

**Bindura University
Of Science Education**



**CONTRIBUTION OF ARTISANAL MINING TO HOUSEHOLD FOOD SECURITY
AMID EL NINO INDUCED DROUGHT IN MAKAHA WARD 14 MUDZI DISTRICT.**

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**A DISSERTATION PRESENTED TO PARTIALLY MEET THE CRITERIA FOR A
BACHELOR'S HONORS DEGREE IN DEVELOPMENT STUDIES**

APPROVAL FORM

This research project aligns with Bindura University's presentation standards and has submitted for review to ensure adherence to departmental guideline

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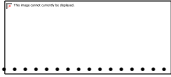
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DECLARATION FORM

I, Tafadzwa Delon Chikwizo (Registration Number: B210961B), solemnly affirm that this research is my original and independent work. It has not been previously submitted, either wholly or in part to meet the requirements of any degree or qualification. This study was undertaken in full compliance with the academic guidelines set by the Faculty of Engineering at Bindura

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ABSTRACT

This research investigated the contribution of artisanal and small-scale mining (ASM) to household food security amid El Nino-induced drought conditions in Makaha Ward 14, Mudzi District, Zimbabwe. The central question guiding the study was “can artisanal mining enhance household food security in the context of climate-related disasters such as El Nino-induced

drought?” The study was guided by Malthusian perspective on resource scarcity and population pressure. In line with a pragmatic paradigm, a mixed-methods was employed to gather data. Purposive sampling was adopted to select 40 artisanal mining households from a targeted population of 50, ensuring engagement with participants possessing direct experience of the phenomenon. Stratified random sampling was also used to improve representativeness by ensuring key subgroups are included and enhancing comparative analysis. Data collection integrated structured questionnaires (administered to 35 households), semi-structured interviews focus group discussion and analysis of secondary sources. The findings revealed that El Nino-induced drought undermined agriculture (71% households) and 43% causing food shortages. In response artisanal and small scale mining emerged as a critical coping mechanism, serving as the primary income source for food purchases. However, ASM’s effectiveness was severely constrained by significant challenges like rampant informality, police harassment, and low mineral yields lack of equipment and land conflicts. Consequently, while ASM functioned as an indispensable lifeline during acute drought, its unstable nature limits its sustainability as a food security strategy. The study concludes that whilst artisanal mining enhanced immediate household food security amid climate shocks, however, it requires transformative interventions to realize its potential. Key recommendations include formalizing the ASM sector through simplified licensing and designated Community Mining Areas (CMAs), integrating ASM households into national food security programs and social safety nets like the Harmonized Social Cash Transfer (HSCT), providing operational support (equipment access and training), enforcing environmental rehabilitation and promoting climate-resilient livelihood diversification beyond mining. This research contributes empirically and theoretically to understanding livelihood adaptation under climate stress and argues for policy coherence recognizing ASM’s role in resilient-building.

Key words: Artisanal and Small Scale Mining (ASM), household food security, El Nino induced drought, climate resilience, livelihood diversification, Malthusian theory, policy integration,

DEDICATION

I Tafadzwa Delon Chikwizo dedicate this dissertation to my parents, Margaret and Gibson Chikwizo. I appreciate your unwavering love and support. In addition, I dedicate this work to Takudzwa and Tawananyasha, my two siblings. Without your love, care, and support, this would never have been possible. I appreciate everyone's belief in me. You have always been my pillars of support, and I am grateful for everything.

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ACRONYMS AND ABBREVIATIONS

- ASM -Artisanal and Small-scale Mining
- CMAs -Community Mining Areas
- FAO -Food and Agriculture Organization
- FGDs -Focus Group Discussions
- HSCT -Harmonized Social Cash Transfer
- KIIs -Key Informant Interviews
- SPSS -Statistical Package for the Social Sciences
- SDGs -Sustainable Development Goals

- WFP -World Food Programme
- FAW -Fall Armyworm
- EWS Early Warning Systems
- NAW Native African Worms
- CGIAR Consultative Group on International Agriculture Research
- IFAD International Fund for Agriculture Development
- NGOs Non-Governmental Organizations.

LIST OF FIGURES

Figure 1: Map of Zimbabwe showing Makaha Ward 14.....	20
Figure 2: Ratings on Food Accessibility Challenges.....	38
Figure 3: Ratings on Source of Household Income	39
Figure 4: Ratings on Proposed Policy Support	46

LIST OF TABLES

Table 1. Participants Response Rate	35
Table 2. Demographic characteristics	35
Table 3 Crop Yield Reduction	37
Table 4 Income stability from mining	40
Table 5: Use of mining income for food.....	40
Table 6: Key challenges limiting mining income	41

Table 7: Institutional challenges affecting mining sustainability	42
Table 8: Proposed Solutions for Economic and Operational Challenges	44
Table 9: Policy and institutional reforms to support miners.....	44

TABLE OF CONTENTS

APPROVAL FORM	1
DECLARATION FORM	2
ABSTRACT.....	3
DEDICATION	5
ACKNOWLEDGEMENT	5
ACRONYMS AND ABBREVIATIONS	6
LIST OF FIGURES.....	7
LIST OF TABLES.....	8
CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY	1

1.2 INTRODUCTION	1
1.3 BACKGROUND OF THE STUDY.....	1
1.4 STATEMENT OF THE PROBLEM	2
1.5 MAIN OBJECTIVES	2
1.6 SPECIFIC OBJECTIVES.....	3
1.7 SPECIFIC RESEARCH QUESTIONS.....	3
1.8 SIGNIFICANCE OF THE STUDY	3
1.9 Hypotheses	4
1.10 Definition of key terms	5
1.10.1 Artisanal Mining.....	5
1.10.2 Household Food Security	5
1.10.3 El Niño	5
1.10.4 Drought	6
1.11 Chapter Summary	6
CHAPTER 2: LITERATURE REVIEW	7
2.0 Introduction	7
2.1 How Artisanal mining is viewed in enhancing food security in various perspectives around the world	8
2.1.1 Global Perspective	8
2.1.2 Regional Perspective	8
2.1.3 Local Zimbabwean Perspective.....	8
2.2 The concept of food security-food.....	10
2.3 Food insecurity situation caused by El-Nino induced droughts.....	10
2.3.1 Land use conflict	11
2.3.2 Land and Water pollution (degradation)	12
2.4 The contributions of Artisanal Small-scale Mining on Food Security.	13
2.4.1 Employment creation.....	14
2.4.2 The challenges associated with food security in relation to artisanal mining.....	15
2.5 Policy Proposal	16
2.5 Theoretical Framework.....	17
2.5.1 Food availability approach (Malthusian theory).....	17
2.6 Summary of identified gaps in knowledge and key research questions.....	18

2.7 Chapter summary.....	19
CHAPTER 3: METHODOLOGY	20
3.1. Introduction	20
3.2 Study Area	20
3.3 Research Approach	21
Target Population or Research participants.	23
Sampling methods	23
Stratified Random Sampling	23
2. Non-Probability Sampling	24
Purposive Sampling.....	24
3.5 Permission to conduct study.....	25
3.6 Data Collection Procedures.....	25
3.7 Data Types.....	25
3.8 Primary Data	25
Data Collection Methods	26
3.9.1Key Informant Interviews (KIIs).....	26
3.9.2 Advantages of Key Informant Interviews (KIIs).....	27
3.10 Questionnaire Surveys	28
3.10.1 Advantages and disadvantages of Questionnaires	28
3.11 Focus group discussions.....	29
3.11.1 Advantages and Disadvantages of Focus Groups	30
3.12 Secondary Data	30
3.13 Data Analysis.....	31
3.13.1 Quantitative Data Analysis.....	31
3.14. Ethical Considerations.....	32
3.15 Limitation of the Study.....	32
3.16 Chapter Summary	33
CHAPTER 4: DATA PRESENTATION AND INTERPRETATION	34
INTRODUCTION.....	34
4.2 RESPONSE RATE	35
4.3 DEMOGRAPHIC CHARACTERISTICS	35

