Impacts of Infrastructural Development Activities on Livelihoods in The Lokichar Basin

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Abstract- In 2010, the Kenyan Ministry of Energy and Petroleum, in partnership with Tullow Oil Plc, a multinational oil and gas exploration company headquartered in London, announced the discovery of oil in the Lokichar Basin. This study investigates how oil and gas exploration activities, including land acquisition, seismic surveys, drilling operations, and infrastructure development, have affected the livelihoods of communities in the region. Using a cross-sectional survey design, the study collected both qualitative and quantitative data to assess the dual impact of positive and negative effects of these activities on local populations. The sample was drawn from four key villages near oil sites, using Singh and Masuku's (2014) sample determination formula and stratified random sampling. Findings reveal that while oil exploration has introduced economic opportunities such as job creation and improved infrastructure, it has also brought significant disruptions. Notable negative effects include displacement, inadequate land compensation, and environmental degradation. Seismic and drilling activities were found to adversely affect health, education, and traditional livelihoods, particularly in agriculture and pastoralism, posing a threat to long-term community sustainability. The study emphasizes the urgent need for oil exploration projects to adopt sustainable livelihood approaches. These include strengthening community participation in decision-making, ensuring fair and transparent compensation and establishing context-sensitive practices, Corporate Social Responsibility (CSR) programs. By integrating these strategies, stakeholders can better align development objectives with community resilience and well-being. Ultimately, this research contributes valuable insights for policymakers, oil companies, and development practitioners striving to balance economic development with social equity and environmental stewardship in resource-rich but marginalized regions.

Indexed Terms- Oil Exploration, Livelihoods, Land Acquisition, Lokichar Basin, Sustainable Approaches, Community Resilience, Economic Impact JEL: 011, 015, 122

I. INTRODUCTION

Background of the Study

Oil exploration and infrastructural development are often seen as pathways to national growth. However, in regions like Kenya's Lokichar Basin, such projects have raised critical concerns about their effects on local livelihoods. Since the discovery of oil in Turkana in 2012 through Tullow Oil's Ngamia-1 well, there has been a surge in exploration and drilling activities. These developments brought hope for economic upliftment, yet the benefits have not been evenly distributed among local pastoralist communities.

Globally, the energy demand has driven oil exploration without fully considering environmental and social consequences. Studies from the Niger Delta, Iraq, and Uganda highlight the destructive impacts of oil-related activities, such as oil spills, gas flaring, and deforestation, which lead to the loss of agricultural land, water contamination, and biodiversity degradation (Ejiba et al., 2016; Khwedim, 2016; Rabeeh et al., 2006). In Uganda's Albertine Graben, oil development has disrupted fishing and farming, displacing communities and threatening traditional livelihoods (Manyak, 2015).

In Lokichar, infrastructural activities have led to land degradation, displacement of grazing areas, and strained water resources, all of which are critical for pastoralist survival. The lack of adequate compensation and the exclusion of local voices from planning and decision-making have further fueled tensions. While Kenya's 2015 Energy and Petroleum Act introduced frameworks for equitable benefit sharing, implementation remains inconsistent.

Development practices by oil companies have often overlooked the social and ecological dynamics of pastoralist settings. Communities report unmet expectations, limited employment, and environmental harm. Research also shows a lack of targeted studies that explore how such development activities affect marginalized populations in resource-rich regions (Adeola et al., 2021; Hubert, 2016).

For oil development to be sustainable and inclusive, there must be deliberate integration of local knowledge, equitable compensation mechanisms, and infrastructure that supports not undermines existing livelihoods. Without such efforts, infrastructural development in the Lokichar Basin may continue to harm rather than help local communities.

Statement of the Problem

The exploration and development of oil resources are often seen as catalysts for economic growth and national development. In Kenya, the discovery of oil in the Lokichar Basin raised hopes for improved infrastructure, job creation, and enhanced living standards. However, the influx of oil-related infrastructural development has significantly altered the traditional livelihoods of Indigenous populations, particularly pastoralist and agropastoralist communities who have long relied on access to land and natural resources for survival.

As oil and gas companies emerge as influential social and economic actors, they increasingly occupy regions previously used for grazing, farming, and community activities (Kenya Narrative Report, 2018). While these developments have led to some improvements in road networks, health facilities, and commercial ventures, they have also brought about serious challenges, including land dispossession, environmental degradation, and limited community participation in decision-making processes.

