

**IMPLICATIONS OF THE CLOSURE OF FLUORSPAR MINING COMPANY
ON COMMUNITY LIVELIHOOD IN KEIYO SOUTH SUB-COUNTY,
KENYA**

BY

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DECLARATION

Declaration by the candidate

This thesis is my original work and has not been presented in part or as a whole for the award of a degree or any other academic award in this or any other University

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DEDICATION

This thesis is dedicated to my family, my dear wife Faith Jepchumba and our children Ian Kipkemboi, Terryanne Jebet and Natalie Jemutai for their moral support, prayers, patience and understanding throughout this course. I owe much of this work to you as well as my parents Jackson Bargarora and Jane Kiplagat who have a great passion for education. They laid a good foundation for me. To my children, may this work be a great source of inspiration in your pursuit for knowledge.

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ABSTRACT

The establishment and existence of the Fluorspar Mining Company created direct and indirect employment opportunities for the local population. It also generated new prospects for starting new businesses and expanding existing ones, further contributing to poverty reduction and economic growth. However, the closure of mining activities within the mining area may have led to social and economic challenges for the local communities. These were widespread unemployment, poor nutrition, high crime rates, and increased dependency. The general objective was to investigate the implications of the closure of Fluorspar Mining Company on the community livelihood in Keiyo South Sub- County. The specific objectives included examine the effects of the closure on livelihood among the households, to analyze the livelihood strategies among households, and to assess the influence of closure on gender relations among households in Keiyo south sub-county Kenya. The study was informed by the theory of Redefinition of the situation. The study employed mixed approach design which entailed exploratory design and descriptive survey. The target population was all the households' heads in the study area. The sample size was 254 respondents. Multistage sampling technique was used. Data collection methods included questionnaires, interviews, and observation, and focus group discussions as the main data collection tools. Quantitative data collected was analyzed in the form of frequencies and percentages and presented in the form of matrix tables, charts, and graphs. On the other hand, qualitative data was analyzed thematically based on the specific research objectives. The study results show that mining is a major propellant of economic activities in the study area by creating wealth, providing jobs, and stimulating business ventures for community members. Further, the closure of the company acted as a major economic setback to the community as a whole. The study findings also show that the majority 91(44.4%) of respondents earned an income of 4001-8000ksh while the minority 7(3.4%) earned an income of between 0-500kshs. The average income per month after closure was too low since their main source of income was lost, leaving them in despair. Furthermore, the closure of mining company led to change on income generating activities, roles and decision making among men and women. The study concluded that mining closure gradually depleted the mining community's livelihood assets and resulted in the collapse of their livelihood sources. The closure affected the community's nutrition, health, education, food security, water, shelter, levels of community participation, and personal safety. The study recommends that mining companies should develop a contingency plan to mitigate the potential socio-economic consequences of unexpected mine closure. Contingency plan will assist in building the community's economic resilience. Communities and mineworkers should be involved in planning for company closure and all other matters that affect their livelihoods.

TABLE OF CONTENTS

DECLARATION.....	II
DEDICATION	III
ACKNOWLEDGEMENTS	IV
ABSTRACT.....	V
LIST OF TABLES	X
LIST OF FIGURES	XI
LIST OF PLATES	XII
LIST OF ABBREVIATIONS AND ACRONYMS	XIII
CHAPTER ONE	1
INTRODUCTION.....	1
1.1 Background to the Study	1
1.2 Statement of the Problem	6
1.3 Main objective of the Study.....	7
1.4 Objectives of the Study	8
1.5 Research Questions	8
1.6 Justifications of the Study.....	8
1.7 Scope and Limitations of the Study	9
1.8 Definition of Terms and Operationalization of Variables	10
CHAPTER TWO	11
LITERATURE REVIEW AND THEORETICAL FRAMEWORK	11
2.1 General Overview	11
2.2 Closure of Mining Company and Effects on Livelihoods	11
2.3 Closure of Mining Companies and Livelihood Strategies.....	38
2.4 Closure of Mining Company and Gender Relations	52
2.5 Theoretical Framework	60
2.6 Conceptual Framework	62
CHAPTER THREE	65
RESEARCH METHODOLOGY	65
3.1 Introduction.....	65
3.2 Study Area	65
3.3 Research Paradigm.....	67
3.4 Research Design.....	68
3.5 Unit of Analysis	69
3.6 Target Population and Sample Selection.....	69
3.6.1 Target Population	69
3.6.2 Sample Size and Sampling Procedure	69

3.7 Methods of Data Collection	70
3.7.1 Survey Method	70
3.7.2 Key Informants Interview	71
3.7.3 Focus Group Discussion (FGDs)	71
3.7.4 Direct Observation	72
3.8 Validity and Reliability of the Instruments	72
3.8.1 Validity of the Instruments	72
3.8.2 Reliability of the Instruments.....	73
3.9 Methods of Data Analysis	74
3.10 Ethical Considerations	75
CHAPTER FOUR.....	76
EFFECTS OF CLOSURE OF FLUORSPAR MINING COMPANY ON HOUSEHOLDS' LIVELIHOOD	76
4.1 Introduction.....	76
4.2 Response Rate.....	76
4.3 Demographic Characteristics of the Respondents.....	77
4.3.1 Gender of the Respondents	77
4.3.2 Age of Respondents.....	78
4.3.3 Level of Education of the Respondents	79
4.3.4 Current Occupation of the Respondents	79
4.3.5 Marital Status	80
4.3.6 Family Size	81
4.3.7 Respondents Links to Fluorspar Mining Company.....	81
4.4 Benefits Derived by the Community from Fluorspar Mining Company	82
4.4.1 Improved Systems of Education	85
4.4.2 Improved Road Network	89
4.4.3 Construction of Rental Houses	90
4.4.4 Electrification in the Community	91
4.5 Closure of Fluorspar Mining Company and Its Effects on households' Livelihood.....	91
4.5.1 Reasons for the Closure of the Fluorspar Mining Company	91
4.5.2 Income Levels before the closure of mining company	99
4.5.3 Current average income per month	100
4.5.4 Transport Sector	103
4.5.5 Business Enterprises	106
4.5.6 Livestock Keeping.....	108
4.5.7 Health.....	108
4.5.8 Nutrition.....	114
4.5.9 Food Security	115
4.5.10 Formal Employment	116
4.5.11 Closure of the Mining Company Effect on Households Education	118
4.5.12 Household Education Level.....	119
4.5.13 Environmental challenges associated with the closure of the mining company.....	122

CHAPTER FIVE.....	136
CLOSURE OF FLUOSPAR COMPANY AND HOUSEHOLDS' LIVELIHOOD STRATEGIES.....	136
5.1 Introduction.....	136
5.2 Livelihood Strategies.....	136
5.2.1 Household Economic Needs after the Closure of the Mining Company	136
5.2.2 Livestock Keeping.....	139
5.2.3 Alternative Employment Opportunities.....	141
5.2.4 Agricultural Activities	144
5.2.5 Income-Generating Activities	149
CHAPTER SIX	158
CLOSURE OF FLUORSPAR MINING COMPANY AND ITS INFLUENCE ON GENDER RELATIONS	158
6.1 Introduction.....	158
6.2 Closure of Fluorspar Mining Company and Its Influence on Gender Relations ..	158
6.2.1 Gender Social Status.....	158
6.2.2 Current Employment status of the Households.....	159
6.2.3 Rates of Drugs Abuse after Closure of Mining Company.....	162
6.2.4 Closure of Fluorspar Company and Household Family Size	163
6.2.5 Closure of Fluorspar Mining Company and Community Participation	165
6.2.6 Different Roles for Men and Women	166
6.2.7 Changes in Socialization Processes due to absence of men at home	168
6.2.8 Gender Decision Making	169
6.2.9 Stability of Relationships between Men and Women	170
CHAPTER SEVEN.....	176
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS	176
7.1 Introduction.....	176
7.2 Summary of Findings	176
7.3 Conclusions.....	178
7.4 Recommendations	180
7.4.1 Policy Recommendations	180
7.4.2 Recommendations for Further Research	181
REFERENCES.....	182
APPENDIX I QUESTIONNAIRES	198
APPENDIX III INTERVIEW SCHEDULE.....	202
APPENDIX III INTERVIEW SCHEDULE FOR KEY INFORMANTS.....	207
APPENDIX IV FOCUS GROUP DISCUSSION GUIDE FOR COMMUNITY MEMBERS.....	208

APPENDIX V MAP OF KENYA SHOWING KEIYO SOUTH SUB COUNTY	209
APPENDIX VI RESEARCH PERMIT	210
APPENDIX VII COUNTY COMMISSIONER RESEARCH AUTHORIZATION	211
APPENDIX VIII MINISTRY OF EDUCATION RESEARCH AUTHORIZATION	212

LIST OF TABLES

Table 3.1 Target Population	69
Table 3.2 Sample Size	70
Table 4.1 Response Rate	76
Table 4.2 Age Bracket of Respondents	78
Table 4.3 Education level of Respondents	79
Table 4.4 Respondents' Current Occupation.....	80
Table 4.5 Marital Status of Respondents.....	80
Table 4.6 Family Size	81
Table 4.7 Respondents Links to Fluorspar Mining Company	82
Table 4.8 Benefits the Community used to get from the Company.....	82
Table 4.9 Household Source of Income	98
Table 4.10 Income Levels before the closure of mining company.....	99
Table 4.11 Current average income per month	100
Current average income per month.....	100
Table 4.12 Whether the current income sustain the household needs	102
Table 4.13 Place of Seeking Health Services	109
Table 4.14 Closure of the Mining Company Effect on Households Education	118
Table 4.15 Education Level.....	119
Table 4.16 School Attendance	121
Table 4.17 Environmental Challenges Associated with the Closure of the Mining Company	122
Table 5.1 Household Economic Needs after the Closure of the Mining Company.....	136
Table 6.1 Social Status Before and After the Closure of the Mining Company	159
Table 6.2 Current unemployment levels in the community	160
Table 6.3 Rates of Drugs Abuse after Closure of Mining Company	162
Table 6.4 Closure of Fluorspar Company and Household Family Size	164
Table 6.5 Closure of Fluorspar Mining Company and Community Participation.....	165
Table 6.6 Different Roles for Men and Women	166

LIST OF FIGURES

Figure 2.1 Conceptual Framework	62
Figure 3.1 Keiyo South Sub-County Map.....	66
Figure 4.1 Distribution of Respondents by Gender	77
Figure 4.2 Kenya Fluorspar Primary School Classroom.....	86
Figure 4.3 Kenya Fluorspar Primary School Library	87
Figure 4.4 Household's Sources of Livelihood	92
Figure 4.5 Flax Center.....	104
Figure 4.6 Lorries rusting away at Kimwarer trading centre in Keiyo South Sub-County following the closure of Kenya fluorspar mining company.....	105
Figure 4.7 Closure of the Mining Company and Level of Hospital Utilized	113
Source: Field Data 2019	113

LIST OF PLATES

Plate 4.1 Dangerous Open Dam..... 125

LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
ASAL	Arid and Semi-Arid Land
ASM	Artisanal and Small-Scale Mining
CARE	Cooperative for Assistance and Relief
CDF	Constituency Development Fund
CSR	Corporate Social Responsibility
FGD	Focus Group Discussion
FGT	Foster Greer and Thoebecke
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
ICT	Information and communications technology
ILO	International Labour Organization
KCM	Kenya Chamber of Mines
KVDA	Keiyo South Sub-County Development Authority
MPRDA	Mineral and Petroleum Resources Development Act
MTP	Medium-Term Plan
NACOSTI	National Commission for Science Technology and Innovation
NGOs	Non-Governmental Organizations
NHIF	National Hospital Insurance Fund
NTFP	Non-Timber Forest Product
PCENR	Parliamentary Committee on Environment and Natural Resources,
PMG	Paper Money Guaranty
SAM	Social Accounting Matrix
SARDP	Semi-Arid Rural Development Programmes

SPSS Statistical Package for Social Sciences

UIF Unemployment Insurance Fund

WHO World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Globally, livelihood assurances and sustainability are key to human survival. However, any destruction of livelihood is likely to lead to serious psychological, social, physical suffering and even death. It becomes even worse when policy intervention is not put in place in time. Despite the impressive contribution of the mining sector to national government revenue, foreign reserves and other infrastructural development, many stakeholders still argue that the adverse effects of mining erode the benefits of mining (Assan & Muhammed, 2018).

Livelihoods are understood not only in terms of income earning but also a much wider range of activities, such as gaining and retaining access to resources and opportunities, dealing with risk, negotiating social relationships within the household and managing social networks and institutions within communities (Mutemi et al., 2017). Livelihoods of rural households are diverse across regions and countries, and within countries. While some rural households rely primarily on one type of activity, most people now seek to diversify their livelihood base as a way to reduce risk (Jones, *et al*, 2014). In North America, raw mineral production is valued at approximately US\$ 70 billion. The industry employs approximately one million people in the country (Arthur, et al., 2017).

In Peru, the mining sector accounts for 50% of the country's annual export earnings. The mining industry's contribution to the Peruvian economy is represented by \$240m paid in taxes; \$400m spent on local purchases; \$280m in imported goods and accounted for over 11% of GDP (Pierola, Fernandes & Farole, 2015). In Sweden

mining companies and the surrounding mining communities face a broad range of practical challenges that provide both possibilities and obstacles when it comes to social sustainable development (Abrahamsson, et al. 2016). The mining companies and communities in Sweden, to varying degrees, share these challenges with mining companies and communities in Australia, Canada, and several other countries. For example, mining often takes place in rural districts where regional growth depends on mining (as well as forestry and steel) (Fleming & Measham, 2015).

Minatiet al. (2018) studied Livelihood strategies in Mining Region of Odisha, India and the findings showed that mining influences the livelihood strategies of local population. These strategies in livelihood system resulted in net monetary economic gain to the local population. Livelihood strategies such as artisanal and small-scale business with various transforming structures and processes such as culture influence livelihood assets which in turn help to enhance productivity within the households. The customs of the transforming structure and processes in the framework enhance or hinder people's access to an asset or resource such as owning family assets and the contribution to household income (Chowdhury, 2015). Assets' relationships with livelihood strategies illustrate that people with more assets tend to have range of options and ability to move between multiple strategies to secure their livelihoods as well as achieve positive livelihood outcomes.

In Africa, mining is a major economic activity in many Sub-Saharan countries (Andriamasinoro & Angel, 2012). However, mining as an industrial activity takes place on the natural environment, disturbing areas around where it occurs (Tom-Derry, et al., 2012). Assan and Muhammed (2018) indicated that the livelihoods of mining communities in developing countries are structured around an assortment of

agrarian activities and complementary subsistence occupations whose impact on the environment is negligible compared to mining operations. However, when mining companies displace these companies, they attempt to diversify the economy of the local people which is often unsuccessful because of lack of the requisite capacity among the indigenous people to take advantage of the formal employment opportunities resulting from the mining operations.

Even though the mining sector reforms have contributed tremendously to macro-economic gains, the associated growth has had detrimental impacts on indigenous communities in many ways such as land degradation, contamination, and chemical pollution Quarshie, (2015). Livelihoods and quality of life of the rural dwellers in Sub-Saharan Africa is affected or even controlled by a multiplicity of factors or contexts that make life for them almost a struggle for survival Mensah, (2014). These factors border on economic policies, agro-climate, environment, socio-culture, demography, infrastructure, services, governance and so forth. In South Africa, where gold is the largest mineral foreign income earner, gold mining alone contributes 27.4% in mineral revenues. The gold industry is also responsible for 56% of South Africa's mine labour force (Issifu, 2017).

In Ghana, the mining sector plays a vital role in the development of the economy. In the year 2000, minerals accounted for 38.96% of total export earnings, followed by cocoa (22.51%) and timber (9.03%) (ISSER, 2001). The mining sector now contributes 41% to Ghana's foreign exchange and is the leading foreign exchange earner. Of the \$612.9 million in total mineral export income in 1997, gold, the most important mineral, accounted for \$579.2 million, or 94.5%, while the remaining 5.4% came from diamonds, bauxite and manganese (Senadza, et al, 2015).

Mining companies have taken giant steps in reducing or mitigating the devastating effects of their activities in the communities and areas of operation by developing comprehensive strategies for dealing with the effects as well as massive investment in infrastructure such as roads, hospitals, schools, electricity, water supplies among others, as a means at least to offset some of the cost of mining activities. Although subterranean minerals are often a source or perpetuator of violence, the potential to lift the country's rural communities out of extreme poverty makes the mining industry an essential part of the nation's development strategies (Perfect, 2017).

However, the structure of mining jobs potentially discriminates against female participation (Kemp, Owen, Gotzmann & Bond, 2011). Women still struggle to achieve work-related parity, with responsibility for family and social roles. The expected traditional roles for women such as family careers or providing support remain an issue that impedes the advancement of women at various levels. For instance, at the operational level, women's jobs tend to be concentrated in administrative positions and provision of clerical or domestic services with a similar division in mine sites (Kemp et al., 2011).

In many circumstances, women participate in the mining industry on a seasonal basis or at times of particular economic difficulty (Pimpa, Moore, Gregory, & Tenni, 2015). The fairness of the recruitment, promotion, and empowerment of women in the mining industry has long been questioned. This issue was addressed by Laplonge (2018) who stated that the creation of "ideal women" in the mining industry is a part of the masculine norms. When women join the mining industry, they agree to participate in the traditional masculine, and neo-liberal practices of mining (Laplonge, 2018). They may have to adapt the traditional roles of women as approved

by the men in the industry. Their social roles, as well as professional status, will need practical movement for and by women to sustain themselves (Laplonge, 2016) and their families in the masculine environment (Laplonge, 2018). This point is firmly supported by Ey (2018) and Spence (2014) that masculine hegemony embeds in the ideology and culture of all aspects in the mining industry globally.

Kenya is one of the leading mining countries of East Africa. The current combined mineral exports from Kenya are valued at \$240 million. The sector boasts a wealth of opportunities that the national and county governments can exploit for wealth creation and the socio-economic transformation of its citizens (Mwakumanya & Mwachupa, 2018). Indeed Nguyen (2018) claimed that extractive industries do contribute to both poverty reduction and economic growth. Mining has the potential to enrich the resident's livelihood by providing them assurance to employment (Mitchell, & Shannon, 2018). Kotsadam and Tolonen (2016) observed that industrial mine openings constitute a mixed blessing for households in Sub-Saharan Africa.

However, mining also has challenges that typically arise due to mine closure. The difficulties associated with such closure revolve mainly around two issues: the rehabilitation or restoration of the environment and the dependency of the surrounding community on mining activities for employment, services, and a market for local businesses (Fourie and Brent, 2008; Stacey *et al.*, 2010). Studies by Balanay *et al* (2014) explained that the influence of mining on social dimension of households is evident in the type of health facilities and the quality of water sources accruing from income benefits of mining. The dependence on mine-related employment in local communities becomes acutely apparent when mines closure result in widespread unemployment, poor nutrition, and high crime rates and increased dependency (Pini,

et al., 2010). It is thus expected that employees who used to work in these mines should find ways of diversifying their sources of income to keep their socio-economic status stable (Chapman, et al. 2016).

While the issue has been addressed elsewhere, as pointed above, the need for country specific evidence cannot be over emphasized. For instance, the closure of mining activities and how it affects the local households depend on national institutional setup, social and cultural factors, and the presence of forward and backward linkages of the mining industry to the local economy (Vanclay et al., 2018). These dynamics may be country specific and hence results reported in one country may not carry over to another.

It is against this background that the study aimed at answering following research questions; how has the closure of fluorspar mining company affected on livelihood among households in Keiyo south sub-county Kenya? What are the livelihood strategies among households in Keiyo South Sub- County after the closure of fluorspar mining company? And to what extend has the closure of the fluorspar mining company affected gender relations among households in Keiyo south sub-county Kenya. Therefore, the study sought to examine the implications of the closure of fluorspar mining company on livelihood strategies among households in Keiyo South Sub-County.

1.2 Statement of the Problem

The establishment and existence of the mining companies are likely to create direct and indirect employment opportunities for the local population and generate prospects for starting new businesses and expanding existing ones, further contributing to poverty reduction and economic growth by enriching livelihoods. Moreover, mining

projects provides livelihood assurances and develops basic infrastructure facilities such as schools, dispensaries and recreational facilities among others in the mining areas thus replacing social dimensions of households. However, closure of fluorspar mining activities in the year 2016 which used to produce substantial tones of fluorspar mineral for export has led to social and economic challenges to local communities resulting in widespread unemployment, poor nutrition, high crime rates and increased dependency. In addition, there is need therefore to understand livelihood strategies among the communities affected by the mine closure. It becomes even worse when policy intervention is not put in place in time.

Despite closure of fluorspar mining company in Kenya, little research if any, has been done on its effect on the livelihoods of households as well as impacts of the mining activities on the environment. In view of this, the study investigated how the closure of mining companies has affected livelihoods, strategies adopted and gender relations among households in Kenya. Furthermore, the study shades light and provides information on the consequences of mining closure on livelihood, livelihood strategies and the gender relations among households within the mining area. This information provides bridge to existing knowledge gap on implications of closure of fluorspar mining company and community livelihood among households in Keiyo south sub-county Kenya.

1.3 Main objective of the Study

The main objective of the study was to investigate the implications of closure of fluorspar mining company on community livelihood among households in Keiyo south sub-county, Kenya on the closure of the Fluorspar Mining Company.

1.4 Objectives of the Study

The study was guided by the following research objectives:

- a) To evaluate the effect of the closure of fluorspar mining company and its effects on livelihoods among the households in Keiyo south sub-county Kenya.
- b) To examine the livelihood strategies among households in Keiyo south sub-county Kenya in relations to closure of fluorspar mining company.
- c) To assess the influence of closure of fluorspar mining company on gender relations among households in Keiyo south sub-county Kenya.

1.5 Research Questions

The study was guided by the following research questions:

- a) How has the closure of fluorspar mining company affected the livelihoods among the households in Keiyo South sub-county Kenya?
- b) What are the livelihood strategies among households in Keiyo South Sub-County after the closure of fluorspar mining company?
- c) How has the closure of the fluorspar mining company affected gender relation among households in Keiyo south sub-county Kenya?

1.6 Justifications of the Study

The study findings are useful for other mining industries as well as companies in coming up with livelihood strategies to surrounding communities after closure of their activities such as Webuye Pan Paper, Mumias Sugar Company and Corn Products Company among others in Kenya. In addition, the study findings contribute to existing academic knowledge on the possible consequences of closure of mining companies on livelihoods of communities.

The study findings serve as a guide in formulating further policy on mine closure, rehabilitation of the environment, and also on the various socio-economic consequences of closure on livelihoods. The study findings are informative to policy makers in private and public sectors to find ways of mitigating the possible effects of closed mining resource in Kenya and beyond. The detrimental effect of closure in the mining industry necessitates a comprehensive and a holistic approach to examine the various dimensions of mine closure geared towards alleviation of human suffering.

1.7 Scope and Limitations of the Study

The study was carried out in Keiyo South Sub- County, Elgeyo-Marakwet County, Kenya. It examined the implications of the closure of fluorspar mining company on community livelihood in Keiyo South Sub-County, Kenya. The target population of the study was 846 households and sample size of 254. The study was carried out from month of October 2018 to November 2019 confined to fluorspar mining company therefore the findings are specific to the study area. The study was conducted in a diligent process and adequate information was obtained. There are a variety of challenges that the researcher may face: First, unwillingness of the respondents to divulge any information regarding the study objectives. However, they were assured that the study is meant for educational purpose only. The study was limited to using questionnaires in collecting the information. However, a series of interviews and focus group discussion were used to get more information concerning study variables. During data collections the researcher also faced by mobility problems. The sub-county has poor transport network, terrain and accommodation. To mitigate this, the researcher used more time in the study area to cover logistics during data collection.

1.8 Definition of Terms and Operationalization of Variables

Closure of mining company This is the period of time when the core-extracting activities of a mine have ceased and exposing the communities dependent on it to socio-economic uncertainties; it is generally associated with reduced employment levels, which can have a significant negative impact on local economies.

Coping Strategies These are short term plans applied by households during crisis periods. They are heavily deployed and practiced by households to lessen and escape from the livelihood uncertainties.

Gender Relations This refers to roles and responsibilities associated with men and women that are socially determined by socio-economic status, culture, religion, or socially acceptable ways of thinking or being.

Household This refers to a person or a group of persons, related or not related, who live together in the same dwelling unit, who make common provisions for basic needs or share the same social environment, or who pool their income for the purpose of socio-economic sustainability.

Livelihood This refers to the means of securing the necessities of life. It may also comprise of capabilities, assets (material and social resources) and activities required for a means of living.

Mining The process of earth excavation to extract minerals for example coal, gold, Fluorspar among others.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 General Overview

This chapter reviews literature on closure of mining companies and their effects on livelihoods among households, closure of mining companies and the livelihood strategies among households and closure of mining companies and their influence on gender relations among households. The chapter also presents the theoretical framework and conceptual framework.

2.2 Closure of Mining Company and Effects on Livelihoods

Mines are usually closed at the end of their life cycle because of depleted resources, but may also be closed for other reasons such as economic, geological or structural reasons (Laurence, 2006). There are two types of mine closure: sudden and gradual. Sudden mine closure refers to an instantaneous decision to shut down a mine, barely giving any prior indication to the affected mining communities. On the other hand, gradual closure refers to a process in which affected communities have sufficient time to cope with their losses as well as find suitable sustenance, minimizing impact to the maximum extent possible without compromising on any decision taken on account of closure.

Gradual closure allows those who stand to lose their livelihood a window to find alternate means of sustenance even in difficult situations. While decision-making in sudden closure aims at addressing survival in the immediate present, gradual closure focuses on minimizing loss from a long-term perspective. Gradual closure, a preventive measure, is more preferable and allows for minimization of loss to a larger extent. Dowd (2005) compares both the methods by quantifying them and concludes

that the costs associated with gradual closure can be one-fifth the costs associated with sudden closure, making the former the more financially feasible option a clear case of fluorspar mining company.

Some mines close because of a number of reasons, including liquidation and legislation, or natural occurrences such as landslides and earthquakes. Temporary closure may occur because of the need for necessary care and maintenance when the mine has ceased production for various technical, environmental, financial or labour-related reasons (Swart, 2003). Unfortunately, the last stage of mining, which is mine closure, still lacks the interest or prestige surrounding the other phases (Laurence, 2006). A closure plan must be subjected to a public participation process of at least 30 days. The closure plan must address the requirements, as set out in the regulations, pertaining to the financial provision for the rehabilitation, closure and post-closure of prospecting, mining or production operations (Digby, 2016).

Mining communities are the worst affected by mine closure since they derive their livelihood directly or indirectly from the industry. Mine closure has been a challenging issue both in developed and developing countries. To ameliorate its effects, we need to have proper design, supervision, and effective implementation, especially of financial obligations. Mine closure generally left behind a legacy of polluted areas, abandoned mines and ghost towns. If not managed efficiently and effectively, mine closure may pose significant challenges to the mining industry, government, the environment, national and local economic prosperity and communities in the peripheral areas of mines (Oliveira 2016). Ineffective mine closure also impacts adversely on future generations. Mine closure, whether temporary or

permanent, is an issue that needs to be addressed with responsibility towards all stakeholders including the mining community and the labour force (Digby, 2016).

Stacey et al. (2010) indicates that when there is a closure of mining communities are not prepared beforehand for the loss of employment and ensuing poverty. Most affected mining communities suffered from shock. Both the emotional and economic spheres of the inhabitants' existence were affected. This process also impacts social structures and the economic wellbeing of a mining community. They noted that there is strong relationship between unemployment, emotional issues, and health problems such as hypertension, insomnia, and psychological maladies like depression and feelings of uncertainty. According to Botha, Van der Waldt and Ackermann (2018) the mining communities experience social changes related to job loss, for example unemployment and poverty after closure of mining company. This is because most individuals had acquired skills only for employment in the mining industry, and job creation schemes failed as well.

Globally, the mining communities also experienced social changes related to job loss, for example unemployment and poverty. Even though plans for skills development and job creation schemes were proposed in the MPRDA, in the past these interventions were not realized in time to ameliorate the consequences of closure for the mineworkers. These individuals had acquired skills only for employment in the mining industry, and job creation schemes failed as well (Botha, Van der Waldt & Ackermann, 2018). Mineworkers lose their right to housing when the mine closes. However, their dwellings are left abandoned and are then inhabited by illegal occupants. This clearly impacts negatively on the existing social structures and on the safety of the neighborhoods. Mining sites are stripped of usable metal, which is then

sold to metal recyclers. The infrastructure and facilities of the closed mine are often vandalized. Mining operations cannot re-open unless the infrastructure is rehabilitated, which would be at an extremely high cost to the new mine owner (Botha, Van der Waldt & Ackermann (2018)).

Ackermann et al. (2018) in their study on the socio-economic consequences of mine closure revealed that the closure gradually depleted the livelihood assets and resulted in the closure of their coping strategies and livelihood outcomes. The study further noted that closure of mines generally affected the communities' nutrition, health, education, food security, water, shelter, levels of community participation and personal safety. Zvarivadza, (2018) focused on a plausible option for communities' survival beyond mine closure and found that the mining companies' investments in community projects aided life after mine closure. Arondekar and Murthy (2017) in their study on the socio-economic impact of mining ban on the households in India at Goa's mining belt found that mining industry gave lucrative incomes to its dependents but its closure had a severe blow on their socio-economic characteristics. Despite The study focusing on the mining ban and socio economic, the findings did not show how the mining ban effects on the livelihood of the communities which study focused.

Haney and Shkaratan (2003) investigated mine closure and its impact on the community against the backdrop of economic transition; several countries have undertaken far-reaching programs to restructure their coal sectors. One aspect of restructuring was closure of loss making-mines, which are often located in communities where coal industry is their main employer, and significance of downsizing of the work force. Mitigation efforts that are employed at the time of mine closure (such as severance payments) are usually intended only for the laid-off

workers. Haney and Shkaratan examine the impact of mine closure on the entire community five years after mine closure in Romania, Russia, and Ukraine.

Using quantitative and qualitative research methods and based on interviews with national, regional, and local experts and members of the affected population, the authors describe the effect of mine closure and evaluate the various mitigation efforts that have been used by governments in such cases. They conclude with policy recommendations of broad relevance to programs of industrial restructuring in communities dominated by single industry. The study was informed by the use of both quantitative and qualitative research methods during data collections.

Constantine and Battye, (2015) examined Mining towns- meant bust for health services who noted that community's benefit from the mining company health instructions. However, after the closure of the mining company health facilities operations as well. Essential community services such as health, education, local government and emergency services are increasingly finding they are unable to retain and recruit workers due to wages incompatibility, housing affordability and lack of supply of personnel. The study was led by a community steering committee, including representatives from mining companies, the local council, community organizations and the state government. The project methodology included: Analysis of relevant data and literature. A review of available information was undertaken to identify and describe: the demographic and industry profile of the Isaac region, key issues impacting workforce and the delivery of health services in Moranbah and Dysart, health service plans that may impact on health service delivery in the short, medium and long term. However, the study used secondary data through analysis of relevant

data and literature while study used the primary data collected through the use of questionnaires, interviews, focus group discussion and direct observations.

Shandro, et al (2011) examined perspectives on community health issues and the mining boom bust cycle. The health of mining communities is becoming a priority for the mining industry, governments, and researchers. This study describes an exploratory qualitative study into community health issues and mining activities (associated with the mining boom–bust cycle) from the perspective of health and social service providers in the northern Canadian coal mining community of Tumbler Ridge, British Columbia. Health and social service providers report on increases in pregnancies, sexually transmitted infections, and mine related injuries during booming mine activities. During bust times, mental health issues such as depression and anxiety were reported. Overarching community health issues prominent during both boom-and-bust periods include burdens to health and social services, family stress, violence towards women, and addiction issues. This study concludes by providing recommendations as to how the industry can enhance community health made by this important stakeholder group. However, the study employed exploratory qualitative study into community health issues and mining activities while this study used both qualitative and quantitative approaches.

Veiga, et al (2001) examined mining communities. The study considered as sustainable, a mining community needs to adhere to the principles of ecological sustainability, economic vitality and social equity. These principles apply over a long-time span, covering both the life of the mine and post-mining closure. The legacy left by a mine to the community after its closure is emerging as a significant aspect of its planning. Progress towards sustainability is made when value is added to a community

with respect to these principles by the mining operation during its life cycle. This study presented a series of cases to demonstrate the diverse potential challenges to achieving a sustainable mining community.