4.4 FINDINGS OF OBJECTIVE 1: food insecurity situation caused by El Nino-induced droughts in Makaha Ward 14, of Mudzi District	37
4.4.1 Decline in Agricultural Productivity due to Drought.....	37
4.4.2 Food access and challenges	38
On food access and challenges, the results are as indicated in Fig 4.2	38
4.5 FINDINGS OF OBJECTIVE 2: Identifying the contribution of artisanal miners to household food security.....	39
4.5.1 Mining as the Primary Economic Driver for Food Security	39
4.5.2 Income Stability from Mining and its Impact on Food Accessibility	40
4.5.3 Mining as a Household Strategy to Bridge the Food Gap.....	40
4.6 FINDINGS OF OBJECTIVE 3: Challenges faced by artisanal miners in contributing to household food security	41
4.6.1 Economic and Operational Challenges	41
4.6.3 Institutional and Legal Constraints	42
4.7 Findings of Objective 4: Ways these challenges can be mitigated to enhance household security amid El Nino induced droughts	43
4.7.1 Addressing Economic and Operational Constraints.....	43
4.7.2 Overcoming Institutional and Legal Barriers	44
4.7.3 Integrating Mining Policy with Food Security Programs.....	45
4.8 SUMMARY.....	46
CHAPTER 5: DISCUSSION, IMPLICATION AND LIMITATIONS.....	47
5.1 Introduction	47
5.2 Re-evaluation of the central question and study objectives	48
5.3 Significance of the study	49
5.4 Study Summary	50
CHAPTER 6: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS	52
6.1 Comprehensive Summary of Findings and Conclusions	52
6.2 Objective 2: Assess the contribution of artisanal mining to household food security.....	52
6.3 Objective 3: Examine challenges faced by artisanal miners in supporting food security.....	53
6.4 Objective 4: propose mitigation strategies to enhance food security.	53
6.5 Relevance and Evaluation of the Theoretical Framework (Malthusian Theory)	54
6.6 Contribution to knowledge	55
6.8 Policy Recommendations.....	56

6.7 Limitations of the study	57
6.9 Directions for Future Research	58
LIST OF APPENDIXES	69
APPENDIX 1: RESEARCH SUPPORT LETTER	69
APPENDIX 2 : APROVAL LETTER	70
APPENDIX 3 QUESTIONNAIRE	72
APPENDIX 4: INTERVIEW GUIDE FOR KEY INFORMANTS.....	75
APPENDIX 5: PLAGIARISM REPORT	79

CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

1.2 INTRODUCTION

Chapter One introduces research exploring how artisanal mining influences household food security in Makaha Ward 14, located in Zimbabwe's Mudzi District, especially within the perspective of El Niño-induced droughts. In response to Zimbabwe's enduring economic difficulties, many rural communities have increasingly relied on artisanal mining as a key source of livelihood. This adaptive strategy prompts critical inquiry into its potential role in strengthening food security under intensifying environmental pressures.

The chapter presents the study's background, emphasizing the intersections among artisanal mining, climate variability, and food security. It further outlines the research problem, objectives, and significance, along with the hypotheses that shape the inquiry. The explore seeks to generate meaningful perceptions with the evolving realities of rural livelihoods in Zimbabwe, offering evidence that may help guide policies and strategies aimed at resilience and sustainable development.

1.3 BACKGROUND OF THE STUDY

The World Bank acknowledged the significance of local-level knowledge and organizations in promoting sustainable development. Due to the economic challenges faced in Zimbabwe, artisanal mining has emerged as a key spring of income for a number of families, particularly in rural regions where formal employment opportunities are limited (Gratian et al, 2020). In Makaha Ward 14, Mudzi District, artisanal mining activities has provided a source of livelihood for numerous families, contributing to local economies and livelihoods. This shows that artisanal mining has become a vital livelihood strategy for many households in Zimbabwe, particularly in rural areas. However, its impact on household food security, especially during El-Nino induced droughts, remains understudied

The prevailing El-Nino induced droughts in the region are exacerbating vulnerabilities that is already in marginalized communities. They have heightened concerns about food security among households dependent on agriculture. These droughts on local food production and availability

underscores the importance of exploring alternative livelihood strategies, such as artisanal mining, in sustaining households during periods of environmental stress (Williams, 2019).

The artisanal mining sector is characterized by small-scale, labor-intensive operations that often lack proper regulation and oversight (Ofosu 2010),. As a result, concerns about its environmental and social repercussions have been raised. The predominant view that unregulated mining practices are causing environmental degradation, involving water pollution, deforestation and soil erosion jeopardizing food security by affecting agricultural productivity and natural resource availability. Recognizing the complex interplay between artisanal mining, household food security, and environmental sustainability, there is a need for empirical research to understand the specific dynamics at play in Makaha Ward 14. By investigating the contributions of artisanal mining to household food security amid El-Nino induced droughts, this study aims to give more insight on the nuanced relationships between livelihood strategies, natural hazards, and community resilience. Additionally, by emphasizing the role of local knowledge and organizations, the study aligns with global efforts to promote community-driven sustainable development initiatives that empower vulnerable populations and enhance their adaptive capacities in the face of environmental challenges.

1.4 STATEMENT OF THE PROBLEM

Researches on the informal and often unregulated nature of artisanal mining operations have dwelt heavily on its environmental and social repercussions. For example, however, there is scant information on the potential benefits of this artisanal mining especially when juxtaposed against climate-related shocks, such as El-Nino induced droughts. Against the backdrop that artisanal mining has emerged as an alternative livelihood strategy for households in regions like Makaha Ward 14, Mudzi District, the question that remains unanswered is: Can artisanal mining enhance household food security in light of EL-Nino induced droughts?

1.5 MAIN OBJECTIVES

The main objective of this study is to assess the contribution of artisanal mining to household food security amid El-Nino induced drought in Makaha Ward 14, Mudzi District.

1.6 SPECIFIC OBJECTIVES

1. To identify food insecurity situation caused by El-Nino induced droughts in Makaha Ward 14, of Mudzi District
2. To identify the contribution of artisanal miners in contributing to household food security.
3. To examine the challenges faced by artisanal miners in contributing to household food security
4. To propose ways these challenges can be mitigated to enhance household food security amid El-Nino induced droughts

1.7 SPECIFIC RESEARCH QUESTIONS

1. What food insecurity situation is being caused by the El-Nino induced droughts in Makaha Ward 14, of Mudzi District?
2. What is the contribution of artisanal miners in contributing to household food security?
3. What are the challenges being faced by artisanal miners in contributing to household food security?
4. How can these challenges be mitigated in Makaha Ward 14, of Mudzi District to enhance household food security amid El-Nino induced droughts?

1.8 SIGNIFICANCE OF THE STUDY

This study may contribute significantly to the understanding of the role of artisanal mining in enhancing household food security in rural Zimbabwe. By examining how artisanal mining activities intersect with food security dynamics in the context of climate-related shocks, such as El-Nino induced droughts, the research may provide valuable insights into the complex socio-economic and environmental interactions shaping rural livelihoods. Furthermore, the findings of this study will not only fill a critical knowledge gap regarding the specific contributions of artisanal mining to household food security but will also offer practical implications for policymakers, development practitioners, and local communities. Understanding the nuances of how artisanal mining can either support or hinder food security efforts will enable stakeholders to design targeted interventions that harness the potential benefits of mining while mitigating its negative impacts on food production, natural resources, and community well-being.

According to Brown, (2020), understanding the nuances of this relationship is essential for policymakers, development practitioners, and communities to devise targeted strategies that

leverage the potential benefits of artisanal mining while mitigating its adverse impacts on food security and environmental sustainability. A comprehensive analysis of these dynamics is vital for promoting resilience and ensuring the long-term well-being of rural households in Zimbabwe facing the compounding threats of climate change and resource extraction.

Moreover, the study's outcomes will have broader implications for sustainable development initiatives in similar contexts globally. By shedding light on the intricate relationships between livelihood strategies, environmental factors, and food security outcomes, this research can serve as a model for designing holistic and inclusive approaches to resilience-building in regions facing intersecting challenges of resource scarcity, climate variability, and economic vulnerabilities.

Ultimately, the insights generated from this study have the potential to guide evidence-based policy formulation and programmatic interventions that aim to enhance the adaptive capacities of rural households in Zimbabwe and beyond. By promoting sustainable livelihood practices and bolstering food security mechanisms in the face of climate-related shocks, the study seeks to contribute to the overarching goal of building resilient communities capable of weathering environmental uncertainties and securing sustainable futures for generations to come.

1.9 Hypotheses

1. H1: Increased income from artisanal mining positively correlates with improved household food security in Makaha Ward 14.
2. H2: Households engaged in artisanal mining demonstrate greater resilience to the impacts of El Niño-induced drought compared to those reliant solely on agricultural income.
3. H3: The diversification of income sources through artisanal mining enhances food access utilization among households affected by drought.
4. H4: Participation in mining cooperatives leads to higher income and better food security outcomes compared to independent mining operations.
5. H5: Households employing adaptive strategies that integrate artisanal mining and agriculture will exhibit superior food security metrics compared to those that rely on a single source of income.