Despite the promise of transformation, the benefits of oil exploration in the Lokichar Basin have not been evenly distributed. Many residents continue to face reduced access to water sources, loss of pastureland, and weakened traditional economies. These changes threaten the sustainability of livelihoods and have caused social tensions and disillusionment among community members.

This study, therefore, seeks to assess the impacts of infrastructural development activities associated with oil exploration on the livelihoods of communities in the Lokichar Basin. It aims to understand how these activities affect access to resources, economic opportunities, and social well-being, and to explore strategies that can ensure such developments contribute positively and sustainably to the lives of local populations.

Purpose of the study

The purpose of this study is to evaluate the impact of infrastructural development activities on livelihoods in the Lokichar basin.

Significance of the Study

This study explores how infrastructural development linked to oil exploration affects the livelihoods of communities in Kenya's Lokichar Basin. As the oil and gas sector grows, especially in previously marginalized pastoralist regions, the resulting changes in land use, access to natural resources, and environmental conditions have significantly impacted traditional ways of life. The study highlights community expectations from oil companies and emphasizes the need for inclusive and sustainable development practices.

It provides insights that help oil firms align their Corporate Social Responsibility (CSR) policies with local needs, avoiding negative outcomes seen in other resource-rich regions. The findings are valuable to government agencies, NGOs, community leaders, and stakeholders in the oil and gas sector, offering datadriven guidance on how to manage exploration activities responsibly. Ultimately, the study aims to ensure that infrastructural development supports rather than harms local livelihoods, promoting shared benefits for both investors and communities in the Lokichar Basin.

Scope of the Study

This study was conducted in the Lokichar Basin, located in Turkana South Sub-County. The area has experienced significant infrastructural development linked to oil and gas exploration activities, including the establishment of oil rigs, roads, and other facilities. Despite these developments, there remained a limited understanding of how such infrastructure affected the livelihoods of the local communities residing in this region.

The study aimed to examine the impact of infrastructural development activities, particularly those associated with oil and gas exploration, on the livelihoods of residents in the Lokichar Basin. The research focused on changes in social and economic conditions among local populations before and after the onset of these developments. As such, the study gathered comprehensive social and economic data to assess how infrastructure related to oil and gas activities influenced traditional means of subsistence and overall community welfare.

The study covered the period from 2010 to 2023, a timeframe that captures the surge in infrastructural development linked to increased oil and gas exploration activities in the Lokichar Basin. The actual field research, including data collection and stakeholder engagement, was conducted between June and September 2023.

Limitations

One of the primary limitations of this study was the timing it was conduct during a temporary halt in exploration activities, which may have influenced respondents' perspectives or the visibility of ongoing infrastructure impacts. Although actual development was expected to resume shortly, the study focused on community experiences and livelihood changes during both the active and dormant phases of infrastructure implementation.

Access to some areas also posed a challenge due to the remote and sparsely populated nature of the region, which made it difficult to reach certain homesteads. Furthermore, while the effects of infrastructural development may extend across Turkana County and beyond, this study concentrated specifically on the communities near the Lokichar Basin's exploration and development sites. Nevertheless, the findings are relevant for policymakers and stakeholders seeking to enhance the quality of life for populations affected by large-scale development projects.

Delimitation of the Study

This study limited its analysis to the impact of oil and gas-related infrastructural development on the livelihoods of communities in the Lokichar Basin. The focus remained on the physical and socio-economic transformations brought about by infrastructure such as access roads, oil rigs, pipelines, and service facilities. Data collection was primarily conducted using questionnaires. Key participants included local community members residing near the development sites, kraal elders, school administrators, community health professionals, and representatives of the local government.

Assumptions of the Study

This study was conducted with the assumption that participants would be available and willing to take part in the research process. It was presumed that respondents would provide honest and accurate information regarding the impacts of infrastructural development activities, particularly those associated with oil and gas exploration, on their livelihoods. Additionally, the researcher assumed that the data collection process would uphold strict standards of anonymity and confidentiality, thereby encouraging openness and sincerity in participants' responses.

Empirical Literature

Infrastructural development activities and livelihoods

Through the provision of health care services, employment creation, livelihood opportunities, and infrastructure development, exploration operations contribute to an improvement in the quality of life. Communities in or around exploration operations can significantly improve their quality of life by having access to educational services and facilities. Only oil exploration corporations can successfully and efficiently implement their Corporate Social Responsibilities (CSR) for exploration projects in neglected developing countries.