These case studies of both new and old mining communities are drawn mainly from Canada and from locations abroad where Canadian companies are now building mines. The study concluded by considering various approaches that can foster sustainable mining communities and the role of community consultation and capacity building. Nevertheless, the study considered as sustainable, a mining community needs to adhere to the principles of ecological sustainability, economic vitality and social equity. While the study went further to understand livelihood strategies adopted after the closure of fluorspar mining company.

Ge, and Lei (2013) examined mining development, income growth and poverty alleviation. A multiplier decomposition technique applied to China Mining has grown rapidly and is expected to continue to develop solidly in the future with the economic development in China. Based on this trend, how an increase in the outputs of mining sectors affects household income and poverty alleviation is an issue worthy of study. A multiplier decomposition method within a social accounting matrix (SAM) framework shows the linkages through which a mining sector's output contributes to household income growth and poverty alleviation.

The decomposition applied to China reveals that mining development has more significantly positive impacts on the high- and middle-income household than low-income household. Moreover, the decomposition incorporated with the Foster, Greer and Thoebecke (FGT) poverty measure shows that the 'coal' sector contributes most to poverty alleviation and the low-income household group, which has the biggest

poverty rate, is the smallest beneficiary from the mining development. Thus, the policy implication is proposed that the government should give appropriate adjustment on the distribution of income between rich and poor households and help the unskilled human capital from the household group at a low-income level to handle advanced technology of mining through education and training to reduce poverty more effectively.

Oberholzer (2010) asserted that the issues surrounding these mines received extensive media attention. These issues included the non-payment of the Aurora mineworkers and the threat of a devastating environmental crisis posed by the mine water if the daily pumping of 108 000 mega litres of water from the shafts would cease. It also coincides with Esterhuizen, (2011) who asserts that the closing of the Orkney and Grootvlei mines affected an estimated 5300 mineworkers (with dependents) who lost their income. As a result, the mineworkers and their dependents were living in dire circumstances and needed humanitarian assistance. Shafts at both mines were also flooded and ransacked, which caused permanent damage. The sudden closure of these mines left the surrounding communities in a state of crisis.

World Bank (2017) reported that the low quality of education in rural areas and the outdated vocational training is likely to place some of the thousands of positions out of the reach of local residents. There is a mismatch between possible opportunities and available skills which has led to the increasing use of workers from Russia and China in the construction and mining sectors, the idleness rate of vocational school graduates is 26 percent. Bowes, et al (2009) examined Socio-economic impacts of the Nanisivik and Polaris mines, Nunavut, Canada. Nunavut has gained importance in the last few years as an area of high mineral potential with exploration leading to discoveries of

several mineral deposits that have, or will in the coming years, become mines. As a territory with an economy based in large part on government employment, new mining operations have the potential to provide Nunavut with an alternative way to develop its economy through job creation, local business opportunities, royalties, and taxes.

Mining could provide the people of Nunavut with training opportunities for various jobs that can later be used for employment with community-based businesses. Understanding the socio-economic impacts of past Arctic mining operations, such as the Polaris and Nanisivik Mines, is important if these opportunities are to become reality and if Nunavut is to benefit as much as possible from future mining operations. This qualitative study uses company and government reports and the data from 51 interviews, conducted over a 4-week period in January–February 2005 with residents of Resolute and Arctic Bay, to learn how current and future mining in Nunavut might better establish long-lasting, positive socio-economic benefits according to current sustainable development practices (Bowes-Lyon, 2006).

Conde and Billion (2017) noted that besides, in some cases in the past, the residents resisted the mining companies before the onset of the operation because they perceived those negative impacts on the environment might be caused in the future. Conflicts occurred in many cases when the proximate community was dependent on agriculture and the mining operation perceived to have impacts on water and land. One of the example cases as following. Taylor (2011) described that Vale company was preparing for a gold and copper mining operation in Condebamba Valley, Peru. The local villagers protested before the start of mining operation because negative impacts on water and land might be caused, like people had experienced in other areas

in Peru. In addition, the protestors wanted to defend the agriculture in the village for their livelihood and for future generations.

Furthermore, Moffat and Zhang, (2014) found that distrust towards the mining company and environmental impacts of a mining are some of the related factors which are the reasons for mining conflicts. In addition, they described various types of the factors that caused mining conflicts in the past such as: state related, mining companies related, local communities related and mining project related factors. The perceptions of mining's adverse effects on natural environment led to distrust and resistance. For example, mining effect on water quality and quantity caused a conflict in Peru (Bebbington and Williams, 2008). Local people resisted mining in Mongolia due to water contamination and land alteration (Beck et al., 2007; Dalaibuyan, 2012; Reeves, 2011). In Andean highlands of Peru, local residents competed for land and water (Conde and Le Billon, 2017).

Reeves (2011) noted that the mining sector remains the country's main source of environmentally harmful economic activity and it threatens to upset Mongolia's unique biodiversity, cultural heritage and traditional economic structure based on livestock herding (Sharma et al, 2015; Upton, 2012). In many areas rapid expansion of mining has occurred alongside dramatic changes in land use, water use and herder's livelihoods. Nomadic livestock herding is under serious threat by the drivers of socio-economic change brought by growing national and international interest in mining and resource development activities from bio-physical changes occurring as a result of increasing climatic variability and change. Water and land related environmental impacts of mining activities have been recorded in Mongolia.

McIntyre et al., (2016) examined a multi-disciplinary approach to understanding the impacts of mines on traditional uses of water in Northern Mongolia. Mongolia is an example of a nation where the rapidity of mining development is outpacing capacity to manage the potential land and water resources impacts. Further, Mongolia has a particular social and economic reliance on traditional uses of land and water, principally livestock herding. While some mining operations are setting high standards in protecting the natural resources surrounding the mine site, others have less incentive and capacity to do so and therefore are having adverse effects on surrounding communities. The study describes a case study of the Sharyn Gol Soum in northern Mongolia where a range of mining types, from artisanal, small-scale mining to a large coal mine, operate alongside traditional herding lifestyles. A multi-disciplinary approach is taken to observe and attribute causes to the water resources impacts in the area. Surveys of the herding household community, land use mapping, and monitoring the spatial variations in water quality indicate deterioration of water resources. Collectively, the different sources of evidence suggest that the deterioration is mainly due to small-scale gold mining. The evidence included the perception of 78% of the interviewed herders that water quality had changed due to mining; a change in the footprint of small-scale gold mining from 2.8 to 15.2 km² during the period 1999 to 2015; and pH and sulphate values in 2015 consistently outside the ranges observed at a baseline site in the same region.

It is concluded that the lack of baseline data and effective governance mechanisms are fundamental challenges that need to be addressed if Mongolia's transition to a mining economy is to be managed alongside sustainability of herder lifestyles. A multi-disciplinary approach was taken so that multiple available sources of evidence contribute to developing understanding of change and its impacts, involving the

integration of three sub-studies. Interviews with Sharyn Gol Soum herders provided qualitative information about mining impacts on hydrology and water quality. A land use change analysis based on remote-sensed (Landsat) data allowed generalizations about the expected changes in hydrology and water quality. A snapshot of the water quality variability down the river provided the third source of evidence. The integration of the social science with earth science research is necessary because understanding impacts goes beyond observing and statistically linking land use and water quality change indices. Quantitative surveys were conducted in the Sharyn Gol area to collect data on perceived changes in water resources and the level of attribution to mining or other climatic conditions. Over 70 household surveys were conducted, in 2006 and 2013. However, a multi-disciplinary approach was taken to observe and attribute causes to the water resources impacts in the area. While mixed method approach was used in the study.

Hilson (2002) did an overview of land use conflicts in mining communities. The study examined the causes and impacts of land use conflicts between large-scale mines and community groups, identify a series of (land use) conflict resolution strategies for mine management. It is becoming increasingly challenging for mines, which demand a significant amount of area to operate, to coexist with the indigenous people of surrounding communities who depend largely upon the land for their livelihoods. The article contends, however, that most of the unavoidable environmental problems that occur namely erosion, sedimentation and vegetation removal fare largely dismissed by locals, but that poor communications and highly preventable environmental accidents have been, and continue to be, the chief causes of intense land use disputes between mines and surrounding communities. As governmental intervention is often miniscule, most of the responsibility rests with mine management to ensure that land use

conflicts are effectively prevented and resolved. Whilst no de facto strategy exists that will completely satisfy both parties, quite conceivably, compromises can be reached if: community consultation between the parties is significantly improved; regional governments assume a leadership role in coordinating the efforts of international agencies; appropriate compensation packages are provided to impacted communities; and partnerships are forged between large- and small-scale miners.

In Africa, the pollution and ecological degradation caused by continual mining is a major concern. Mine water pollution is already a serious issue in South Africa. Abandoned mine shafts and illegal mining in these shafts also constitute a serious problem for mining communities. If mine dumps are not treated, particles containing hazardous chemicals are blown from the dumps. Mining houses have developed mine closure toolkits and best practices to address the issues of sustainable development and to improve the practices associated with mine closure. This is done in order to retain the social license that allows them to carry on mining adjacent to these communities in the future. Therefore, in this study its evident the closure of fluorspar mining company depleted community's livelihood and generally effect on nutrition, education, food security and community participation.

Dziro (2014) studied on community development and corporate social responsibility: A case study of mining companies in Zvishavane and Mutoko in Zimbabwe. The research attempted to find the relevance of community development and corporate social responsibility in the work of indigenization and empowerment programmes in Zimbabwe. The study was carried out in two different Districts where mining companies operate. The study employed a qualitative method in collecting data. The study then found that corporate social responsibility is influenced by the desire to

make profits and not by the philanthropic need to assist communities in their economic, social and environmental development. The research noted the need for Government to introduce mechanisms that help mining companies to use some of their profits to improve local communities like community share ownership schemes in a transparent and accountable manner to ensure that all citizens benefit despite individuals' political and economic affiliations.

This could happen through recruitment of locals with appropriate skills to avert the problems of unemployment, to motivate companies to procure some items which can be found locally as part of promoting community development as this would assist locals to improve on their lives (Dziro, 2014). One of the mechanisms would be to adhere to the requirements of the indigenization and Empowerment Act with some amendments to accommodate all stakeholders making it an all-encompassing piece of legislation which does not discriminate on colour, political affiliation, race or place of origin. However, the study employed a qualitative method in collecting data while the study went further to collect both qualitative and quantitative data which gave more in depth information on implication of closure of mining company.

Fessehaie and Morris (2013) focused value chain dynamics of Chinese copper mining in Zambia: enclave or linkage development? In order to secure supply, China has become a substantial foreign investor in the Zambian copper extractive sector acquiring control over copper mines, smelters and processing industries. The expectation is that the Chinese mines would operate as enclave operations concerned only with securing raw materials for its industrial and infrastructural needs, and promoting exports from Chinese companies.

Sugiyarti, et al (2018) who noted that education in a country life plays a very important role to ensure the survival of the state and the nation. The problems faced in getting the scholarship are parent income, parental responsibility, academic achievement, non-academic achievement. The study used C4.5 algorithm is one method of data mining to predict the selection of scholarship grantee to senior high school student seen from external factors and internal students. The test results and analysis show that the Decision Tree C4.5 algorithm is accurately applied for prediction of final grades of senior high school students with 94.7368% accuracy. More so, data collection was by conducting interviews directly with the teachers, staff or students to get input materials for the authors of this study. So, the authors can find information about school so that it can help the author to achieve the solution from (interview). However, this study C4.5 algorithm method of data mining to predict the selection of scholarship grantee to senior high school student seen from external factors and internal students. Whereas this study used interview schedule, questionnaires, focus group discussion for data collection.

Ackerman, Van der Waldt and Botha (2018) stated that all the shafts at the Grootvlei Mine in South Africa were finally closed down because of the following factors: safety risks of working with poorly maintained mining equipment, the continued non-payment of workers (after promises of pending remuneration) and the cutting off of the electricity supply to the mines because of unpaid Eskom accounts by Aurora. The research was conducted within a naturalistic domain, guided by a relativist orientation, constructivist ontology and an interpretivist epistemology. Data was collected by means of document analysis, semi-structured interviews, focus group discussion and unstructured observation. The research was conducted at the Orkney Mine and the

Grootvlei Mine (Springs). Nevertheless, the study was conducted by use of mixed methods at different place as compared to this case in Kenya.

Lawson and Bentil (2014) noted that the contribution of mining to the Ghanaian economy has been substantial. The mining sector is currently a major foreign exchange earner and contributes to long-term capital formation and fiscal payment to the state. However, the industry continues to have adverse consequences on the lives of local community dwellers, most of whom are often unprepared to deal with these impacts. Often, new mining exploration takes place on land that provides land-based livelihood to many rural people. Ironically, compensation payments seem to worsen poverty in the mining communities and bring about the social conflicts. Hence, whilst communities are highly welcoming of mining companies during exploration, they become resentful during operation of the mine. The study recommended that among others, precise channels of communication and dialogue before mining begins and during the operation of the mine, to increase awareness among community members.

Appiah and Buabe (2012) realized that gold mining activities have adversely affected livelihoods via landlessness, more in Prestea and Damang than Tarkwa, as per the proportionate representation of 41%, 33% and 26% respectively. Surface mining for instance, has claimed farmlands which are main source of livelihood and rendered many people jobless (Cottrell & Rankin, 2000), and cited in (Obara& Jenkins, 2006). Being denied access to their farmlands, they had to initiate other sources of livelihood which have not been self-sustaining. The fact is the retrenchment of many mine workers during the transition from underground mining to surface mining has made a lot of people redundant. This idea was mainly expressed by petty traders in the communities, who related this problem to the drastic reduction in their customer base.

Kitula (2006) reported that mineral exploitation involves the appropriation of lands from indigenous people and massive displacement of settlements. In rural communities, locals depend on the land as a source of livelihood.

These studies affirmed that mine opening results in a transition from agriculture to service sector employment which is often female dominated. However, the job losses from the agriculture sector far outweigh the increase in service sector employment; hence the net effect on female employment is negative. The men on the other hand find direct employment in the mining sector (Kotsadam and Tolonen, 2016).

Studies by Stacey et al., (2010), and Botha, Van der Waldt and Ackermann (2018) identified the general socio-economic consequences of mine closure for community's confusion about managing social risks. In most cases, communities were not prepared beforehand for the loss of employment and ensuing poverty. Most affected mining communities suffered from shock. Both the emotional and economic spheres of the inhabitants' existence were affected. This process also impacts social structures and the economic wellbeing of a mining community. Studies indicated a strong relationship between unemployment, emotional issues, and health problems such as hypertension, insomnia, and psychological maladies like depression and feelings of uncertainty. Participants also reported feelings of helplessness and anger.

In addition, Teschner (2013), 22 interviews were conducted with participants out of which 20 were drawn mainly from four catchment communities in the mining area, while the remaining two were with the Community Affairs Manager of Goldfields Damang and a staff member of the Ghana Chamber of Mines. These catchment communities, Damang, Koduakrom, Subri, and Huni-Valley, were selected due to their closeness to the mining company's operations, the large size of the communities

as compared to other satellite communities in the district and the benefits residents have derived from the mining company. Five interviews were with government officers and four with civil society groups. The 15 interviews conducted at the local level were split between ordinary community members, community consultative committee members, opinion leaders, youth leaders, and leaders of community-based organizations. The notion of 'sustainability' was addressed by the question that asked how the communities envision their lives five to ten years after the company leaves (Goldfields, 2016). The study used both qualitative and quantitative approach while carrying out the study.

Humphreys (2000) noted that a business perspective on community relations in mining. Community relations have in recent years become an increasingly important component of mining companies' strategic thinking. This is partly because a failure to respond to growing community activism can impose substantial costs on mining companies. It is also because the competitive environment in relation to customers, resources and the labour market is changing in ways that favour those companies which take their community relationships seriously. At the same time that community issues are having an increasing influence on mining business behaviour, so business principles are helping to shape mining companies' approach to managing their community affairs, by emphasizing rigor, reciprocity and sustainability. Further, Abuya (2018) noted that CSR activities from mining companies in developing countries, especially in Africa, have had a questionable reputation. Many views the few programs rolled out under this program as having done little in meeting the needs of the affected mining communities.

Owen and Kemp (2015) revealed that physical displacement of communities surrounding the mining area, relocation and resettlement are widely acknowledged as posing enormous social risk. Mining-induced displacement and resettlement is associated contemporary policy debates surrounding the mining industry, including 'consent', 'negotiated agreements' and overall effectiveness of existing social safeguards in regulating industry practice. Nevertheless, the study used primary source of data. Taabazuing, et al (2012) explored the impact of mining on the everyday lives of people in the Wassa West District, Western Region, Ghana. It is based on an interpretative methodology involving focus group discussions and in-depth interviews, complemented with an analysis of policy documents. The results reveal an extensive geographic transformation of livelihoods at various scales as a result of the local people being displaced from their lands that have become contested economic spaces.

Monetary compensation for farmers who have lost their lands to mining companies remains a contentious issue, with farmers reporting that they are always at the losing end of any contestation for land and compensation (Taabazuing, et al., 2012). Furthermore, the local public perception is that there is hardly any trickle down of mining benefits to the local communities to improve their lives. After more than two decades of operation of various minerals and mining laws, the findings point to a conflicting and confused mining sector policy environment that disadvantages local communities. There is therefore a need to revise the country's mining laws to reflect international best practices, to help make Ghana a sustainable mining investment destination in Africa, and to facilitate sustainable economic development in the country.

Nel, et al (2003) examined the closure of coal mines and local development responses in Coal-Rim Cluster, northern KwaZulu-Natal, South Africa. The impact of mine closure can have a devastating effect on the local economies of the towns that they once supported. Drawing on comparative, international material, this article examines the nature and effectiveness of the local economic development responses that have been initiated in the former coal-mining towns in northern KwaZulu-Natal in South Africa. Although a range of innovative locally identified strategies have been embarked upon, considerably greater effort and investment will be needed in order to catalyze significant and meaningful regeneration endeavors. Nevertheless, the study was looking at fluorspar mineral as opposed to closure of coals mine in South Africa.

Chuhan-Pole et al. (2015) examined the local socioeconomic effects of gold mining: evidence from Ghana. Ghana is experiencing its third gold rush, and this paper sheds light on the socioeconomic impacts of this rapid expansion in industrial production. The paper uses a rich data set consisting of geocoded household data combined with detailed information on gold mining activities, and conducts two types of difference-in-differences estimations that provide complementary evidence. The first is a local level analysis that identifies an economic footprint area very close to a mine; the second is a district-level analysis that captures the fiscal channel. The results indicate that men are more likely to benefit from direct employment as miners and those women are more likely to gain from indirect employment opportunities in services, although these results are imprecisely measured. Long-established households gain access to infrastructure, such as electricity and radios. Migrants living close to mines are less likely to have access to electricity and the incidence of diarrheal diseases is higher among migrant children. Overall, however, infant mortality rates decrease significantly in mining communities.

Teschner, (2014) examined “Orpaillage pays for everything”: How artisanal mining supported rural institutions following Mali's coup d'état. This study argues that during the period after the March 2012 coup d'état in Mali, rural institutions in gold-rich areas of country shifted their revenue dependence away from the state and instead drew upon a local, evolving artisanal and small-scale mining (ASM) sector. The study discusses the effects of the March 2012 coup and its aftermath on the state and how these changes trickled down to local institutions in the rural commune of Yallankoro-Soloba. During that same period, technological advances in the commune's ASM sector increased local investment and improved profitability in ASM activities. As the state withdrew financial support from the commune government and social services, local government officials, medical services, educational institutions and local populations were able to capitalize on these ASM-generated revenues.

Teschner, (2014) research finds that Mali suffers from the same ASM formalization problems as other mineral rich countries in the region. What makes Mali's situation unique is that ASM has become a critical rural industry which is not only supplying much needed income to rural people, but also serving to informally fund social institutions from the bottom up during a time of national crisis. Local government officials are stuck in limbo between the state which provides them with legitimacy and ASM which supports their communes' population and institutions. The study concludes that even as Mali begins its recovery, there are urgent needs to formalize rural ASM. If formalization actions are delayed, technological advances will make formalization even more difficult and enable institutions and local officials to become increasingly detached from the fragile central government.

In the Kenyan context, most existing literature on the influence of closure of mining activity and its consequences is far less understood. Ngetich (2015) in his study on socio-economic and environmental effects of mining in Kenya found that 55.8% reckoned that all trading and commercial ventures are dependent on fluorspar mining activities. The location of fluorspar mining company in the Keiyo South Sub-County led to the development of other infrastructural units such as clean piped water, 9 medical and 13 educational services. These helped people living in the Keiyo South Sub-County to utilize these infrastructural units. However, after closure of fluorspar mining company these infrastructural units were closed. Therefore, there is need to understand the consequences of fluorspar mining company closure to communities dependent on the resource.

In addition, Mwakwambirwa (2015) in her study on influence of mining related factors on livelihoods of resettled communities in Kenya recommended that to address the economic resource distribution, the mining company need to be compelled to ensure that it fulfills the pledges it made to the locals on the provision of employment opportunities and other services. Therefore, the study focused on livelihood strategies adopted by households in Keiyo south sub-county after the closure of the fluorspar mining company and not on relocated communities for mining as capture in previous study.

The Kenyan government recognizes that the mining sector which includes mining of fluorspar has the potential to contribute significantly to the community's and country's economic development. Currently, the sector contributes 0.8 percent to gross domestic product (GDP) per annum. The contribution to GDP is expected to increase to three (3) percent by 2017 and ten (10) percent by 2030 according to the Medium-Term Plan

(MTP) II (2013-2017). This will contribute to the targeted ten (10) percent annual growth envisaged in the Vision 2030 that will propel the country into a newly industrializing nation. However, with the closure of fluorspar mining company, the country lost contribution of the mineral to economic development. Further, the household who depend on the mining company lost their livelihood; hence this study looked at the livelihood strategies adopted after the closure.

Given the potential of the mining sector, the Ministry of Mining has prepared a comprehensive policy framework to strengthen the regulation and coordination of the sector. The Mining and Minerals Policy paves way for the preparation of a new Mining Bill that will repeal Mining Act Cap 306, The Diamond Industry Protection Act Cap 310 and the Trading in Unwrought Precious Metals Act Cap 309 and provide a more progressive and comprehensive Mining Act. The development of this Policy was done in a consultative manner with input from the Kenya Chamber of Mines, mining companies, academic and research institutions, development partners, members of the Parliamentary Committee on Environment and Natural Resources, civil society, representatives of mining communities and the general public. The Policy therefore represents the aspirations of key stakeholders in the mining sector and full implementation of the Policy will enable the realization of sustainable mineral exploration and development.

Ocansey (2013) in a study of the influx of mining companies and mining activities in many ways affected the livelihood of the people by displacement, relocation and even resettlement. The socio-economic, environment, and the lives of the inhabitants of the catchment area are adversely affected by mining activities which has led to food shortages, land degradation, water pollution, high cost of living, food price hikes and

many other factors. Dustin and McAvoy (2015) revealed that recreation planning and management based on satisfaction levels are then shown to perpetuate improvement in the quality of recreation environments themselves.

Tempelhoff (2010) noted that mining communities under investigation depended on the mine as their main source of income. The workers' salaries provided them with the opportunity to also partake in the local market. When the mines closed, they lost their ability to participate in this aspect of their livelihood strategies. Production and exchange opportunities were not a main activity, even though it was reported that the mineworkers living at the hostels-maintained vegetable gardens to sustain themselves and their families. The mine closure affected the mineworkers living in the mining town differently than those who remained at the hostels.

Gaillard and Kelman (2012) investigated closure of mining greatly affects the household. The household is resilient hence; inability to access resources indicates vulnerability of the household. Frankenberger et al. (2012) noted that food security is an extremely important aspect in any household. The need for food is almost in every case the first sign of a community's vulnerability and of a condition of poverty this condition.

Deikema (2010) asserted that lack of income and loss of cash flow excluded the mineworkers and their relatives from normal activities to which they had access prior to the mine closure. These included being able to partake in social activities such as eating at restaurants and going to places of entertainment provided by the city and municipality. Interviews with the business owners during the observation of the mining site confirmed a severe drop in the mining communities' ability to partake in these activities. The families affected by the mine closure did not even have the

finances to buy groceries and the basic personal items that they needed (Tempelhoff, 2010).

Wisner, et al (2012) noted that in order for the household not to be vulnerable, it has to have assets and resources after closure of mining company operations. Access to resources indicates that a household is resilient; hence, inability to access resources indicates vulnerability. Owen and Kemp (2018) noted that to remain at the forefront of livelihood the households must innovate through new products and technologies or alternative source of income. As modes of operating become outdated, the ability to transform business practices becomes a key determinant in the household's members. Household lost their source of income from mining company which was an economic uplift and prosperity through the construction and operational phases of mine life, contractions at project closure and relinquishment.

Tempelhoff (2010) asserted that the mineworkers' skills were restricted to the mining industry only. When the mine closed, most of these workers were unable to find work; they could not afford travelling expenses to attend a job interview or they lacked the skills and abilities required to work outside the mining industry. Approximately 1000 mineworkers stayed on at the hostels of the mine, with no food and clean water. In general, there was a feeling of hopelessness and despair among the mineworkers who did not find employment and some completely gave up on hope to find employment.

Limpitlaw (2014) noted it is a major challenge to create an economy and provide jobs for retrenched mine workers. Therefore, there is need for major financial investment and both national and county government commitment for assisting retrenched miners (Cooke & Limpitlaw, 2003). It is often difficult to identify alternative opportunities for retrenched people in dispersed rural areas (Choshi, 2001). Many mining companies

do not provide financial help for social and economic community projects, especially after closure.

Mutti et al (2012) revealed that community members believe the mines had some positive short-term impacts, but few lasting benefits. Positive economic impacts included the creation of new businesses and jobs at the mines, with resulting increased incomes; however, many of these benefits disappeared after mine closure. Positive social impacts were restricted to better education opportunities at the Nanisivik School, whereas negative impacts included increased alcohol consumption. The benefits of employment were mixed because, although employment was available to local Inuit, training was limited and did not in general lead to any certification that could be transferred to other jobs after mine closure.

Mutti et al (2012) concluded that because the benefits were not numerous and mostly did not persist after mine closure these mines did not contribute to the long-term sustainable development of the region. To increase socio-economic benefits and assist communities with fulfilling their sustainable development objectives, mining companies in Nunavut should emphasize education and training for locals and encourage local business development and partnerships, through strong relationships and close communication with involved stakeholders.

Temper, et al (2015) found out that mining leads to conflict this is due to these worldwide expansions of mineral extractions, the mining conflicts between mining companies and local communities have been increasing. While fewer than 50 conflicts were recorded annually up to year 2000, the numbers have steadily risen to 250 conflicts in 2016, which means annual case of the conflicts has increased 5 times in last 16 years. Various studies have been conducted on diverse aspects of mining

conflicts to prevent confrontations and ensure sustainable mining development and satisfaction of local people.

From the reviewed literature it was found that studies previously done focused majorly on the influence of mining closure and not livelihood strategies adopted after the closure. Mwakwambirwa (2015) focused on the influence of mining related factors on livelihoods of resettled communities in Kenya. The study recommended that to address the economic resource distribution, the mining company need to be compelled to ensure that it fulfills the pledges it made to the locals on the provision of employment opportunities and other services. However, the study results did not touch on livelihood strategies adopted by households after the closure of mining company. Therefore, this study filled the research gap by focusing on closure of fluorspar mining company and livelihood strategies among households in Keiyo south sub-county, Kenya.

Stacey et al. (2010) study results noted that there is strong relationship between closure of mining activities and unemployment, emotional issues, health problems such as hypertension, insomnia, and psychological maladies like depression and feelings of uncertainty. However, the study did not show after these relationships how will these people come up with coping strategies for their livelihood, hence the study filled the gap. Further, from reviewed literature, it was found out that previous studies done were carried out using qualitative research approach leaving the quantitative aspects. Therefore, the study used both qualitative and quantitative approach while carrying out the study.

2.3 Closure of Mining Companies and Livelihood Strategies

There is a growing awareness in the mining industry that it is imperative to plan ahead for mine closure (Laurence, 2006). This is particularly applicable to unexpected closure. Globally, codes of best practices as well as toolkits have been developed that help mining companies comply with the legal requirements of the MPRDA and the Mining Charter, as well as the goals of sustainable development (Gammon, 2002 in Stacey *et al.*, 2010).

Livelihood assets determine both the livelihood strategies a community adopts and the livelihood outcomes a community achieves. Livelihood outcomes refer to the goals the community is seeking for themselves regarding their livelihoods (DFID, 1999). Livelihood strategies and outcomes also depend on people's access to resources. Every household needs at least a minimum access to resources or livelihoods in order to be resilient when confronted by disasters. The Cooperative for Assistance and Relief (CARE) Household Livelihood Security model focuses on the basic needs of a household to obtain security for household livelihoods and is discussed consequently.

Globally sustainable livelihoods can be achieved through access to natural, economic, human, physical and social capitals or resources. Jansen *et al.* (2006) have contributed to framing the livelihoods analysis by introducing geographical determinants as a sixth fundamental factor. Soltani *et al.* (2012) argued that, beside specific assets, location has an important effect on households' livelihoods strategies. They propose dividing this location asset into infrastructures and environmental state. These assets are often combined to define different livelihoods strategies including agricultural intensification, specialization or diversification (Poufoun, 2016). Among the

numerous case-specific studies on livelihoods strategies, Soltani et al. (2012) examined poverty and forest degradation in rural areas of Zagros (Iran) accounting for location assets beside the traditional SLF approach in order to identify the most sustainable households' livelihoods strategies. They studied three continuous indices of poverty, over-grazing and over-harvesting on a stratified random sample of 79 households. They found that 64% of the households surveyed adopt mixed strategies.

Depending on available assets, households may prefer to diversify their activities as a survival strategy or safety net to cope with shocks in order to maintain or enhance their capabilities or for income motive, while, contextual effects can lead to specialization in a particular activity (Ellis, 2000b; Scoones, 1998). A range of global level studies have been focusing on the reliance on environmental income for gap-filling and as a safety net to cope with risk. Indeed, agriculture is subject to myriad risks including weather, price, pests, diseases and fire Pattanayaket Sills, (2001), and diversification activities can be seen as a way to cope with risk, in a context of lacking insurance and credit markets. Angelsen et al. (2014); Delacote (2009, 2007); Vedeld et al. (2007) and Wunder et al. (2014) are among the main researchers who pointed out the importance of environmental amenities and income for seasonal gap-filling and as rural safety net to shocks.

Wunder, Börner, Shively and Wyman (2014) found that households with poor human, natural and social capital were more likely to go to the forest after a shock; while forest extraction has limited importance for seasonal gap-filling Wunder et al., (2014). Wunder et al. (2014) found that forest income contributes between 22.2% to 27% of total households' income with large and systematic variations among regions, and that, the poor rely more heavily on subsistence products such as wood fuels and wild

foods, and on products harvested from natural areas other than forests (Nguyen et al., 2015). A similar result was found by Belcher et al. (2015) in a case study in Jharkhand (India). However, this category of households (poor households) is more likely to be trapped in common-property resources extraction activities that provide only minimum requirement. This is especially true for households with a large need of insurance.

Ibarraran, et al (2014) examined life skills, employability and training for disadvantaged youth: Evidence from a randomized evaluation design. This study presents an impact evaluation of a revamped version of the Dominican Republic's youth training program Juventud by Empleo. The study analyzes the impact of the program on traditional labor market outcomes and on outcomes related to youth behavior and life style, expectations about the future and socio-emotional skills. In terms of labor market outcomes, the program has a positive impact on job formality for men of about 17 percent and there is also a seven percent increase in monthly earnings among those employed. However, there are no overall impacts on employment rates. Regarding non-labor market outcomes, the program reduces teenage pregnancy by five percentage points in the treatment group, which is consistent with an overall increase in youth expectations about the future. The program also has a positive impact on non-cognitive skills as measured by three different scales. Scores improve between 0.08 and 0.16 standard deviations with the program.

Although Ibarraran, et al (2014) suggests that socio-emotional skills increase employability and quality of employment, the practical significance of the impacts is unclear, as there is only weak evidence that the life skills measures used are associated

to better labor market performance. This is an area of growing interest and relevance that requires further research. Random assignment was applied on a group of potential participants identified by the COS that applied to the program and met the eligibility criteria. The program received the information from the COS and verified that none of the applicants had been registered before. For each course, the COS submitted data on 35 eligible and interested young people, and the program managers at the PCU randomly selected and then divided them into two groups. The first one is formed by 20 young people who were offered the program. The second group is composed by the remaining 15 young people, who were assigned to the control group. However, the study focused on life skills leaving out the research gaps on the implication of mining company closure on livelihood strategies.