1.10 Definition of key terms

1.10.1 Artisanal Mining

Artisanal mining describes small-scale, informal mineral extraction activities that rely on low-tech, labor-intensive methods. Typically undertaken by individuals or small groups, these operations use rudimentary tools and techniques to access mineral resources, often outside formal regulatory frameworks. Artisanal miners usually operate outside of formal regulations, which can lead to varying degrees of legality and environmental impact. This type of mining is labor-intensive, often involving manual extraction, and is common in developing regions where larger mining operations are not feasible (Zvarivadza, 2018).

1.10.2 Household Food Security

The term "home food security" describes a situation in which every member of a household continuously has access to enough wholesome food that is necessary for an active and healthy lifestyle. Food availability, accessibility, consumption, and stability across time are all included in this multifaceted concept (Mupaso et al., 2024).

- **Availability:** Sufficient food must be produced or imported to supply the necessities of the family.
- **Access:** Families should have economic means to acquire food.
- **Utilization:** Food must be used effectively, considering nutritional value and cooking methods.
- **Stability:** Households should maintain food security over time, even in the face of shocks or crises.

1.10.3 El Niño

It is defined as an irregular climatic event characterized by elevated sea surface temperatures in the central and eastern Pacific Ocean. This temperature anomaly disrupts global atmospheric patterns, often resulting in heightened occurrences of extreme weather—such as extended periods of drought, severe flooding, and significant alterations in rainfall distribution. In regions like southern Africa, El Niño events are particularly associated with severe drought conditions that

hinder agricultural productivity, disrupt water supplies, and contribute to unpredictable growing seasons (Muza, 2017).

1.10.4 Drought

Drought refers to an extended period of significantly below-average rainfall compared to the long-term climatic norm of a given region. This deficit in precipitation leads to critical water shortages, with far-reaching consequences for agriculture, drinking water availability, and ecological systems (Mutowo et al., 2014).

- Meteorological Drought: presented by a shortage of rainfall over a detailed period.
- Agricultural Drought: Occurs when there is insufficient moisture for crops to grow.
- Hydrological Drought: Involves the depletion of water supplies in rivers, lakes, and reservoirs

1.11 Chapter Summary

This study investigates the input of artisanal mining to household food security in Makaha Ward 14, Mudzi District, particularly amid El Niño-induced droughts. It has delivered the background, the problem statement the research objective the significance and hypothesis. It has also provided the definition of terms, structure of the dissertation. The next chapter focuses on the literature review.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter delves into the intricate relationship between artisanal mining and household food security, particularly in the context of El Niño-induced droughts in Makaha Ward 14, Mudzi District. Artisanal and small-scale mining (ASM) plays a dual role in food security, providing critical income for vulnerable households while often exacerbating environmental degradation and land-use conflicts. In regions like Zimbabwe, where climate shocks and economic instability undermine agriculture, ASM serves as a vital livelihood alternative, yet its informal nature and unsustainable practices threaten long-term food production through land degradation, water pollution, and labor shifts away from farming. While ASM enhances short-term food access by enabling market purchases, its competition with agriculture raises concerns about stability and nutritional diversity, particularly in drought-prone areas affected by El Niño. Addressing these challenges requires formalizing ASM, enforcing sustainable mining practices, and integrating land-use policies to balance economic benefits with food security. This study examines these dynamics through a Malthusian lens, highlighting the tension between population needs and resource scarcity, and proposes policy interventions to harmonize ASM with resilient food systems.

2.1 How Artisanal mining is viewed in enhancing food security in various perspectives around the world

Artisanal mining has the potential to enhance food security through income generation, its effectiveness is often compromised by environmental challenges, market access issues, and the informal nature of the sector. Addressing these challenges is crucial for maximizing the contributions of artisanal mining to food security in Zimbabwe and beyond.

2.1.1 Global Perspective

ASM plays a critical role in supporting the livelihoods of millions globally, especially within developing nations (Ofosu et al., 2020). By offering a vital income stream, ASM enables households to purchase food and meet basic needs, contributing to improved food security. In areas where formal employment is limited, ASM serves as an alternative economic pathway, empowering individuals to sustain their families and local communities.

However, the largely informal nature of ASM poses significant challenges. Limited regulation often results in poor working conditions, inadequate safety measures, and restricted access to financial or technical resources. These constraints can diminish the potential of ASM to consistently enhance food security and long-term well-being (Atlantic Council, 2023).

2.1.2 Regional Perspective

In Africa, artisanal mining is particularly prevalent and has been linked to both positive and negative impacts on food security (Hentschel, 2003). On one hand, ASM can enhance food security by providing income that enables households to buy food, especially in rural areas where agricultural production may be insufficient due to environmental challenges like droughts. For example, in Guinea, markets serving ASM communities have been shown to facilitate access to food, although they often lack diversity in nutritious options (Turner et al., 2022). On the other hand, ASM can also lead to environmental degradation, which negatively affects agricultural productivity and, consequently, food security. The competition for land and resources between mining and agriculture can exacerbate food insecurity in mining regions (Atlantic Council, 2023).

2.1.3 Local Zimbabwean Perspective

In Zimbabwe, artisanal mining has emerged as a crucial economic activity, particularly in rural areas where formal employment is limited. The sector provides a significant source of income for

many households, which can be directed towards food purchases (Zvarivadza, 2018). However, the challenges faced by artisanal miners, such as lack of formal recognition and access to markets, can hinder their ability to contribute effectively to food security. The informal nature of mining operations often results in unstable incomes, making it difficult for families to rely on this income for consistent food access (Turner et al., 2022). Moreover, the impacts of climate change, including El Niño-induced droughts, further complicate the situation, as these events can disrupt both mining and agricultural activities, leading to heightened food insecurity in affected communities.

2.2 The concept of food security-food

Security, as a multidimensional and interdisciplinary construct, gained traction within global development frameworks during the 1960s and 1970s (Von Braun et al., 1992; Anderson & Cook, 1999; FAO, 2006). Over the decades, its scope has broadened to encompass a range of social, political, ethical, and human rights dimensions. Within this wider discourse, food security has emerged as a vital component—defined by the World Food Summit (1996) as a state wherein every person has both physical and financial access to sufficient, safe, and nutritious food that aligns with their dietary requirements and cultural preferences, enabling them to live healthy, active lives. The Food and Agriculture Organization (2006) outlines four foundational pillars of food security: availability, which refers to a reliable supply of quality food, either locally produced or imported; access, which concerns the means—economic, social, or physical—that allow individuals to obtain this food; utilization, which involves the proper biological use of nutrients, influenced by factors such as healthcare, diet quality, and sanitation; and stability, which addresses the consistency of food access and supply over time, even during crises or seasonal fluctuations. Globally, food security is regarded as a cornerstone of sustainable development, with Sustainable Development Goal 2 aiming to end hunger, improve nutrition, and promote sustainable agriculture. Despite ongoing policy efforts, achieving this goal remains a significant challenge. The FAO, IFAD, UNICEF, WFP, and WHO (2022) report that the world is not on pace to realize the Zero Hunger target (SDG 2.1) by 2030—a situation worsened by the COVID-19 pandemic, which has disrupted food supply chains, exacerbated socio-economic disparities, and underscored the critical need for holistic and resilient strategies to combat global food insecurity.

2.3 Food insecurity situation caused by El-Nino induced droughts

In Zimbabwe, El Niño has contributed significantly to environmental fragility, widespread crop failure, and large-scale livestock mortality. The 2015–2016 El Niño-induced drought, described as the most severe in Southern Africa in over three decades, had profound and far-reaching effects on food and nutrition security across the region (Hove & Kambanje, 2019; Mazvimavi, Murendo & Chivenge, 2017; World Food Programme [WFP], 2016). More than 40 million people were affected by food insecurity linked to failed harvests and deteriorating livelihoods (RIASCO, 2017; WFP, 2016). In Zimbabwe, rain-fed agriculture—the backbone of rural livelihoods—was especially hard hit, with crop production coming to a near standstill (Arslan, 2018; FAO, 2016; Mazvimavi et al., 2017; RIASCO, 2017; WFP, 2016). The region’s heavy reliance on rain-fed

cultivation leaves it highly vulnerable to such climatic disruptions (Mavhura, Manatsa & Mushore, 2015). Beyond Southern Africa, Ghana also experienced significant agricultural losses due to the same El Niño episode, with reported consequences including food insecurity, income loss, debt accumulation, and worsening poverty levels (Owusu et al., 2019). In Zimbabwe specifically, the impact was amplified by the country's dependence on peasant farming for approximately 70% of its food production (FAO, 2016), and the fact that over 80% of rural households lack access to irrigation infrastructure—further deepening their exposure to climate shocks. Land use plays a critical role in food production, availability, and utilization. In many districts, artisanal gold mining occurs on fertile land that could otherwise be utilized for agriculture, thereby undermining food security. While gold mining has been adopted as an economic activity to support livelihoods, this shift often comes at a substantial cost. Many individuals have abandoned sustainable agricultural practices in favor of mining, leading to the gradual phasing out of other livelihood activities such as fishing and livestock rearing. Compounding these challenges, remaining agricultural lands are frequently degraded due to inadequate mining practices, particularly in fragile wetland ecosystems that are crucial for domestic and livestock water supply. This degradation results in the loss of hydrological, ecological, and socio-economic value, leading to drying animal watering points and depleted soil moisture, which are essential for high food yields.