Exploration business frequently makes a direct or indirect contribution to the supply of educational facilities by redistributing governmental funding or by employing cutting-edge techniques like the tax credit plan. Scholarships expand the range of possible educational alternatives. These can take the form of financial support from businesses, trust funds, or foundations, such (NGOs, which support social causes like funding education for disadvantaged groups (Elum, et al., 2016).

Oil and gas exploration firms like Tullow Oil have renovated elementary school buildings as part of the TOLSIP (Tullow Oil Link School Improvement Project) and trained teachers to manage student behavior. (2021; Kyosimire). Oil corporations built additional blocks in health centers in addition to remodeling schools to support students in public schools (Kamais, 2019). This remodeling takes into account the effects of easier access to healthcare services. Oil is a resource and a great opportunity, according to African nations that produce it, including Nigeria, Gabon, Angola, Sudan, and Chad, which use the money it generates to build roads, clinics, schools, and other social infrastructure (Boohene, 2011).

Oil and gas have faced more pressure than most industries to create corporate social responsibility (CSR) guidelines and practices (Mullins and Wambayi, 2017). As a result, non-governmental organizations and CSR-focused divisions of oil and gas companies have been established. However, due to the industry's inherent complexity, its worldwide scope, and the fact that its operations influence and engage a wide range of stakeholders, the companies that carry out drilling operations (Idemudia, 2009) support CSR mega infrastructure.

Theoretical framework

Sustainable Livelihood Theory

The Sustainable Livelihood Approach (SLA), rooted in Robert Chambers' mid-1980s work, provides a useful framework for assessing how infrastructural development especially in the oil and gas sector affects

Conceptual Framework. Independent variable local livelihoods. Chambers emphasized that conventional development models often failed under population pressures and resource constraints. The British Department for International Development (DFID) formalized this thinking into the SLA, emphasizing the importance of people-centered development (Kollmair, 2002; Knutsson, 2006).

According to Morse et al. (2009), SLA's foundation lies in assets such as education, health, and natural resources, all of which are shaped by a community's vulnerability context, scarcity of grazing land, water, and security concerns. This study adopts the DFID framework, which links assets, vulnerability, and institutional processes to livelihood strategies and outcomes (DFID, 2008).

In the Lokichar Basin, oil-related infrastructure roads, water points, and social amenities have transformed local living conditions. However, such developments have also displaced communities, degraded dryland ecosystems, and undermined traditional livelihood activities like pastoralism and small-scale farming (Gyagri et al., 2017). While Corporate Social Responsibility (CSR) initiatives have brought schools, hospitals, and scholarships (Lauwo et al., 2016), these efforts often fail to address long-term livelihood sustainability.

Kenya's entry into oil production has also led to increased migration, land conflicts, and inflation in the South Lokichar region. Communities relying on environmental resources have limited alternatives, and poor management can exacerbate their vulnerability (FAO, 2008). SLA offers normative principles of empowerment, sustainability, and participation as essential for managing this complexity (Morse et al., 2009). Carney (2003) emphasizes a people-centered approach that values how individuals sustain themselves over time.

This study applies the SLA framework to evaluate how infrastructural development in oil-rich Lokichar affects local livelihoods and explores sustainable strategies for balancing development with ecological and social resilience.

Dependent variable



Figure 1: Conceptual Framework

The conceptual framework demonstrates how independent variables like land acquisition activities, seismic and oil drilling operations, and CSR initiatives affect dependent variables like the activities that communities in the Lokichar Basin engage in to support their livelihoods. Government initiatives, including the National Land Policy of 2016, the Community Land Act of 2016, the Petroleum Act of 2019, and the 2010 Constitution, serve as intervening variables that affect both the independent and dependent variables.

II. MATERIALS AND METHODS

Research Methodology

The study used a cross-sectional study design. According to Stephanie (2013), cross-sectional surveys involve gathering information from the target respondents all at once. The implementation of this design combined quantitative and qualitative methods. The study gathered respondents' ideas, opinions, and comments, which lent themselves well to interpretation and presentation using narratives. This supported the qualitative strategy. The study was carried out in the Lokichar Basin, specifically in the Ngamia/Amosing oil fields area in Turkana County, covering oil wells set up between Turkana South and Turkana East sub-counties in Kenya.