In Sub-Saharan Africa, many people are poor and rural households have adopted low-risk, immediate and low-return agricultural and other income-generating strategies (Keenan, Reams, Achard, de Freitas, Grainger & Lindquist, 2015). In the same vein, when property rights are insecure, deforestation can be seen as a risk management strategy (Pinder, Davids, Renshaw & Araújo, 2011). Small-scale agriculture is relatively inefficient, since it is based on obsolete agricultural technologies resulting to large yield gaps compared to potential agricultural production (Masters et al., 2013; Laurance et al., 2014). Environmental resources are important to millions of poor households in developing countries (Angelsen, 2011).

As pointed out by Kimengsi, Mukong and Balgah (2020), rural households develop further livelihoods strategies, beside agriculture, including forest resource extraction, hunting bush meat and/or mixing among them. In many places in the developing world, rural households adopt various sets of livelihood strategies (Damette &

Delacote, 2011). Some of them specialize in one activity, while others tend to diversify their activities portfolios. Motivations behind these choices can depend on households' characteristics, on the economic and environmental context and on preferences.

A livelihood depends on the range of capabilities and assets that the members of a household possess. External forces, such as unexpected changes affect the households, and as a result cause the households to lose assets and capabilities and thereby face greater risk and uncertainties. Further, risk leads to decline in income and is often coupled with increased demands on budgets of the households, reducing the overall income (Bhattarai 2005). But all households do not experience the risk in the same or equal measure. The impact and level of risk and uncertainties depend on the access to the resources such as type of occupation, education levels, household size and composition, social prestige, age, gender, ethnic group, among others.

Davis, et al (2010) assessed an African cross-country comparison of rural income generating activities. This study used a newly constructed cross-country database composed of comparable income aggregates to examine the full range of income generating activities carried out by rural households. The analysis paints a clear picture of multiple activities across rural space in countries on all four continents, though less so in African countries. For most countries the largest share of income stems from off-farm activities, and the largest share of households has diversified sources of income. Diversification, not specialization, is the norm. Nevertheless, agricultural sources of income remain critically important for rural livelihoods in all countries.

Coping strategies are heavily deployed and practiced by poor households to lessen and escape from the livelihood uncertainties, stress and shocks throughout the year. They may take the form of changing consumption patterns like reducing number and quality of foods or meals, postponing entertainments, among others. (Davies 1993, 1996 cited in Dercon 2001, Adams, et al (1998) uses the term coping strategies to explain the short-term strategies applied by households during crisis periods. Similarly, coping responses are made to reduce the negative impact of an external change (Bhattarai 2005).

Musaba and Bwacha (2014) assessed technical efficiency of small-scale maize production in Masaiti district, Zambia: a stochastic frontier approach. Maize is a major staple food crop of Zambia dominantly produced by smallholder farmers. The study examines technical efficiency of smallholder maize farmers in Zambia. Data were collected using a structured questionnaire administrated to 100 randomly selected smallholder maize farmers in Masaiti district in Zambia. The estimated stochastic frontier Cobb-Douglas production function showed that maize land size and fertilizer were the significant factors that affected maize production.

The efficiency analysis results indicated that farm level technical efficiency ranged between 52.2% and 93.2% with a mean of 79.6%. This indicates that overall, there is potential to increase maize production among smallholder farmers in the study area by 20.4% through efficient use of present technology. The results of the inefficiency model indicate that age of farmer, cooperative membership which implies access to fertilizer, and farm size, have significant positive effects of efficiency. The seed types used, rotation practices, and education level of the farmer had negative effects on technical efficiency. The policy implications are that to improve farm efficiency

efforts should focus on access to improved inputs such as certified seed and fertilizer), information on agronomic practices, and farmer's education. Nevertheless, data were collected using a structured questionnaire while the study used interview schedules to collect data regarding the livelihood strategies.

Headey, et al (2014) assessed diversification and development in pastoralist Ethiopia on recent droughts in the Horn of Africa had raised concerns over the viability of pastoralism. Vulnerability to drought, arguably increasing on the back of climate change and population pressures, provides a compelling justification for encouraging economic diversification. It is less clear however, which specific social or economic sectors can provide pro-poor economic transformation. The study assessed potential for diversification into both sedentary agricultural and non-farm activities in Ethiopia. We conclude that while irrigation and large farm investments do have sizeable potential to create jobs, education should be the central pillar of diversification strategies in pastoralist areas. Nevertheless, the study assessed diversification and development in pastoralist. However, this study looked at the coping strategies after the closure of mining company.

Svubure, et al (2015) examined yield gap analysis and resource footprints of Irish potato production systems in Zimbabwe. Irish potato is the third most important carbohydrate food crop in Zimbabwe after maize and wheat. In 2012, the Government of Zimbabwe declared it a strategic national food security crop. The study, examined the country's potential for increasing Irish potato yield and help ease the nation's food security challenges. The magnitude of food production increase on already existing croplands depends on the difference between the current actual yields and the potential yield of the crop in the given agro-ecological environment, also called the

yield gap. The study analysis suggests that there is opportunity to improve water, nutrients and biocides resource use efficiencies and increase potato actual yields in Zimbabwe. However, there is still research gap which was filled by the study by focusing on implication of closure of mining company on livelihoods strategies.

Zulu and Richardson (2013) examined on Charcoal, livelihoods, and poverty reduction: Evidence from sub-Saharan Africa. More than 80% of urban households in sub-Saharan Africa use charcoal as their main source of cooking energy, and the demand is likely to increase for several decades. Charcoal is also a major source of income for rural households in areas with access to urban markets. The study review studies of the socioeconomic implications of charcoal production and use, focusing holistically on the role of charcoal in poverty alleviation based on four dimensions of poverty defined by the World Bank: material deprivation, poor health and education, vulnerability and exposure to risk, and voice lessons and powerlessness. The draw conclusions from household-level studies to better understand the determinants of participation in charcoal production and sale, and of urban household demand. Poorer households are more likely to participate in the production and sale of charcoal but their participation is mainly a safety net to supplement other income.

Although charcoal production contributes to poverty reduction through alternative income-generation opportunities, it can also undermine production of ecosystem services, agricultural production, and human health. Reducing rural household dependence on charcoal requires coordinated policies providing alternative income opportunities for farmers, affordable alternative energy sources for urban households, and more efficient and sustainable approaches for producing and using charcoal (Zulu & Richardson, 2013). For future research, the study emphasizes the importance of

large-N panel datasets to better understand the net benefits of charcoal production as a poverty-reduction strategy. However, the study draws conclusions from household-level whereas the study draws conclusion from community members in coping strategies.

Abasilim, et al (2017) assessed entrepreneurship the tool for economic diversification in Nigeria. The Nigerian economy is characterized by over-dependency on oil, inadequate infrastructure, high rate of unemployment, and the consequences of these conditions. There is, therefore, a great need for diversification of the economy, especially in the face of the dwindling oil prices, falling value of Naira against other world currencies, and the call by the government for greater commitment and interest in other sectors of the economy to create an economy that will not solely depend on oil for its growth and development. Entrepreneurship is noted and globally acknowledged as one of the instruments for achieving economic growth and development as well as employment creation. In the light of the foregoing, this paper examined the processes, issues, and challenges that are involved in using entrepreneurship as a tool for massive industrialization, economic growth and development, and to reduce the dependency on oil sector.

Abasilim, et al (2017) study presents a review of related literature and concludes that poor entrepreneurship development is a major factor militating against economic diversification in Nigeria drive. The study therefore recommended that government should encourage entrepreneurship development through the provision of basic social amenities and economic infrastructure that will enable the necessary productive activities. Entrepreneurs and innovators should also be encouraged through the grant of soft loan and tax holidays.

Amone (2014) examined the phenomenon of ethnicity in Uganda with a view to underscoring the role of staple foods in ethnic identity formation and maintenance. By way of qualitative discourse, predicated on both primary and secondary sources, the paper observes that Uganda's ethnic identities emerged and are maintained by, among others, the staple foods and delicacies of the respective people in question. Although food choices are largely determined by culture, the availability of various foodstuffs is a function of diverse edaphic, topographic, and vegetative and humidity conditions across the country. Millet, cooking bananas, cassava and sweet potatoes are the major traditional foodstuffs, and members of different Uganda's ethnic identities are known by the traditional foods and delicacies they consume and how they consume them. This was phenomenological research. The discipline of phenomenology may be defined as the study of structures of experience, or consciousness. In the human sphere, this normally translates into gathering 'deep' information and perceptions through inductive, qualitative methods such as interviews, discussions and participant observation, and representing it from the perspective of the research participant(s). The study relied on interviews, narratives and observation in the territories of eight selected ethnic identities of Uganda.

Chang'ach, (2016) examined household livelihood strategies among the Keiyo in Kenya. The study demonstrated that people in all three ecological zones of Keiyo try to diversify their economic opportunities. Moreover, the study suggests that Keiyo diversify both in order to reduce risk and uncertainty and in hopes of succeeding financially and getting ahead. On the other hand, it has shown that the interaction of ecological factors has limited the economic opportunities that are available to most people in the valley, and to a lesser degree, on the escarpment. The highlands ecological zone provides the greatest opportunities for achieving economic security

and success. Usually through a combination of on-farm and off-farm activities, households are able to live more comfortably there than in the other two areas. Ironically, however, it is also in the highlands that diversification of activities becomes least essential for economic survival and prosperity. Because of the much more favorable opportunity structure there, households in the highlands do not feel as compelled to diversify their economic activities as do people who lived in the valley or on the escarpment.

Nonetheless, it demonstrated that diversification is still the most common strategy pursued in all three ecological areas. The instruments used for data collection were through in-depth interviews and focused group discussion. These methods provided data that were not possible to obtain using questionnaires. Through these methods, the researcher clarified questions that were not clear. Purposive sampling is a non-probability technique which allows the researcher to use cases that provide required information with respect to objectives of the study. In this regard, the sampled respondents provided the requisite information through in-depth interviews and focused group discussion.

Mwacharo and Drucker (2015) noted that the reasons for keeping cattle were to help in adaptive way of live. In addition to the traditional short-term coping mechanisms, the long-term adaptation strategies used include diversification of livelihood sources; livestock mobility to track forage and water resources; diversification of herd composition to benefit from the varied drought and disease tolerance, as well as fecundity of diverse livestock species; and sending children to school for formal education as a long-term investment expected to pay back through income from employment. Policies and development interventions that reduce risks, diminish

livelihood constraints, and expand opportunities for increased household resilience to drought are critical complements to the existing pastoral strategies.

McCord, et al (2015) investigated on crop diversification as a smallholder livelihood strategy within semi-arid agricultural systems near Mount Kenya. Crop diversification is one strategy that smallholder farmers may employ to reduce their vulnerability in the face of global environmental change. Diversification not only expands the number of potential crop types for market, it also improves agro ecosystem functioning by building redundancy into the agricultural system and allowing for innovation in areas exhibiting impacts of climate variability. While the driving forces behind and impacts of crop diversification have been extensively investigated, there are particular issues for the prospects of crop diversification to reduce household vulnerability within semi-arid agricultural systems. The decision to diversify crops is a particularly challenging one for farmers in semi-arid systems. Semi-arid systems can exhibit greater variability in annual precipitation in areas that are marginal for agricultural production. Changes to the timing of the growing season (onset of rains) and mid-season dry periods in particular pose significant challenges to farmers in semi-arid ecosystems.

McCord, et al (2015) examines the spatial diversification of crop types across an upland-lowland gradient on Mount Kenya's northwestern slopes. The study performed regression analyses using household-level survey data collected during the summer of 2012 to investigate the factors contributing to varying levels of crop diversification and implications for crop production in a semi-arid irrigated agricultural system. The study hypothesized that the study area locations at higher elevations will be able to grow a greater variety of crops due to climate suitability. The study analysis demonstrates that household-level income, field size, exposure to agricultural

extension officers, and suitability of environmental conditions are related to the likelihood of smallholder crop diversification.

More favorable growing conditions appear to outweigh limitations posed by inaccessibility and financial constraints, which has implications for adaptation to climate change in semi-arid ecosystems. For example, the shredding of jobs in the industrial mining industry, parallel with the lack of alternative sustainable economic activities, results in entrepreneurship and the development of livelihood strategies related to artisanal and small-scale mining. This relates to the fact that the two realities of on the one hand poor, unemployed people that did not enjoy the economic benefits of the country trying to survive in a desperate environment and on the other hand powerful multi-shareholding, wealthy individuals, rarely come together and are constantly in conflict (Smith, 2018).

From reviewed literature on closure of mining companies and livelihood strategies, previous studies majored on livelihood strategies carried out by communities. For example, the FAO (2015) report noted that in Sub-Saharan Africa, where many people are poor, rural households adopt low-risk, immediate and low-return agricultural and other income-generating strategies to fight poverty. This was not caused by closure of mining company but due to persistent poverty in the area hence households ought to look for livelihood strategies to sustain their lives.

Further, Angelsen, Larsen and Olsen (2012) noted environmental resources are important to millions of poor households in developing countries. Due to poverty, rural households develop further livelihoods strategies, beside agriculture, including forest resource extraction, hunting bush meat and/or mixing among them. Motivations behind these choices can depend on households' characteristics (education,

productivity, among others.), on the economic and environmental context (access to markets, access to land, quality of environmental resources, among others) and on preferences (profit-maximizing or safety-first approaches, among others).

This implies that there is need to fill a research gap on livelihood strategies adopted by households after closure of mining company apart from poverty and other socio-economic factors. In this study the aim of coping strategies was to save livelihood of communities surrounding the fluorspar mining company from unexpected closure of mining companies. This implies application of available resources and capital assets to deal with such livelihood uncertainties and vulnerabilities. Each individual and household varies in their ability to cope during crisis. Therefore, the study added into the existing literature on the closure of mining resource on coping strategies of households in Keiyo South Sub County.

2.4 Closure of Mining Company and Gender Relations

Gender dynamics are majorly shaped by social-cultural norms and the transition to a market economy. Qasim (2013) report indicates that 83 percent of adult women have reached secondary or higher level of education compared to 81.8 percent of their male counter parts in many parts of the world. Changes in the economy and labor market, as well as social factors such as taking care of children, doing household work and early retirement, explain the relatively lower employment rates for women. More men than women are involved in small-scale mining. Estimates and calculations of the share of women versus men in small-scale mines range from 19.4 percent women (Navch et al. 2006) to 35.3% women (World Health Organization, 2009), 40-45% women (ADB 2010) and 45-50% women (Bjerregaard 2009).

For women working in the mining sector, there are disparities in access to types of employment. Women's participation in the large-scale mining sector is low, whilst in the Artisanal and small-scale mining sector women's participation may be greater but they often occupy risky and low value roles. While there are cross-cutting challenges for women in mining generally, it is also necessary to make a clear distinction between large-scale, industrial mining and artisanal and small-scale mining (ASM). ASM activities are largely informal and characterized by low-tech, labor-intensive operations. Making a clear distinction between the two sectors is in recognition of the issues specific to each sector, as well as the great variation within and between them in terms of the types of mining and roles undertaken by both women and men.

Furthermore, given that ASM is a largely poverty-driven activity, there is a significant difference in the varying social and economic backgrounds of the people working in both sectors, in turn influence their participation and daily experiences. The distinction is also in keeping with the wider literature on ASM that has consistently argued for tailored policy and legislation, where appropriate, to support and priorities the formalization of the sector.

Furthermore, as the main caregivers, women are often accompanied to the mine site by their children. Discriminatory practices around land ownership and customary practices concerning women in mining may also act as a barrier in some countries. These factors can act to hinder women from being able to easily gain a license, sell or rent their land for mining, as well as preventing them from working in certain roles.

Lahiri-Dutt (2006) in a study on gendered livelihoods in small mines and quarries in India: noted that the proportion of women among the workers in the small mines and quarries varies from country to country, according to location, nature and value of the mineral, processing techniques used, marketing systems, local social milieu, availability of alternative occupations and other factors. In the actual mining jobs, panning, processing, transportation and related jobs on the fields, the percentage of women participating varies from a low of 10% to a high of 50%. The numbers have increased with the rise in the number of quarries, and decline in alternative occupations. Given the seasonality of these jobs, insecurity and low wages, and the global trend of 'feminisation', 'informalization' and casualization of women's labour, it can safely be assumed that the work participation of women in the ASM will also rise.

Hinton et al. (2003) noted that the key factors in determining gender roles and status of women in Asia's small mines include 'women's and men's access to and control of, resources; their ability to attain knowledge of resources, their decision-making capacity or political power; and beliefs or attitudes that support or impede the transformation of gender roles.

Colfer, et al (2015) findings establish a baseline on gender and governance in five communities with landscapes that include forestry, agroforestry, and agriculture: Bonto Tappalang and Tana Toa in South Sulawesi, and Tawanga, Ladongi, and Wonua Hua in Southeast Sulawesi. These indicators, which we complement with ethnographic insights, fall into two categories: level of public involvement and skills relevant for political action, each of which is assessed for both women and men.

The study findings reflect what we believe to be a comparatively equitable gender situation in Sulawesi, with hopeful prospects for enhancing women's (and men's) public involvement in governance. The study concludes with some practical and ethnographically informed suggestions for enhancing collaboration with women and men in these (and similar) communities. Villamor, et al (2014) attested inequity between men and women in terms of access to decision making relating to resource management, land use, mine resources and climate change negotiations. In many parts of the world, women have a relatively limited level of involvement in resource management in general. Despite the increase in the participation of women at international climate summits, policy forums, and in forest resource negotiations, women's voices in the decision process at local and national levels remains limited as depicted in Keiyo south sub-county where majority of women are treated unfairly due

to cultural values in the society that limits their decision-making processes in the households.

Morgan (2017) examined women, gender and protest: contesting oil palm plantation expansion in Indonesia. The study found that the conditions that lead to the participation of rural women in protest. Drawing from a case study in Indonesia, it finds that gender relations are integral to shaping the motivations and political opportunities that lead to women's decisions to participate in protests around land. It also argues that gender relations are not fixed. Individual actors play an influential role in opening up new political opportunities for women, who are discursively cast as apolitical. Despite dominant gender relations that tend to exclude women from politics, the presence of women in protest opens up the possibility that rural struggles around land and dispossession, though ostensibly free of explicit gender concerns, may simultaneously serve as sites of struggle over gender as well.

Duffy (2015) revealed that an often long and arduous journey amidst the complexity of loss of livelihood which led to family separation and remarrying. As with many people living on a low income, they incorporated creative strategies to survive and enhance their own and their children's quality of life. International Labour Organization (ILO) surveys have found that 70-82 percent of the children involved in mining and mining support services may be boys (IPEC 2007; Navch et al. 2006). However, in some places, the proportion of girls to boys is almost the same or even higher.

On average, male gold miners tend to be younger than female gold miners (Navch et al. 2006; UNFPA/School of public Health 2007). Male gold miners are more likely than female gold miners to be single, while female gold miner are relatively more

likely to be married (UNFPA/and School of public Health 2007). On average, female gold miners tend to be slightly higher educated than male gold miners (UNFPA/School of public Health 2007). In this study gender relation shows how both male and female gold miners are likely to have social life, economic activities and their marriage status. The study therefore shaded light on the influence of mining on gender relations among households in Keiyo South Sub-County.

In many African countries, women are rarely, if ever, found working mining or may be considered less able to perform the same work as men. Furthermore, ASM is a hazardous occupation with additional and unique health and safety risks for women. For example, there are often few, if any, sanitary facilities at mine sites specifically for women or care provisions for children. Women and girls who work and live in ASM communities are also less likely to complete formal education and are at greater risk of sexual exploitation.

Siyongwana and Shabalala (2019) examined the socio-economic impacts of mine closure on local communities: evidence from Mpumalanga Province in South Africa. The study found both negative and positive impacts of mine closure and the coping strategies. The negative socio-economic impacts of mine closure included: rise in poverty, deterioration of living standards, increase in outward migration, emergence of crime and diseases, decline in the provision of services, reduction in employment opportunities in the mine and second-order employment, loss of foreign exchange, limited money circulation, reduction of buying power and in the payment of rates by the community.

The positive impacts of mine closure included: an increase in government initiatives aimed at helping the community, strong social cohesion of the local people and a

focus on agriculture in the area. The coping strategies of the host community following the mine closure comprise of dependence on severance packages, support from relatives, finding jobs elsewhere, practicing agriculture, and engagement in the informal sector. The study's significance lies in highlighting the need for proper planning, in order to ease the diverse socio-economic impacts following the closure of the mines. Nevertheless, this study investigates the socio-economic impacts and coping strategies adopted by the local community of Pilgrim's Rest in Mpumalanga following the closure of the gold mine. However, this study brings out the geographical research gap because it was carried out in Pilgrim's Rest in Mpumalanga and none of the same study has been carried out in Keiyo south sub-county Kenya.

Ackermann, et al (2018) assessed potential socio-economic consequences of mine closure. The research was conducted at the Orkney Mine and the Grootvlei Mine (Springs). From the research findings, it is evident that mine closure, in general, have a devastating effect on the surrounding mining communities as well as on the employees. Mine closure in the case studies gradually depleted the mining communities' livelihood assets and resulted in the collapse of their coping strategies and livelihood outcomes. It generally affected the communities' nutrition, health, education, food security, water, shelter, levels of community participation and personal safety. If not managed efficiently and effectively, mine closure may pose significant challenges to the mining industry, government, the environment, national and local economic prosperity and communities in the peripheral areas of mines. This truly amplifies that mine closure, whether temporary or permanent, is an issue that needs to be addressed with responsibility towards all stakeholders, including the mining community and the labour force.

Mwakwambirwa (2015) in a study found out that increasing household family sizes due to diminished livelihood may place pressure on relocation housing; young people may demand an equivalent dwelling when they marry. Households are increasing in size because of the emerging downfall of livelihoods. The increase in household size is significant because it could have implications for household economic status and high dependence ratio due diminished sources of livelihood. These demographic changes may reflect more fundamental societal changes such as reduced industrialization and rising living standards (especially for youths).

Sharma and Bhatnagar (2014) noted that in occupational communities, people must have the means to survive and prosper, either in the same place or elsewhere, once mining ceases. Issues such as the transfer of skills and future employment must therefore be addressed. In residential communities, minimizing the environmental footprint of mining will be a priority, and thus access to information about potential impacts as well as the power to influence decisions will be important.

Anderson et al. (2013) argued that strategic research and innovation agenda for the mining industry have important links with gender inequality, efficient use of resources, attractiveness and sustainable growth. The study also concurs with Lahiri-Dutt (2013) who noted that women do not own mines or land where mining activities take place. The study also agrees with Anderson (2012) who describes two types of men; a few outspoken men who think that gender equality has gone too far and a large group of men who think that gender equality is important and benefits everyone at the time economic crisis like sudden loss of livelihood as a result of mine closure.

The instruments used for data collection were through in-depth interviews and focused group discussion. These methods provided data that were not possible to obtain using

questionnaires. Through these methods, the researcher clarified questions that were not clear. Purposive sampling is a non-probability technique which allows the researcher to use cases that provide required information with respect to objectives of the study. In this regard, the sampled respondents provided the requisite information through in-depth interviews and focused group discussion.

Deikema (2010) noted that there is high depression and feelings of hopelessness among households affected by the closure of mining activities. These feelings of hopelessness have led to emergence of substance abuse, domestic violence and divorce escalated. A number of suicides, suicide attempts and attempted family murders were reported after the mine closure. From previous studies on closure of mining company and gender relations it was found out that they majored on the ratio of men and women in mining sector employment. For example, the UNDP Human Development Report (2013) report indicates more men than women are involved in small-scale mining. It further revealed that for women working in the mining sector, there are disparities in access to types of employment. These studies finding leave a research gap on how closure of mining company affect the gender relation.

Mwakwambirwa (2015) noted that households are increasing in size because of the emerging downfall of livelihoods. The increase in household size is significant because it could have implications for household economic status and high dependence ratio due diminished sources of livelihood. However, the study did not mention on what was the cause of downfall of livelihoods among households. The study also did not focus on the closure of mining company and how does it affect the gender relation which this study filled. Some studies focused on gender and own ship of mining sites, for example the Lahiri-Dutt (2013) noted that women do not own

mines or land where mining activities take place. Therefore, a research gap created on influence of closure of Fluorspar mining company on gender relations among households in Keiyo South Sub- County Kenya.

2.5 Theoretical Framework

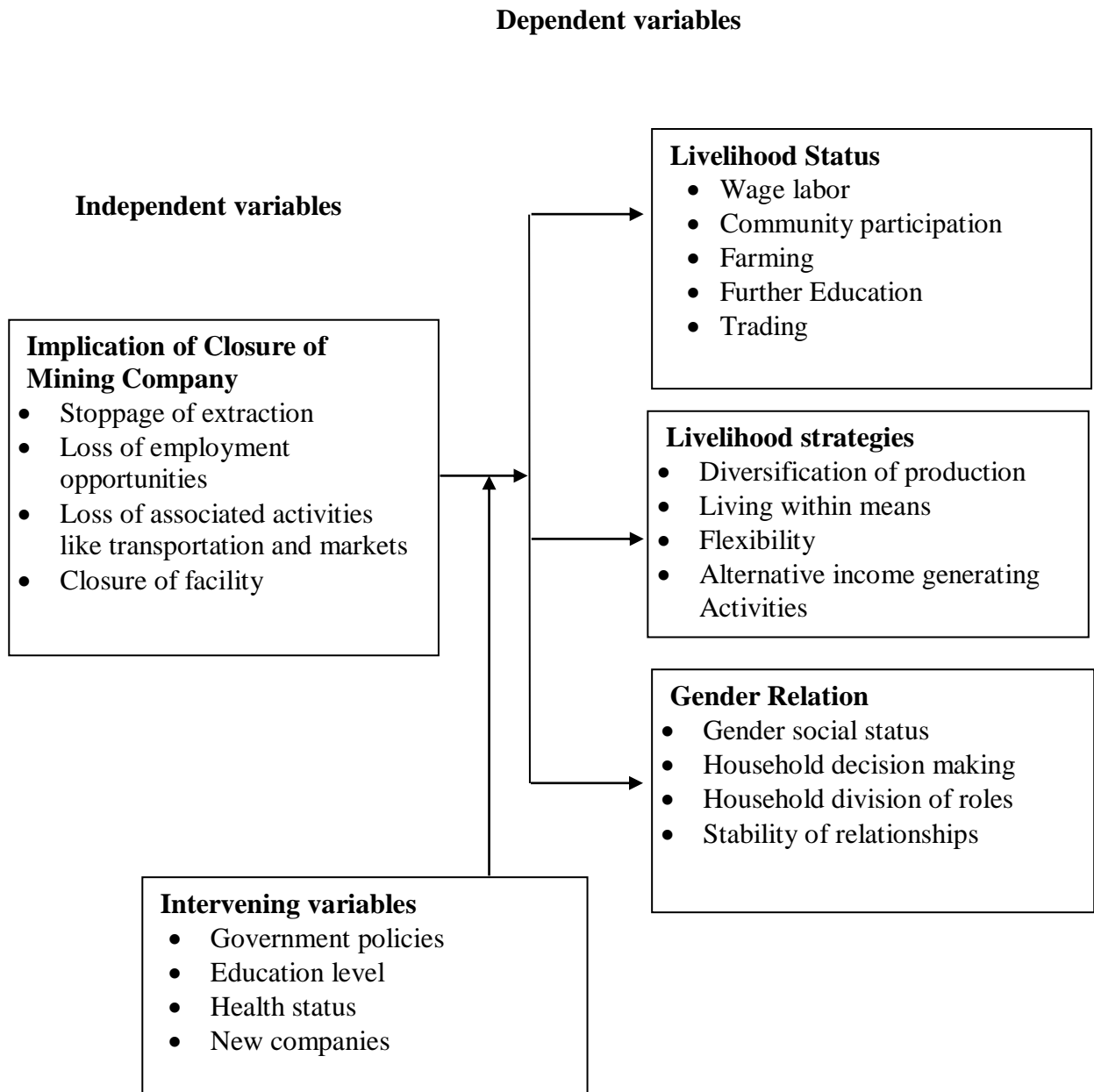
This study adopted the theory of Redefinition of the Situation by Thomas and Swaine (1928). According to the theory human beings start with the way they are and when they find that they are not comfortable, they change their cognition, their attitude and finally their behaviour. The theory came up with the four wishes: - the wish to see some new experience happen; the desire for security; the desire for recognition; and the wish for response within a given situation.

The wishes are part of desires to secure their livelihood. These decisions like looking for alternative sources of livelihoods have to do with redefinition their situation. According to William Thomas, People redefine their situation when there is a crisis. It means that ceased or closure of the fluorspar mining company as a source of livelihood resulted into new ways of behaviour action to fit in to a new mode of life in absence of the mining firm. This applies to households and communities in Keiyo South Sub-County who lost their sources of livelihoods. The communities around the mining resource have to contain with certain changes, for examples looking for alternative sources of their livelihood. The usual source of livelihood has undergone some disruption and the communities surrounding the mining resource are forced to look for alternative ways to adapt to the situation. The current situation may come with possible changes of loss of income due to collapse businesses, loss of employment, re- adjustment of household roles, and social participation on community activities.

The communities in Keiyo South Sub-County re-orientated themselves to adjust to the new situation by adopting coping strategies. These coping strategies helped them meet their necessities of life such as capabilities, assets (material and social resources) and activities required for a means of living. The theory of Redefinition of the situation explained how the communities in the study had to redefine their situations by looking for alternative means of meeting the daily basic needs within households. The households' decision making may also have to undergo some re-definition in terms of gender relations within families. Men find themselves in a situation where the traditional African societies prescribed roles are interfered with in provision of support system in terms of social institutional adjustments to enhance sustainable livelihoods.

2.6 Conceptual Framework

The conceptual framework in Figure 2.1 below illustrates the relationship between the dependent and the independent variables.



Source: Author (2021)

Figure 2.1 Conceptual Framework

The independent variable of the study is the closure of the fluorspar mining in Keiyo South Sub-County while the dependent variable of the study was the livelihood strategies among households. The relevance of this conceptual framework lies in the recognition that closure of fluorspar mining has an impact on livelihoods and gender relations among households. Closure of the mining company in Keiyo South sub-County means sudden or gradual stoppage of extractions of fluorspar mineral with plans or unplanned closure. The closure of the mining company may result to immediate loss of employment opportunities among the employees and surrounding communities who may be in one way or the other fully dependent on the operations of such companies. This may also mean the loss of associated mining activities such as those engaging in income generating activities in form of transportation, small businesses in small markets surrounding the mining companies among others.

Similarly, closure of mining company could be temporary closure while others may be due to diminished mineral, land utility issues leading to permanent closure of the mining facility ceasing any operations within its premises. The closure of the mining company could have an effect on livelihoods especially those who fully dependent on the company for day today living. In other words, it may affect the wages of individuals and communities in terms of sources of income which in turn affect their participation community processes of engagements such as traditional ceremonies, weddings, community-based organizations among others. The closure of the company could also bring about reduced farming activities due to loss of substantive inputs as well as reduced markets for farm produce. Sudden loss of economic resource derails aspects of furthering education, expansive health services and doing business to majority of households.

Moreover, closure of the mining company calls for certain measures and strategies as a means of securing livelihood. Communities affected by the closure being a dependable resource could engage in diversification of production for example greater resilience to food varieties. It may also lead to change of lifestyles and living within means. This will reduce financial burden in buying of market foods which may be out of reach to many poor households. Families may decide to reduce their expenditure on health and education, pulling children out of private schools to public schools among other life adjustments. Other forms of livelihood strategies could be engaging in alternative income generating activities such as horticulture, charcoal burning business, rearing of goats and sheep among others.

Closure of the mining company could further lead to social change in terms of gender relations among households. This phenomenon may be attributed to survival tactics among couples in order to maintain their social status in society. Men for example could engage in alternative income generating activities by trading on horticultural produce and milk products which was initially the preserve of women. This re-orientation is geared to maintaining the patriarchal nature as head of household in terms of decision making, division of labor and power sharing in the household.

In addition, the closure of the mining company may be intervened by government policies in terms of land use, environmental policies, average time for operational permits and other necessary approvals needed for mines to operate. Intervention on education and health could be former employee's possession of qualifications and experiences that leads to employment in other organizations.