2.3.1 Land use conflict

In Zimbabwe, the influx of artisanal and small-scale miners has led to significant land use disputes between smallholder farmers and miners, with some conflicts escalating into violence. Both sectors require large tracts of land, which intensifies competition over which economic activity should take precedence. Mining is particularly demanding in its land use, often rendering affected areas unusable for other purposes (Luckeneder, 2021). As a result, many farmers have converted historically productive agricultural fields into mining sites in hopes of tapping into the potential for substantial profits, jeopardizing food production in the process. Smallholder farmers, lacking the political or financial influence necessary to defend their interests, have often been forcibly displaced from their farmland due to aggressive actions by miners (Adonteng-Kissi, 2017; Chari, 2021). This situation is compounded by a land tenure system that grants the President exclusive control over community lands, fostering an environment where economic gain is prioritized over the rights and safety of local populations (Garret, 2007; Hentschel, 2002).

The challenges in enforcing land use laws and regulations are exacerbated by the involvement of powerful domestic and international actors who benefit from the status quo (Mkodzongi & Spiegel, 2020). The negative externalities associated with artisanal mining have had a direct and detrimental effect on agricultural productivity (Oxfam, 2013). Incidents of violence, such as attacks by machete-wielding gangs in the Midlands and Mashonaland Central Provinces, have disrupted farming activities and contributed to a decline in agricultural output (The Herald, September 2, 2020). This loss of control over land means that rural farmers are increasingly unable to manage their food production and access, leading to localized food shortages and rising cases of child malnutrition, even in regions where food is otherwise available (Clapp et al., 2022; Servin-Moseley, 2022).

The overlap between small-scale mining and agriculture often leads to the degradation of arable land and the displacement of existing farms, creating substantial risks for food security. Studies employing remote sensing technologies have revealed a largely antagonistic relationship between artisanal mining and smallholder agriculture—disrupting food systems, fragmenting trade networks, and displacing farming communities (Awotwi et al., 2018; Hausermann et al., 2018b; Ferring & Hausermann, 2019; Obodai et al., 2019; Snapir et al., 2017). This dynamic has led to reduced household incomes and major shifts in land use patterns that increasingly prioritize mining activities over farming. Despite its far-reaching implications for rural livelihoods and food systems, this intersection remains underexplored in academic literature, underscoring an urgent need for deeper investigation and informed policy responses.

2.3.2 Land and Water pollution (degradation)

Miners in the artisanal gold industry rely heavily on hazardous chemicals such as mercury, which pose significant threats to biodiversity and the health of land and water resources (Magidi-Hlungwane, 2023). The situation is exacerbated by inadequate storage facilities and the careless application of these toxic substances during gold cleaning processes, leading to contamination of nearby soil and water systems. This pollution not only jeopardizes local food supplies but also adversely affects agricultural productivity (Musemwa, 2019). In Zimbabwe, lax regulations surrounding waste disposal and mining dumps further compound the issue, with waste often being dumped into water bodies that are crucial for smallholder irrigation downstream (Eludoyin, 2017).

Additionally, effluent from tailing dams frequently seeps into farmlands and groundwater, rendering these resources unsuitable for irrigation and domestic use (Watari et al., 2019).

Uncontrolled gold panning has led to the contamination and siltation of key rivers such as the Mazoe, Save, Mutare, and Odzi, which are vital for irrigation and the cultivation of horticultural products like vegetables (Alrumman et al., 2016). Evidence from Eludoyin (2017) highlights that in Ghana, the presence of heavy metals in the soil has severely reduced crop yields, particularly for shallow-rooted plants like maize and cocoa, resulting in stunted growth and low-quality produce that contribute to malnutrition. In regions like Gwanda and Insiza, the degradation of land and water resources due to mining activities has also led to a decline in livestock quality and economic losses for farmers. Deforestation and the burning of grasses associated with increased gold mining have diminished grazing land, forcing farmers to rely on costly feed supplements (Chari et al., 2021). This loss of natural pastures, coupled with rising feed costs, results in high livestock production expenses that many rural farmers struggle to afford, ultimately leading to lower quality meat production (The Standard, June 20, 2019).

2.4 The contributions of Artisanal Small-scale Mining on Food Security.

Artisanal small-scale mining has emerged as a vital coping mechanism for many communities grappling with struggling economies, significantly contributing to household food security. In areas like Mhondoro-Ngezi, local populations engage in artisanal and small-scale gold mining to generate capital that supports their small-scale farming initiatives and other food-related businesses (Mkodzongi-Spiegel, 2019). This dynamic partially addresses the inquiry by Cartier and Bürge regarding whether the mining sector complements or competes with agricultural efforts to ensure food security (Cartier-Bürge, 2011). Contrary to earlier views that framed artisanal mining as a force of "departmentalization and deagrarianization," the capital influx from mining activities can actually bolster agricultural production, enhancing the overall resilience and food security of households (Mkodzongi-Spiegel, 2020).

The financial gains from mining also play a crucial role in mitigating the adverse effects of climate change on farming, as they enable families to access supplementary food commodities that they may not be able to produce themselves. By strengthening their own-production entitlements, as described by Sen (1982), mining households improve their food agency, allowing them to make informed choices about their nutrition and food sources (Clapp et al., 2022). As many communities

face seasonal food shortages during the dry season, artisanal small-scale mining offers a critical alternative to bolster food security during these challenging times. Vaitla et al. (2009) emphasize that much of the world's acute hunger and under nutrition occurs during the annual "hunger season," when previous harvests dwindle and food prices rise, underscoring the importance of diversifying income sources.

In Zimbabwe's farming regions, where rainfall is relatively abundant, the seasonal nature of artisanal mining allows smallholder farmers to participate in mining activities during non-agricultural periods. This strategy helps broaden their income streams during the dry season, thus mitigating their vulnerability to seasonal hunger and food shortages (Maconachie et al., 2006). This phenomenon, described as "temporary migration" in household economic activities, illustrates how mining can serve as a buffer against the cyclical challenges of food production. Consequently, artisanal and small-scale mining plays a crucial role in stabilizing food supplies for households that may not produce sufficient food, providing a necessary support system until the next agricultural season arrives.

2.4.1 Employment creation.

Against the backdrop of Zimbabwe's deteriorating economy and growing urban unemployment, artisanal and small-scale mining has become a critical livelihood option. This sector has absorbed a substantial portion of the economically active population—particularly youth, who account for roughly 67% of the national demographic (Gwasira, 2022). For individuals lacking formal qualifications or vocational training, artisanal mining offers a vital means of sustaining household welfare and ensuring food access. It is estimated that more than 500,000 people are informally engaged in this sector, with income frequently channeled into the purchase of higher-quality food, thereby improving both household and community food security (Dube et al., 2016). According to Chigumira (2018), artisanal mining plays an important role in rural economies by offering alternative employment opportunities, diversifying income sources, and reinforcing market-based food entitlements.

However, the rise of artisanal mining has also led to negative consequences for local farmers, particularly regarding land loss and reduced agricultural productivity (Chari et al., 2021). Critics argue that mining competes destructively with agriculture for resources and labor, leading to a scenario described as the "Dutch disease," where labor migrates toward more lucrative mining

opportunities (Hilson & Laing, 2017). This shift creates a labor vacuum in the agricultural sector, leaving an aging workforce that is less capable of meeting food production demands (Okoh-Hilson, 2011). Consequently, this decline in agricultural output exacerbates food insecurity, limiting households' control over their food security situation (Clapp et al., 2022; Sen, 1987). While income from mining may be used to purchase food, evidence indicates that low-income households typically buy basic carbohydrates with minimal fruits and vegetables, resulting in a less nutritious diet compared to what could be achieved through home production (Zhang et al., 2020). Thus, the dynamics between mining and agriculture present a complex challenge to food security in Zimbabwe.