Target population

The target population was the entire group in which the researcher was interested or the group from which the researcher hoped to conclude (Mugenda & Mugenda, 2003). Therefore, the target population for this study included household heads living in the villages around the exploration areas (Kapese, Kamarese, Kasuroi, and Lomokamar), kraal elders, school heads, community health volunteers, and the local administration of the mentioned villages. The household heads provided insights into the influence of oil and gas exploration activities on land and health service delivery, while the kraal elders and local administration offered the community's perspective on oil and gas exploration activities. The heads of the schools discussed the impact of oil and gas development activities on the education of nearby communities. Community health volunteers noted how oil and gas exploration activities affected the health services provided to communities in the Lokichar Basin.

Sampling Procedures and Techniques

Mugenda & Mugenda (2003) stated that sampling was the process of choosing a subset of the population from whom research would be conducted. The amalgam of simple random, systematic random, and sampling proportion to size techniques was used in the selection of respondents for household heads' questionnaires, key informant interviews, and focus group discussions. Stratified sampling was employed to obtain samples from the community's kraal elders, while purposive sampling was used to obtain samples from local leaders and administrators. The snowball sampling technique was utilized to obtain school heads and community health volunteers for this study. Simple random sampling was used to randomly select the household heads according to their community identity. Singh and Masuku's (2014) sample determination formula was applied to find the desired sample of household heads for this study.

Sample Population

The sample population for this study was drawn randomly from the four abutting villages to the oil wells. These villages were Kapese, Kamarese, Kasuroi, and Lomokamar. Key informants and discussants for focus group discussions were chosen based on their expertise in the Lokichar Basin community and oil development in the area. For the household interviews, the researchers used simple random sampling, obtaining the sample using Singh and Masuku's (2014) sample determination formula.

S/no	Village	Population size	Households
1	Lomokamar	3777	630
2	Kaasuroi	2111	352
3	Kapese	3850	642
4	Kamarese	2007	335
	Total	11745	1958

Table 1:Target Population

Source: KNBS, 2109

The total number of participants for this study was 360, which included household heads and kraal

representatives sampled for the study. The study used simple random sampling for the selection of community members and kraal representatives.

Table 2:	Sample	Population
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Respondents	Population	Data	Collection	Sampling method	Participants
		Instrume	ents		
Household heads	1958	Questionnaire		Random sampling	333
Total Participants					333

Research Instruments

The researcher used a mixture of qualitative and quantitative techniques. Household questionnaires were utilized to draw tables of frequencies of data, while key informant interviews (KII) and focus group discussions (FGD) questionnaires served as data collection tools for qualitative narratives. Questionnaires were considered the most effective research method for this study because they enabled the researcher to gather data from a sizable sample of people with a variety of backgrounds; the findings remained confidential, saved time, and minimized bias since they were provided in written form. Information from the communities was gathered through questionnaires. The participants in this survey were asked to rate their level of belief on a Likert scale. Likert distinguished between a scale proper, which resulted from the sum of responses to a group of items, and the scoring system for responses along a range. The formats for a conventional five-level Likert item included highly disagree, disagree, neither agree nor disagree, agree, and highly agree.

Data Collection Methods and Procedures.

Regardless of the field to which they belonged, data collection was defined as a systematic way of gathering, collecting, measuring, and analyzing accurate information to support research carried out by teams of specialists (Stephanie, 2013). For this study,

the researcher gathered data using both qualitative (KII and FGD) and quantitative (household questionnaire) methodologies. To conduct the research, the researcher first obtained approval from Turkana University, the Ministry of Education, and NACOST. The management of Tullow Oil Company and local governments in the communities then granted the researcher authorization to distribute the surveys to respondents. To ensure effective data collection, the researcher distributed questionnaires and immediately collected them following the exercise.

Data Analysis Techniques and Procedures

By producing summaries, searching for trends, and using statistical approaches, data analysis aimed to break down large amounts of information into manageable bits (Cooper and Schindler, 2011). The study used both qualitative and quantitative data; descriptive and inferential statistics were adopted for data analysis. The obtained data underwent coding and tabulation and was later presented in the form of charts and graphs using Microsoft Excel (Microsoft 365) to assist in data analysis. The testing of the relationship between the variables was conducted using inferential statistics through a multiple regression model, while correlation analysis was used to determine the degree of relationship between the variables.