CHAPTER THREE

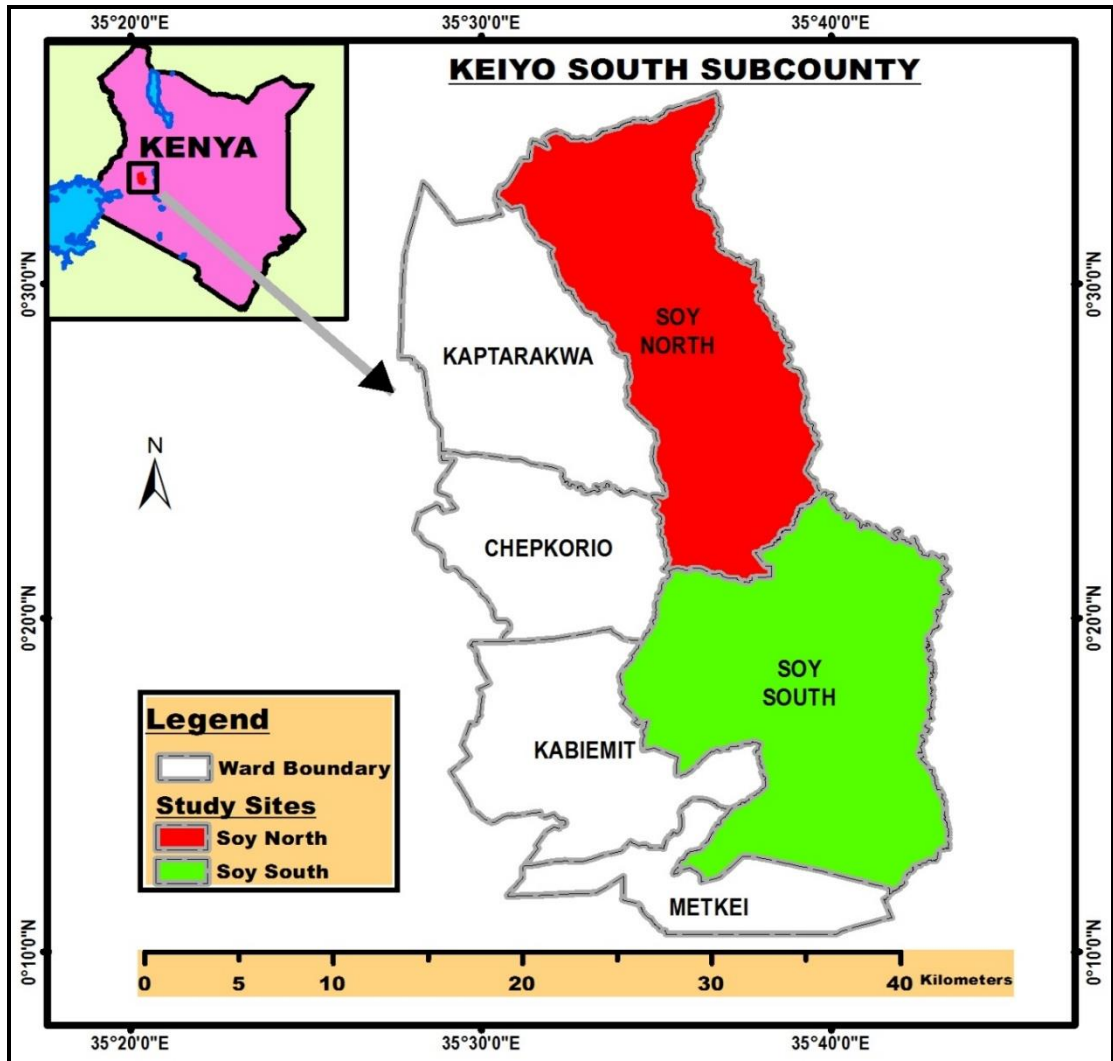
RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides a philosophical orientation that guided this study, the methodology that was followed when carrying out the study. Specifically, the research design, study area, target population, sample size, and sampling procedures are discussed. Methods of data collection and instruments, data analysis, procedures, presentation and ethical considerations.

3.2 Study Area

The study was carried out in Keiyo South Sub County, Elgeyo Marakwet County, Kenya. Keiyo South Sub County is situated in North Rift Region and is one of the Sub Counties in Elgeyo/ Marakwet County. It borders Ainabkoi Sub County to the West, Baringo Central to the East, Eldama Ravine to the South, and Keiyo North to the North. The Sub- County is divided into six wards; Chepkorio, Kaptarakwa, Metkei, Kabiemit, Soy North, and Soy South. The Sub- County office is 42km from Eldoret Town along Kaptagat–Eldama Ravine Road (see map on pg. 70). Local people are mostly of the Sub- Keiyo Tribe. The main economic activities include livestock and subsistence farming, and small business. It is endowed with arable land, waters from River Kerio and Fluorspar at Kimwarer, which has since been closed (Kipchumba, 2019). Mining fluorite by the Kenya Fluorspar Company was the largest industry in the former district before its closure.



Source: Author (2021)

Figure 3.1 Keiyo South Sub-County Map

3.3 Research Paradigm

A research paradigm is a strategy of action that links methodology to research outcomes. Paradigms are worldviews or belief systems that are a reflection of and guide the decisions that researchers make. The pragmatism philosophy informed this study. Pragmatists link the choice of approach directly to the purpose and the nature of the research questions posed (Creswell, 2012).

This research adopted a pragmatist design as it allows for the combination of both qualitative and quantitative strategies within various phases of the research procedure (Tashakkori & Teddlie, 2003). Pragmatist mainly emphasizes the 'what' and 'how' of the study problem, (Creswell, 2003). In addition, pragmatism is perceived as a model that gives the fundamental theoretical framework for mixed research methodologies (Somekh & Lewin, 2005; Tashakkori & Teddlie, 2003). This paradigm was considered appropriate for this study since the research was anchored on qualitative and quantitative techniques.

Also, pragmatism is normally considered as the theoretical partner for the mixed methods research approach. It provides a set of expectations about knowledge and inquiry that supports the mixed methods research strategy and which differentiates the strategy from purely quantitative strategies that are based on a philosophy of post positivism and purely qualitative strategies that are underpinned on a philosophy of interpretivism or constructivism (Denscombe, 2008).

3.4 Research Design

Burns and Grove (2016) define research design as a blueprint for conducting a study with maximum control over factors that may interfere with the findings' validity. The study employed mixed approach design which entailed exploratory design and descriptive survey. Exploratory research design was adopted in this study to gather qualitative data using key informant interviews, focus groups and direct observations. Qualitative data consists of open-ended questions that the researcher uses to gather in-depth. The qualitative data analysis (words, text, or behaviors) typically follows the path of aggregating it into categories of information (themes) and presenting the diversity of ideas gathered during data collection. The design enabled in-depth understanding and corroboration while offsetting the weaknesses inherent to using each approach by itself.

Descriptive survey design allowed the collection of quantitative data. The method enables the collection of quantifiable information to be used for statistical analysis of the population sample. The design also allows the researcher to describe the research problem adequately. Descriptive survey research design allowed the use of questionnaires on getting a sense of implications of the closure of fluorspar mining company on community livelihood in Keiyo South Sub-County, Kenya. The researcher was able to judge the implication of closure of fluorspar the mining company and then accurately presented the findings. Quantitative data includes close-ended questions. This data analysis consists of analyzing scores collected on instruments (questionnaires) to answer research questions. The study gathered both qualitative and quantitative data from the field. However, qualitative data were majorly derived since the researcher's interest was on narratives from the respondents to better understand the implications of the closure of the mining company.

3.5 Unit of Analysis

The unit of analysis for the study was the households. The head of household was interviewed to provide the household's information.

3.6 Target Population and Sample Selection

3.6.1 Target Population

This study's target population was all households' heads in Keiyo south sub-county who were in close proximity to the mining company and were mostly affected by its closure. Therefore, the study targeted two wards (479 households in Soy North and 367 household heads in Soy South) with a total population of 846 households sparsely populated. This was contributed by the fact that the area is an ASAL region.

Table 3.1 Target Population

Ward	Target Population
Soy North	479
Soy South	367
Total	846

Source: Keiyo South Sub-County Records (2018)

3.6.2 Sample Size and Sampling Procedure

The target population of this study consisted of 846 households. Therefore, the study used 30% of the target population to derive the sample size of 254. According to Kerlinger (1973), 10-30% of the target population forms a representative sample. A multistage sampling technique was used in this study. Firstly, the researcher purposively selected two wards from the six wards in Keiyo South Sub- County. The main goal of purposive sampling was to focus on particular characteristics of a population of interest, which best enabled one to answer the research questions. Cluster sampling was used to select the villages from the two selected wards forming

31 clusters. Proportionate sampling was used to get the number of households to be selected from each cluster.

The researcher used a simple random sampling to select households for study from each cluster, giving equal chances of being selected. Further, simple random sampling was used to select the household's heads in reference to the respective number in each cluster. This enabled the researcher to achieve the sample size desired in a relatively fast and in an inexpensive way. The two selected wards (Soy North and Soy South) were those mostly affected by the closure of the mining company.

Table 3.2 Sample Size

Ward	Sampling Distribution	Sample Size
Soy North	479×0.3	144
Soy South	367×0.3	110
Total	846×0.3	254

3.7 Methods of Data Collection

The study used both qualitative and quantitative methods to collect data. The method was utilized because such integration permits a more complete and synergistic utilization of data than do separate quantitative and qualitative data collection and analysis. This took considerations of the sampling techniques which were appropriate for the study. The data collection methods used by the study include; survey interviews, key informant interviews, focus group discussions and direct observations.

3.7.1 Survey Method

The study used survey interviews as the main method of data collection. This was because the surveys helped the researcher to describe the characteristics of a large population, which provided the broad capability and ensured a more accurate sample

for gathering targeted findings, which helped make conclusion and recommendations. The study also used researcher administered questionnaires as a tool to collect information from the 254 households in Keiyo-South Sub- County. The questionnaires consisted of structured and unstructured questions in the form of close and open-ended questions based on the research's purpose. This questionnaire allowed the researcher to collect both qualitative and quantitative data.

3.7.2 Key Informants Interview

This study's key informants were former five human resource managers, three transport managers, two area chiefs, and eight village elders. Using the interview schedule Key Informants gave in-depth information concerning livelihood strategies among households in Keiyo South Sub-County, Elgeyo Marakwet, after the closure of fluorspar mining. The schedules consisted of structured and unstructured questions in the form of open-ended questions based on the set objectives. The interview guide offered the researcher the opportunity to interact face to face with respondents.

3.7.3 Focus Group Discussion (FGDs)

Focus Group Discussion (FGD) was used to gather qualitative information from the seven community members in every village; this meant that the researcher held eight FGDs to cover the study area. FGD was conducted with the help of eight area chiefs and thirty-one village elders who organized for meetings where the researcher conducted the FGD. Area chiefs and village elders were briefed about the study early enough to call for the meetings per village on different days. The discussions were recorded using audio recording and used in the analysis. FGD is applauded and widely used mainly because of its strength of convenience, economic advantage, high face

validity, and speedy results. In addition, focus groups were used to generate information on collective views and to gather meanings behind those views in depth.

3.7.4 Direct Observation

The researcher also engaged in direct observation. The researcher maintained a constant presence, carefully watching and recording events, activities, and other interest phenomena for the study. The observation was done during visits to villages and households in the study area. The data collected using observation was on the effect of the closure of the physical mining environment, socio-economic activities, and infrastructure status in the area. The main purpose was to get a real picture of the effect of the mining closure and strategies employed by the households.

3.8 Validity and Reliability of the Instruments

3.8.1 Validity of the Instruments

Validity was geared to give the extent to which an instrument measures what is thought to have measured (Polit & Beck, 2004). The validation of instruments involved face and content validity. Face validity of the instruments was to ascertain if it measured the right concept under study while the content validity provided sampling capabilities of the concept to be measured (Polit & Beck, 2004)

The research tools were subjected to critical evaluation by the supervisors, followed by the researcher's pilot study to determine if the schedules yielded the expected information. The researcher conducted interviews in 30 households that were purposively selected in a study area different from that where the actual data collection was done.

3.8.2 Reliability of the Instruments

According to Brink (2000), reliability refers to the probability of gaining similar results when a similar variable is measured more than once or when more than one individual measure the same variable. Reliability is the ability of that test to consistently yield the same results when repeated measurements are taken of the same individual under the same conditions (Koul,1993). Reliability is in principle, another researcher, or the same researcher on another occasion should be able to replicate the original piece of research and achieve comparable concerned with consistency in the production of the results and refers to the requirement that, at least evidence or results, with the similar or same study population. This study tested internal consistency reliability.

Sijtsma (2009) defined internal consistency as the extent to which all of the test items measure the same construct, that is, the general factor saturation. The reliability of the instrument was tested through the use of the Cronbach Alpha value. That is, to establish the reliability of the questionnaire. Cronbach alpha coefficients are reported as an indication of the construct reliability of the measuring instruments. Values range from 0 to 1, with higher values indicating greater reliability. Alpha coefficient of; below 0.60 is unacceptable, between .60 and .65 undesirable, between .65 and .70 minimally acceptable, between .70 and .80 respectable between .80 and .90 very good, > 0.90 is considered perfect. However, if Cronbach Co-efficient alpha of $\alpha = 0.70$ is obtained, then it indicates that the research instruments are reliable and therefore can be adopted for data collection.

Cronbach's alpha coefficient measures the internal coefficients of the instrument as follows;

$$\alpha = \frac{N \times C}{V + (N-1) \times C}$$

Where;

α - internal consistency; C -average covariance;

N - Number of items and is V —average variance.

The researcher computed internal consistency of data after piloting the research instruments in the Kabiemit ward, which was not part of the study area but had characteristics similar to the study area. After a pilot study, the collected data were coded to SPSS software to run Cronbach Alpha. If the Cronbach Alpha value is above 0.7, this indicates that the research instruments are reliable. However, if the Cronbach Alpha value is less than 0.7, then have an implication that the research instruments are not reliable; hence the researcher should readjust them before going for main data collection. The Cronbach Alpha value for this study was 0.853.

3.9 Methods of Data Analysis

The collected data was be analyzed using both quantitative and qualitative methods. Quantitative analysis entailed the use of descriptive statistics, such as percentages and frequency distribution tables. The qualitative analysis involved narrations and descriptions of data collected from the interview guides, key informant interviews and focus group discussions. This involved identifying major themes emerging from the data collected and relating them to the research objectives. The thematic analysis emphasizes pinpoints, examines and records the themes within the collected data. Themes and patterns across data set a basis that is important to the descriptions of a phenomenon associated with specific research questions. Qualitative data was presented by using themes denoted by narrations and tabulations on responses in verbal form and pictures found in the area of study.

3.10 Ethical Considerations

Ethical considerations are the most important parts of the research. The researcher obtained research permits from the National Commission for Science Technology and Innovation (NACOSTI) and County Commissioner's Office and Education Ministry in Keiyo-South Sub-County. The confidentiality of participants in the study was strictly adhered to throughout, following the study and finally, the publication of the findings. The researcher also sought permission from the respondents and the key informants just before embarking on the interview. This was achieved through informed consent to participants. The researcher also kept the information given with confidentiality, of which the respondents did not feel threatened. Consent for household members participating in the study was sought verbally during data collection. The results of the study were provided to relevant authorities and the interested participants.

CHAPTER FOUR

EFFECTS OF CLOSURE OF FLUORSPAR MINING COMPANY ON

HOUSEHOLDS' LIVELIHOOD

4.1 Introduction

This chapter presents the study findings and discussions based on study objective one. The section covered in this chapter include respondents' response rate, demographic characteristics, fluorspar mining company benefits to the community, closure of fluorspar mining company and its effects on households' livelihood.

4.2 Response Rate

Response rate equals the number of people with whom semi-structured questionnaires were properly completed divided by the total number of people in the entire sample (Fowler, 2004). The results of response rate are presented in Table 4.1.

Table 4.1 Response Rate

Response Rate	Frequency	Percentage
Responded	205	80.7
Not responded	49	19.3
Total	254	100.0

The study administered 254 questionnaires for data collection. However, 205 questionnaires were properly filled and returned. This represented 80.7 percent overall successful response rates. The 80.7 percent response rate was attributed to the use of researcher administered questionnaires. Respondents were also assured of confidentiality of the information provided. Babbie (1990) suggested that a response rate of 50% is adequate 60% is good and 70% and above very good for analysis. Chen (1996) argued that the larger the response rate, the smaller the non-response error. This implies that 80.7 percent response rate was very appropriate for data analysis.

4.3 Demographic Characteristics of the Respondents

This study's demographic characteristics provided information that gives the readers a quick idea about a category of people who took part in the research. The study obtained the subject's responses on gender, age, education level, current occupation, marital status, family size and connection with the fluorspar mining company.

4.3.1 Gender of the Respondents

The respondents were requested to indicate their gender and results are presented in Figure 4.1.

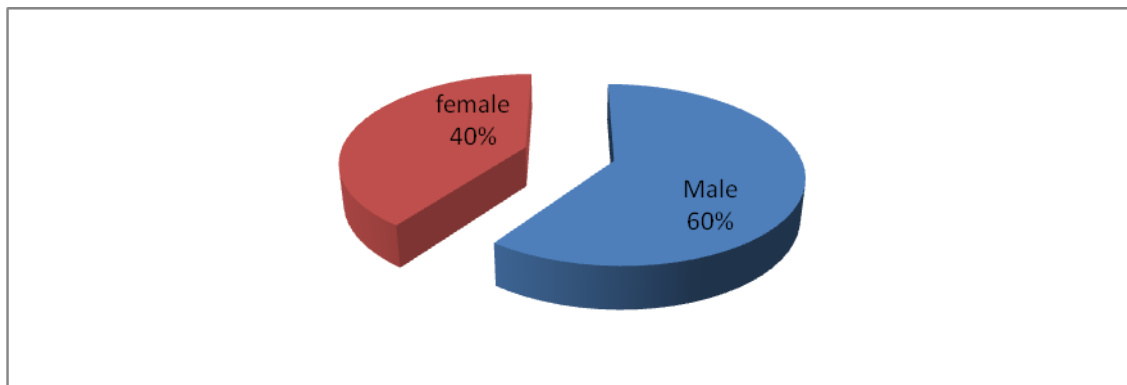


Figure 4.1 Distribution of Respondents by Gender

From the results in Figure 4.1, 60% of the respondents were males, while 40% were females. This was meant to provide a gender opinion in the closure of the fluorspar mining company. This indicates that both males and females have been affected by the closure of fluorspar in the study area. The trend is in no way based on biased assumptions about gender equalities or inequalities because most of the households in the study area are male-dominated, with most males being the household heads who are given respect by allowing them to speak on most issues concerning the households.

The study findings also imply that women often experience the negative impacts of mining more than men and rarely receive the benefits that men do; women are not consulted when companies negotiate access to land compensation benefits, when mining damages the environment, it undermines a woman's ability to provide food and clean water for their family thus increasing their workload, compensation and benefits are paid to men on behalf of their families, denying women access to mining's financial benefits and potentially increasing their economic dependence on men, women lose their traditional status in society when mining creates a cash-based economy, a transient male workforce bring increased alcohol, sex workers and violence into a community, which can affect the safety of women.

4.3.2 Age of Respondents

The respondents were asked to indicate their age bracket as presented in Table 4.2.

Table 4.2 Age Bracket of Respondents

Age Bracket	Frequency	Percentage
Below 25 years	4	2.0
25-34 years	43	21.0
35-44 years	65	31.7
Over 45 years	93	45.4
Total	205	100.0

The study results in Table 4.2 on the age brackets of the respondents shows that 4(2.0%) of the respondents were below 25 years of age, 43(21.0%) were in the age bracket of 25-34 years, 65(31.7%) were in the age of 35-44 years, and 93(45.4%) were in the age of over 45 years. The trend of age is in no way biased based on assumptions about the age bracket. This implies that during the closure of the mining company, all age categories are affected socially or economically.

4.3.3 Level of Education of the Respondents

The education level in this study helps the researcher get information from all levels of education and avoid biasness in obtaining data from one category based on education.

Table 4.3 Education level of Respondents

Education level	Frequency	Percentage
Informal	73	35.6
Primary level	97	47.3
Secondary school	23	11.2
College	9	4.4
University	3	1.5
Total	205	100

The study found that a significant number of respondents, 73(35.6%), had no formal education, 97(47.3%) had a primary level, 23(11.2%) had a secondary level, 9(4.4%) had college level, and 3(1.5%) possessed a university degree. This implies that the majority (82.9%) of respondents had a primary level of education and informal education. Therefore, due to their low level of education, they may not have had enough knowledge for diversification on other means of securing livelihoods such as business, modern farming practices and other opportunities for formal employment.

4.3.4 Current Occupation of the Respondents

Further, the researcher asked the respondents about their current occupation. The study results are resented in Table 4.4.

Table 4.4 Respondents' Current Occupation

Current Occupation	Frequency	Percentage
Unemployed	98	47.8
Self-employed	32	15.6
Farming	55	26.8
Formal employment	20	9.8
Total	205	100

The study findings show that 98(47.8%) were unemployed after mining company closure, 32(15.6%) were self-employed, 55(26.8%) were farmers, and 20(9.8%) were formally employed. This implies that the closure of the mining company rendered many people in the neighborhood jobless. A number of them went for farming, as evidenced by 55(26.8%). This implies that those employed by the mining company were affected the most by the company's closure in terms of employment. They lost their jobs after closure and could not get other new jobs because the majority of them were working as a casual laborer.

4.3.5 Marital Status

The participants were also asked to give their marital status and the results are presented in Table 4.5.

Table 4.5 Marital Status of Respondents

Marital Status	Frequency	Percentage
Single	48	23.4
Married	132	64.4
Divorced	12	5.9
Widow	13	6.3
Total	205	100

The findings show that the majority of the respondents, 132(64.4%), reported that they were married, 48(23.4%) reported that they were single parents, 13(6.3%) were widows/widowers, and only 12(5.9%) had divorced Table 4.4 presents these results.

This shows that after the closure of the mining company, the majority (64.4%) of respondents had married, and many households lost their livelihoods. Therefore, they had to look for other sources of livelihood in order to sustain their family needs.

4.3.6 Family Size

The participants were also asked to give their family size and the results are presented in Table 4.6.

Table 4.6 Family Size

Family size	Frequency	Percentage
1-5 members	78	38
6-10 members	92	44.9
11-15 members	35	17.1
Total	205	100

An investigation into the family sizes of the respondents shows that most 92(44.9%) of the households who participated in the study comprised of 6-10 members, 78(38%) said that they were 1-5 years while 35(17.1%) indicated that they were between 11-15 members. This is as shown in Table 4.5. This implies that employment and even housing was not adequately provided, and thus the families were facing the challenge of meeting their needs.

4.3.7 Respondents Links to Fluorspar Mining Company

The respondent's links to the fluorspar mining company were sought to understand how the mining company's closure affected their livelihood. The results are presented in Table 4.7.

Table 4.7 Respondents Links to Fluorspar Mining Company

Links to Fluorspar Mining Company	Frequency	Percentage
Employment	97	47.3
Suppliers	26	12.7
Casual workers	33	16.1
Health services	49	23.9
Total	205	100

According to the results from interview schedules, 97(47.3%) of the respondents were former employees of the mining company, 26(12.7%) of the respondents were former suppliers to the mining company, 33(16.1) of the respondents were former casual workers, and 49(23.9%) of the respondents provided health services. This shows that the closure of the mining company acted as a major drawback to the livelihoods of the neighborhood.

4.4 Benefits Derived by the Community from Fluorspar Mining Company

The study sought to determine the benefits of the community derived from the company. Table 4.8 presents the study results.

Table 4.8 Benefits the Community used to get from the Company

Benefits the Community used to get from the Company	Frequency	Percentage
Positively affected our main economic activities	35	17.1
Our sources of livelihoods (agriculture) were greatly improved	23	11.2
The company shared mining revenue by supporting developmental projects in the area for example construction of schools, dispensaries, social halls	24	11.7
Social services have improved (health, education) as a result of mining	29	14.1
Livelihoods significantly improved since mining activities began	27	13.2
Roads improved as a result of mining activities thereby making accessibility easier to agricultural markets and	29	14.1
There was adequate housing as a result of mining operations	38	17.1
Total	205	100

The study findings show that 35(17.1%) of the respondents indicate that mining positively affected respondents' main economic activities, 23(11.2%) indicated that mining improved their sources of livelihoods (agriculture). Further, the study revealed that 29(14.1%) of respondents indicated that the company shared mining revenue by supporting developmental projects in the area, for example, the construction of schools, dispensaries, social halls. The study also indicated that 27(13.2%) of the participants noted that Livelihoods significantly improved since mining activities began, 29(14.1%) of the respondents indicated that roads improved as a result of mining activities, thereby making accessibility easier to agricultural markets and farms and finally, 38(17.1%) of the respondents indicated that there was adequate housing as a result of mining operations.

It is noted from the findings that mining provided employment such as casual labourers and formal employment. It also led to growth in business and trading centers such as Kimwarer and Moskut trading center. The company constructed schools and provided educational scholarships for 113 university students. Further, they provided recreational facilities such as football, swimming, taekwondo, parties, among others. Road networks aided businesses and agriculture in transportation. Also, the presence of the company led to the construction of rental houses and businesses, which acted as a boost to the local's income generalization.

Mining provided employment, and skills were transferred to the people employed in the company. The mining company's presence also led to the creation of small business enterprises, for example, the opening of small kiosks such as Nyaru and Turesha center. The study finding agrees with Dziro (2014), who studied community development and corporate social responsibility in Zvishavane and Mutoko in

Zimbabwe. The research attempted to find the relevance of community development and corporate social responsibility in indigenization and empowerment programmes in Zimbabwe. The study found that corporate social responsibility is influenced by the desire to make profits and not by the philanthropic need to assist communities in their economic, social and environmental development.

One of the former employees of the mining company narrated how he had a fortune.

“When I got the job at the company, my fortunes changed for the better. I was earning enough money that afforded my family to enjoy significantly improved standards of living. I consider myself lucky that I had learned to landscape while working in the company's environmental department. I occasionally get landscaping contracts in other areas like Kabarnet and Nakuru town.’

From the above observation, it is evident that the mining company helped the residents to develop skills which could improve their career. The findings are consistent with Fessehaie and Morris (2013), who found a linkage between mining activities and development of skills, delineation of critical success factors and upgrading strategies. The fluorspar mining company led to the opening of markets, growth of businesses, and established trading centers, creating employment opportunities for the locals. It is noted from the findings that mining provided employment.

One of the business women reported that,

“I was employed in the mining area where I could get income to sustain my family needs, even my wife was employed there, and we could pull resources and open a small business at the trading centre. The good market provided by the company's demanding workers and staff allowed me to have good business in foodstuff, fruits, water, and milk.’’

This is a clear demonstration that the company's existence provided an economic base for the communities surrounding the mining areas. This was evident in terms of sustained household needs and self-employment for many households. The company's

operation provided opportunities for the sale of farm produce, especially to the company's employees, thus increasing incomes to households doing business on trading centers around the mining areas. These findings are consistent with Lotz and Marais (2017), who found that there is a close relationship between the growth of business and the mining industry.

4.4.1 Improved Systems of Education

The mining company improved education systems by constructing schools, for example, fluorspar primary where the children could attend school without payment of fees. One of the parents, who were a resident at Kimarer area, reported that;

“Our school-going children were going on academic trips for every class every year. During those trips, children eat a balanced diet provided by the school administration. In addition, every year pupils were provided with fruits from the company farm which motivated them in their studies and maintained their best performance.”

This shows that the mining company participated in CSR activities such as schools' construction to benefit the children. The focus of the mining company on education was to enhance education delivery for the community. They invested in school infrastructure (primary, secondary, and nursery), scholarships and libraries. The mining company constructed Fluorspar Primary School (Figure 4.2), a modern private mixed day and boarding school located in Keiyo South Sub-County. The company did not only construct the school but also participated actively in ensuring that the school's pupils had a conducive environment and necessary learning materials, got exposure through field trips, and ate a balanced diet. The trips also provided career development opportunities through pupils relating the class theory work and the entire industry. The company also constructed and equipped a modern library for use by learners (Figure 4.3).



Figure 4.2 Kenya Fluorspar Primary School Classroom

Figure 4.2 shows a pupil being taken through digital learning in Fluorspar Primary School. The company enhanced the education system through the use of ICT in primary schools. This means the provision of digital learning materials, which has uplifted education standards at the primary level. This gave an implication that the pupils were taken through digitalized education, which is relevant in contemporary society.



Figure 4.3 Kenya Fluorspar Primary School Library

Figure 4.3 shows the Fluorspar Primary School library constructed by the mining company. The school had a big and well-equipped modern library. This means that the mining company ensured the pupils got enough and world-class teaching and learning resources. One of the key informants reported that:

“The mining company fully funded Kenya Scholar Access Programme (KenSAP), a project that helped bright, needy students from an underserved region of Kenya gain admission to elite colleges in the United States and Canada. The company placed more than 130 students at the USA and Canada's most competitive institutions, all with full financial aid. Out of 117 enrolled students 114 either have graduated or are on track for a timely graduation from institutions that include: Harvard, Yale, Princeton, Brown, Cornell, Penn, Columbia, Dartmouth, MIT, Stanford, Duke, Amherst, University of Toronto, and McGill.”

This means that the company's scholarships provided opportunities to less fortunate society members to advance their education further. This, in turn, provided additional skills, especially in different disciplines, which in turn enhanced the socio-economic development of community members around fluorspar mining company.

This implies that students who got scholarships were expected to come back to the community with skills knowledge acquired to improve the lives of the other students, their families, their community and the country. The growing cohort of graduates from the world's best universities to which KenSAP made a significant contribution and brought strong, judicious leadership that is geared to assume power in the coming decades, and with such leadership, Kenya, in turn, will uplift the majority of its citizens out of crippling poverty.

These findings compare to those by Sugiyarti et al. (2018), who found that Malaysian education plays a very important role to ensure the survival of the state and the nation. The problems faced in securing the scholarships are parent income, parental responsibility, academic achievement, non-academic achievement.

Pupils from fluorspar primary school were also taken to sports activities for various competitions in the area and beyond. This was facilitated by the school bus, which was available at all times. Competitive games like Taekwondo provided an educational scholarship for bright and needy students from the community, thus boosting educational levels in the area. Furthermore, they provided recreational facilities, such as football, swimming, Taekwondo, and parties. The company's existence provided weekly training and competition in sporting areas like football, Taekwondo thus tapping talents from the community to benefit the immediate families and the country at large. One community member indicated that:

“The company's recreation facilities enhanced true confidence through knowledge in mind, honesty in the heart and strength in the body. It helped to keep friendship with one another and to build a strong and healthy community among Keiyo South Sub-County residents.”

This implies that the company's existence provided a social base for communities in terms of creating social networks. These social networks have created a sense of social cohesion and great healthy bonds that foster development among the residents of Keiyo South Sub-County. One of the Fluorspar primary school administrators noted that:

‘As part of the company's recreation facilities, Taekwondo lessons were offered free of charge to 600 students who attended Kenya Fluorspar Primary School and several other surrounding schools. Youth and adults from surrounding villages were also enrolled.’

This means that the taekwondo training created career and skill development for many residents, especially the youth. Skills development through sports means an alternative source of livelihood in contemporary through social welfares by mining companies and other corporate social responsibilities to communities surrounding the mining areas. Recreational engagements also involved the staff and surrounding communities through monthly get together parties, which created a social gathering, thus providing an enabling environment for more cohesion and integration.

The study findings concurred with those of Dustin and McAvoy (2015), who found that recreation planning and management based on satisfaction levels perpetuate improvement in the quality of recreation environments themselves. A new goal for recreation planning and management is proposed based on equality of opportunity with the diversity of environmental settings.

4.4.2 Improved Road Network

Road network is an important factor in accessing farmers and business people, and women to easily deliver their goods to or from the market. The fluorspar company has impacted one way or another to the local communities through its road infrastructure.

One of the respondents noted that:

“The road network was improved with the operation of mining activities. The company needed transport for raw materials, and some businessmen secured financing to buy Lorries for this line of work. Some of them went on to establish successful transport enterprises.”

This implies that the fluorspar mining company improved road networks in the area, which aided businesses and agriculture. The improved transport network led to the growth of centres. Transportation provided employment within the mining area and the destination areas of the mineral. The Lorries employed drivers and conductors who loaded and transported the mineral. Transporters were particularly hit hard, and they expressed fear that it was a matter of time before auctioneers come calling because of pending loan payment.

The study findings agreed with those of Robbins and Perkins (2012), who noted that the mining company had improved the transport infrastructure to be used in the transportation of minerals and was highly relevant to the economies concerned.

4.4.3 Construction of Rental Houses

Affordable housing has greatly improved since the operation of the fluorspar company, and rental houses were constructed by locals, which positively impacted the sub-county economy. One of the respondents revealed that:

“The mining activities in the area led to the construction of rental houses because of the increased population. People come here as mining employees, business people and other public servants.”