2.4.2 The challenges associated with food security in relation to artisanal mining

Food security is a multifaceted and interdisciplinary concept that gained prominence in global development discourse during the 1960s and 1970s (Von Braun et al., 1992; Anderson & Cook, 1999; FAO, 2006). Since then, its definition has evolved, shaped by contributions from scholars and institutions that have emphasized broader dimensions—including social equity, political context, ethical considerations, and human rights. The World Food Summit (1996) defines food security as the condition in which all individuals have both physical and economic access to adequate, nutritious food that aligns with their dietary needs and personal preferences, enabling them to lead healthy and active lives. According to the FAO (2006), the concept rests on four foundational pillars: availability, access, utilization, and stability. Food availability refers to the presence of adequate, high-quality food, whether produced domestically or imported. Access pertains to individuals' ability to obtain the resources necessary to purchase food that satisfies their dietary requirements. Food utilization involves the body's capacity to absorb nutrients effectively, influenced by factors such as safe drinking water, hygiene, healthcare, dietary practices, and food preparation. Lastly, stability concerns the consistency of food availability and access over time, indicating that a person may still be considered food insecure if they experience frequent access issues, even if they are well-nourished at a given moment.

The significance of food security is widely acknowledged by both researchers and policymakers as a foundational pillar of global development. Sustainable Development Goal 2 specifically targets the eradication of hunger, the achievement of food and nutrition security, and the advancement of sustainable agricultural practices (Flores et al., 2017). Despite international

commitment, progress remains uneven. A 2022 report by FAO, IFAD, UNICEF, WFP, and WHO indicates that the world is not on course to meet the Zero Hunger objective by 2030. The COVID-19 pandemic has further aggravated food insecurity, pushing millions more into hunger. In 2021, an estimated 702 to 828 million individuals—representing 8.9% to 10.5% of the global population—suffered from hunger, with Africa bearing the heaviest burden at approximately 278 million people (20.2%). Alarmingly, food insecurity intensified across nearly all African sub-regions, where around 58% of the population experienced moderate to severe food stress.

This deepening crisis stems from a complex set of interrelated challenges, including soil degradation, declining agricultural productivity, poor health and sanitation infrastructure, demographic pressures, poverty, conflict, climate variability, and systemic exclusion (Stringer, 2000; Abdullah et al., 2018; FAO et al., 2018, 2022; Krishna Bahadur et al., 2018). In light of these multifaceted issues, understanding the influence of small-scale mining on food security becomes increasingly urgent. This thesis seeks to explore that intersection by engaging with key theoretical frameworks that have shaped global food security discourse. By situating the analysis within the broader context of smallholder agriculture and rural livelihoods, the study aims to unpack how artisanal mining activities intersect with food access and production. The following section will examine the conceptual foundations that inform this inquiry.

2.5 Policy Proposal

Artisanal and small-scale mining plays a crucial role in supporting food security and the broader economy. However, its illegal and informal nature has led to negative consequences for agriculture and the environment, prompting concerns about the sector's sustainability. This destruction largely stems from weak institutional frameworks, inadequate policies, fragmented legal regulations, and poor enforcement of environmental and mining laws. To address these challenges, Chari et al. (2021) argue that formalizing artisanal and small-scale mining and integrating it into the mainstream economy is essential. Doing so would grant miners access to land rights, mining licenses, and legitimate documentation, allowing them to operate legally (Chari et al., 2021). This formalization would also help delineate mining areas, thereby protecting smallholder farmers from violent encroachments on their lands.

Implementing modern, comprehensive, and harmonized legal frameworks for agriculture, environment, and mining is vital for fostering sustainable coexistence between these sectors. Such frameworks would facilitate collaboration between farmers and miners based on mutual agreements, enabling mining activities to complement agricultural production and bolster food security. However, achieving this integration requires significant political will, particularly in light of the vested interests of powerful minority groups that may resist meaningful reforms. A notable example is Belo Horizonte's Fome Zero (Zero Hunger) program, documented by Chappell (2018), which illustrates how governments can adopt policies that effectively enhance food security in sustainable ways. By drawing inspiration from such successful initiatives, stakeholders can work towards creating a more equitable and sustainable future for both mining and agriculture.

2.5 Theoretical Framework

2.5.1 Food availability approach (Malthusian theory)

Although multiple theoretical perspectives inform the discourse on food security—including the basic needs approach developed by the International Labour Organization (ILO), Amartya Sen's entitlement theory, the sustainable livelihoods framework, and the experiential-based approach—this study is primarily grounded in Malthusian theory. Originally proposed by Robert Malthus in his 1798 *Essay on the Principle of Population*, the theory asserts that unchecked population growth tends to outpace the rate of food production, leading to inevitable shortages and widespread hunger (Ian et al., 2012). Malthus observed that while human populations expand exponentially, agricultural output tends to increase at a much slower, linear rate, thereby creating a chronic risk of food scarcity unless deliberate measures are taken to control population growth. Historically, the Malthusian framework dominated food security discussions, particularly before the 1970s, emphasizing the need for a consistent and sufficient food supply to meet domestic, regional, and national demands. This perspective led to significant initiatives such as the Green Revolution, which aimed to boost agricultural productivity in developing nations. Organizations like the World Food Programme (WFP), Consultative Group on International Agricultural Research (CGIAR), and the International Fund for Agricultural Development (IFAD) emerged during this period to address food insecurity through improved agricultural practices and technology. However, critics argue that Malthusian pessimism has not been vindicated by history. Technological advancements in food production have often outpaced population growth, challenging Malthus's original

assertions and highlighting the complexities of food access, particularly for marginalized groups (Sen & Sen, 1982).

In the context of El Niño-induced droughts, the Malthusian theory becomes particularly relevant as it offers insights into the relationship between environmental shocks and household food security. Regions affected by such droughts experience significant declines in agricultural productivity, exacerbating food scarcity. According to Malthusian principles, these environmental challenges increase the gap between food supply and the needs of growing populations, compelling households to seek alternative livelihoods, such as artisanal mining. This sector provides a crucial income source for families facing agricultural failures, allowing them to purchase food and mitigate immediate food insecurity.

Ultimately, the Malthusian theory underscores the structural challenges of balancing population needs with resource availability in the face of climate-induced stressors. In the context of El Niño-induced droughts, artisanal mining emerges as a critical, albeit temporary, solution for household food security. However, sustainable management of natural resources and diversification of livelihoods are essential to mitigate the long-term implications of Malthusian pressures. By understanding these dynamics, this study aims to investigate the food insecurity situation caused by El Niño in Makaha Ward 14, assess the contributions of artisanal miners to household food security, and propose effective strategies to enhance food security amid these challenges.

2.6 Summary of identified gaps in knowledge and key research questions

The literature review highlights a significant research gap regarding the interplay between smallholder agriculture and small-scale mining, particularly in relation to food security. While extensive information exists about the characteristics and motivations of the small-scale mining sector worldwide, the existing studies predominantly focus on its environmental and socioeconomic impacts, often presenting conflicting narratives. Despite recognizing the spatial interconnections and shared resource requirements between small-scale mining and smallholder farming, the literature has largely overlooked the implications of this relationship on food security across its four dimensions: availability, access, utilization, and stability.

2.7 Chapter summary

In conclusion, this chapter highlights the complexity of the interaction between smallholder agriculture and small-scale mining, underscoring the necessity of a careful examination of their interdependencies. This study attempts to close the current gap in the literature by tackling the methodological issues that have impeded earlier research. It looks into how food security is affected by the interaction of personal, environmental, and socioeconomic factors in the setting of smallholder farming and small-scale mining. In the end, this chapter lays the groundwork for a more thorough comprehension of these connections, which is necessary to create interventions and policies that effectively improve food security and the general well-being of impacted populations.

CHAPTER 3: METHODOLOGY

3.1. Introduction

The literature study on the subject of evaluating the role of artisanal mining in household food security under El Nino-induced drought in Makaha Ward 14, Mudzi District, was the main emphasis of the previous chapter. The study methodology—a strategy the researcher employs to gather and examine data was the main topic of this chapter. Stated differently, it covered data types, data analysis, sample techniques, and data collection methods. The study began with a description of the research area. The study design comes next, and then the study approach. Along with discussing the ethical issues, the chapter also covered the methods used to analyze the data.

3.2 Study Area

This study was conducted in Ward 14 of the Mudzi District, located in Zimbabwe's Mashonaland East Province. As illustrated in Figure 3.1, the ward falls within Natural Farming Region IV—a semi-arid zone situated at an elevation of 500 to 900 meters above sea level (ZIMSTATS, 2022). Agro-ecologically, this region is considered low-potential due to its susceptibility to prolonged dry spells and recurrent droughts. The area receives an average annual rainfall of 450 to 500 mm, with mean temperatures hovering around 23.8°C. According to the 2022 Census, Mudzi District had a total population of 162,381, of which Ward 14 accounted for approximately 20,916 people—comprising 10,927 males and 9,989 females—across 5,665 households (ZIMSTATS, 2022). The community's heavy dependence on artisanal mining as a primary livelihood strategy made it an ideal context for investigating the sector's implications on food security, particularly under conditions of environmental stress. Widespread poverty and persistent food insecurity in the ward further emphasized the relevance and urgency of this research.