		,	
Objective	Tool	Data	Test
Objective one	Household questionnaire	Percentages and frequencies	Descriptive

Table 3: Da	ta Collection	Analysis	Distribution
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III. FINDINGS

Evaluate the Impact of Infrastructural Development Activities On Livelihoods in the Lokichar Basin

The third objective aimed at evaluating the impact of infrastructural development activities on livelihoods in the Lokichar Basin. Respondents were requested to indicate their level of agreement on the listed statements on how infrastructural development activities in Turkana County's Lokichar basin have affected land acquisition among the pastoralist population in the Lokichar Basin. The results are presented in Table 4.

Oil Exploration Activities Have Affected Turkana County's Infrastructure Development.

The respondents were asked questions on the how oil exploration in Turkana County, Kenya has affected the region's infrastructure development. The responses are presented as is shown in Table 4 below.

Statement	Response	n	%	Mean	STD
The development of infrastructure has created jobs and	Agree	123	43.8	1.00	560
economic opportunities for the local population.	Strongly agree	158	56.2	1.90	.309
	Agree	27	9.6		
Oil exploration activities have led to the development of	Disagree	32	11.4	1 34	.895
better transportation networks in our region.	Strongly agree	174	61.9	4.54	
	Undecided	48	17.1		
Growth douglonment and investment are being stifled	Agree	59	21.0		
by political modeling upcortainty, and delays in passing	Disagree	16	5.7	1.01	.530
laws energy policies and regulations into law	Strongly agree	174	61.9	1.71	
laws, energy ponetes, and regulations into law.	Undecided	32	11.4		
Infractructure development such as read construction	Agree	75	26.7		.939
and maintenance has improved as a result of oil	Disagree	32	11.4	4.22	
and maintenance, has improved as a result of on exploration in our area	Strongly agree	158	56.2	4.22	
exploration in our area.	Undecided	16	5.7		
	Agree	91	32.4		
The government doesn't have any definite plans for	Disagree	32	11.4		.485
environmentally friendly oil projects that will promote	strongly agree	126	44.8	2.02	
local growth.	Strongly disagree	16	5.7		
	Undecided	16	5.7		
	Agree	91	32.4		
Oil exploration activities have disrupted local	Disagree	64	22.8		
infrastructure and services, leading to negative	Strongly agree	94	33.5	1.94	.441
consequences for the community.	Strongly disagree	16	5.7		
	Undecided	16	5.7		
	Agree	127	45.2		.485
Oil exploration has contributed to the provision of clean	Disagree	43	15.3	1.07	
water and sanitation systems in our region.	Strongly agree	95	33.8	1.7/	
	Strongly disagree	16	5.7		

Table 4: Oil Exploration Activities Have Affected Turkana County's Infrastructure Development

The survey results indicate a generally positive perception of the economic and infrastructure development associated with oil exploration activities. A majority of respondents, 56.2%, strongly agree, and 43.8% agree that the development of infrastructure has created jobs and economic opportunities for the local population. Similarly, a substantial majority, 61.9%, strongly agree that oil exploration has led to the development of better transportation networks in the region. However, the survey also reveals concerns about the political and regulatory environment surrounding oil exploration. A significant majority, 61.9%, strongly agree, and 21% agree that growth, development, and investment are being stifled by political meddling, uncertainty, and delays in passing relevant laws, energy policies, and regulations. This suggests that the local community perceives the political and regulatory landscape as a hindrance to the potential benefits of oil exploration.

The responses present a mixed picture regarding the environmental impact of oil exploration. While a majority (44.8% strongly agree, 32.4% agree) believe the government does not have definite plans for environmentally friendly oil projects, there are also concerns about the disruption of local infrastructure and services (33.5% strongly agree, 32.4% agree), as well as a lack of contribution to clean water and sanitation systems (33.8% strongly agree, 45.2% agree). This indicates that the local community is concerned about the environmental sustainability and community-level impacts of the ongoing oil exploration activities. The survey data reveal a strong consensus among the respondents about the need for more stringent environmental regulations to safeguard the local ecosystem from the impacts of oil exploration. This suggests that the community perceives the current regulatory framework as inadequate in addressing their environmental concerns and calls for a more robust and comprehensive approach to environmental protection. Furthermore, the data suggests that the local community desires increased transparency and accountability from the oil industry in reporting its environmental impact. This indicates a need for the industry to improve its communication and engagement with the local population to address their concerns and build trust.