This implies that due to the increased population in the areas, there was a high demand for rental houses because their houses became limited. Therefore, there was increased construction of rental houses of different costs to accommodate the different tenants' different levels. Therefore, the company's presence leads to the construction of rental houses that were used for businesses. With the increase in rental houses in the area,

there was an increase in water demand for household's domestic use and irrigation. This led to the creation of water sources by the company.

4.4.4 Electrification in the Community

Since the establishment of the company, locals have benefited from electrification in their homesteads.

One of the Key informants recalls the impact the company had on the community.

“We were the first people in Keiyo South Sub-County to get electricity in the early 1990s,” he recalls proudly. “People envied this area; we had development projects coming up, businesses, schools and social amenities breathed life into this locality; we hoped for a brighter future for our community . . . all this changed when the company closed its doors.”

Electric power is a great source of socio-economic development. Electricity provided a great source of livelihood to many communities of Keiyo South Sub-County. It came as a fortune to many households in terms of business opportunities through power, better education for their children, improved health services, water for irrigation, among others. This implies that the closure of fluorspar mining company affected many households due to diminished livelihoods due to lack of power.

4.5 Closure of Fluorspar Mining Company and Its Effects on households' Livelihood

4.5.1 Reasons for the Closure of the Fluorspar Mining Company

Investigating the reasons for the closure of the fluorspar mining company indicated that the company closed its operations in February 2016. This mainly was due to the expiry of the lease period given by the mining ministry. The respondents indicated that after the expiry of the lease period, the company stakeholders could not renew it due to demands by the community members. The researcher wanted to know if the

closure of the fluorspar mining company affected their household(s) in terms of family sources of livelihood. Figure 4.4 presents the study results.

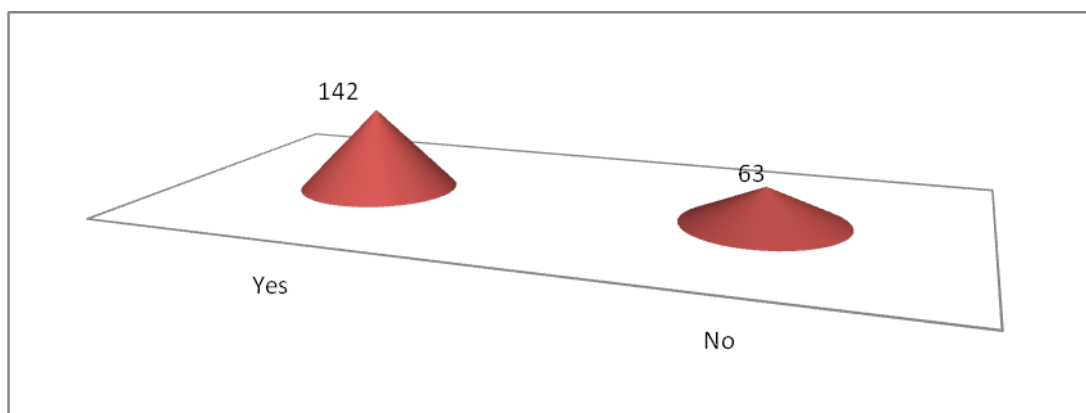


Figure 4.4 Household's Sources of Livelihood

Source: Field Data 2019

The study findings in Figure 4.4 shows that most 142(79.5%) indicated that the closure of the fluorspar mining company affected their household(s) in terms of family sources of livelihood. In comparison, 63(20.5%) of respondents indicated that the closure of the fluorspar mining company did not affect their household(s) in terms of family sources of livelihood. This shows that mine closure in the fluorspar area gradually depleted the mining community's livelihood assets and resulted in the collapse of their coping strategies and livelihood outcomes. It generally led to the redundancy of employment and hence loss of income, reduction of business, stalled markets of small and large entrepreneurs/ reduced trading activities, Poor Road network/ maintenance and poor water distribution and treatment.

This further implies that the household form the most affected in terms of livelihood strategies and responds and reacts to internal and external factors in the environment after mining operations. The study findings agree with Wisner, Gaillard and Kelman (2012), who noted that it has to have assets and resources after the closure of mining

company operations for the household not to be vulnerable. Access to resources indicates that a household is resilient; hence, an inability to access resources indicates vulnerability.

The study findings further agree with Frankenberger et al. (2010), who noted that livelihood outcomes are positive when households have access to livelihoods and security through access to food, water, shelter, education, and community participation. Household livelihood security would imply that the inhabitants can acquire, protect, develop, utilize, exchange and benefit from assets and resources. Livelihood outcomes are hampered and diminished when a household cannot withstand shocks or meet contingencies that negatively affect assets and access to livelihood strategies.

One of the key informants noted that the households affected wanted land compensation before renewing the lease. They noted that land was taken away from them and the mining operation started before being compensated. Therefore, after the lease period's expiry, they demanded to be compensated first before the renewal. This has delayed the revival of the company following a dispute between the government and residents over compensation. More than 500 families were displaced from 9,070 acres during the mining process and have issued new demands for government compensation. The issue has split the families, with some insisting on being given alternative land while others need cash. Further, the respondent indicated the reason for the closure of the mining company was due to a reduction in the world market for fluorspar mineral.

However, according to Laurence (2016), mines are usually closed at the end of their life cycle because of depleted resources. Still, they may also be closed for other

reasons such as economic, geological or structural reasons. The closure of the fluorspar mining company was sudden, causing a lot of effect on the affected communities. This was an instantaneous decision to shut down a mine, barely giving any prior indication to the affected mining communities. Therefore, there was insufficient time for communities to cope with their losses and find suitable sustenance. However, a closure plan must be subjected to a public participation process of at least 30 days (Beierle, 2010).

Eighty seven percent of the respondents noted that;

“Since the company's closure in 2016, we have experienced a lot of challenges economically and socially. The closure was so sudden, which didn't allow us to adjust or get other means of survival since we were fully dependent on its operations. Until now, we wish the company could not have closed its operation.”

This shows that sudden mining closure has a great effect on household socio-economic status. The mining communities faced several effects after the closure of the mining company in terms of closure railway transport, fall of trading centres, scholarships, loss of electric power, road transportation, diminished business activities, food security, health, and nutrition. These were worsened by the sudden closure where households' members were not given enough time to adjust to the new situation of the minimal source of livelihood. It also indicated the aggravated losses on household income, which affected the level of spending at the household level in matters of food security, education, health, and other social amenities. Mine closure brings about social crimes due to a lack of economic and social engagement, especially youth. It is even worse where members of the household were fully dependent on the operation of the company as the main source of livelihood.

This gave the impression that there is a need for every operating company to give prior information regarding plans for the closure of their activities. This will reduce

the adverse consequences to the households and communities dependent on their operations as a source of livelihood. The closure plan must address the requirements, as set out in the regulations, pertaining to the financial provision for the rehabilitation, closure and post-closure of prospecting, mining or production operations made in terms of the Act, which is inconsistent with Stacey et al. (2010) who asserts that Mine closure planning should uphold the following principle with respect to the mining community: 'using, conserving and enhancing the mining communities.

The finding concurs with Laurence, (2006) who asserts that mines are usually closed at the end of their life cycle because of depleted resources but may also be closed for other reasons such as economic, geological or structural reasons. The study findings concurred with Gorman and Dzombak (2018), who asserts that mines are usually closed at the end of their life cycle because of depleted resources but may also be closed for other reasons such as economic, geological or structural reasons.

Further, the study concurs with Swart (2013), who asserts that temporary closure may occur because of the need for necessary care and maintenance when the mine has ceased production for various technical, environmental, financial or labour-related reasons. Similarly, Lawson and Bentil (2014) noted that often mining exploration takes place on land that provides land-based livelihood to many rural people. Compensation payments reduce the poverty level among mining communities and bring about social harmonies. Hence, whilst communities are highly welcoming of mining companies during exploration, they become beneficial during the mine's operation. The channels of communication and dialogue is important before mining begins and during the operation of the mine, to increase awareness among community members on the benefits of the mining operation.

Further, Abuya (2018) CSR activities from mining companies in developing countries, especially in Africa, have had a questionable reputation. Many views the few programs rolled out under this program as having done little in meeting the affected mining communities' needs.

Furthermore, one of the key informants stated that;

“The government should consider resettling locals to save them from the high cost of buying land elsewhere.”

This means that since the lease of the land to mining company households have never been compensated on the utilized land on mining. Therefore, carrying out other economic activities such as farming has been altered. This implies that the government proposal for compensation didn't go as promised. So far, the residents still cry for compensation of the lands or resettlement in other areas to carry out daily life and long-term investment without the fear of further displacement.

The study findings concurred with those of Owen and Kemp (2015), who found that physical displacement of communities surrounding the mining area, relocation and resettlement are widely acknowledged as posing an enormous social risk. Mining-induced displacement and resettlement are associated with contemporary policy debates surrounding the mining industry, including 'consent', 'negotiated agreements' and the overall effectiveness of existing social safeguards regulating industry practice.

One of the key informants reported that:

“I criticize the disagreements among locals but call for collaboration with government agencies and officials in order to hasten compensation. Those creating a split are not genuine residents. They are not affected by a fluorspar mining company and are only out to get free money.”

This is a demonstration there is heightened dispute regarding land compensation in the community. There are people who have come to take advantage of the situation and

were not initially own land under dispute. This has made it difficult to hasten the matters surrounding the compensation of communities affected by mining operations. This implies counting of families should be done to identify genuine beneficiaries, and their preferred mode of compensation should be done where the names should be verified before the list is forwarded to relevant State departments.

The study agrees with Taabazuing, Luginaah, Djietror and Otiso (2012) that an extensive geographic transformation of livelihoods at various scales as a result of the local people being displaced from their lands that have become mining areas. Monetary compensation for farmers who have lost their lands to mining companies remains a contentious issue. Farmers report that they are always at the losing end of any contestation for land and compensation. There is a conflicting and confusing mining sector policy environment that disadvantages local communities. Therefore, there is a need to revise the country's mining laws to reflect international best practices to facilitate sustainable economic development in the mining areas.

However, 23% of residents noted that the fluorspar mining company's closure has never affected their livelihood and vowed to remain in their ancestral land. The majority of these groups of respondents were those who were not majorly dependent on the mining company. Therefore, after the mining activities' closure, they continued with their activities as a source of livelihood. The majority (71%) were subsistence farmers, livestock farmers and beekeeping. This implies that all the households surrounding the mining area were not fully dependent on its operations. Therefore, they become a bench-mark to those who were fully dependent on the mining company's operation in coming up with immediate coping strategies to sustain their basic needs.

This study sought to determine the household source of income to determine its sustainability in relation to their daily household expenses. This was to show the current income source to the residence after the mining company's closure. The study results are presented in Table 4.9.

Table 4.9 Household Source of Income

Household source of income	Frequency	Percentage
Self-employed	32	15.6
Farming	153	74.6
Formal employment	20	9.8
Total	205	100

The study findings on the source of income show that 32(15.6%) of the respondents were self-employed, 55(26.8%) of the respondents were farmers, and 20(9.8%) of the respondents were formally employed. This shows that the main source of income of Keiyo South Sub-County residents was subsistence farming. The residence practiced subsistence farming in steep and sloppy areas such as millet, sorghum, groundnuts, maize, beans and sweet potatoes, cassavas, cowpeas. However, currently, its production is low because there is no water for irrigation and environmental degradation.

Some were rearing livestock farming such as goat, sheep and indigenous cows. The self-employment being carried out in this area is kiosks business, charcoal business, boda boda business. The formal employment among the residents of this area was teaching profession, health profession, security personnel, and mining ministry officials. This was because the area's residence was not prepared beforehand for the loss of employment and ensuing poverty after the closure of the mining company.

The study finding concurs with Owen and Kemp (2018), who noted that to remain at the forefront of livelihood, the households must innovate through new products and technologies or alternative income sources. As modes of operating become outdated, transform business practices becomes a key determinant in the household's members. Household lost their source of income from mining company which was an economic uplift and prosperity through the construction and operational phases of mine life, contractions at project closure and relinquishment. The study agrees with Tempelhoff (2010), who asserts that the mineworkers' skills were restricted to the mining industry only. When the mine closed, most of these workers were unable to find work; they could not afford travelling expenses to attend a job interview or lacked the skills and abilities required to work outside the mining industry. Approximately 1000 mineworkers stayed on at the hostels of the mine, with no food and clean water. In general, there was a feeling of hopelessness and despair among the mineworkers who did not find employment, and some completely gave up on hope to find employment.

4.5.2 Income Levels before the closure of mining company

The study sought to determine the participant's income per month before the closure of the mining company. This was done to compare the income level before the closure and after the fluor spar mining company's closure. Table 4.10 presents the study results.

Table 4.10 Income Levels before the closure of mining company

Income Levels	Frequency	Percentage
0-500 Kshs	15	7.3
501-2000 Kshs	35	17.1
2001- 4000 Kshs	13	6.3
4001- 8000 Kshs	28	13.7
8001-15000 Kshs	20	9.8
15001-25000 Kshs	79	38.5
Above 25000 Kshs	15	7.3
Total	205	100

The study findings shows that the majority, 79(38.5%), earned an income of 15001-25000ksh while the minority 15(7.3%) earned an income of between 0-500kshs. The average income per month was high during the company's operation. This implies that the mining company was the major source of income for the study area's residence. The study findings concur with Ge and Lei (2013), who noted that an increase in mining sectors' outputs affects household income and poverty alleviation. The mining sector's output contributes to household income growth and poverty alleviation. The decomposition applied to China reveals that mining development has more significantly positive impacts on the high- and middle-income household than low-income household.

4.5.3 Current average income per month

The study sought to determine the participant's income per month to ascertain the current average income per month of the residence from the source of income they are operating on after the closure of the fluorspar mining company. Table 4.11 presents the study results.

Table 4.11 Current average income per month

Current average income per month	Frequency	Percentage
0-500 Kshs	7	3.4
501-2000 Kshs	20	9.8
2001- 4000 Kshs	17	8.3
4001- 8000 Kshs	91	44.4
8001-15000 Kshs	25	12.2
15001-25000 Kshs	16	7.8
Above 25000 Kshs	29	14.1
Total	205	100

The study findings shows that the majority 91(44.4%) of respondents earned an income of 4001-8000ksh while the minority 7(3.4%) earned an income of between 0-

500kshs. The average income per month was too low since their main income source was lost, leaving them in despair.

This implies that the average income per month for many households after the fluorspar company's closure was low, which could not sustain household needs. Therefore, it is an indication that the mining company's closure had a great impact on the income levels of the households in the area. After the closure of the mining company, there was a deterioration of networks and social groups. Mineworkers had to change their lifestyles to adapt to their newly acquired statuses of low income or no income.

Some of the mineworkers who were part of the care and maintenance team had to sleep at the mine. They had no money for transport to take them home, as they received no salary for four months (Tempelhoff, 2010). The mine closure negatively affected 40 000 people. The findings showed that mineworkers who were laid off had an estimated 4–10 dependent (Botha, Van der Waldt and Ackermann, 2018). According to calculations by the media, the number of workers who suddenly became unemployed at the two mines was 5300, and according to estimates of Helping Hand, about 40 000 mineworkers and their dependents were affected (Deikema, 2010).

The study findings agreed with Oberholzer (2010), who asserts that the issues surrounding these mines received extensive media attention. These issues included the non-payment of the Aurora mineworkers and the threat of a devastating environmental crisis posed by the mine water if the daily pumping of 108 000 megalitres of water from the shafts would cease. It also coincides with (Esterhuizen, 2011) who asserts that the Orkney and Grootvlei mines' closing affected an estimated 5300 mineworkers (with dependents) who lost their income. As a result, the mineworkers and their

dependents were living in dire circumstances and needed humanitarian assistance. Shafts at both mines were also flooded and ransacked, which caused permanent damage. The sudden closure of these mines left the surrounding communities in a state of crisis.

Table 4.12 Whether the current income sustain the household needs

Current Income Sustain	Frequency	Percentage
Yes	33	16.1
No	172	83.9
Total	205	100.00

Further, the study findings in Table 4.12 show that the majority, 172(83.9%) they had unsustainable income, while 33(15.1%) of the respondents currently had sustainable income. This implies that the little income obtained from their farms and self-employment was insufficient to sustain them. In most cases, communities were not prepared beforehand for the loss of employment and ensuing poverty.

The study findings concurred with Limpitlaw (2014), who noted it is a major challenge to create an economy and provide jobs for retrenched mine workers. Therefore, there is a need for major financial investment and national and county government commitment to assist retrenched miners (Cooke & Limpitlaw, 2003). It is often difficult to identify alternative opportunities for retrenched people in dispersed rural areas (Choshi, 2001). Many mining companies do not provide financial help for social and economic community projects, especially after closure.

The study findings were further in agreement with Tempelhoff (2010), who asserts that the mineworkers' skills were restricted to the mining industry only. When the mine closed, most of these workers were unable to find work; they could not afford travelling expenses to attend a job interview or lacked the skills and abilities required

to work outside the mining industry. Approximately 1000 mineworkers stayed on at the hostels of the mine, with no food and clean water. In general, there was a feeling of hopelessness and despair among the mineworkers who did not find employment, and some completely gave up on hope to find employment and also, they could not sustain their household needs.

4.5.4 Transport Sector

The transport industry is key to any sector of the economy to realize economic growth. Closure of the fluorspar company resulted in the loss of employment opportunities for drivers who use to work for the company and those who operated on the roads linking fluorspar and other areas.

One of the respondents, a resident of Flax center reported that:

“Many people lost their jobs when Kenya Fluorspar mining company closed its operations citing a slump in prices”.

This implies that after the closure of the fluorspar mining company, people operating on transportation of mineral by road and railway lost their jobs. Fluorspar was exported in its raw form hence had employed the majority of the people. This was because the fluorspar was transported by road to Flax Township, where it was loaded and taken to Mombasa by rail. The study findings concurred with Haney and Shkaratan (2003), who noted that many people lost jobs after the closure of loss-making mines, which are often located in communities where the coal industry is the dominant employer, and the significant downsizing of the workforce.

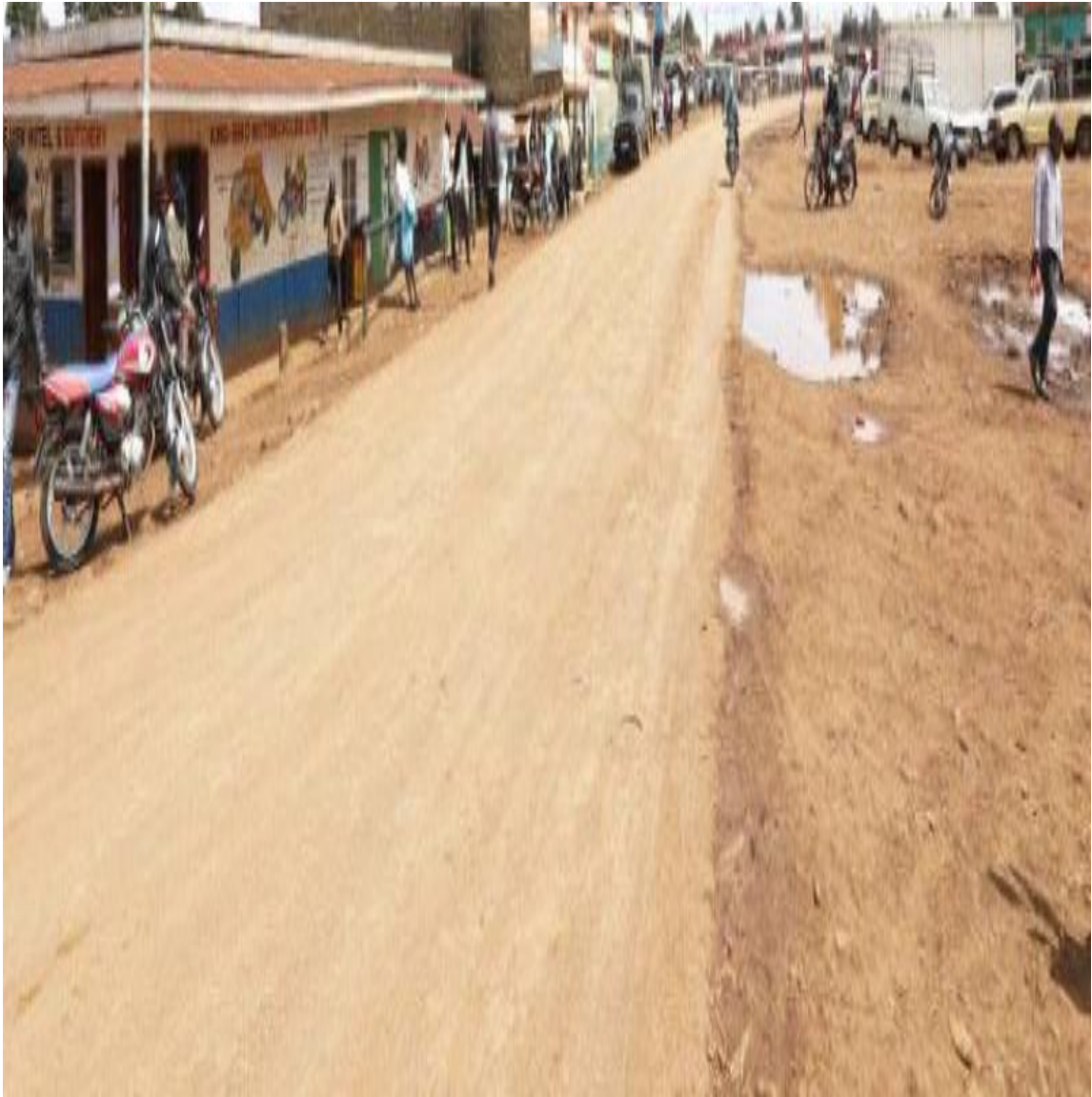


Figure 4.5 Flax Center.

Source: Field Data 2019

Figure 4.5 shows the Flax centre with low business activities after the closure of Kenya fluorspar Company. This implies that some businesses were closed down after the mining company's closure due to the migration of business to other towns to look for jobs; hence, there were no business activities. The study findings concurred with those of Nel et al. (2003), who found that the impact of mine closure can have a devastating effect on the towns' local transport industry that they once supported.

One of the former transporters indicated that;

My husband and I owned five lorries. Four of them are now lying idle in front of my shop. However, it has been able to secure transport of construction materials in the neighboring Uasin-Gishu County for the fifth lorry.

“I used to employ ten drivers and an equal number of loaders who were working in shifts. Today, I have only one driver and a loader. The rest are now jobless. In sum, we are talking of nine families at the risk of falling into poverty.”



Figure 4.6 Lorries rusting away at Kimwarer trading centre in Keiyo South Sub-County following the closure of Kenya fluorspar mining company.

Source: Field Data 2019

From Figure 4.6, it is evident that from the closure of the mining company, the operational Lorries remained stuck with no work. The drivers and conductors also lost their jobs. Therefore, the owners of lorries experienced great losses as well as their employees. One of the former lorry drivers recalled:

“Lorries that roared day and night hauling raw materials to keep the factory engines purring now serve as shades for goats during hot afternoons.”

This is a clear demonstration that the residents of Kimwarer experience the negative side of the mining company's closure, especially the lorry drivers and conductors who used to get the earnings lying on the shades. Further, the mining company's closure affected the motor vehicle spare part suppliers who lost business after tens of lorry owners who offered transport services to the mining company went out of business.

A long stretch of trading centers that owed their existence to the company has been massively affected by its closure. Flax center, located at the border of Keiyo South Constituency and Uasin Gishu County, is one of them. Here, Fluorite processed in Kimwarer was stored, awaiting a train to transport it to Mombasa. When the company was closed, the fortunes of Flax Centre fell with it. Currently, only less than six businesses in the center remain open.

4.5.5 Business Enterprises

Business operation has gone down since the closure of the fluorspar company. One of the business owners a women aged 47 years in Kimwarer shopping center narrated the effect of the closure of mining company.

‘Alongside the grocery shops, I also operate a hardware shop. Since the company closed, business is so bad that I open the hardware only when I have a customer who needs something. The grocery shop is not doing well either. Most of my customers were former employees of the fluorspar company who left. Therefore, it was not just an exodus of people; but also, an exodus of money.’

One of the female residents 37 years said that;

“Our businesses entirely depended on the company because its workers were our main clientele. But now, the majority of traders have closed shop. I was a vegetable trader but have since changed to hawking food to the few Boda-boda operators in the area. The government should know we are in a bad situation.”

A forty-year-old woman stated;

“When the company was in operation, I would sell more than 20 chickens in a day. Nowadays, I rarely sell any. The situation is bad, and the government should know the closure of the company worst hits the peasant families.”

A 52-year-old man, a meat trader revealed that;

“There were more than ten butcheries at the center. At the moment, there are only two which have survived, from time to time, had to throw away meat for lack of customers. There is no business around this region.”

From the three voices, it is evident that the closure of the fluorspar has greatly brought to stand still most of the businesses in the area, hence affecting the area residents' livelihood.

After the mining company's closure, most former employees and other household members migrated to other towns to look for a source of livelihood. This led to the loss of customers to booming businesses which some collapsed and some few still operating. The study findings revealed that low business and diminished sources of income-driven men to hawk firewood and goats to service loans from micro-finance lending institutions. This had also led to auctioneers towing away lorries to recover unpaid pending loans.

One of the male residents aged 40 reported that;

“Almost all economic activities in the area revolved around the mines, and chances of getting even a casual job are rare. Even those businesses that are still open are struggling. People moved out of the place after the collapse of the fluorspar company,”

These findings are consistent with those of Tempelhoff (2010), who found that mining communities under investigation depended on the mine as their main income source. The workers' salaries provided them with the opportunity to also partake in the local market. When the mines closed, they lost their ability to participate in this aspect of their livelihood strategies. Production and exchange opportunities were not a major activity, even though it was reported that the mineworkers living at the hostels-maintained vegetable gardens to sustain themselves and their families. The mine closure affected the mineworkers living in the mining town differently than those who remained at the hostels.

4.5.6 Livestock Keeping

The study findings showed a few community members who had saved some money which they invested in livestock. However, this economic engagement is risky because the region is an ASAL area that is regularly faced with the challenge of drought, affecting livestock production. One livestock farmer reveals that

‘Despite the importance of livestock keeping as a livelihood strategy, there are fears that come with livestock rustling, drought, and the emergence of diseases hence low production.’

4.5.7 Health

The majority (76%) of the respondents reported that fluorspar mining company-provided health care to its employees and the community during its operation. However, after its closure, the household members and former employees have suffered primary health care services, for example, immunization of children and maternal services, among others. The study results are in agreement with Ackermann, Botha and Van Der Waldt (2018) who noted that most of the workers at mines lost

their medical aid, unemployment insurance fund (UIF), and pension benefits, some after working 25 years for the mining industry.

It is reported that even though the money for their pension and medical aids was subtracted from their salaries, the mining companies did not pay their money to the respective funds. Further, Tempelhoff (2010) noted that payments were also not made to the UIF. Furthermore, the value-added tax was never paid on any of Aurora's transactions. The media accused the mine owners of running the two mines on a Ponzi scheme. This practice involves making payments on the grounds of promises of money based on forthcoming income and funding, which was never realized in the case of Aurora (Pauw & Louw, 2012).

The study further sought to determine where the household members seek medical services. This was carried out to find out where the households seek medical services after the mining company's closure. The study results were presented in Table 4.13.

Table 4.13 Place of Seeking Health Services

	Frequency	Percentage
Public hospitals	194	94.6
Private hospitals	11	5.4
Total	205	100

The study results in Table 4.13 on the type of health facilities show that the majority 194(94.6%) of the households seek medication from public hospitals. In comparison, the minority 11(5.4%) seek their medication from a private hospital since most public health facilities offer the services for free and therefore it is easily accessible. The findings above gave an impression that after the mining company's closure, the households experience challenges in meeting health service expenses. During the

operational period of fluorspar mining company, the residence was provided with free medical services at the company's health facilities.

However, after the closure, these health services also failed to continue, and the facilities were taken over by the county government of Elgeyo Marakwet hence becoming a public facility. The residents near mining companies are prone to health-threatening conditions. These conditions manifested in tendencies of diabetes, heart conditions, miscarriages, depression, increased mental issues, substance abuse, suicides, and, for children learning difficulties that impacted negatively on their school performance.

The study findings concurred with those of Constantine and Battye (2015), who found that the community benefits from the mining company's health instructions. However, after the mining company's closure, health facilities ceased to operate, offering health services to the community. Essential community services such as health, education, local government, and emergency services are increasingly finding they cannot retain and recruit workers due to wage incompatibility, housing affordability, and lack of personnel supply.

Health Care for the individuals in communities dependent on mineral development is also essential. Healthy workers are necessary for the good functioning of the mine, but healthy families are also necessary for a community's functioning. In Canada, health care is primarily a provincial or territorial responsibility. Still, the development of a mine in a remote area can quickly strengthen a provincial or territorial health care system's capacity. The influx of outsiders and the presence of development can bring about better health care in an area, and yet, some health care issues, such as increased drug and alcohol abuse, can arise due to the presence of the mine. Health care is not

limited to the provision of health facilities and professionals on a site. It can include the provision of services to the individuals and families in a community (Stewart, 2020).

Health care includes access to services, access to health education and preventive measures, and access to mental health services. In specific communities, preventive measures may be aimed at potential or existing problems, such as alcohol and drug addiction, or specific groups within the community such as the elderly, women, or youth. The health of individuals and families is essential to the sustained development of a community and a development. Although some elements, such as access to medical services, maybe general to all communities, communities may also be interested in ensuring specific services geared to their situation or problems and maybe looking to industry to offer assistance. Such assistance may include, but not be restricted to, education on preventive health care, counseling for workers and their families, and providing health services at the mine site open to all members of a community.

The influx of outsiders into a community and the ensuing rapid expansion of the community can be a cause for concern for individuals and families. Increases in prostitution, sexually transmitted diseases, alcoholism, drug abuse, and violence are seen as the negative side of development. Such impacts are especially worrisome for women concerned about the safety of children and young women and who fear the breakdown of family values. Fly-in operations seem at first glance to have resolved this issue. Still, it should be remembered that the employees are flown in from a given community that will experience an increase in outsiders and expansion, increasing social problems. Goods and services are also acquired in a community that will feel

the impact of a development. Dealing with the problems that can occur from the influx of outsiders to a community can require an increase in health care delivery. Counseling for alcohol and drug abuse and victims of violence or sexually transmitted diseases can help decrease the negative impact of outsiders on individuals and families. Such counseling can be made available not only to mine workers but also to their families.

Crime prevention programs may also be necessary, and the mining industry can assist communities in developing such programs and the capacity to apply them. Furthermore, some companies have set goals of including high levels of local people within the workforce or even replacing all outsiders with local people. Although it is difficult to prevent some of the negative influences that occur from outsiders' presence, some of the impacts can be diminished through fly-in mining and an increase in the proportion of local workers.

With fly-in mining, larger settlements that act as service and transportation centers will increase outsiders. In contrast, some of the settlements from which workers originate will see very few outsiders. In some cases, they will see a declining population as their residents relocate to larger centers after working for a while with the mine. As the local proportion of mine workers increases, the proportion of outsiders will decrease. Training, education, advancement opportunities, and a policy of hiring local people can decrease the negative influence of outsiders on communities. Outsiders can also have positive impacts on a community by providing new or improved services, such as health services and education. Furthermore, tourists are outsiders who can put money into the economy of a region.

The study furthermore sought to know whether the mining company's closure changed the health facility where their members sought health services. Figure 4.3 presents the study results.