Figure 1: Map of Zimbabwe showing Makaha Ward 14

3.3 Research Approach

Mixed-methods research involves the deliberate integration of both qualitative and quantitative approaches, tailored to align with the study's objectives and the nature of its research questions. This combination is intended to produce a more holistic and insightful understanding of the subject matter (Creswell, 2011). Thus, the study involved the collection of quantitative and qualitative data. Quantitative research involves collecting data, measuring it and using statistical analysis to confirm or reject a hypothesis. (Williams, 2011). . This approach is particularly useful for identifying patterns, relationships, and cause-and-effect dynamics within a study. Creswell (2014) further emphasized that quantitative research enhances precision and reduces bias, making it suitable for studies requiring large-scale data analysis. The structured nature of quantitative data collection through surveys, experiments, or existing datasets ensured consistency and replicability, which were critical for validating research outcomes. Quantitative data was crucial for this study because it allowed for measurable, objective analysis of food insecurity and the economic

contributions of artisanal miners in Makaha Ward 14. According to Creswell (2014), quantitative research provides statistical evidence that can identify trends, correlations, and causal relationships-key for assessing the severity of El Niño-induced droughts on food security. Qualitative research is a form of social study which focuses on how people interpret and make sense of their experiences to understand social phenomena

By combining quantitative and qualitative methods, this dual approach did not only enhance the comprehensiveness and depth of the data collected but also enabled a more holistic understanding of how artisanal mining practices influenced household food security within the context of environmental challenges like El Niño-induced droughts. The quantitative data offered statistical rigor and generalizability, while the qualitative data provided depth, context, and a nuanced understanding of the lived experiences of the community members (Creswell & Plano Clark, 2018). This synergistic combination of methods was instrumental in generating comprehensive findings and actionable insights to inform policy decisions and interventions aimed at improving food security in artisanal mining communities.

3.4 Research design: Case study

A research design provides a structured framework that outlines the methods and procedures used to systematically address a research problem (Bhat, 2019). This study adopted a case study approach, which Yin (2018) defines as an empirical method that investigates a current phenomenon by examining it within its real-world context. According to Harrison et al. (2017), the case study design is particularly useful for probing complex issues in depth, offering nuanced insights into multifaceted dynamics. It allows for an intensive exploration of the subject within its natural environment. Furthermore, as noted by Onghena et al. (2019) and Yin (2018), case study research can integrate both qualitative and quantitative methods, making it suitable for comprehensive, mixed-method inquiries.

Sample design and research participants

Sample design refers to the systematic approach used to identify a subset of individuals from a broader population, with the goal of ensuring that this group accurately reflects the characteristics of the larger population (Leedy, 2002). According to Sharma (2017), sampling is the methodological process through which researchers deliberately select a smaller group of

participants from a defined population, guided by the objectives of the study. Walliman (2017) describes the research population as the entire group of individuals or entities that the study aims to investigate. A sample, therefore, is a carefully chosen segment of that population, intended to share key attributes with the whole and to serve as a practical representation for data collection and analysis.

Target Population or Research participants.

Breakwell et al (2006) described the target population as the intended group of people from whom the researcher seeks to collect and evaluate data for the study. The initially targeted population was 50 households involved in artisanal mining in Ward 14, Mudzi District. This population was particularly relevant as they were directly affected by both mining activities and climatic conditions.

Sampling methods

In order to make sure that the chosen sample appropriately represents the features of the entire population, researchers employ systematic techniques known as sampling methods to pick a subset of people from a larger population (Creswell & Creswell, 2018). The two basic categories into which these methods fall are probability sampling and non-probability sampling. By giving every member of the target population a known, non-zero chance of being included in the study, probability sampling lowers the possibility of selection bias (Etikan et al., 2016). Stratified random sampling is one such method, where participants are chosen at random from each subgroup after the population is divided into discrete strata according to common characteristics.

Stratified Random Sampling

Stratified random sampling is a structured sampling procedure wherein the broader population is first partitioned into mutually exclusive categories—known as strata—based on specific shared traits. These strata act as miniature reflections of the population's internal diversity. From each stratum, a random selection of participants is made, ensuring that the resulting sample preserves proportional representation and analytical balance across the defined subgroups (Creswell & Creswell, 2018). This ensured representation of key subgroups in the final sample. The purpose of stratified random sampling was to improve representativeness by ensuring key subgroups are

included, enhancing comparative analysis (e.g., comparing food security between male and female miners) and increasing precision by reducing sampling error (Taherdoost, 2016).

2. Non-Probability Sampling

Non-probability sampling does not use random selection, meaning some population members have no chance of being included (Palinkas et al., 2015). This method was useful when a representative sample was difficult to obtain. It included techniques such as purposive, convenient, quota, and snowball.

Purposive Sampling

Purposive sampling is a targeted non-probability sampling strategy wherein researchers intentionally choose participants who possess particular qualities, specialized knowledge, or firsthand experiences directly aligned with the study's objectives. This method enables the researcher to draw insights from individuals who are most likely to offer rich, relevant, and context-specific information (Palinkas et al., 2015). Unlike random sampling, this method relied on the researcher's judgment to choose information-rich cases. It deepened qualitative insights into how El Niño droughts affect miners' food security, targets information-rich participants who can explain coping strategies and complements quantitative data (e.g., surveys) by adding narrative depth. Purposive sampling was employed for this study because my research focused on specific groups—artisanal miners and households affected by El-Nino-induced droughts in Makaha Ward 14 of Mudzi District. Given the specialized nature of my objectives, I needed to target individuals who have direct experience with artisanal mining and food insecurity in this particular region. Random sampling was not effective in capturing these key respondents, whereas purposive sampling allowed me to deliberately select participants who can provide in-depth insights into the contribution of mining to household food security amid drought conditions. By engaging knowledgeable informants, such as active miners, affected families, and local leaders, I could gather rich, relevant data that directly addresses my research questions. This method ensured that my findings were context-specific and meaningful for understanding the challenges and opportunities in enhancing food security in Makaha Ward 14.

Sampling size

The sample size refers to the number of representatives of a population selected for a purpose. According to Gubrium and Holstein (2002), sample size refers to the number of components from which data is obtained. According to Schumacher (2002), sample sizes were critical since “studying everyone everywhere doing everything” is impossible. In determining the sample size for this study, the mathematical formulae provided by Yamane (1967) was used to arrive to the final sample size. This formula was expressed as $n = \frac{N}{1+N(e)^2}$, where n is the sample size, N is the population size, and e is the level of precision. For instance, the community of interest has a population (N) of 20916, as stated in this chapter, section 3.2. Therefore, the sample size for this study was determined by $n = 20916 / [1 + 20916 (0.05)^2]$; $n = 20916 / 26 = 384.62 = 804$

3.5 Permission to conduct study

Permission to gather the required data was formally requested from the Mudzi Rural District Council before commencing the study. The researcher sought official approval to ensure compliance with local regulations and ethical standards. Proper authorization from the council was essential to conduct the data collection process legally responsibly

3.6 Data Collection Procedures

Data collection involved the process of gathering information from various sources using proven procedures. Participants were contacted through key community stakeholders in Makaha Ward 14, including local leaders and representatives from traditional authorities. After initial consultations with these stakeholders, the researcher engaged various informal groups of artisanal miners and farmers, to communicate the study’s purpose, and formally invite them to participate.

3.7 Data Types

Data types refers to the fundamental categories of information collected in research studies, which determine how data is measured, analyzed and interpreted. In research methodology the two main data types, namely, primary and secondary data.

3.8 Primary Data

Primary data refers to first-hand information collected directly by the researcher for the express purpose of addressing a specific research problem, ensuring both relevance and accuracy (American Psychological Association, 2020). This form of data is valued for its originality, precision in targeting the research objectives, and high degree of reliability.

In this study, primary data were obtained through quantitative means, specifically via a structured questionnaire designed to elicit measurable information. The instrument comprised four sections: the opening segment gathered socio-demographic details, while the remaining sections were tailored to the study's central focus—examining the influence of artisanal mining on household food security in the context of El Niño-induced drought conditions. Prior to participation, respondents were informed about the study's aims and assured of their rights, including the option to withdraw at any point. The researcher actively supported participants throughout the questionnaire process, offering clarifications where necessary to promote consistency and completeness in the responses. For qualitative data, semi-structured interviews were conducted to explore in-depth perspectives. This flexible approach allowed the researcher to adapt questions based on participants' responses, probe for deeper insights, and explore emerging themes (Mason, 2011; Cramer, 2018). Interviews were conducted with 24 participants, including 10 artisanal miners (to assess income and food security linkages), 10 farmers (to examine drought impacts and alternative livelihoods), 2 local agricultural officers (to understand policy and support mechanisms), and 2 mining regulatory representatives (to evaluate formal/informal sector dynamics).