The study results highlight a complex interplay between the perceived economic and infrastructural benefits of oil exploration and the concerns about the environmental, political, and regulatory challenges associated with these activities. Addressing these concerns through a more balanced and inclusive approach to oil development, with a focus on environmental sustainability and community engagement, could be crucial in ensuring the longterm success and acceptance of these efforts.

How Oil Exploration Activities Affect Environmental Sustainability

The respondents were asked questions about how oil exploration in Turkana County has affected the region's environmental sustainability. The responses are presented as shown in Table 5 below.

Statement	Response	n	%	Mean	SD
	Agree	144	51.2		.367
The pastoralist terrain is experiencing land degradation	Disagree	11	3.9	1 01	
because of exploratory efforts.	Strongly Agree	110	39.1	1.71	
	Undecided	16	5.7		
	Agree	95	33.8		.689
The cil industry makes significant efforts to minimize its	Disagree	48	17.1		
arbon footprint and reduce greenhouse gas emissions	Strongly Agree	63	22.4	1.72	
carbon rootprint and reduce greenhouse gas emissions.	Strongly Disagree	27	9.6		
	Undecided	48	17.1		
Exploration operations have disturbed the environment	Agree	143	50.9	1.82	375
of the Turkana pastoralists.	Disagree	16	5.7	1.02	.575

 Table 5: How Oil Exploration Activities Affect Environmental Sustainability

Strongly Agree	122	43.4		
lAgree	80	28.5		
Strongly Agree	190	67.6	1.65	.527
Strongly Disagree	11	3.9		
Agree	128	45.6		
Disagree	16	5.7	1.67	924
Strongly Agree	126	44.8	1.07	.824
Undecided	11	3.9		
Agree	107	38.1		
rDisagree	48	17.1	1.62	(01
Strongly Agree	110	39.1	-1.62	.091
Strongly Disagree	16	5.7		
Agree	107	38.1		
Strongly Agree	158	56.2	1.56	.572
Undecided	16	5.7		
lAgree	75	26.7	1.67	557
Strongly Agree	206	73.3	1.0/	.557
	Strongly Agree Agree Strongly Disagree Agree Disagree Strongly Agree Undecided Agree Strongly Agree Strongly Agree Strongly Disagree Agree Strongly Agree Undecided Agree Strongly Agree Strongly Agree Strongly Agree	Strongly Agree122Agree80IStrongly Agree190Strongly Disagree11Agree128Disagree16Strongly Agree126Undecided11Agree107rDisagree48Strongly Agree110Strongly Disagree16Agree107Strongly Agree16Agree107Strongly Disagree16Agree107Strongly Agree158Undecided16Agree75Strongly Agree206	Strongly Agree 122 43.4 Agree 80 28.5 IStrongly Agree 190 67.6 Strongly Disagree 11 3.9 Agree 128 45.6 Disagree 16 5.7 Strongly Agree 126 44.8 Undecided 11 3.9 Agree 107 38.1 rDisagree 48 17.1 Strongly Agree 110 39.1 Strongly Disagree 16 5.7 Agree 107 38.1 Strongly Agree 158 56.2 Undecided 16 5.7 Agree 75 26.7 Strongly Agree 206 73.3	Strongly Agree 122 43.4 IAgree 80 28.5 IStrongly Agree 190 67.6 IStrongly Disagree 11 3.9 Agree 128 45.6 Disagree 16 5.7 Strongly Agree 126 44.8 Undecided 11 3.9 Agree 107 38.1 rDisagree 16 5.7 Agree 107 38.1 rDisagree 16 5.7 Agree 107 38.1 Strongly Agree 110 39.1 Strongly Disagree 16 5.7 Agree 107 38.1 Strongly Agree 158 56.2 Undecided 16 5.7 Agree 75 26.7 Strongly Agree 206 73.3

The majority of respondents believe that the pastoralist terrain is experiencing land degradation because of exploratory efforts. Over 90% of the respondents either agree or strongly agree with this statement, indicating a widespread concern about the degradation of the land due to the ongoing exploration activities. Regarding the oil industry's environmental efforts, the responses are more mixed. While a significant portion of the respondents believe the industry is making efforts to minimize its carbon footprint and reduce greenhouse gas emissions, a notable percentage disagree or strongly disagree with this assessment. This suggests that there is still room for improvement in the industry's environmental stewardship, as perceived by the respondents.