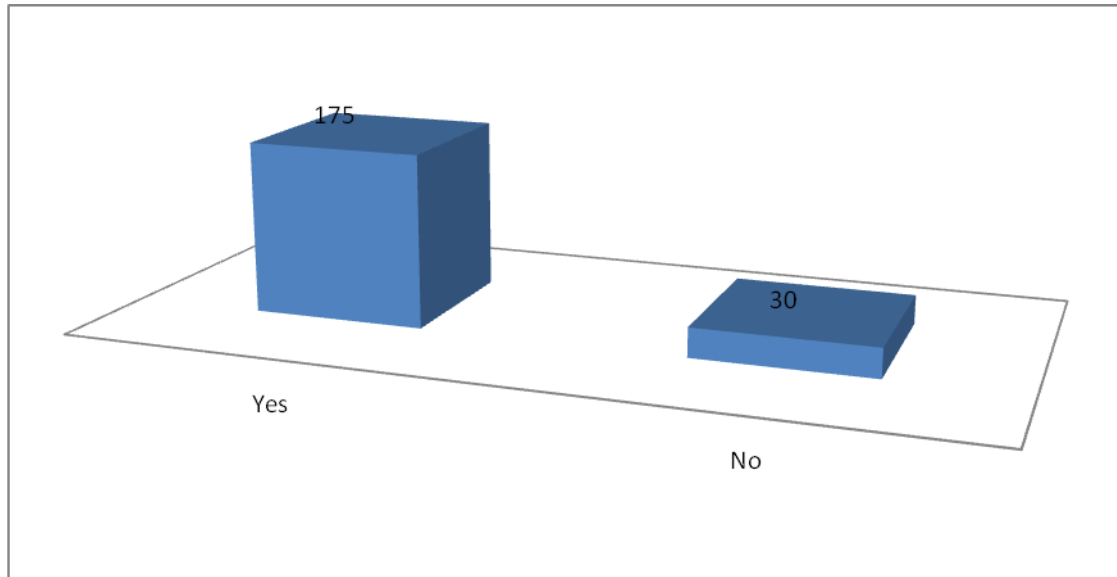


Figure 4.7 Closure of the Mining Company and Level of Hospital Utilized

Source: Field Data 2019

The study results on closure of the mining company and level of hospital utilized are as shown in Figure 4.7. The findings show that the majority 175(%) of the respondents reported changing a hospital, 30(%) indicated that they did not change the hospital's level. This implies that due to loss of income occasioned by unemployment, the household members opted for hospitals they could afford.

This study findings agrees with World Bank (2007), who found out that mining company closure will lead to self-treatment or make people ignore their ailments. They noted that unregistered women are more likely to avoid health services while men regularly seek treatment). The study results are also in agreement with Ackermann et al. (2018), who asserts that as a result, most of the workers at mines lost their medical aid, unemployment insurance fund (UIF), and pension benefits, some

after working 25 years for the mining industry. It is reported that even though the money for their pension and medical aids was subtracted from their salaries, the mining companies did not pay over their money to the respective funds. Further, Tempelhoff (2010) noted that payments were also not made to the UIF.

Furthermore, the value-added tax was never paid on any of Aurora's transactions (Ackermann et al., 2018). The media accused the mine owners of running the two mines on a Ponzi scheme. This practice involves making payments on the grounds of promises of money based on forthcoming income and funding, which was never realized in the case of Aurora (Pauw et al., 2012).

4.5.8 Nutrition

Nutritional status is often considered one of the best outcome indicators for overall livelihood security. The inability of the households to provide nutrition for their children was evident from the following responses.

In terms of nutrition status, the respondents noted that mineworkers live in terrible conditions after the mining company's closure; there is no food, water, or electricity.

Another respondent noted that:

“My neighbor died, I think he was depressed, there was nothing to eat. Another neighbor died of hunger”

Another respondent also stated that,

“I fell pregnant. I was under stress all the time, not having enough to eat during my pregnancy. My baby was declared dead after it was born”

All the participants reported malnutrition. This condition resulted in miscarriages and bouts of depression among children and adults. Children felt ashamed of their situation at home. As a result, suicide attempts and suicidal behavior were reported in

the mining communities. Proper nutrition is crucial as an expression of a community's general health and well-being, of which regular access to food is only one.

The study agrees with Shandro et al. (2011) that mining communities' health is becoming a priority for the mining industry, governments, and researchers. Health and social service providers report increases in pregnancies, sexually transmitted infections, and mine-related injuries during booming mine activities. During bust times, mental health issues such as depression and anxiety were reported. Overarching community health issues prominent during both boom-and-bust periods include burdens to health and social services, family stress, violence towards women, and addiction issues.

Chuhan-Pole et al. (2015) also reported that infant mortality rates significantly decreased in mining communities relative to non-mining areas. The study contradicts Aragon and Rud (2015), who reported that farmers located near mines experienced a relative reduction in total factor productivity of almost 40% between 1997 and 2005, with pollution emanating from mining as the most plausible explanation for the agricultural productivity slowdown in mining areas.

4.5.9 Food Security

Food security is an important factor in the wellbeing and survival of mankind. The respondents noted that the community had no food security at the mining company closure. The community lost their access to food because of the non-payment of their salaries for a prolonged period. Food parcels were distributed to the miners and their families regularly. Food parcels provide basic foods and do not always make provision for the needs of the family for proper nutrition to ensure psychological health as well as growth and development in children.

A 55-year-old woman said that:

“Getting food on our table is a real struggle these days; we use to get a water supply from the company. Still, when it closed its operations, we lacked water for irrigation, which helped us irrigate our farms due to disconnection of power and poor maintenance of the broken pipes.”

This implies that the households could meet their economic needs by quality control of meals, reducing consumption patterns, and diversifying farming and production. This corresponds to (WHO, 2013), which asserts that food parcels provide basic foods and do not always make provisions for the family's needs for proper nutrition to ensure psychological health and growth and development. The study also concurs with Gaillard and Kelman (2012) closure of mining greatly affects the household. The household is resilient; hence, the inability to access resources indicates the vulnerability of the household.

The study findings agreed with Frankenberger et al. (2012), who noted that food security is an extremely important aspect of any household. The need for food is, almost in every case, the first sign of a community's vulnerability and a condition of poverty; this condition becomes apparent from the responses below:

“The mine closed and no salaries were paid. I ask myself if life is still worth living if you have lost everything and have nowhere to go and no food to eat”
Food insecurity was evident in most households in the study area due to the sudden closure of mining company which was a great source of livelihood. It's even aggravated by adverse weather condition as the region is an ASAL area.

4.5.10 Formal Employment

The study findings revealed that the majority (53%) of respondents were employed in a fluorspar mining company. They were employed as mining engineers, managers, machine operators, field officers, finance officers, and laboratory experts. However,

after the mining company's closure, these groups of people lost their jobs, which was their major source of livelihood.

The study findings on emerging livelihoods agree with Chuhan-Pole et al. (2015), who revealed that men are more likely to benefit from direct employment as miners while women are more likely to gain from indirect employment opportunities in services. They also show that mining improves access to infrastructure (such as electricity and radios) and health outcomes of the children of long-established households relative to migrants.

It is also agreeing with Veiga et al. (2001), who noted that mining communities should be considered sustainable, a mining community needs to adhere to ecological sustainability, economic vitality, and social equity. These principles apply over a long-time span, covering both the life of the mine and postmining closure. The legacy left by a mine to the community after its closure is emerging as a significant aspect of its planning. Progress towards sustainability is made when a value is added to a community with respect to these principles by the mining operation during its life cycle. These case studies of both new and old mining communities are drawn mainly from Canada and from locations abroad where Canadian companies are now building mines.

The study findings also concede with Ackermann (2013), who asserts that lack of income and cash flow loss excluded the mineworkers and their relatives from normal activities to which they had access prior to the mine closure. These include being able to partake in social activities such as eating at restaurants and going to places of entertainment provided by the city and municipality. Interviews with the business owners during the mining site observation confirmed a severe drop in the mining

communities' ability to partake in these activities. The families affected by the mine closure did not even have the finances to buy groceries and the basic personal items they needed (Tempelhoff 2010). The workers and their families needed food parcels because of the non-payment of salaries from April 2010 to October 2010.

4.5.11 Closure of the Mining Company Effect on Households Education

The study sought to know whether the company's closure affected the type of school for your household members. This was important in order to understand how the closure of the mining company affected the education of household members and the coping strategies they employed. Table 4.14 presents the study results.

Table 4.14 Closure of the Mining Company Effect on Households Education

	Frequency	Percentage
Yes	165	80.5
No	40	19.5
Total	205	100

As shown in Table 4.14, most 165(80.5%) of the respondents said that the company's closure affected the type of school of the household members. In comparison, 40(19.5%) indicated that the company's closure did not affect the type of school of the household members. This implies that the company's closure leads to unemployment and closure of small enterprise businesses, making those household members who go for private schools change to the free public schools.

The study findings concurred with the Kraay (2018), who reported that the low quality of education in rural areas and the outdated vocational training are likely to place some of the thousands of positions out of the reach of residents. There is a mismatch between possible opportunities and available skills, which has led to the increasing use

of workers from Russia and China in the construction and mining sectors; vocational school graduates' idleness rate is 26 percent.

In education, the delivery of quality education is undermined by inadequate inputs. Facilities, equipment, desks, books, and other key requirements for teaching are lacking. In addition, the number of specialist teachers in rural areas is insufficient as there are few incentives to work in rural areas where compensation is lower than in urban areas. Less than 10 percent of the teachers in rural areas have the lead teacher's rank compared to 30 percent in city schools (Bebbington, Woolcock, Guggenheim & Olson, 2006). Providing incentives for teachers and increasing the allocations for pupils to "provide for those sparsely populated soums that are at a disadvantage from the budget allocation" is critical, especially in the context of mining development where improving human capital is critical to increasing local employment and thus local incomes World Bank, (2017).

4.5.12 Household Education Level

The participants were also asked to indicate the household education levels after the closure of the mining company. This was carried out in order to understand the implication of the closure of mining companies on the education level of households.

Table 4.15 summarizes the study findings.

Table 4.15 Education Level

Education Level	Frequency	Percentage
Informal	73	35.6
Primary level	97	47.3
Secondary school	23	11.2
College	9	4.4
University	3	1.5
Total	205	100

In respect to respondents on educational qualification level, 73(35.6%) had no formal education, 97(47.3%) had a primary level, 23(11.2%) had a secondary level, 9(4.4%) had a college level, and 3(1.5%) possessed a university degree. The results show that the respondents' literacy levels influenced their bargaining power during the site's Closure as those who may have or low formal education level could be compromised.

The study concurs with Bowes et al. (2009), who revealed that the mining companies had increased the residence level. However, after Closure, the education level dropped due to the cost associated with the provision of education. Community members believe the mines had some positive short-term impacts but few lasting benefits. Positive economic impacts included creating new businesses and jobs at the mines, resulting in increased incomes; however, many of these benefits disappeared after mine closure. Positive social impacts were restricted to better education opportunities at the Nanisivik School. To increase socio-economic benefits and assist communities with fulfilling their sustainable development objectives, mining companies in Nunavut should emphasize education and training for locals and encourage local business development and partnerships through strong relationships and close communication with involved stakeholders.

The study finding agrees with Botha, Van der Waldt and Ackermann (2018), who asserts that the mining communities will experience social changes related to job loss, for example, unemployment and poverty after the Closure of the mining company. This is because most individuals had acquired skills only for employment in the mining industry, and job creation schemes failed.

Children of affected households during closure of mining activities experienced learning problems and were not motivated to perform well at school. Children had to

cope with their households' new financial position in which parents were not able to provide new school clothes; they had to wear second-hand clothes. It was reported by 48 years old female resident that one child was so embarrassed that he attempted suicide. Children were taken out of school because of non-payment of school fees (Deikema, 2010). Some children also did not have access to their year-end academic results because their parents' owed money to the school. Children report hungry at school, and as a result, feeding schemes were launched at the schools Van der Walt, (2009).

The study sought to determine where the household members go for school after the closure of mining companies. The results are presented in Table 4.16.

Table 4.16 School Attendance

School Attendance	Frequency	Percentage
Public schools	167	81.5
Private schools	38	18.5
Total	205	100

The study results in Table 4.16 show that the majority of 167(81.5%) of the respondent's noted that their children go to public schools while 38(18.5%) of respondent noted that their children go to private schools. This shows that most of the respondents' children, as evidenced by 167(81.5%), have opted for public schools since private schools are associated with high costs.

The above results showed that after the mining company's closure, most households opted to take their children to public schools to reduce the cost of schooling. This is because public schools have subsidies from the national government, making the payable school fees lower than that of private schools. The low incomes of the households could have occasioned this after the closure of the mining company. The

study findings concurred with findings of Teschner (2014), who noted that during mining operation there was increased educational advances, increased local investment, and improved profitability business. However, after the mining company's closure, there was the withdrawal of financial support for educational institutions, which increased the school fees, making the parents take their children to low-paying school fees schools.

4.5.13 Environmental challenges associated with the closure of the mining company

The participants were asked about the environmental challenges associated with the closure of the mining company. This was done in order to understand the effect of the closure of the mining company on the surrounding environment. The study findings were presented in Table 4.17.

Table 4.17 Environmental Challenges Associated with the Closure of the Mining Company

Environmental Challenges	Frequency	Percentage
Yes	110	53.7
No	95	46.3
Total	205	100

The study findings in Table 4.17 above revealed that the majority, 110(53.7%) of the respondents, indicated that there were environmental challenges associated with the mining company's closure. In comparison, 95(46.3%) of the respondents noted that there were no environmental challenges associated with the mining company's closure.

This gives an impression that the fluor spar area faced the challenge of preserving the natural environment on mining operations along the Keiyo South Sub-County. This is because the mines operated in areas where the community already engaged in

agriculture, hence disrupting the region's food supplies. Agriculture and mining industries should, however, co-exist sustainably. People in the local community are in close connection to the environment for generations from ancient times. Due to the perceptions of negative environmental impacts, there are always many local communities resisting mining operations in terms of land injustices bending compensation. The fluorspar mining company operated in the ASAL area, where the common economic activity keeps livestock as a source of livelihood. However, mining companies caused environmental problems, for example, water pollution and land degradation. These environmental problems caused some negative impacts on residents' lives. For example, the water sources decreased due to mining, the communities surrounding the mining area faced difficulties of water shortage for drinking themselves and livestock.

The study findings concurred with Conde and Billion (2017), who noted that besides, in some cases, the residents resisted the mining companies before the onset of the operation because they perceived those negative impacts on the environment might be caused in the future. Conflicts occurred in many cases when the proximate community was dependent on agriculture and the mining operation perceived to impact water and land. Taylor (2011) described that Vale Company was preparing for a gold and copper mining operation in Condebamba Valley, Peru. The local villagers protested before mining operations because other areas in Peru might negatively impact water and land. In addition, the protestors wanted to defend agriculture in the village for their livelihood and future generations.

The study findings further give an impression that the challenges associated with closure were; water being contaminated by the soil from the site, high effects on crops

as fertility rate decreased due to emissions of smoke from the mining sites, dust and smoke, health issues due to mosquitoes, siltation and open pits left as a result of mining being a risk to human and livestock, poor productivity of food due to infertile soil and soil erosion, wells and springs drying up, water sources changing directions and increase of diseases like skin rashes, TB and HIV/AIDS, open dams, crocodiles in the dams, charcoal burning for income leading to environmental degradation/ landslides, water pollution due to lack of treatment and maintenance, poor road networks, stalled houses, cars, and lorries.





Plate 4.1 Dangerous Open Dam

Source: Field Data 2019

The plate 4.1 shows a gorge left after closure of mine. One of the community members 52 years male residents noted that:

“The open dams left mining is a threat to our life. Many open dams are manifested with crocodiles which is dangerous to us and our livestock as well. We have lost many goats and sheep and even cows snatched by crocodiles when they go to drink water in these dams.”

This implies that deep gorges left after the mining operation's closure, which posed a danger to residents and their livestock. This also implies that the main concern is pollution and ecological degradation caused by continual mining. Mine-water pollution is already severe. Abandoned mineshafts present a serious problem to mining communities after the mine has been closed. If mining dumps are not treated, particles containing hazardous chemicals are blown from these dumps. Mining houses have developed mine-closure toolkits and best practices to address sustainable development issues and improve the practices associated with mine closure. This is

done in order to retain the social license that allows them to carry on mining adjacent to these communities in the future.

The study findings agree with those of Constantine and Battye (2015), who found that mining companies' dams release enormous quantities of tailings into river catchments. The open dams cause accidents that pose a serious threat to animal and human health and are of concern for mining industries and the wider community. Therefore, the nature of the material held within these dams, what best safety practice is for these structures and, should the worst happen, what adverse effects such accidents might have on the wider environment and how these might be mitigated.

The study findings further concur with those of Conde and Le Billon (2017), who found that many countries face challenges in preserving natural environment while extracting mineral resources for economic development. Mineral extraction is crucial for human lives providing energy and metals for goods production; however, it also impacts natural environments. On the other hand, local people are engaged in agricultural activities to preserve the natural environment for future generations. Therefore, mining companies have to preserve these natural environments for the satisfaction of local people and in order to ensure the co-existence for both subjects. Mineral extraction has been increasing since the 1950s, and the major lift has taken place in the past decade to meet the growing global demand for natural resources. Mining activities took place widely in the United States, Canada, and Australia until the mid-1990s. Since then, the mining investments have moved to the developing countries in Latin America, Sub Saharan Africa, Southeast Asia, the Pacific Islands, and Central Asia Dougherty & Olsen, (2014).

The study findings further agree with Temper et al. (2015), who found that mining leads to conflict; this is due to these worldwide expansions of mineral extractions. The mining conflicts between mining companies and local communities have been increasing. While fewer than 50 conflicts were recorded annually up to the year 2000, the numbers have steadily risen to 250 conflicts in 2016, which means the conflicts' annual case has increased five times in the last 16 years. Various studies have been conducted on diverse aspects of mining conflicts to prevent confrontations and ensure sustainable mining development and local people's satisfaction Temper et al (2015).

Furthermore, Moffat and Zhang (2014) found that distrust towards the mining company and environmental impacts of mining are related factors that are the reasons for mining conflicts. In addition, they described various types of factors that caused mining conflicts in the past, such as state-related, mining companies related, local communities-related, and mining project-related factors. The literature described that the perceptions of mining's adverse effects on the natural environment led to distrust and resistance. For example, the mining effect on water quality and quantity caused a conflict in Peru Bebbington & Williams, (2008). Local people resisted mining in Mongolia due to water contamination and land alteration (Beck et al., 2007; Dalaibuyan, 2012; Reeves, 2011). In the Andean highlands of Peru, residents competed for land and water Conde and Le Billon, (2017).

The study findings agree with Reeves (2011), who found that the mining sector remains the country's main source of environmentally harmful economic activity, and it threatens to upset Mongolia's unique biodiversity, cultural heritage, and traditional economic structure based on livestock herding Sharma et al., (2015). In many areas, the rapid expansion of mining has occurred alongside dramatic changes in land use,

water use, and herder's livelihoods. Nomadic livestock herding is under serious threat by the drivers of socio-economic change brought by growing national and international interest in mining and resource development activities from bio-physical changes occurring due to increasing climatic variability and change. Water and land-related environmental impacts of mining activities have been recorded in Mongolia.

The study findings further concur with McIntyre et al. (2016), who reported serious water pollution in the Shariin Gol River, in Selenge Province, North Mongolia, due to large-scale and small-scale mining companies and private miners (individual people mine at abandoned mine sites). In this area, a river stream was diverted to another course in order to reach a coal seam. Coal was washed, and the water was treated in a sedimentation pond and discharged directly into the river. Also, the surface water of the mine pit was discharged into the river. An examination of the river water quality showed a relatively low PH, a sign of acidity. This was assumed as the impact of small-scale mines located in the headwater area. The researchers noted that the baseline data of the river water quality was limited, and chemicals in the water were unknown and poorly regulated. Under the Law on Water (2012), the pollution of water should be penalized Rosa, Chiarelli, Rulli & D'Odorico, (2019).

The study findings from the focus group discussion revealed that the main reasons for the closure of the fluorspar mining company were the lease period's expiry and the reduced demand for fluoride in the world market. This closure of the mining company affected the livelihood of surrounding communities. It affected the community's livelihood assets and resulted in to diminish of coping strategies and livelihood outcomes. It affected the community's nutrition, health, education, food security,

water, shelter, community participation levels, and personal safety. The average income per month was reduced significantly.

The focused group discussion indicated that environmental challenges caused by the closure of the mining company were; water being contaminated by the soil from the site, high effects on crops as fertility rate decreased due to emissions of smoke from the mining sites, dust, and smoke, health issues due to mosquitoes, siltation, and open pits left as a result of mining, poor productivity of food due to infertile soil and soil erosion, wells and springs drying up, water sources changing directions and increase of diseases like skin rashes. They further show that the company's closure leads to unemployment and closure of small enterprise businesses making those household members who go for private schools change to free public schools. The rate of drugs increased after the closure of mines.

The closure of the Fluorspar Company had a devastating effect on the quality of life of the mining community and the former employees and their families who were affected directly. However, this issue has not received sufficient attention in official assistance from the national and county government. In the cases, the community has come up with coping strategies to uplift themselves in terms of mutual assistance such as merry-go-round, Saccos, and youth groups.

Surrounding community members employed by the company depend solely on the mining industry to help sustain them and their dependents for a full lifespan until and throughout retirement. Therefore, after the closure of the fluorspar mining company, communities were not left with an unstable working environment, nor promise a secure income to household members who depend wholly on a salary for their livelihoods. The community members did not prepare for the mine closure; they also

did not expect this sudden closure of the mining company. Studies by Van der Waldt and Ackermann (2018) identified the general socio-economic consequences of mine closure for communities.

The closure of Fluorspar company has devastated the local economy, forcing many businesses to close, from food retailers to money transfer services. Approximately 1 km from the abandoned crushing plant, deserted Kimwarer shopping center is dotted with closed shops and stalled trucks. Young men are idling and playing board games under a tree.

One of the residents stated that;

"When the company stopped mining, our vehicles also stopped moving."

The trucks used to transport blasted rocks from the mines to the plant and railway, which ferried them to the country's coastal part for export. The respondent further noted that they had loans with banks, which they are now struggling to pay. Some of their trucks have been towed by creditors. Keiyo South Sub-County communities were not prepared beforehand for the loss of employment and ensuing poverty. The Keiyo South Sub-County communities suffered from shock. Both the emotional and economic spheres of the inhabitants' existence were affected. This process also impacts social structures and the economic wellbeing of the community. The study found out that due to the mining company's closure, communities were faced with sudden unemployment, emotional issues, and health problems such as depression and feelings of uncertainty. Some reported feelings of helplessness and anger due to their awaiting consequence on their livelihoods' immediate loss.

Since there was no planned closure of the mining company, community members were not ready and had no initial self-employment training. Therefore, mining communities also experienced social changes related to job loss, for example, unemployment and poverty. Even though plans for skills development and job creation schemes were within the company's policy, there was no time to adjust to the consequences of closure for the mineworkers and community at large. These individuals had acquired skills only for employment in the mining industry, and job creation schemes failed.

The study found out that the mineworkers lose their right to housing when the mine closes. However, their dwellings are left abandoned and are then inhabited by illegal occupants. These impacted negatively on the existing social structures and the safety of neighborhoods. Mining sites are stripped of usable metal, which is then sold to metal recyclers. The infrastructure and facilities of the closed mine are often vandalized due to a lack of security. Mining operations cannot re-open unless the infrastructure is rehabilitated, which would be extremely costly to the new mine owner.

The pollution and ecological degradation caused by abandoned mining sites are a major concern. Mine water pollution is already a serious issue in Keiyo South Sub-County. Abandoned mine constitutes a serious problem for mining communities. The mine dumps were left untreated, which has caused water and air pollution. Locals have used mining premises for grazing and keeping the animals, while termites and others have invested others by reptiles such as snakes, lizards, rats, and spites. The findings concur with Ocansey (2013), who found out that the influx of mining companies in the study areas showed that mining activities within the region of the

study have in many ways affected the livelihood of the people by displacement, relocation, and even resettlement. The social, economic, environmental, and livelihoods of the inhabitants of the catchment areas are adversely affected by mining activities, leading to food shortages, land degradation, water pollution, high cost of living, food price hikes, and many other factors.

The study findings concurred with Appia and Buaben (2012), who found that despite the enormous wealth generated from mining activities, host communities persist in lifestyles. The study agrees with White (2013), who asserts that mining operations usually result in environmental degradation in the mining communities if mines owners do not adhere to regulations that have been put in place to ensure that the environment is not harmed and degraded the activities.

Bowes et al. (2009) found the Nanisivik and Polaris mines' socio-economic impacts, Nunavut, Canada. Nunavut has gained importance in the last few years as an area of high mineral potential, with exploration leading to discoveries of several mineral deposits that have, or will in the coming years, become mines. As a territory with an economy based largely on government employment, new mining operations have the potential to provide Nunavut with an alternative way to develop its economy through job creation, local business opportunities, royalties, and taxes. Mining provided Nunavut people with training opportunities for various jobs that can later be used for employment with community-based businesses. The results revealed that community members believe the mines have positive short-term impacts but few lasting benefits. Positive economic impacts included the creation of new businesses and jobs at the mines, with resulting increased incomes; however, many of these benefits disappeared after mine closure.

Positive social impacts were restricted to better education opportunities at the Nanisivik School, whereas negative impacts included increased alcohol consumption. The benefits of employment were mixed because, although employment was available to local Inuit, training was limited and did not in general lead to any certification that could be transferred to other jobs after mine closure. The study concluded that because the benefits were not numerous and mostly did not persist after mine closure, these mines did not contribute to the region's long-term sustainable development. To increase socio-economic benefits and assist communities with fulfilling their sustainable development objectives, mining companies in Nunavut should emphasize education and training for locals and encourage local business development and partnerships through strong relationships and close communication with involved stakeholders.

Further and Hilson (2002) found that small-scale mining and its socio-economic impact in developing countries by examining both the positive and negative socio-economic impacts of small-scale mining in developing countries and outlined key measures for improving the sector's sustainability. He clarified that, despite experiencing its share of environmental and health-related problems that adversely impact the human quality of life, small-scale mining plays a pivotal role in alleviating poverty in the developing world and contributes significantly to national revenues and foreign exchange earnings. Though these important socio-economic contributions make small-scale mining an indispensable economic activity, there is an obvious need for improved sustainability in the industry, more specifically, for operations to resolve pressing problems, many of which have wide-ranging impacts. However, because

most small-scale mines are low tech and employ poorly trained, uneducated people, it is difficult for the sector to improve on its own. Thus, governments and regional international bodies must play an expanded role in bridging critical information, technological and economic gaps.

It was concluded that governments and regional organizations could accomplish much in the way of improved sustainability in the small-scale mining industry by (1) legalizing small scale mining and implementing sector-specific legislation; (2) contributing to community development and providing increased economic support; and (3) providing training and educational assistance, and playing an expanded role in the dissemination and transfer of important technologies.

The companies that supported the mines with basic services such as electronics, electricity, and security were not paid, and their services were duly terminated. Some of the smaller businesses that benefitted from the mining operations and workers' salaries were closed down or went bankrupt after the mines closed. Electricity was cut in 2010 because of the non-payment of bills to Eskom and because the amounts exceeded the mine owners' ability to pay.

The buildings in which the mine offices were situated were left empty and were not maintained. Electricity at the mines and the homes of mineworkers was cut off because of a lack of payment to Eskom and the local municipalities Deikema (2010). The entrance to the gate and the roads were not maintained and showed signs of damage. The pipes were rusting because of lack of maintenance and caused a safety risk to the workers who were part of the care and maintenance operations (Tempelhoff (2010). The care and maintenance unit workers complained that the lights on their

safety helmets were faulty, and miners had to rotate the helmets among them to have light when working underground.

One of the community members revealed that;

"There are a few available casual jobs that can be found on the farms. However, the farmers have little or no money to spare and some of my former workmates are paid for their labour in grains such as maize in order to feed their families,".

These results imply that the majority of the residents in the Keiyo south Sub- County lost their daily bread in the form of casual jobs they use to do to sustain their daily needs. This again denied them stable income since most of these jobs were linked to the operations of the fluorspar mining company.

CHAPTER FIVE

CLOSURE OF FLUOSPAR COMPANY AND HOUSEHOLDS' LIVELIHOOD STRATEGIES

5.1 Introduction

This chapter presents the findings and discussions on closure of Fluorspar Mining Company on livelihood strategies

5.2 Livelihood Strategies

The second objective of the study was to analyze the livelihood strategies adopted by Keiyo South Sub-County communities who had benefited from fluorspar mining company after its closure. This was done to understand how the communities cope with the effect of the closure of the mining company. The livelihood adopted by the communities surrounding the mining area is discussed below;

5.2.1 Household Economic Needs after the Closure of the Mining Company

The study sought to find out how the respondents met their economic needs after the closure of mining company. Table 5.1 presents the study results.

Table 5.1 Household Economic Needs after the Closure of the Mining Company

Household economic needs	Frequency	Percentage
Farming	133	64.9
Self-employment	27	13.2
Formal employment	45	21.9
Total	205	100

The study results in Table 5.1 showed that the respondents were able to meet their economic needs by resorting to farming, evidenced by 133(64.9%), 27(13.2%) became self-employed, while 45(21.9%) were employed. This implied that after the

mining company's closure, the households adopted other livelihood strategies to sustain their livelihood and meet their economic needs. The household diversified their farming, such as growing tomato, millet, maize, beans, and groundnuts. The household adopted this to reduce food insecurity. This was because agriculture has to generate household incomes and stimulate the growth of productive off-farm activities in rural areas like Keiyo South Sub-County. To achieve these goals for agriculture, several strategies have been pursued.

Therefore, there is a need for other stakeholders to encourage these households in Keiyo South Sub-County to adopt more productive practices, especially the wider use of improved varieties, fertilizer, disease and pest control, pricing policies, and marketing policies and institutions. The extension services can be the main instrument in obtaining much higher yields through known techniques. Another livelihood strategy adopted by households in Keiyo South Sub-County was charcoal burning in order to earn an income. The households reduced food consumption patterns from three meals a day to two and one. After reduced income, some households changed the type of school, changed health sources, and reducing recreational activities.

The study results agree with FAO (2015), which asserts that the households would adopt low-risk, immediate, and low-return agricultural and other income-generating strategies after losing the current income source. The finding agrees with Chang'ach (2016), who demonstrates that people in all three ecological zones of Keiyo try to diversify their economic opportunities to meet the livelihood. Moreover, Keiyo communities diversify both to reduce risk and uncertainty and in hopes of succeeding financially and getting ahead. On the other hand, it has shown that the interaction of environmental factors has limited the economic opportunities available to most people

in the valley, and to a lesser degree, on the escarpment. The highlands ecological zone provides the greatest opportunities for achieving economic security and success. Usually, through a combination of on-farm and off-farm activities, households can live more comfortably than in the other two areas.

Ironically, however, it is also in the highlands that diversification of activities becomes the least essential for economic survival and prosperity. Because of the much more favorable opportunity structure, households in the highlands do not feel compelled to diversify their economic activities, as do people who lived in the valley or on the escarpment. Nonetheless, it demonstrates that diversification is still the most common strategy pursued in all three ecological areas. The study findings further concur with Mukangai (2019), who noted that maize and other grains should be re-organized and accelerated to generate the new, high-yielding varieties that are essential to keep pace with consumption. In Keiyo South, Sub-County communities practiced small-scale farming.

Some households have been employed in the civil service, which is an important income-generating activity besides casual and contractual jobs. Moreover, a number of people are employed by the rural access roads program. For people who want casual labor, opportunities exist, for example, fencing, weeding, harvesting, and constructing a hut, which is paid per day's work (or predetermined sum of money). In monetary terms, these casual jobs and local contracts are readily available opportunities. Some people own transportation businesses (public service vehicles) and Boda-boda services. Others are in self-employment, such as small kiosks, shops, and selling honey.

5.2.2 Livestock Keeping

A 52 years old man reported that;

“After the closure of the fluorspar mining company and losing jobs, we opted for livestock keeping in order to sustain our household needs, for example school fees for our children, health expense, and community engagement, for example ceremonies.”

This gave an impression that after the closure of the fluorspar mining company, households had no option but to come up with alternative strategies to sustain their livelihood. The region is ASAL; therefore, livestock keeping has become an adaptive measure. The main types of livestock reared in this region include cattle, sheep, goats, poultry, rabbits, pigs, donkeys, and bees keeping. The milk income level in the valley is considerably lower than that of the escarpment and the highlands.

The study findings agree with Mwacharo and Drucker (2015), who noted that keeping cattle helps in the adaptive way of life. In addition to the traditional short-term coping mechanisms, the long-term adaptation strategies used include diversification of livelihood sources; livestock mobility to track forage and water resources; diversification of herd composition to benefit from the varied drought and disease tolerance, as well as the fecundity of diverse livestock species; and sending children to school for formal education as a long-term investment expected to pay back through income from employment. Policies and development interventions that reduce risks, diminish livelihood constraints, and expand opportunities for increased household resilience to drought are critical complements to the existing pastoral strategies.

The residents practiced poultry farming which was local chicken under a free-range management system with minimum feed supplement and moderate housing structures. However, marketing is a major constraint in the commercial poultry sector. Farmers fail to get good returns to sustain the enterprise and the households due to long

distances to competitive markets. Eldoret town and hotels in Iten town are the main market outlets for poultry and products from the region. Pig keeping was not popular in the region due to low management skills and market constraints. The few animals kept are by the institutions in the area. The pigs kept are crossbreed Landrace and Large White. There is no group in the area that is seriously involved in the value addition of honey except the Keiyo South Sub-County Development Authority (KVDA), which served a limited area in the valley, and this was the reason why most of the bee-keepers sold their honey in crude or semi-crude form.