Data Collection Methods

3.9.1 Key Informant Interviews (KIIs)

According to Annum (2014), interviews involve a structured conversation between an interviewer and a respondent, during which standardized oral questions are posed to gather relevant information. In this study, key informant interviews were utilized as the primary method of data collection. As Kothari (2004) explains, this approach involves the use of predetermined questions along with systematic techniques for recording responses. Morgan (1988) further highlights that key informant interviews are effective for eliciting open-ended responses, thereby facilitating richer, more nuanced data. These interviews typically involve one-on-one interactions, allowing participants to express their views freely and in greater depth. Establishing trust between the researcher and participants enhanced the openness of the dialogue, encouraging respondents to share meaningful insights. This method provided a more conducive setting than structured

questionnaires for exploring sensitive topics related to artisanal mining and household food security.

3.9.2 Advantages of Key Informant Interviews (KIIs)

KIIs allowed for detailed, firsthand accounts from stakeholders with specialized knowledge—such as mining syndicate leaders, local agriculture officers, or NGO workers—who could explain how mining income buffers food shortages during droughts (Tongco, 2007). This method was particularly effective for probing sensitive issues like illegal mining practices or intra-household conflicts over resource allocation, which might not emerge in group settings. Interviews were adapted to each informant’s role (e.g., asking miners about daily earnings versus asking traders about food price fluctuations). This flexibility helped uncover nuanced dynamics, such as how women used informal gold trading to secure household food supplies (Buss et al., 2019). Another advantage was Non-Verbal Data Capture, observing informants’ body language or hesitation when discussing topics (e.g., corruption in gold markets) revealed unspoken challenges in the mining-food security nexus (Gill et al., 2008). More so, Institutional Perspectives was also another advantage. KIIs with local officials or NGO staff clarified policy gaps, for example, why government food aid programs overlook mining-dependent households during droughts (Hilson and Maconachie, 2020).

However key informant interviews also presented some challenges which include, Time and Resource Constraints. Conducting interviews with diverse stakeholders (e.g., miners, farmers, officials) in remote Makaha villages required significant travel and logistical effort (Adams et al., 2014). Interviewer Bias was also another potential challenge, for instance, an interviewer’s phrasing (e.g., leading questions like “Don’t you think mining harms agriculture?”) could skew responses, especially when discussing contested issues like environmental degradation (Kvale and Brinkmann, 2009). Social Desirability Bias, Informants downplayed illegal mining activities or overstated their food security to align with community norms or authority expectations (Hilson, 2016). For instance, miners might hide income levels to avoid scrutiny from tax authorities. Limited Generalizability was also another limitation, findings from a small number of informants (e.g., 10–15) did not represent all mining households, particularly marginalized groups like female-headed households or undocumented miners (Tongco, 2007).

3.10 Questionnaire Surveys

The researcher also used questionnaire surveys as a data collection method. Innum (2014), mentions that a questionnaire is a meticulously designed document consisting of a series of questions specifically intended to elicit responses from research participants, Surveys provided valuable quantitative data and insights from a larger sample size. They helped in understanding the general trends and opinions within the community regarding artisanal mining and its impact on household food security amid El-Nino induced droughts in Makaha Ward 14. By using surveys, the researcher gathered structured responses from a wide range of participants, providing a more comprehensive understanding of the topic.

In this study, a total of fifty (50) questionnaires will be created by the researcher and dispersed at random among the occupants of Makaha ward 14 in Mudzi district. It enabled the researcher to obtain information directly from people with first-hand knowledge and experience. The chosen homes were given a structured questionnaire with both closed- and open-ended questions. The 50 questionnaires made it possible to translate the goals of the research into precise questions that needed to be addressed. In order to obtain the highest quality data feasible, one-on-one interviews were used to administer the questionnaire.

3.10.1 Advantages and disadvantages of Questionnaires

Questionnaires offered several advantages for investigating the contribution of artisanal mining to household food security during El Niño-induced drought in Makaha Ward 14. One key benefit was their ability to efficiently collect data from a large number of respondents across dispersed mining communities, which was particularly valuable given the geographic spread of artisanal mining sites in rural Zimbabwe (Bryman, 2016). The standardized format ensured consistency in data collection, allowing for systematic comparison of how different households rely on mining income to cope with food shortages. Additionally, the relatively low cost of administering questionnaires made them practical for research in resource-constrained settings (Fowler, 2014). The anonymity provided by questionnaires encouraged more honest responses about sensitive topics such as illegal mining activities or food insecurity levels that respondents might hesitate to discuss in face-to-face interviews (Dillman et al., 2014). Questionnaires also incorporated both quantitative measures (e.g., frequency of mining income) and qualitative open-ended questions (e.g.,

descriptions of drought coping strategies), providing a more comprehensive dataset for analysis (Creswell, 2014).

However, questionnaires presented several limitations for this specific research context. The structured format restricted the depth of information that could be gathered about complex livelihood strategies that intertwined mining and agriculture (Oppenheim, 2000). For instance, questionnaires failed to capture the nuanced decision-making processes households employed when allocating labor between farming and mining during drought periods. The literacy levels in rural Makaha Ward 14 also affected response quality, as some miners and farmers struggled with written questionnaires (Sudman & Bradburn, 1982). Additionally, self-reported data on mining income and food expenditures was unreliable due to recall bias or intentional underreporting, particularly when dealing with informal economic activities (Tourangeau et al., 2000). The lack of researcher presence during completion meant that opportunities for clarifying ambiguous responses or probing interesting answers was lost, potentially missing important contextual details (Foddy, 1993). Finally, questionnaire data did not adequately reflect the seasonal variations in mining productivity and food security that are crucial to understanding El Niño impacts, as they typically provided only a snapshot in time (De Vaus, 2013).

3.11 Focus group discussions

Focus group discussions were also employed as a key data collection method in this study. According to Punch (2004), this approach involves engaging multiple participants—typically between six and eight—simultaneously in a guided conversation. Morgan (1988) emphasizes that focus groups leverage group dynamics to elicit insights and perceptions that might not emerge in individual interviews. The decision to use this method was grounded in its ability to capture diverse viewpoints and facilitate richer dialogue, making it particularly effective for unpacking complex or sensitive issues through collective reflection and interaction. In addition, due to social and cultural differences, focus group discussions allowed the interaction of different cultural beliefs, sharing their experiences pertaining their perception on the significance of artisanal mining in attaining food security and it helped to gather more information about the topic as artisanal mining practices vary.

3.11.1 Advantages and Disadvantages of Focus Groups

Focus groups offered several advantages for researching the contribution of artisanal mining to household food security amid El Niño-induced drought in Makaha Ward 14. Firstly, they provided an in-depth understanding of how miners and their families perceive the role of mining in sustaining food access during droughts, allowing participants to share lived experiences and build on each other's insights (Morgan, 1996). This was particularly valuable in capturing local perspectives on livelihood shifts from agriculture to mining during climate shocks. Secondly, group discussions encouraged participants to openly discuss sensitive economic coping strategies such as informal gold trading or food purchases using mining income that they did not disclose in one-on-one interviews (Stewart & Shamdasani, 2014). Thirdly, focus groups were cost-effective for reaching multiple stakeholders (miners, farmers, traders, and local leaders) in a resource-constrained setting like rural Zimbabwe (Krueger & Casey, 2015).

However, focus groups also presented challenges for this research context. The small sample size typically of focus groups limited generalizability across Makaha's diverse mining communities (Krueger, 1993). Power dynamics could skew discussions for example, dominant voices (e.g., mine owners or male household heads) overshadowed marginalized groups (e.g., women miners or those facing food shortages), distorting findings on intra-household food distribution (O'Donnell et al., 2018). Additionally, participants withheld truths about illegal mining activities or food insecurity due to fear of reprisals from authorities or employers present in the group (Hilson & Maconachie, 2020). In Makaha's patriarchal mining culture, women avoided criticizing gender inequalities in mining income allocation if male relatives participate (Buss et al., 2019).

3.12 Secondary Data

Secondary data consists of pre-existing information collected by others for different purposes but repurposed for new research (American Psychological Association, 2020). However, in this study, this data type, was obtained from government reports (e.g., drought patterns in Zimbabwe), academic articles on mining economies, and census records.