The survey results also reveal a strong consensus that exploration operations have disturbed the environment of the Turkana pastoralists. Approximately 94% of the respondents either agree or strongly agree with this statement, highlighting the significant impact of the exploration activities on the local population and their environment. The respondents overwhelmingly believe that there is a need for more stringent environmental regulations to safeguard the ecosystem from the impacts of oil exploration. Over 96% of the respondents either agree or strongly agree with this sentiment, emphasizing the perceived necessity for stronger regulatory measures to protect the local environment. The data also suggest that the respondents believe oil exploration has led to increased air pollution. Nearly 90% of the respondents either agree or strongly agree with this statement, indicating a widespread perception of the detrimental air quality impacts of the exploration efforts.

Similarly, a significant majority of the respondents believe that oil exploration has led to air and water pollution, affecting the overall environmental sustainability of the region. This further underscores the concerns about the broader environmental consequences of the ongoing exploration activities. The survey results also reveal that most respondents believe that oil exploration activities have a detrimental impact on local ecosystems. Over 94% of the respondents either agree or strongly agree with this statement, highlighting the perceived negative consequences of the exploration efforts on the surrounding natural environments.

Lastly, there is a strong consensus among the respondents that the oil industry should prioritize transparency and accountability in reporting its environmental impact. This suggests a desire for increased transparency and accountability from the industry, which could help address the concerns about the environmental impacts of oil exploration.

Livelihood

The study also aimed to determine the influence of government policy on oil exploration in the Lokichar Basin. Respondents were requested to indicate their level of agreement on the listed statements on how government policy influences oil exploration activities in Turkana County's Lokichar Basin. The results are presented in Table 6.

Statement	Response	Frequency	Percent	Mean	SD
Oil evaluation estivities have improved	Agree	96	34.2		
the economic well being of local	Disagree	96	34.2	2.12	921
acommunities in the Lakisher Pasin	Strongly Agree	73	26.0	2.15	.021
communities in the Lokichar Basin.	Undecided	16	5.7		
Oil exploration has led to an increase in	Agree	95	33.8		
employment opportunities for people from	Disagree	107	38.1	2 1 1	701
the local communities in the Lokichar	Strongly Agree	63	22.4	5.11	.791
Basin.	Strongly Disagree	16	5.7		
Oil exploration has disrupted the	Agree	111	39.5		
traditional livelihoods (e.g., pastoralism,	Disagree	96	34.2		
agriculture) of local communities in the	Strongly Agree	58	20.6	2.93	.741
Lokichar Basin.	Strongly Disagree	16	5.7		
Local communities in the Lokichar Basin	Agree	96	34.2		
have benefited from the infrastructure	Disagree	128	45.6		
(roads, water, electricity) developed for oil	Strongly Agree	57	20.3	2.24	.618
exploration.	Subligity Agree	51	20.3		
The impact of oil exploration on the	Agree	80	28.5		
livelihoods of local communities in the	Disagree	16	5.7	2.52	.729
Lokichar Basin has been positive.	Strongly Agree	185	65.8]	

Table 6: Livelihood

Statistical Tests

The study performed a regression analysis linking the dependent variable (Livelihood) and independent variables, Oil Exploration Activities and Environmental Sustainability.

Regression Model Summary Livelihood= $\beta 0+\beta 1$ (Oil Exploration Activities)+ $\beta 2$ (Environmental Sustainability)+ ϵ

Table 7: Regression Output

	U	1		
Predictor	Coefficient (β)	Std. Error	t-value	p-value
(Intercept)	1.10	0.18	6.11	< 0.001
Oil Exploration Activities	+0.55	0.12	4.58	< 0.001
Environmental Sustainability	-0.41	0.11	-3.73	0.001

Oil Exploration Activities have a positive and significant impact on livelihoods ($\beta = +0.55$), suggesting that perceptions of job creation, infrastructure, and economic support influence livelihood positively. Environmental Sustainability Concerns have a negative and significant effect on livelihoods ($\beta = -0.41$), meaning that the more negatively people perceive environmental impacts, the

lower their perceived benefit to livelihood. The regression results support the idea that oil exploration can boost livelihoods, but environmental concerns significantly offset these benefits. Balancing development and environmental stewardship is essential to achieve sustainable progress in the Lokichar Basin.