A minority of households in the lowlands sell honey. Most households use it for home consumption, for medicinal purposes to make a local honey brew, and as a delicacy. Honey processing was done by the Rokocho honey refinery center owned by the KVDA. The bee-keepers are also embracing modern methods of beekeeping, such as the use of the KTBH. Cattle production activities in Keiyo are in accordance with the three distinct topographical features: the highlands, the escarpment, and the Keiyo South Sub-County. This was due to differences in altitude and rainfall amounts.

A group of community members noted that;

“KVDA has provided us with alternative source livelihood after the mining company's closure by providing us beehives that we keep until it's ready for harvesting. They also come into harvest honey and pay us our dues.”

From the above sentiments, it is evident that KVDA has provided an alternative livelihood strategy to households in Keiyo South Sub-County to generate income through honey sales. The KVDA is running several projects which have employed many people. These projects include Arroyo multipurpose project, mango processing plant, honey processing plant, lower Turkwel irrigation, greenhouse technology, and meat processing. The introduction of greenhouse technology and the promotion of

aquaculture as an alternative source to food security by KVDA has boosted livelihood among the residents because they can buy subsidized food from KVDA.

In addition, supported farm forestry through raising and sale of 10 million assorted tree seedlings to institutions, individual farmers, and Non-Governmental Organizations (NGOs) for planting within Cherangany and other catchments. Increase in land under irrigation by 500 hectares in existing irrigation projects at Tot, Arror, and Ptokou/Sangat to improve food security in the region. Production of 6,000 beehives for community empowerment by improving the quality of honey produced in the region. Construction of 10 (ten) small dams and 90 (ninety) water pans spread within the Keiyo South Sub-County region. Establishment of three additional community empowerment projects, i.e., fish farming in Weiwei, greenhouses in Kerio Roses, and Lodwar. Establishment of Livestock improvement Programme in Chemeron, Baringo County.

KVDA has also rolled out seed nursery projects in the area that encompasses different varieties of fruit seedlings such as pawpaw, bananas, and mangoes. These projects have created self-employment, especially for the youths.

5.2.3 Alternative Employment Opportunities

One of the youths noted that:

“After the closure of fluorspar company, we had no option but to look for employment either formal or self-employment in order to sustain our livelihood.”

This gives the impression that after the mining company's closure, people had to look for coping strategies to sustain their lives. They look for employment elsewhere, and some practice self-employment. Since most households in the study area are poor, there was a need to achieve economic growth through the use of their productivity,

such as self-employment after the mining company's closure. Failure of a fluorspar mining company to employ after its closure severely handicaps the community's economic effort. Therefore, low-income groups are numerous in the study area; hence they can create surpluses in highly productive sectors and then use those surpluses to alleviate their poverty utilizing welfare and relief payments. The households adopted this coping strategy with the need to protect and enhance the assets and income streams. The study findings concurred with Clemens and Wither (2019), who found that binding minimum wage increases had significant, negative effects on targeted workers' employment and income growth.

One of the landscaping experts reported that;

"After the closure of fluorspar mining company, I used my learned skills of landscaping in other parts where could get earning to feed my family."

This implies that personal skills and social networks can provide employment, safety nets in times of distress, and routes to savings and remittances used for investment purposes when the formal employment sectors do not help anymore. Therefore, there was a need by the household to find ways of assisting the households to increase the range and quality of their productive opportunities and livelihood choices.

The creation of productive employment opportunities is one of the most serious challenges facing households in Keiyo; therefore, they had to come up with a self-employment strategy. A central component of the larger efforts towards economic growth, poverty reduction, and increased employment is the strategy for the balanced development of rural areas. Improved productivity and output in self-employment, which is essential for overall economic growth, is closely linked to services and inputs provided from accessible urban areas. The study findings concur with Ibarraran, Ripani, Taboada, Villa, and Garcia (2014) that personal skills increase employability

and quality of employment, the practical significance of the impacts is unclear, as there is only weak evidence that the life skills measures used are associated to better labor market performance.

The study findings further agree with Chang'ach (2016) that the livelihood strategies adopted by the households were small-scale economic activities (casual labor, charcoal burning, making and selling alcohol, craftwork such as making calabashes or ropes, and financial remuneration from relatives); salaried employment (with the government or a private company) or wage labor (working locally in a business, such as butchery or a bar); business endeavors/entrepreneurial activities (ownership of a bar, a duka (small retail shop), or a matatu (public vehicle); Both salaried employment/wage labor and business endeavor/entrepreneurial activity. All these activities are normally carried out in conjunction with, rather than as alternatives to, agriculture. It is suggested that category four (combining salaried employment with a business enterprise) is the most desirable option for people in terms of reducing feelings of risk and uncertainty and the potential for getting ahead. Categories two and three are the next best options, respectively. While category one (small-scale activities) is the least desirable since it is the least diversified.

Nearly every able-bodied adult, regardless of age and gender, is able to engage in casual labor, such as working for the neighbors during critical periods in the agriculture cycle, such as land preparation, planting, weeding, or harvest. In terms of more gender-specific small-scale activities, for men, there is the burning of charcoal, while for women, the making and selling of beer can bring in a cash income. In the three ecological zones, craftwork is a relatively insignificant source of income; even those few who engage in these activities are still only performed on a part-time basis.

Some older persons are no longer physically able to engage in such casual labor as the burning of charcoal or the brewing and selling beer. Moreover, their ability to work on their plots has also diminished with advanced age. These people tend to rely on their relatives for food, clothing, or money. This support source is especially important for the older people with children or grandchildren who may be employed in urban centers like Eldoret, Iten, and other major towns. Indeed, kinship continued to act as a support system in contemporary Africa (Chang'ach, 2011).

The possibility of securing salaried employment with the government or major private firms in Eldoret depends on several factors. The most important are educational qualifications and personal social networks (Chang'ach, 2011). Local jobs also, at least ostensibly, depend on both educational qualifications and personal connections. In and around the Fluorspar Mining Company, the possibility of securing employment is low. Business endeavors and entrepreneurial activities, such as ownership of a bar or small retail shop (duka), provide one of the best means of insuring an individual and his/her family against uncertainty stemming from dependence on the vagaries of climate (rainfall and temperature) or labor shortages in the production of crops or animals. Nevertheless, a few people are ever able to do so because the ability to invest in a business is heavily dependent on relatively large amounts of capital (Chang'ach, 2011). Thus, entrepreneurial activities are restricted to a very small number of individuals and households. Moreover, this is the most certain path to affluence, but it is also a highly unlikely one for the vast majority of people because of lack of capital (Chang'ach, 2011).

5.2.4 Agricultural Activities

One of small-scale farmers reported that;

"We had no option after closure of the fluorspar company, but to actively participate in agricultural activities in able to cater for our daily needs."

This shows that agriculture was the largest source of gainful employment among most households after the closure of the fluorspar mining company. This is central to the households' economic development and requires a long-term strategy for employment creation and transformation of the economy. Agricultural performance is crucial for the households because it provides vital ingredients for economic transformation, such as demand, foreign exchange, raw materials, food, and labor. As part of their diversified livelihood strategies, nearly all households in Keiyo are engaged in some crop production. Farming is the basis of life for most people, although the degree to which they depended upon agriculture varied across the household capability. Furthermore, the types of crops that can be grown, the amounts that can be produced, and the use to which they are put vary in the three ecological zones.

The study concurs with Saha and Bahal (2016), who noted that nearly two-thirds of the farmers participated in different non-farm activities. About 53 per cent of the diversifiers were successful, and 47 per cent were unsuccessful in their diversified activities. Nearly 41 per cent of the successful diversifiers had moderately high success, and only 13.10 per cent were under the high success category. Some of the households had a highly diversified livelihood, which included farming, no farming, and migration. However, this highly diversified nature is mainly scattered under the low success group. Despite the vast potentiality to diversify the livelihood towards the farm and non-farm activities in the study area, there were problems such as the negative perception of the community, outdated method of production, lack of improved technology and skills, lack of business start-up budget, and absence of a wide market for the non-farm output.

One of the farmers reported that;

"The main crop being planted is the maize which is the staple food."

This implies that the staple food in the study area is maize, grown in the area as a source of food. Maize tends to be the staple crop for people in the study area. The residents opted for growing maize because they are less susceptible to damage from crop pests, such as weaverbirds, than are millet and sorghum. The study agrees with Chang'ach (2011), who noted that the advantage of maize is that it is less susceptible to damage from crop pests, such as weaverbirds, than are millet and sorghum. Just as in much of Africa, maize has displaced the traditional cereals, such as finger millet and sorghum, for several reasons. In the days prior to universal primary education, children (along with older adults) could spend much of their time on elevated platforms in the fields to scare away birds and wild animals.

In addition, another respondent noted that;

"The reason for planting maize here is that it requires less labour during planting, weeding, harvest, and processing than those other grains; it is a labor-saving crop compared to the indigenous grains."

This implies that after the closure of the fluorspar mining company, the household opted to plant maize because it was less costly during its production. Also, the crops helped the household in food security. Maize has also acquired a higher monetary value than millet and sorghum, and the Keiyo farmer responded to widening market opportunities. Moreover, maize serves the dual purpose of being a commercial crop and being a subsistence crop. Though maize is considered a food crop, it is a cash crop as well, for it is an important money earner for both small-scale and large-scale farmers.

The study findings agree with Musaba and Bwacha (2014), who noted that maize is a major staple food crop of Zambia that smallholder farmers predominantly produce due to low labor cost. The inefficiency model results indicate that age of farmer, cooperative membership, which implies access to fertilizer, and farm size, have significant positive effects on efficiency. The seed types used, rotation practices, and education level of the farmer negatively affected technical efficiency.

A 50-year-old woman revealed that;

“When the mining company closed, we had to look for alternative means of generation income. As a family we had to plant millet which is friendly to this environment and widely used to brew Busaa and chang’aa.”

This means that people continue to grow millet, especially for brewing beer, as an alternative source of income to sustain their livelihood. However, older informants routinely stated that they grow much less of these millets than they did in the past. The reasons they give for this change in the amount of millet planted center on the greater amount of work they require and its tedious nature. The study concurs with Dlamini and Siwela (2015) that indigenous grains, such as millet and sorghum, are more drought-resistant and can be a safer alternative, yet most people today plant maize their primary food crop in the study area. Headey et al. (2014) shed light on the dilemma between food crop specialization and diversification. The study finds that the vast majority of households grow crops despite the modest contribution of agriculture to income. Most agricultural land is devoted to staple food production; high-value commodities such as fruits and vegetables are also produced but limited.

Another respondent revealed that;

“Apart from planting maize and millet planting of Irish potatoes was an afterthought due to the prevailing situation in this area after the closure of mining company.”

The study findings mean that Irish potatoes were grown in the area because they are suitable to the climate and soils in the study area. The Irish potatoes are popular in these areas because of its commercial value and the fact that it matures in a shorter period than other available crops. It needs very little labor, and the yields are very high. Finally, potatoes like maize serve the dual purpose of being a commercial as well as a subsistence crop. The distribution between “cash” and “food” crops is often an artificial one imposed by the observer.

The study concurs with Svubure et al. (2015) that Irish potato is the third most important carbohydrate food crop in Zimbabwe after maize and wheat. Irish potato yield and help ease the nation's food security challenges. The new agrarian landscape and the national strategic food security status of Irish potatoes present a perfect scenario to investigate the scope of increasing potato production in Zimbabwe under the current cropping systems with available land and water resources.

The study findings give an impression that many people in the study area grow crops, such as maize, millet, and Irish potatoes, for sale and consumption as an alternative coping strategy to cushion against the prevailing low-income levels among households' closure of the mining company. Although some amounts may be grown for consumption, this amount can be altered by reality. People often face emergency needs for cash: medical expenses, school fees, and funerals. Suppose an emergency arises around the time for harvest or thereafter. In that case, some of the maize intended for consumption can end up being sold, often for low prices, to local entrepreneurs.

Furthermore, and unfortunately for the households involved, they later have to buy this maize back at inflated prices. These crops, which are grown for food, also tend to

be those grown for sale. On the other hand, maize, once dried, can be stored for relatively long periods of time. Finally, it should be noted that the Irish potatoes are sold locally and on a very small scale. By and large, Irish potatoes bring a small but steady source of income.

Although agriculture is the most important means of making a living for most of the households in the study area, by no means do these activities exhaust the range of possibilities. Households engaged on alternatives and grew crops and kept animals; however, their ability to do so varies. The heading “small-scale income-generating activities” subsumes various possibilities, including casual labor (*kibarua*).

The study findings concurred with a study by McCord et al. (2015), who noted that crop diversification is one strategy that households’ members may employ to reduce their vulnerability in the face of diminished sources of livelihood. Diversification expands the number of potential crop types for consumption and improves the sources of income for the households. The decision to diversify crops is a particularly challenging one for farmers in ASAL areas. Changes to the growing season's timing (onset of rains) and dry mid-season periods, in particular, pose significant challenges to farmers in ASAL areas. Household-level income, field size, exposure to agricultural extension officers, and suitability of environmental conditions are related to the likelihood of smallholder crop diversification. More favorable growing conditions appear to outweigh limitations posed by inaccessibility and financial constraints, which has implications for adaptation to climate change in semi-arid ecosystems.

5.2.5 Income-Generating Activities

A group youth reported that:

"The mining company's closure forced us to look for kibarua, such as weeding in farms, collecting fire hood, transportations, stocking the wood for charcoal burning, and sand harvesting. This has helped to sustain us in terms of providing our parents and young families."

This means that after the closure of the fluorspar mining company, the youths and other household members are trying to do other income-generating activities and growing crops, and keeping animals to sustain their livelihoods. Therefore, they have opted for small-scale income-generating activities that subsumed a variety of possibilities, including casual labor (*kibarua*). *Kibarua* is day labor or piece of work paid either in cash or in goods such as sugar or salt," beer brewing and sale, charcoal burning and sale, craftwork, such as the making of sisal ropes, and the making of decorated calabashes (used for milk) from gourds. However, it should be noted that the degree to which households depend upon casual labor for income generation was inversely correlated with elevation. Thus, the average amount of money that household members earned and the degree to which they depended upon casual labor for economic survival was greater in the valley than on the escarpment or the highlands. The study agrees with Mukangai (2019) that people work in casual labor to sustain their daily needs when there is no formal employment. Casual labor is not gender-specific. It is regularly performed by both males and females alike. Other small-scale income-generating activities tend to be more gender-specific.

One of the youths reported that:

"I have resorted to play hide and seek game in the forest of burning charcoal in order to survive this harsh state of life after the closure of mining company. Although its illegal I try my luck because I have no other option left to sustain my family."

This means that some residents in the study area have opted for illegal means of survival to provide their households' basic needs. They have resorted to burning and

selling charcoal, which is undertaken primarily by males, due to the greater availability of trees. In a normal situation, a person has to possess a license in order to burn trees to make charcoal; in reality, few people do. As it leaves the valley, the price steadily increases.

The study findings agree with Zulu and Richardson (2013) that charcoal a major source of income for rural households in areas with access to urban markets. More than 80% of urban households in Sub-Saharan Africa use charcoal as their main source of cooking energy, and the demands are likely to increase for several decades. Poorer households are more likely to participate in the production and sale of charcoal, but their participation is mainly a safety net to supplement other income. Although charcoal production contributes to poverty reduction through alternative income-generation opportunities, it can also undermine ecosystem services, agricultural production, and human health. Reducing rural household dependence on charcoal requires coordinated policies providing alternative income opportunities for farmers, affordable alternative energy sources for urban households, and more efficient and sustainable approaches for producing and using charcoal.

A 55year old woman reported that:

"Life had been difficult after closure of mining company and the brewing of busaa has enabled me take my children to school and also my grandchildren. I have been able to feed my family with the earning from the brewing and selling of busaa and chang'aa brew."

The above statement is evidence that other income-generating activities adopted by the household members after the mining company's closure are the brewing of *busaa* and *chang'aa*. Although officially proscribed, the brewing and sale of traditional beer (*busaa*) have since been commercialized as a source of income. Currently, *busaa* is a substantial source of income, especially for women. This beer is

often used to compensate the members of a communal work party, and today, the workers who come to perform labor during critical periods in the agricultural cycle are still rewarded with busaa (Chang'ach, 2011).

Busaa is also freely consumed on many other occasions, including, but not restricted to, ceremonial events, such as weddings, circumcisions, and the naming of infants. However, presently, busaa has become a commodity, and as such, it is also brewed specifically with the intent of making money. An addition to *busaa* is the refining of a spirit known as *changaa*. When it is available, people show up to drink and socialize with others in the area. Accordingly, this income-generating strategy seems to be most common among female-headed households, and it is practiced in all three ecological zones Chang'ach, (2011).

A 57-year-old woman noted that:

"After the closure of fluorspar mining company my child lost his job and we were dependent on him. Therefore, I had to look for other means of survival to vent by making craftwork in order to raise income to feed myself and grandchildren."

This gives the impression that despite craftwork being limited in the study area, some household members practice as a source of income. The craft activities being carried out in study area were making ropes from sisal fibers and calabashes from guards as a minor supplementary source of income. Women mostly did this activity.

One of the businessmen indicated that:

"After the mining company's closure, we likely had some money that enabled me to start up a goat business. I buy goats cheaply here at Keiyo South Sub-County and supply them on the highlands, where I sell at higher prices. This has enabled me to provide for my family in terms of medical expenses, school fees, and entertainment."

This finding shows that households who had made some savings during their employment term ventured into entrepreneurship after the mining company's closure. They were able to organize production and be ready to risk in the business. Like people in rural communities elsewhere in the developing world, households in the study area do many different things in order to survive; they diversify rather than specialize in their economic enterprises.

The study concurs with Abasilim et al. (2017), who noted that entrepreneurship is one of the instruments for achieving economic growth and development as well as employment creation. Therefore, the government should encourage entrepreneurship development through the provision of basic social amenities and economic infrastructure that will enable the necessary productive activities. Entrepreneurs and innovators should also be encouraged through the grant of soft loans and tax holidays.

A 32-year-old man reported:

"After closure of fluorspar mining company many casual laborers lost their source of livelihood and collecting, and selling of scrap metals become an alternative source of income due to its demand and ready market."

The findings shows that due to the mining company's closure, there were unutilized metals and equipment sold as craps metals. This becomes a source of income for some youths who ventured into the scrap metal selling business. This study finding agreed with Du Venage (2011), whose findings the mines that employed 5300 workers were stripped of equipment, which reportedly was sold as scrap metal. Furthermore, the mining shafts' flooding worsened the damage to the mines and will cost millions to repair before mining operations could take place again.

The study findings from focus group discussion revealed that the mining company used to employ numerous unskilled workers trained and developed for mining

operations. However, the majority of these workers have not found employment in other industries after the mine closure. They have to settle for a severely reduced income through subsistence farming, charcoal burning, Boda-boda business, and livestock keeping. This has led to a considerably lower quality of life. Therefore, the study findings indicated that retrenched mineworkers were reluctant to leave their communities at the mine sites. They prefer to wait for new owners to take over the mine, which may provide employment and uplift their living standards.

After the closure, gender roles changed especially for men whereby they engaged in horticultural produce, milking of cows, selling vegetables along the tarmac roads and other markets, performed merry-go-rounds financial venture which was traditionally the preserve duty of women

A group community member reported that:

"After the closure of fluorspar mining company, we lost source of livelihood. Therefore, we had no option but to come up with other means of survival such as subsistence farming, casual employment, and some of our household members going to bigger towns to look for formal employment."

The community adopted other means of survival that could sustain their family needs after the mining company's sudden closure. They resorted to subsistence farming, where they grew maize, beans, millet, sorghum, sweet potatoes, and groundnuts. The farming was done much for food, and a little surplus was sold for income generation.

The study concurs with Amone (2014), who noted that they had to resort to growing traditional foodstuffs such as millet, cooking bananas, cassava, and sweet potatoes for the community to sustain their livelihood among members of different Uganda's ethnic identities.

In agreement with the above views Davis, et al. (2010) noted that rural households combine a diverse set of income-generating and social activities and construct a portfolio of livelihood activities to meet and, if possible, enhance better livelihood outcomes. However, low productivity in farming and limited accessibility to non-farm income sources has been increasing these people's vulnerability, which is often poor and deprived of a minimum standard of life World Bank Group, (2015). Although poverty is a multi-dimensional issue, it is directly associated with a household's income, asset holding, and other economic activities that mutually generate a household's livelihood strategy and outcomes. Hence, it is important to underpin the underlying mechanism related to rural poor's livelihood strategies to achieve the international goal of poverty reduction.

Subsistence farming could not meet the family needs; hence the household members had to look for casual jobs to get the income to pay for medical, school fees, and contribution to the community ceremonies. They had to look for casual jobs such as sand harvesting, farm wedding, and firewood collection for sell among others.

The community members who participated in FGD noted that:

“Part of KVDA projects is the making of seedlings such as mangoes and avocados that do well in Keiyo South Sub-County. This provided us with other sources of income and employment creation from the production and processing of these fruits.

In relation to community members' responses above, KVDA becomes one of the alternative sources of livelihood to community members after the mining company's sudden closure. They create employment for some community members to work on their projects such as tree nurseries, beekeeping, and irrigation. They also provided community members with training on growing drought-resistant crops and supplying them with seedlings.

Furthermore, the household members had to look for self-employment to cope with the sudden loss of livelihood. They invested in small businesses such as kiosks, mitumba business, butcheries, groceries, and Boda boda business. Few community members carried these businesses to meet the daily needs of their family members and dependents.

Family members with skills and educated, made a decision to look for formal jobs in other areas of the country. Some moved to Eldoret and Iten towns in search of formal employment to meet their basic needs and for their family members who were fully dependent on them.

The community members noted:

"Due to sudden loss of livelihood after closure of mining company, we had to invest on livestock keeping especially goats and indigenous cows who are adapt well to the weather of ASAL areas. These animals help us in terms of food and for income generation. We sell them in order to send our children to school and meet daily family needs as well as medical expenses."

The above voices show that the community members had to invest in livestock keeping due to the favorable environment for rearing goats and indigenous cows. This was an alternative strategy to relieve them from dire poverty situations. These animals become the source of income to meet family expenses as well as the source of food. Rearing of these animals doesn't need much production cost because they graze in open land and need few maintenance expenses in deworming and mineral supplements.

Further, the community members practiced poultry farming as an alternative source of income. These were mostly the indigenous chicken which required less maintenance

cost and was done by women. It was practiced for food and sale at local markets such as Kabarnet town.

A person's livelihood comprises the capabilities, assets (material and social) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

According to the World Development Report (2008), the rural poor use the following livelihood strategies: smallholder entrepreneurship, participation in the agricultural and non-farm labor market, and migration. Migration from rural to urban areas is increasing in some parts of the Asia-Pacific (which has a gender dimension). Urbanization is taking place at a rapid pace for many countries. The livelihood strategies adopted by many in the urban areas are strongly linked to agriculture and non-farm activities in the rural areas. The rural poor's decisions to adopt a particular livelihood strategy or the impact of strategies used are influenced by the gendered access to resources and gender power relations within the household, community, rural markets, and the policy arena.

CHAPTER SIX

CLOSURE OF FLUORSPAR MINING COMPANY AND ITS INFLUENCE ON GENDER RELATIONS

6.1 Introduction

This chapter presents the data analysis and discussions of closure of Fluorspar mining company and its influence on gender relations.

6.2 Closure of Fluorspar Mining Company and Its Influence on Gender Relations

The third objective of the study was to assess a mining company's closure and its influence on gender relations among households in the Keiyo South Sub- County. This objective was based on the premise that household members have roles and responsibilities. Therefore, this section covers the emerging social life issues after the mining company's closure, which was measured by the following indicators: gender roles, gender decision making, and stability of relationships among men and women, and gender social status. These indicators shall form the main themes on emerging gender relation in this section.

6.2.1 Gender Social Status

The respondents were further asked to rate their social status after the mining company's closure. Table 6.1 presents the study findings. The study results show that the majority, 119 (58%) of the respondents, indicated that the rate of social status after the mining company's closure was low. This implies that a high unemployment rate and poverty lead to low social status among the mining communities. This implies that the company's closure led to confusion about managing social risks: In most cases, communities were not prepared beforehand for the loss of employment and the ensuing poverty. Most affected mining communities suffered from shock. Both the

emotional and economic spheres of the inhabitants' existence were affected. This process also impacts social structures and the economic well-being of a mining community. Studies indicated a strong relationship between unemployment, emotional issues, and health problems such as hypertension, insomnia, and psychological maladies like depression and feelings of uncertainty. Participants also reported feelings of helplessness and anger.

This finding agrees with Botha, Van der Waldt and Ackermann (2018), who assert that due to Inappropriate training for self-employment, the mining communities experienced social changes related to job loss, such as unemployment and poverty. Even though plans for skills development and job-creating schemes were proposed in the MPDRA, 28 of 2002, these interventions were not realized in time for the miners who faced such closure in the past. These individuals had acquired skills only for employment in the mining industry, and job creation schemes failed as well.

Table 6.1 Social Status After the Closure of the Mining Company

Social Status	Frequency	Percentage
High	32	15.6
Moderate	54	26.3
Low	119	58.0
Total	205	100

6.2.2 Current Employment status of the Households

The study sought to determine the current employment levels. This was carried out to ascertain the current employment status of the households Table 6.2 presents the study results.

Table 6.2 Current Unemployment Levels in the Community

Gender/Current unemployment levels	High (%)	Medium (%)	Low (%)	Total (%)
Male	86(39.5%)	16(7.8%)	21(10.2%)	123(60%)
Female	67(35.1%)	8(7.8%)	7(3.5%)	82(40%)
Total	153(74.6)	24(11.7)	28(13.7)	205(100)

The study results, as shown in Table 6.2, shows that the unemployment levels are high as shown by 153(74.6%) respondents, those who said that there is the medium rate of unemployment were 24(11.7%), those who noted that current unemployment status was low were 28(13.7%). The results show that the closure of the mining company increased the unemployment levels. The high unemployment rate may lead to a change of responsibilities; such occurrences like sudden mine closure influence gender relations among households. This phenomenon may lead to a socio-economic downfall following when the vulnerability of livelihood deteriorates into total collapse. A socio-economic crisis entails the loss of employment and implies a change of roles and responsibilities among households.

A large number of household members would re-adjust because of a severe negative impact of the loss of livelihood on their socio-economic wellbeing. The study findings agree with Botha, Van der Walldt and Ackermann (2018), who asserts that the mining communities will experience social changes related to job loss, such as unemployment and poverty after the mining company's closure. This is because most individuals had acquired skills only for employment in the mining industry, and job creation schemes failed.

It is also consistent with Ocansey (2013) in a study of the influx of mining companies and mining activities in many ways affected the livelihood of the people by displacement, relocation, and even resettlement. The socio-economic, environment and lives of the catchment area inhabitants are adversely affected by mining activities, leading to food shortages, land degradation, water pollution, high cost of living, food price hikes, and many other factors. Further, the study findings agreed with Stacey et al. (2010), who indicated that communities are not prepared beforehand for the loss of employment and ensuing poverty when there is a closure of mining. Most affected mining communities suffered from shock. Both the emotional and economic spheres of the inhabitants' existence were affected. This process also impacts social structures and the economic wellbeing of a mining community.

The findings further concur with van Eeden et al. (2009), Stacey et al. (2010), and Botha, Van der Waldt and Ackermann (2018), who identified the general socio-economic consequences of mine closure for communities and confusion about managing social risks. In most cases, communities were not prepared beforehand for the loss of employment and ensuing poverty. The study also concurs with Marais (2013), who in their study found out that their area lost approximately 140,000 jobs in the mining sector due to its closure.

The study agrees with Tempelhoff (2010), who asserts that the mineworkers' skills were restricted to the mining industry. When the mine closed, most of these workers were unable to find work; they could not afford traveling expenses to attend a job interview or lacked the skills and abilities required to work outside the mining industry. Approximately 1000 mineworkers stayed on at the hostels of the mine, with no food and clean water. In general, there was a feeling of hopelessness and despair

among the mineworkers who did not find employment, and some completely gave up on hope to find employment.

6.2.3 Rates of Drugs Abuse after Closure of Mining Company

The study further sought to determine the rate of drugs abuse after closure of mining companies. This was carried out to ascertain the status of drugs abuse among the households after closure of mining company. The study results are presented in Table 6.3.

Table 6.3 Rates of Drugs Abuse after Closure of Mining Company

Rates of Drugs Abuse	Frequency	Percentage
High	167	81.5
Low	38	18.5
Total	205	100

The study findings in Table 6.3 shows that the majority of 167(81.5%) of the respondents indicated that the rate of drugs increased after mines' closure. This implied that unemployment or otherwise those out of the labor force might face financial hardship or have more unstructured time, either of which can result in a higher propensity to consume drugs. Therefore, it is natural to think that an increase in unemployment could lead to increased drug abuse and persistent drug addiction issues. This was due to high brewing from locals for income, stress and depression, idleness.

Contributing factors to law-and-order disruptions include unemployment, income inequality, price inflation of basic goods, perceptions of skewed benefit-sharing, and alcohol consumption compounded by the absence of recreation facilities for workers. The finding concurs with Siyongwana and Shabalala (2019), who recorded both negative and positive impacts of mine closure and the coping strategies. The negative

socio-economic impacts of mine closure include: increase alcohol consumption, rise in poverty, deterioration of living standards, increase in outward migration, the emergence of crime and diseases, decline in the provision of services, reduction in employment opportunities in the mine, and second-order employment, loss of foreign exchange, limited money circulation. The positive impacts of mine closure include an increase in government initiatives to help the community, strong social cohesion of the local people, and a focus on agriculture. The host community's coping strategies following the mine closure comprise dependence on severance packages, support from relatives, finding jobs elsewhere, practicing agriculture, and engagement in the informal sector.

The study findings further agree with Deikema (2010), who noted high depression and feelings of hopelessness among households affected by the closure of mining activities. These feelings of hopelessness have led to the emergence of substance abuse, domestic violence, and divorce escalated. A number of suicides, suicide attempts, and attempted family murders were reported after the mine closure. The finding concurs with Ackermann et al. (2018), who noted that mining communities become vulnerable after mines closed because of their unsustainable livelihood. They majorly depended on one source of income, namely from the mines where they were employed. Therefore, after the mining company's closure, they lack a sudden alternative source of income, hence leading to a majority to resume alcohol drinking as a way of avoiding realities of life.

6.2.4 Closure of Fluorspar Company and Household Family Size

The study further determined whether the community changed the number of children born per family after the mining company's closure. This was to ascertain if the

closure of the mining company led to changes in household family size. Table 6.4 presents the study results.

Table 6.4 Closure of Fluorspar Company and Household Family Size

Household Family Size	Frequency	Percentage
Yes	163	79.5
No	42	20.5
Total	205	100

The study results show that the majority, 163(79.5%) of the respondents, indicated that the community changed the number of children born per family increased after the mining company's closure. They noted that family size increased because the number of children born per family increased. The increased number of pregnancies and children born in this study area may have been caused by idleness and drug and alcohol abuse. After the closure of mining activities, the households had no work to do hence become idle. Also, after the mining company's closure, the entertainment which the company was also facilitating closed, and people had no place for entertainment. Due to high living standards during the mining company's operation, the household had to remarry after failing to sustain the lifestyle after the closure of mining company operations. The increased number of children born in the study area was due to early marriages and early pregnancy. The finding agrees with Sanstrom and Huerta (2013), who found out that family instability adversely, affects the children's well-being and family arrangement.

The study concurs with Mwakwambirwa (2015) findings that increasing household family sizes due to diminished livelihood may place pressure on relocation housing; young people may demand an equivalent dwelling when they marry. Households are

increasing in size because of the emerging downfall of livelihoods. The increase in household size is significant because it could have implications for household economic status and high dependence ratio due to diminished livelihood sources. These demographic changes may reflect more fundamental societal changes such as reduced industrialization, rising living standards (especially for youths).

6.2.5 Closure of Fluorspar Mining Company and Community Participation

The study sought to understand whether the mining company changed the community participation in terms of roles and responsibilities. The study results are presented in Table 6.5.

