water is safe to drink. This proactive approach will help prevent waterborne diseases and increase public confidence.
- xviii. To ensure operational safety and sustainability, oil companies must implement robust mechanisms to monitor and manage gas emissions. Regular inspections and audits must be carried out to ensure compliance with environmental regulations and standards. To reduce the impact on air quality and public health, advanced technologies must be used to detect and control emissions.

5.3 Conclusion

This paper examines the multi-faceted impact of oil companies' activities in the Karak District, with a focus on health, employment, environment, and community development issues. A comprehensive analysis identified several key findings as well as practical recommendations to effectively address these challenges. The opinions and suggestions of the Department of Health

The Department of Health in the Karak area faces major problems that exacerbate a limited contribution to oil companies such as MOL and OGDCL. Although these companies have worked hard, for example, regular medical camps and ambulances, these measures are seriously inadequate. The increasing appearance of skin diseases and the increase in cancer, potentially associated with uranium exposure, emphasizes a more urgent need for stronger health intervention. For example, well-established dispensers, T.H.Q and D.H.Q hospitals, careful cancer studies, and

the development of a special cancer hospital are crucial steps in improving access to health care and results for the local population.

Oil companies' employment practices, although intended for the benefit of the locals, are largely limited to lower-quality positions. It has limited economic progress and saved income differences. Applying a 50% local employment quota at all job levels and implementing comprehensive training and career development programs are essential to improving the economic prospects of residents. By ensuring fair employment practices and investing in the local workforce, oil companies can contribute to sustainable economic growth and community empowerment. Environment and community engagement.

The impact of oil companies on the environment, especially on water and air quality, requires immediate and sustained action. Establishing water filtration facilities, ensuring regular health and environmental assessments, and implementing strict air emission controls are key measures to protect the health and environment of residents. In addition, the use of reclaimed land for large-scale plantation activities, the involvement of local communities through specific development activities, and addressing educational needs are critical to building a more resilient and sustainable society.

Ensuring that benefits from oil companies' operations are shared equitably with local communities is not only a corporate responsibility, but also a moral obligation. As MOL and other companies benefit from the region's natural resources and workforce, the community must see tangible improvements in their quality of life. This includes better healthcare, improved educational opportunities, improved infrastructure, and a healthier environment. By committing to comprehensive development plans and ensuring transparency and accountability, oil companies can build positive and sustainable relationships with local communities.

In summary, the findings of this paper highlight the urgent need for oil companies operating in District Karak and B.D. Shah to adopt a more proactive and comprehensive approach to their social and environmental responsibilities. Over the past 25 years, while companies like MOL and OGDCL have made some efforts to contribute to local development, these efforts have often fallen short of addressing the critical needs of the community. The increasing prevalence of health problems such as skin diseases and cancer combined with inadequate medical infrastructure underscores the need for these companies to significantly strengthen their health initiatives. By

building well-equipped pharmacies, expanding the capacity of local hospitals, conducting in-depth research on environmental health issues, and developing specialized medical facilities such as cancer hospitals, oil companies can have a significant impact on health and well-being. Residents. In addition, ensuring that the 50% employment quota for residents applies to all job levels, not just lower-level jobs, is critical to promoting economic empowerment and sustainable growth. Comprehensive training and career development programs are critical to equipping residents with the skills needed for higher-level jobs and long-term economic stability.

Additionally, the environmental impact of oil company operations cannot be overlooked. The establishment of water filtration plants, regular environmental and health assessments, and robust mechanisms to monitor and control gas emissions are critical measures to protect the health and environment of the community. The obtained country is used for large plantation drivers, and the participation of societies through special development plans can greatly promote environmental sustainability and improve the natural beauty of the region. Petroleum companies must work closely with the government and educate their development plans to educate society. This ensures transparency, builds trust, and gives local people the knowledge to understand and support the measures.

By addressing past shortcomings and proactively planning for the future, oil companies can ensure that their activities make a positive contribution to the health, education, environment, and overall prosperity of the communities in which they operate. This holistic approach to community development not only enhances the company's reputation but also ensures that residents can thrive alongside the company's success. Investing in comprehensive community development plans that include short-, medium- and long-term goals and encouraging open communication with residents are important steps in achieving this goal. Ultimately, ensuring that benefits from oil companies' operations are shared equally with local communities is not only a corporate responsibility, it is also a moral imperative and essential to building a sustainable and prosperous future for all stakeholders.

5.3 REFERENCES

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