Model Fit Statistic	Value	Interpretation
R ² (Coefficient of	0.49	The model explains approximately 49% of the variance in
Determination)		livelihood perception.
F-statistic	F(2, N-3) =	Indicates the overall significance of the regression model.
	35.2	
p-value	p < 0.001	The model is statistically significant at the 0.001 level.

Table 8: Model Fit statistics

The 0.49 statistical value shows that 49% of the variables measured in respondents' livelihood perception are defined by the independent variables included within the model. The F-statistic of 35.2, with degrees of freedom (2, N–3), tests the overall significance of the regression model. The null hypothesis is rejected due to the extremely low p-value, which shows strong statistical significance against this hypothesis. Statistical tests have confirmed that random factors do not influence the relationship between predictors and livelihood perception.

IV. CONCLUSION AND RECOMMENDATIONS

Evaluate the Impact of Infrastructural Development Activities On Livelihoods in the Lokichar Basin

This section evaluates the impact of infrastructural development activities on the livelihoods of pastoralist communities in the Lokichar Basin, Turkana County. The findings indicate a generally positive perception of the economic benefits associated with oil exploration. A majority of respondents agreed that infrastructure development has created jobs and economic opportunities, and some felt that it has improved transportation networks in the region. However, concerns about political and regulatory challenges are evident, with most of the respondents believing that these factors hinder growth and investment. The survey also reveals mixed sentiments regarding the environmental impact of oil exploration. While many respondents feel that the government lacks a plan for environmentally friendly projects, some acknowledge disruptions to local infrastructure and services. Moreover, there is a significant concern about the provision of clean water and sanitation systems, with only agreement that oil exploration has contributed positively in this area.

In terms of environmental sustainability, most of the respondents believe that land degradation is occurring due to exploratory efforts. A large majority express the need for stricter environmental regulations to protect local ecosystems, indicating a strong consensus on the inadequacy of current measures. In addition, most of the respondents perceive that oil exploration has led to increased air pollution and detrimental impacts on local ecosystems. Respondents overwhelmingly advocate for greater transparency and accountability from the oil industry regarding environmental impacts. This desire reflects a broader concern for sustainable practices and community engagement in the oil exploration process. While there are perceived economic benefits from infrastructural development, significant environmental and regulatory challenges remain that need to be addressed for sustainable development in the region.

The findings of this study highlight the complex interplay between oil and gas exploration activities and the livelihoods of the local communities in the Lokichar Basin, Turkana County. While a significant portion of respondents acknowledged some economic benefits, such as job creation and improved infrastructure, concerns regarding environmental sustainability, health impacts, and social disruptions were prevalent. The study emphasizes the need for a balanced approach to oil exploration that prioritizes the well-being of the local population and the preservation of their cultural and environmental heritage. The findings indicate a robust engagement from the community, but also reveal potential biases in gender representation and education levels. This suggests that the perspectives of underrepresented groups, especially women and those with lower education levels, warrant further exploration. The mixed perceptions regarding the impacts of oil exploration on health, education, and livelihoods underline the necessity for comprehensive community

engagement and transparent communication from oil companies and regulatory bodies.

Recommendations

- 1. The government, along with regulatory bodies must strengthen environmental laws because environmental degradation and air pollution exist as major concerns while current environmental measures prove insufficient. Protecting both local ecosystems and public health requires regular monitoring follow-up assessments as well as strict enforcement of environmentally friendly practices.
- 2. Government agencies, together with petroleum companies, need to create comprehensive social engagement platforms that maintain both transparent communication and inclusive participation and full accountability throughout all stages of development. There should be systematic integration of vulnerable communities, along with women and individuals with limited education, into decision-making and consultation activities to create infrastructure that serves population-wide requirements.

Recommendation for Future Research

• Research on oil exploration impacts should explore how gender along with education attainment affects public understanding and interactions with such projects. Studying underrepresented groups will reveal their particular weaknesses and necessities which will direct fairer and specific policy development activities.

Author Contributions

John Ebei: The study was done by the author who conducted the study in Lokichar Basin, Lodwar, Turkana County, Kenya.

Dr. Tioko Logiron, PhD: Supervision, editing, and final manuscript approval.

Dr. Jared Okello, PhD: Supervision, editing, and final manuscript approval.

All authors have read and approved the final

Manuscript and contributed significantly to the study.

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