Table 6.5 Closure of Fluorspar Mining Company and Community Participation

Community Participation	Frequency	Percentage
Yes	163	79.5
No	42	20.5
Total	205	100

The study results show that the majority, 163(79.5%), of the participants indicated that the fluorspar mining company's closure changed the community participation in terms of roles and responsibilities. Some are helping other community members in terms of roles like paying fees, health, and farming. However, some have been left to women like a baby celebration, crafting traditional beads, and preparing young girls to adulthood. The community members started pulling resources together such as ceremonies, fundraising, welfares, cooperatives, self-groups, youth initiatives, and women empowerment.

This gesture progressively may lead to sustainable development in the community. Others were ready to abandon other roles and activities and explore the opportunity to benefit from, for example, pooling resources to improve housing, health care, and

education of community members. The study findings concurred with Seyfang and Smith (2007), who noted that community participation is an important action for sustainable development. The opportunities presented by community participation have led to increasing community-level sustainable development.

The study findings agree with Sharma and Bhatnagar (2014), who noted that in occupational communities, people must have the means to survive and prosper, either in the same place or elsewhere, once mining ceases. Issues such as the transfer of skills and future employment must therefore be addressed. In residential communities, minimizing the environmental footprint of mining will be a priority. Thus, access to information about potential impacts and the power to influence decisions will be important.

The findings further concur with Talo, Mannarini, and Rochira (2014), who noted that participation and community sense are associated factors enhancing community development. The results showed that the community participation relationship is significant, positive, and moderately strong for forms of participation in communities affected by a sudden loss of livelihood.

6.2.6 Different Roles for Men and Women

The study sought to determine whether the closure of fluorspar mining company led to different roles for men and women. The study results are presented in Table 6.6.

Table 6.6 Different Roles for Men and Women

Different Roles for Men and Women	Frequency	Percentage
Yes	174	84.9
No	31	15.1
Total	205	100

The study results in Table 6.6 show that most of the respondents, 174(84.9%), felt that the mining company's closure led to the emergence of different roles carried out by men and women. Both men and women started paying school fees and meeting health needs, ceremonies, farming together, which was initially the role of men. After the mining company's closure, men underwent societal changes whereby they started engaging in horticultural produce, milking of cows, and the formation of merry-go-rounds that women traditionally performed.

This shows that with the mining company's closure, there was a low source of income, and some lost jobs; hence, carrying their responsibilities became a problem. Therefore, the role of patriarchy in society underwent a transformative nature due occurrence of this phenomenon. Men had to perform household duties initially to preserve their women in the quest to control household resources to maintain overpower. This study agrees with Anderson et al. (2013), who argues that strategic research and innovation agendas for the mining industry have important links with gender inequality, efficient use of resources, attractiveness, and sustainable growth. The study also concurs with Lahiri-Dutt (2013), who noted that women do not own mines or land where mining activities occur. The study also agrees with Anderson (2012), who describes two types of men; a few outspoken men who think that gender equality has gone too far and a large group of men who think that gender equality is important and benefits everyone at the time economic crisis like the sudden loss of livelihood.

The study further concurs with Lahiri-Dutt (2006), who noted that the proportion of women among the workers in the small mines and quarries varies from country to country, according to location, nature, and value of the mineral, processing techniques

used, marketing systems, local social milieu, availability of alternative occupations and other factors. In the actual mining jobs, panning, processing, transportation, and related jobs on the fields, women's percentage varies from a low of 10% to a high of 50%. The numbers have increased with the rise in the numbers of quarries and the decline in alternative occupations. Given the seasonality of these jobs, insecurity and low wages, and the global trend of 'feminisation,' 'informalization' and casualization of women's labor, it can safely be assumed that women's work participation in the ASM will also rise.

The study findings agree with Mwakumanya et al. (2016) that women are directly or indirectly engaged in mining activities in many countries in the world despite the plethora of challenges facing them in the sector. The mining industry in the county is a significant driver of development. It contributes to the population's per capita income by creating job opportunities and livelihoods, and infrastructure development.

The industry creates a wealth of opportunities that the county's government can rely on for wealth creation and socio-economic development. The study findings further reveal that Hinton et al. (2003) noted that the key factors in determining gender roles and status of women in Asia's small mines include 'women's and men's access to and control of, resources; their ability to attain knowledge of resources, their decision-making capacity or political power; and beliefs or attitudes that support or impede the transformation of gender roles.

6.2.7 Changes in Socialization Processes due to absence of men at home

The closure of fluorspar mining company led to a change in family socialization whereby the absence of men who migrated to other places in such of alternative

livelihood to sustain their family needs. This led to children lacking a father figure in households, thus lacking the most important agent of socialization.

A 55-year-old woman noted that:

“Our children are completely dependent on others to survive. Our spouses, who play the socialization roles as father figures, are responsible for teaching them to function and care for themselves. We, along with the rest of the family, also teach the children about close relationships, life issues, and sharing resources.”

This implied that the closure of the fluorspar mining company had a great impact on family socialization processes in the study area. With the absence of the father figures in the family, children lacked the provision of their first system of values, norms, and beliefs. This is a system that is usually a reflection of their own social status, religion, and ethnic group, among others.

6.2.8 Gender Decision Making

A 61-year-old man stated that:

“Since I was terminated from the mining company, my income level and other remittances changed, and I looked for other survival ways, which called my spouse's support. This changed the way I used to decide on my house and now involve my spouse in many household decisions making to foster alternative source of livelihood.”

This means that decision-making concerning the different ways men and women respond to the sudden loss of livelihood led to the emergence of alternative means of meeting the household's daily needs. Due to the loss of a source of income, men lacked parental support through monthly remittances; hence women and other family members had to come in to fill the gap.

Owing to the economic downfall in the study area, many households increasingly decide how to use the land to increase household income. This implied that gender is one of several key elements that affect decision-making and practical choices in relation to sustainable household livelihood. Due to the change in decision making,

men felt there was a threat in control of household resources, thus leading to domestic violence in the families as men desire to maintain their dominance.

The study findings agree with Colfer et al. (2015), who reveals considerable female involvement in decision-making and strengthening democratic elements in southern Sulawesi. Analyses of intra-household decision-making in Sulawesi are linked to gender issues shown to affect involvement in landscape management. These include agriculture, food, money, life chances, and attitudes toward domestic violence. Women's decision-making spheres are ascertained and taken into account, men's involvement in care needs to expand, and women's agency requires enhancement and external support.

The study findings do not agree with Villamor et al. (2014), who attest to inequity between men and women regarding access to decision making relating to resource management, land use, and climate change negotiations. In many parts of the world, women have a relatively limited level of resource management involvement in general. Despite the increase in women's participation in international climate summits, policy forums, and forest resource negotiations, women's voices in the decision process at local and national levels remain limited. The study findings also disagree with Morgan (2017), who noted that women in the agricultural communities of Sumatra, Indonesia, are rarely invited to participate in decision-making at the village level. Men and women are ascribed different roles in agricultural activity, as regulated by local customary law.

6.2.9 Stability of Relationships between Men and Women

A 45 years women reported that:

“The closure of the fluorspar mining company brought about a change of mindset to my spouse regarding household roles. He is able to listen to me in the same decisions as opposed to when he used to be the sole provider to this company. Therefore, we can live in harmony despite the current low living standard.”

The study findings indicate that men's ability to listen to their spouse during decision-making can moderate the relationship between women's problem solving and couple stability. An increase in men's listening and understanding is associated with a more positive relationship between problem-solving and couple stability. The relationship between men's problem solving and couple stability is significant when women's income level is lower than that of the spouse. The study also found out that women's conscientiousness and extraversion and men's agreeableness all play a moderator role in the relationship between their partners' communication behaviors and couple stability. Men's neuroticism moderates the relationship between women's problem solving and couple stability.

The study findings also reveal that women tend to force their preferred alternative income source that conflicts with their partner. It thus seems that the combination of a man who tries to solve the sudden loss of livelihood by finding compromises and a woman who is victory-oriented in her problem-solving interactions with her spouse is associated with low couple stability.

A 47-year-old man reported:

"After I lost my job due to closure of fluorspar mining company my long-married spouse left me because I couldn't maintain the living standards we had before the closure. We used to have monthly outing and entertainment with my family, and now after the closure I couldn't afford such lifestyle and led to her leaving me and look for another rich man. Therefore, my marriage life was destroyed."

This demonstrates that with the mining company's closure, many family's lifestyles were interfered and, in extreme situations, the break-up of families. Many families

separated divorces, and remarried so as to maintain their social status after the closure of the mining company. This was the due loss of a source of livelihood, which brought about low-income levels. Many households couldn't maintain the lifestyle and, therefore, the emergence of remarrying to one who can cope with the current low lifestyle.

The study findings concur with Duffy (2015), who revealed that an often long and arduous journey amidst the complexity of loss of livelihood, this led to family separation and remarrying. As with many people living on a low income, they incorporated creative strategies to survive and enhance their own and their children's quality of life. Gottman and Levenson (2002) found that a highly neutral affective style during couple interactions was predictive of divorce after a sudden change of lifestyle. Such could be the case in couples where the man is low on providing for the family.

The findings from the focus group discussion on the closure of the Fluorspar Mining Company and its influence on Gender Relations showed that after the mining company's closure, gender roles and responsibilities changed.

A group of community members revealed that:

"Men have in recent past committed themselves to household tasks that were initially performed by women. However, men's participation is not exclusively a matter of personal preference but the outcome of women's nearly complete domination of the contemporary space of production and social reproduction. As men we did not use to milk cows for sale of milk or vegetables, this was traditionally done by women but we had to do it because of the prevailing situation at least to increase household income by managing it better than our women."

The above observations imply that to survive after the loss of livelihood, men have been forced to participate in activities traditionally performed by women. Therefore,

livelihoods strategies are a key area for understanding how gender operates in limiting or expanding men and women's access, options, choices regarding the use of resources and their material conditions, and ultimately their ability to voice concerns and influence their positions in life.

After the sudden loss of livelihood in Keiyo South Sub-County, the households have resorted to other livelihood options. Now many of the households work as agricultural labourers in the KVDA scheme. Not only men but also many women perform these labor tasks for wages to manage their households' finances. Before the closure of the fluorspar mining company, most men did these hard labor jobs in the mining company. However, after the closure, many women also work as wage laborers and this decision was taken out of compulsion rather than by choice.

Focus group discussions revealed that there also exists a variation in labor wages based on gender. The discussion with community members in Keiyo South Sub-County revealed that the daily wage rate varies from Kenya shillings'100 to `150 for women and from `150 to `250 for men for similar type of work. This means that women's contribution to the total family income has registered a significant decline in a sudden loss of livelihood among households after the mining company's closure. The study findings moreover revealed that every woman contributed at least some part to the family income.

A group of community residents noted that:

"Since the mining closed some men have joined the women merry go rounds as a way of making savings and to cushion them on matters like school fees and to add another income generating activities. These scenarios were never there and when the company stopped its operations, they had to find other ways to fend for their families. Life is miserable here so to speak and we hope the government will rescue us economically by re-opening our mining company."

This clearly shows that women have joined self-help activities to enhance livelihood sources for their households. The respondents further noted that more women have entered agriculture labor markets and take up non-agriculture-based work or diversify their livelihood strategies. It is also evident that new forms of gender asymmetries have emerged. For example, more women than men are taking up vulnerable forms of employment, such as sand harvesting, agricultural farming management, the keeping of goats and sheep, and charcoal business, which increased their ability to cope with the economic shock crisis. It also means many of them are without social protection, such as enrolment in a medical scheme like NHIF, financial subsidies designed for women entrepreneurial activities. However, demand for female labor for these kinds of work indicates that women face challenges that will limit their ability to negotiate in the market.

The increase in the number of women participating in agriculture and the diversification of livelihoods does not necessarily translate into participating and taking equal advantage of these opportunities compared with men. Moreover, in many cases, these developments may have increased empowerment in one institutional site, for example, increased bargaining power within the household. However, these placed women in a disadvantageous position in other sites, such as the market, ownership of household property, and even disposal of these properties.

The study findings further noted that women's engagement in the agriculture labor markets and informal sector and women's labor force participation has increased in the Keiyo South Sub-County, which indicates women have established a support system within households to support their spouses on diminishing sources of livelihoods. The women's labor force participation has increased in Keiyo South Sub-County. The

number of women in vulnerable forms of employment, for example, self-employment, own-account work, contributing family workers, has also increased. The number of women in these vulnerable forms of employment is higher compared to men in the study area.

The respondents further revealed that the women's supplementary income from agriculture labor markets and informal sector women has a sense of pride and a voice in the household's decision-making. Moreover, in the absence of this supplementary income, even the men feel financially tight and insecure.

CHAPTER SEVEN

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter provides a summary of study findings, conclusions and recommendations. Conclusions are presented in order of the study objectives. In addition, recommendations are presented according to the areas covered by the research based on the study objectives.

7.2 Summary of Findings

This study aimed to investigate the Closure of fluorspar mining company and livelihood strategies among households in Keiyo South Sub-County, Elgeyo Marakwet, county, Kenya. The study collected data inform through research-administered questionnaires and conducted two focus group discussions to get information and details on the effects of closure, livelihood strategies, and extent. The closure of the fluorspar mining company affected social structures in terms of family size number, roles among households in Keiyo South sub-county Kenya.

The findings on emerging livelihoods show that mining is a major propellant of economic activities in most mining areas by creating wealth, providing jobs, and stimulating business ventures for community members, implying that the company's closure acted as a major setback to the community as a whole. It also shows that mining closure in the case studies gradually depleted the mining community's livelihood assets and collapsed their coping strategies and livelihood outcomes. It generally affects the community's nutrition, health, education, food security, water, shelter, community participation levels, and personal safety. The average income per month was reduced due to the Closure of the company.

The results also show that literacy levels of the respondents influenced their bargaining power during the closure of the site as those who may have no or low formal education level could be compromised with the fact that agreements are usually written in English, thereby end up appending signatures to issues, they are not conversant with. Finally, environmental challenges caused by the closure of the mining company are; water being contaminated by the soil from the site, high effects on crops as fertility rate decreased due to emissions of smoke from the mining sites, dust and smoke, health issues due to mosquitoes, siltation and open pits left as a result of mining, poor productivity of food due to infertile soil and soil erosion, wells and springs drying up, water sources changing directions and increase of diseases like skin rashes, TB and HIV/AIDS.

The result on the livelihood strategies showed that respondents were able to meet their economic needs by resorting to farming, evidenced by 133(64.9%), 27(13.2%) became self-employed, while 45(21.9%) were employed. Motivations behind these choices can depend on households' characteristics (education, productivity, among others.), on the economic and environmental context (access to markets, access to land, quality of environmental resources, among others) and preferences (profit-maximizing or safety-first approaches, among others.). Unsustainable harvesting of non-timber forest products (NTFPs) observed. The study further shows that the company's closure leads to unemployment and small enterprise business closure, making those household members who go to private schools change to free public schools. The study further indicated that the closure of the mining company changed the level of the hospital. This implies that due to unemployment, the household members opted for public hospitals due to the high cost of private hospitals.

On emerging social issues, the study finding shows that the mining company's closure increased the unemployment levels. The rate of drugs increased after the closure of mines. This implies that unemployment or otherwise those out of the labour force may face financial hardship or have more unstructured time, either of which can result in a higher propensity to consume drugs. Therefore, it is natural to think that an increase in unemployment could lead to increased drug abuse and persistent drug addiction issues. The study also indicated that the community changed the number of children born per family after the mining company closure. The finding agrees with Sanstrom and Huerta (2013), who found out that family instability adversely, affects the well-being and family arrangement of the children. The study indicated that men and women have different roles in the community. This implies that women and men have a different role in communities.

7.3 Conclusions

Based on study findings, the following conclusions are made:

Mining is a major propellant of socio-economic activities in most mining areas by creating wealth, providing jobs, and stimulating business ventures for community members, implying that the company's closure acted as a major setback to the community as a whole. It also shows that mining closure gradually depleted the mining community's livelihood assets and collapsed their coping strategies and livelihood outcomes. It generally affects the community's nutrition, health, education, food security, water, shelter, community participation levels, and personal safety. The average income per month was reduced due to the closure of the company. The results also show that literacy levels of the respondents influenced their bargaining power during the closure of the site as those who may have nor or low formal education level

could be compromised with the fact that agreements are usually written in English, thereby end up appending signatures to issues, they are not conversant with.

The study further concludes that the mining communities can meet their economic needs by resorting to other activities like diversification of farming, self-employment and seeking employment. Motivations behind these choices can depend on households' characteristics (education, productivity, among others.), on the economic and environmental context (access to markets, access to land, quality of environmental resources, among others.) and preferences (profit-maximizing or safety-first approaches, among others).

The study finally concludes that the closure of the mining company increased the unemployment levels. The rate of drugs increased after the closure of mines. This implies that unemployment or otherwise those out of the labour force may face financial hardship or have more unstructured time, either of which can result in a higher propensity to consume drugs.

Cultural values have a great impact on household decision making on matters of alternative income-generating activities. The majority being patriarchal in nature has a great impact on day to day prescribed societal roles that involve the specific responsibilities given to women and men. Most of these households embrace this mode of societal prescribed roles, limiting some members to engage in other modes of income-generating activities, such as horticultural farming for men and commercialization of animal produce.

7.4 Recommendations

7.4.1 Policy Recommendations

There is a need for mining companies to develop a contingency plan to mitigate the potential socio-economic consequences, which leads to human suffering due to unexpected mine closure. This will help build resilience into the livelihood strategies of mineworkers and their dependents and surrounding communities dependent on these mining companies. In addition, the incorporation of government agencies and non-governmental organizations like KVDA, World Vision and other partners like the CDF fund to respond and meet immediate needs for sustenance in a mining community after mine closure.

Communities and mineworkers should be involved in planning for closure and all other matters that involve them and their employment sustainability. Mining companies should enrich project works in partnership and collaboration at National, County and local levels to provide sustainability of the community's livelihoods and address particular challenges, especially the existing agencies like Semi-arid rural development programmes (SARDP). It was also evident that Keiyo South Sub-County has endowed with good sceneries for tourist attraction long the Kerio Valley together with the Rimoi game reserve that the County and National government could commercialize to provide an alternative source of employment to its residents.

Community involvement should be promoted. Community members should be involved in all activities and planning to deal with expected repercussions. Community members must be able to voice their concerns and represent themselves. The marginalized groups on equal grounds with existing mining companies and the local stakeholders on a range of productive or income-generating activities around

these mines, including those at the community level, men and women who are fully dependent on mineworkers for businesses form the proverbial most affected. There is a need, therefore, for urgent interventions to improve their freedom and abilities to choose alternative sources of livelihood with special emphasis on understanding gender roles and relations of men and women in the households due to the emerging social trends, for example, the strategies that men and women have since adopted to sustain their livelihoods after the closure of fluorspar mining company. Similarly, cultural values although very much appreciated should not be an impediment to diversification of household livelihood. Re-adjusting to the new situation sometimes erodes cultural values and believes system of society to emerging social trends for example household roles and responsibilities in order to meet household needs.

7.4.2 Recommendations for Further Research

The study recommends the following areas for further research:

1. Influence of mining activities on socio-economic development
2. Policy interventions in the process of closure of mining activities

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APPENDIX I QUESTIONNAIRES

Section A: Background information

1. Gender
 - Female
 - Male
2. Indicate is your age bracket
 - Below 25 years
 - 25 to 34 years
 - 35 to 44 years
 - Over 45 years
3. What is your education level?
 - Informal
 - Primary level
 - Secondary school
 - College
 - University
 - Others () specify
4. What is your current occupation?
 - Unemployed
 - Self-employed
 - Farming
 - Formal employment
 - Others (specify) _____
5. Indicate is your marital status?
 - Single
 - Married
 - Divorced
 - Widowed
 - Others (specify) _____
6. Family Size
 - 1-5 members
 - 6-10 members
 - 11-15 members
 - 16-20 members
 - Over 20 members
7. What was your connection with fluorspar mining company?
 - Employee
 - Supplier
 - Casual worker

School attendance

Health services

Others (specify) _____

8. What was the benefits the community derived from the company?

Positively affected our main economic activities

Our sources of livelihoods (agriculture) was greatly improved

The company shared mining revenue by supporting developmental projects in the area for example construction of schools, dispensaries, social halls

Social services have improved (health, education) as a result of mining

Livelihoods significantly improved since mining activities began

Roads improved as a result of mining activities thereby making accessibility easier to agricultural markets and farms

There was adequate housing as a result of mining operations

9. Where do you currently seek Health Services?

Public hospitals

Private hospitals

What causes the changes?

10. Closure of the Mining Company and Level of Hospital Utilized

Yes No

11. Did closure of the fluorspar mining company affects your household(s) in terms of family sources of livelihood.

Yes No

12. What is your current source of income after closure of mining company?

Self-employed

Farming

Formal employment

13. Did the closure of the fluorspar mining company affect your household(s) in terms of family sources of livelihood?

Yes No

14. Kindly indicate your current average income per month

0-500 Kshs

501-2000 Kshs

2001- 4000 Kshs

4001- 8000 Kshs

- 8001-15000 Kshs
 15001-25000 Kshs
 Above 25000 Kshs

15. Does the current income sustain the household needs?

- Yes No

16. Before the closure of mining company what was your income levels?

- 0-500 Kshs
 501-2000 Kshs
 2001- 4000 Kshs
 4001- 8000 Kshs
 8001-15000 Kshs
 15001-25000 Kshs
 Above 25000 Kshs

17. Did the closure of the company affect the type of school for your household members?

- Yes No

18. What is household members level of education after the closure of mining company?

- Informal education
 Primary level
 Secondary school
 College
 University

19. Where do household members go for school after the closure of mining companies?

- Public schools
 Private schools

20. Were there environmental challenges associated with the closure of the mining company?

- Yes No

21. How do you meet the household economic needs after the closure of the mining company?

- Farming
- Self-employment
- Formal employment

22. How can you rate your social status before and after the closure of the mining company?

High Moderate Low

23. How are the current unemployment levels in the community?

High Moderate Low

24. How is the rate of drugs abuse after closure of mining companies?

High Moderate Low

25. Did the community change the number of children born per family after the closure of mining company?

Yes No

26. Did the closure of mining company change the community participation in terms of roles and responsibilities?

Yes No

27. Did the closure of fluorspar mining company lead to different roles for men and women?

Yes No

APPENDIX III INTERVIEW SCHEDULE

Section B: Emerging livelihoods

1. When did the fluorspar company close its operations?

2. What were the reasons for the closure of the mining company?

3. What were the main benefits the community used to get from the company?

4. What is your household education level?

Section C: Livelihood Strategies

5. In relation to economic benefits mentioned in section B; with the closure of the mining company how are you meeting the household economic needs?

6. In relation to Education of your household members how do you pay your school fees?

7. How do your household members meet Health services bills after closure of the mining company?

8. In terms of recreation facilities mentioned above: After the closure of the mining company, how do you and other household members meet the recreational expenses?

9. What are the new modes of meeting household food security after the closure of the mining company?

10. What are the new consumption patterns that you and other household members has adopted on food security?

Section C: Emerging Social Issues

11. How are the current unemployment levels in the community?

12. How is the rate of drugs abuse after closure of mining companies?

Low () High ()

Explain your answer.....

What is the status security in the community after closure of mining company?

13. After the closure of mining company did the community change the number of children born per family?

Yes No

Explain

14. Has the closure of mining company led to joining of other community social activities such as self-help groups and cooperatives?

Yes No

Explain

15. In your community, do you have different roles for men and women?

Yes No

If yes, kindly mentioned some of the roles and responsibilities for men and women in your community

16. When it comes to meeting the household basic needs: is it the responsibility of a man or a woman? _____

17. Who usually meets the hospital bills for household members?

18. In case of outings or leisure activities, who meets the expenses?

19. Before the closure of the mining company was the same person paying school fees for household members?

Yes No

If NO explain

20. Before the closure of the mining company was the same person meeting food security for household members?

Yes No

If NO explain

21. Kindly provide your detailed day to day activities in terms of roles and responsibilities

22. Before the closure of the mining company were you handling the same roles and responsibilities?

Yes No

If NO explain

23. In your home who makes decisions on utilization of household resources such as:

Land usage _____

Livestock _____

Household's goods _____

Others (specify) _____

24. From the decisions stated above: does it have any link to the closure of the mining company?

Yes No

Explain

25. How can you rate your social status before and after the closure of the mining company?

High Moderate Low

Explain

26. Did the closure of the mining company change your community participation in terms of roles and responsibilities?

Yes No

If yes explain

Yes No

If no explain

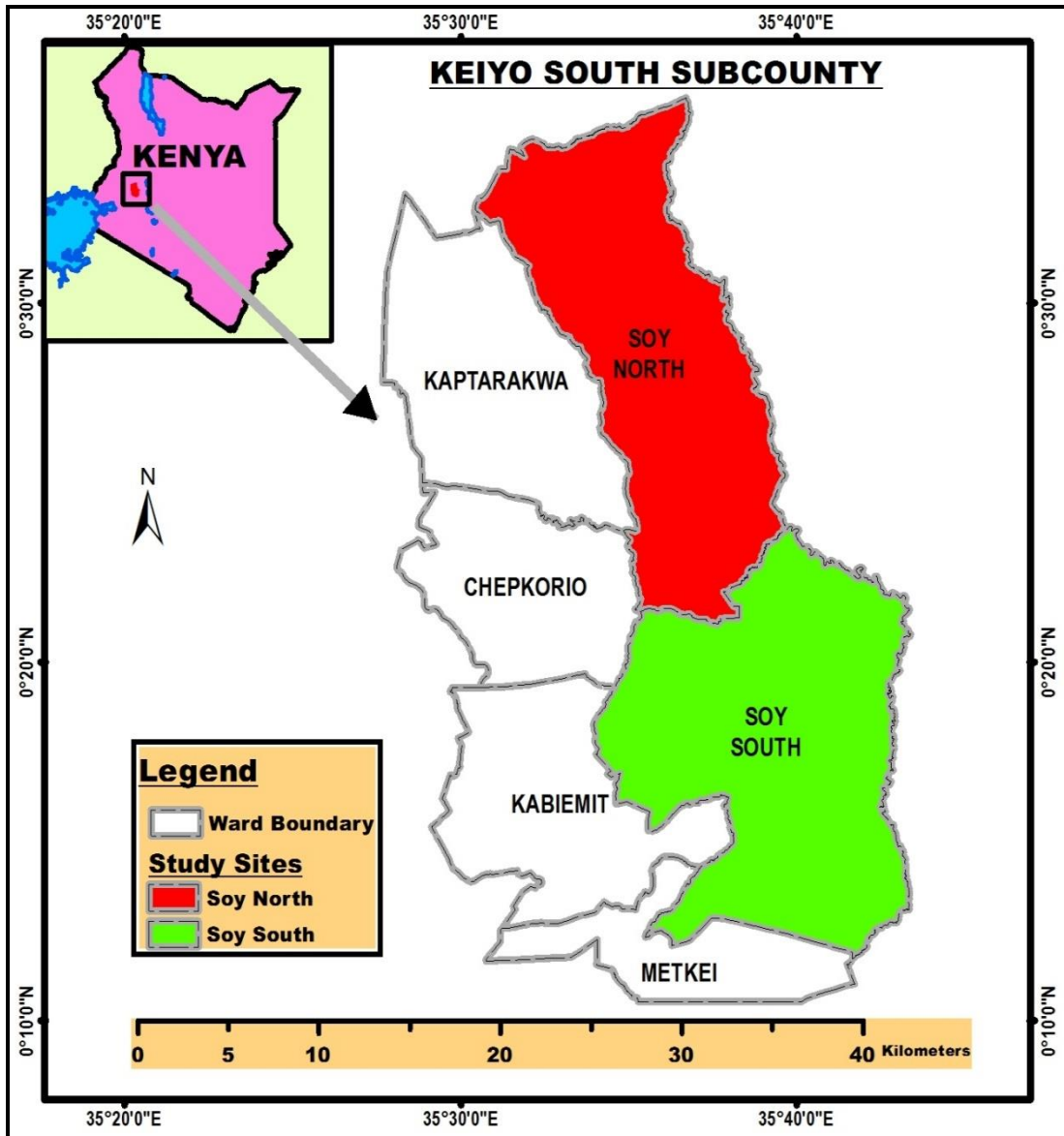
APPENDIX III INTERVIEW SCHEDULE FOR KEY INFORMANTS

- a) What might be the reasons for the closure of fluorspar mining company?
- b) How has the closure of fluorspar mining company affected livelihood of community members?
- c) What are the livelihood strategies adopted by community members after closure of mining company?
- d) To what extent has the closure of the fluorspar mining company affected gender relation among households?

APPENDIX IV FOCUS GROUP DISCUSSION GUIDE FOR COMMUNITY**MEMBERS**

- a) What might be the reasons for the closure of fluorspar mining company?
- b) How has the closure of fluorspar mining company affected livelihood of community members?
- c) What are the livelihood strategies adopted by community members after closure of mining company?
- d) To what extent has the closure of the fluorspar mining company affected gender relation among households?

APPENDIX V MAP OF KENYA SHOWING KEIYO SOUTH SUB COUNTY



APPENDIX VI RESEARCH PERMIT


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REPUBLIC OF KENYA



National Commission for Science, Technology and Innovation

RESEARCH LICENSE

Serial No.A 25667

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:

MR. FINSON KIPROP BARGORIA
of MOI UNIVERSITY, 6825-30100
ELDORET, has been permitted to conduct
research in Elgeyo-Marakwet County

on the topic: CLOSURE OF FLUORSPAR MINING COMPANY AND LIVELIHOOD STRATEGIES AMONG HOUSEHOLDS IN KEIYO SOUTH SUB-COUNTY, ELGEYO MARAKWET, COUNTY, KENYA

for the period ending:
3rd July, 2020

Permit No : NACOSTI/P/19/56823/31542

Date Of Issue : 3rd July, 2019

Fee Received : Ksh 2000



Samm B.S.
Director General
National Commission for Science, Technology & Innovation

APPENDIX VII COUNTY COMMISSIONER RESEARCH AUTHORIZATION



**OFFICE OF THE PRESIDENT
MINISTRY OF INTERIOR & COORDINATION OF NATIONAL
GOVERNMENT**

Telegrams:
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When replying please quote

**COUNTY COMMISSIONER'S OFFICE,
ELGEYO-MARAKWET COUNTY,
P.O. BOX 200-30700
ITEN**

PUB. CC. 24/2 VOL.II/154
Ref.

23rd July, 2019
Date

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION

Finson Kiproop Bargaroria

This is to confirm that the above named has been authorized to carry out a research in Elgeyo Marakwet County on "*Closure of Flourspar Mining Company and livelihood strategies among households in Keiyo South Sub County, Elgeyo Marakwet*". The research will be undertaken for the period ending 3rd July, 2020.

Please accord him necessary assistance.


**COUNTY COMMISSIONER
ELGEYO MARAKWET COUNTY**
K. O. MIFWONI
FOR: COUNTY COMMISSIONER
ELGEYO MARAKWET

c.c. Deputy County Commissioner
Keiyo South Sub County.

KOM/sjk

**APPENDIX VIII MINISTRY OF EDUCATION RESEARCH
AUTHORIZATION**



**REPUBLIC OF KENYA
MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING AND BASIC EDUCATION**

TELEGRAM:.....
TELEPHONE NO: 0534142207
WHEN REPLYING PLEASE QUOTE OUR REFERENCE
EMAIL: cdeelgeyomarakwet@gmail.com

COUNTY DIRECTOR OF EDUCATION
ELGEYO MARAKWET COUNTY
P.O. BOX 214-30700
ITEN.

DATE: 23rd July , 2019

REF No: CDE/EMC/R/26/VOL.II/ (111)

Finson Kiproop Bargoria
Moi University
P.O. Box 3900-30100
ELDORET

RE: RESEARCH AUTHORIZATION- FINSON KIPROOP BARGORIA

Following the authorization by the National Commission for Science, Technology and Innovation (NACOSTI) to carry out research in **Elgeyo Marakwet County** Vide Authority letter **Ref. No. NACOSTI/P/ 19/56823/31542** dated **3rd July, 2019** you are hereby formally granted authority by this office to proceed with your study on **“Closure of fluorspar mining company and livelihood strategies among households in Keiyo South Sub County, Elgeyo Marakwet County ”** for a period ending **3rd July, 2020.**

You are further required to report to the Sub-county Director of Education – Keiyo South Sub Counties.


Getrude Kibet

For: County Director of Education

ELGEYO MARAKWET

Copy to:

1. The Director General/CEO -NACOSTI
2. The Sub-County Directors of Education- **Keiyo South Sub County**

FOR: COUNTY DIRECTOR OF EDUCATION
ELGEYO MARAKWET
P. O. Box 214 - 30700,
ITEN.