It offered cost-effective access to broad contextual information, though its reliability depends on the original source (Public Health Research Guide, 2025). While secondary data saved time compared to primary collection, it lacked specificity for current research needs and requires careful evaluation for relevance and accuracy (Scribbr, 2024).

3.13 Data Analysis

Burns and Grove (2011) define data analysis as the systematic process of reducing, organizing, and interpreting collected data to derive meaningful insights. Given that this study employs a mixed-methods approach, both quantitative and qualitative analytical techniques were used. Quantitative data were subjected to statistical analysis to identify trends and relationships, while qualitative data were thematically analyzed to capture deeper insights and contextual understanding.

3.13.1 Quantitative Data Analysis

Quantitative data for this study were gathered through structured questionnaires, targeting variables such as household income sources, food security indicators, and the perceived impacts of drought within Makaha Ward 14. The collected data were analyzed using SPSS Version 27, applying both descriptive statistics (including frequencies and means) and inferential tests—such as chi-square and regression analysis—to explore potential relationships between artisanal mining activities and household food security. The results were subsequently visualized using Microsoft Excel to aid interpretation and presentation.

3.13.2 Qualitative Data Analysis

For qualitative analysis, thematic analysis were applied to transcripts from interviews and focus group discussions with miners, farmers, and community leaders. The process involved transcription, coding of key themes (e.g., "mining as livelihood strategy," "drought adaptation"), and theme development to explore local perspectives. Qualitative findings were triangulated with quantitative results to provide a comprehensive understanding of how mining contributes to household resilience during drought conditions.

The integrated analysis combined statistical trends with narrative insights, presented through joint displays comparing quantitative patterns with qualitative excerpts. Software including SPSS and Excel supported data processing. The study maintained ethical standards and contextual sensitivity, ensuring findings accurately reflect the complex interplay between artisanal mining, food security, and climate shocks in Makaha Ward 14.

3.14. Ethical Considerations

Ethics refers to the moral principles that guide research conduct, ensuring respect, fairness, and accountability in the treatment of participants (Sobočan et al., 2018). Ethical research practices were essential to protect the rights and well-being of individuals involved while maintaining the integrity of the study. In this research, several ethical measures were implemented to uphold these standards.

To uphold ethical standards, all participants received comprehensive information outlining the study's objectives, procedures, and any potential risks or benefits prior to their involvement. Informed consent was obtained through a signed consent form, affirming their voluntary participation. Participants were also made aware of their right to seek clarification and withdraw from the study at any point without consequence. To ensure confidentiality, pseudonyms were assigned during data analysis and reporting, safeguarding participant identities.

The principles of voluntary participation were strictly observed. Participants were explicitly informed that their involvement was entirely optional and that they can discontinue their participation at any time without providing justification. This approach ensured that no individual felt pressured or coerced into taking part in the study.

Additionally, confidentiality and anonymity were maintained throughout the research process. No personally identifiable information was collected unless absolutely necessary, and all data was stored securely to prevent unauthorized access. Participants were assured that their responses will be used solely for academic purposes and that findings were reported in an aggregated or anonymized format. These measures helped build trust and ensure compliance with ethical research standards.

3.15 Limitation of the Study

This study broke new ground by employing methodological approaches not previously applied to examine artisanal mining's role in household food security during El Niño droughts in Makaha Ward 14. While existing studies have typically relied on either purely qualitative assessments or broad quantitative surveys, our research implemented an innovative stratified sampling framework specifically designed to capture the nuanced relationship between mining livelihoods and food security systems. No prior research in this region had systematically compared food security

outcomes between mining-dependent and agriculture-dependent households during drought conditions using this rigorous quantitative approach.

To overcome previous limitations in the literature, we pioneered several methodological advancements. For the first time in this context, we combined household surveys with geospatial analysis of drought impacts, creating a more robust evidence base than previously available. Our sampling strategy specifically targeted underrepresented groups in mining communities that had been overlooked in past studies. We established a replicable data collection protocol that future researchers can build upon for longitudinal analysis. While earlier studies had been constrained by small sample sizes or narrow geographical focus, our approach generated comprehensive datasets that enabled both localized and regional comparisons. These innovations filled critical knowledge gaps and established new standards for research at the intersection of artisanal mining, climate shocks, and food security systems.

3.16 Chapter Summary

This chapter outlined the research approach used to evaluate how artisanal mining affects household food security during El Niño-related droughts in Makaha Ward 14, Mudzi District. Adopting a mixed-methods strategy, the study integrated quantitative surveys with qualitative techniques, including interviews and focus group discussions, to capture both statistical trends and community experiences. A case study framework guided the investigation, allowing for an in-depth exploration of mining activities and their influence on food access. Data was gathered through structured surveys, questionnaires, key informant interviews, and group discussions, ensuring multiple viewpoints are considered. Quantitative analysis employed statistical tools, while qualitative insights were examined through thematic analysis. The findings aimed to provide evidence-based recommendations for policymakers to strengthen food security in mining-dependent communities facing climate-induced hardships.

CHAPTER 4: DATA PRESENTATION AND INTERPRETATION

INTRODUCTION

The previous chapter provided an examination of the research methodology. It showed that the study is based on mixed outlining the research design. It showed the sample size and sampling techniques, data collection methods analysis. It detailed the systematic approach taken to ensure the reliability and validity of findings, while also addressing ethical considerations related to data collection. This chapter focuses on the presentation and interpretation of research findings on role of artisanal mining in addressing household food security in Makaha Ward 14, Mudzi district particularly in response to El-nino-induced drought. It begins by analyzing the response rate and demographic characteristics, offering insights into the composition of the study's participants. Following this, the findings are presented under clearly defined themes derived from each objective, ensuring a logical and well-organized flow.

4.2 RESPONSE RATE

The response rate shows the level of participants participated in the research. The study initially targeted 50 artisanal miners in Ward 14, Mudzi District, aiming to gather insights on their role in household food security amid El Nino-induced droughts. Thus, 50 questionnaires were distributed to the participants. However, only 35 were returned answered, yielding 70%. The researcher managed to conduct 5 interviews, therefore, only 40 miners participated. The response rate was lower than expected because of the remote location of mining sites with limited accessibility, long working hours reduced availability of participant

Table 1. Participants Response Rate

Method	Targeted Size	Responses	Response rate
Questionnaire	50	35	70%
Key informant interviews	5	5	100%

Despite the relatively low response rate, the data collected provides valuable insights into the contribution of artisanal mining to food security in Ward 14. There are challenges which affected response rate not to reach 100%. Mining operations are often carried out in isolated areas, making access difficult. Miners work long hours, limiting their availability for participation in interviews and surveys. For interviews, only 5 were achieved due to saturation, where no themes emerged.

4.3 DEMOGRAPHIC CHARACTERISTICS

The demographic profile of respondents offers insights into the nature of mining participation and its impact on household food security. Table 4.1 shows demographic characteristics of the respondents.

Table 2. Demographic characteristics

Demographic factor	Categories	Number of participants	Percentage (%)

Gender	Male	32	80%
	Female	8	20%
Age group	18-24	6	15%
	25-34	15	38%
	35-46	12	30%
	47-55	7	17%
Education level	No formal education	5	12%
	Primary level	18	45%
	Secondary level	12	30%
	Tertiary level	5	13%
Household Size	1-3	12	30%
	4-6	18	45%
	7 and above	10	25%

As illustrated in Table 4.1, out of 40 respondents, 32 were men and 8 were women, reflecting the male-dominated nature of artisanal mining. Women, while fewer in number, played supportive roles in mineral processing and vending-related activities at mining sites.

In terms of age a broad spectrum of individuals involved in mining were aged between 18 and 55 years. This, indicating that younger participants from 18-34 years (53%) engaged in mining due to limited formal employment opportunities, while older miners had extensive experience in the industry.

In terms of education, Table 4.2 shows that most miners had primary and secondary education (75%), with few possessing vocational training relevant to mining or entrepreneurship. Limited

formal education affects financial management and awareness of environmental and health risks associated with mining.

.4.4 FINDINGS OF OBJECTIVE 1: food insecurity situation caused by El Nino-induced droughts in Makaha Ward 14, of Mudzi District

This section presents findings on objective 1 which focused on identifying food insecurity situation caused by El Nino-induced droughts. The findings are structured under three themes, supported by survey data and interview responses.

4.4.1 Decline in Agricultural Productivity due to Drought

The study found out that focused on prolonged droughts have affected crop and water yields, water and livestock losses, households' livelihoods.

Table 3 Crop Yield Reduction

Crop Yield Reduction	Number of Participants (n=35)	Percentage (%)
Severe decline	25	71%
Moderate decline	8	23%
Minimal impact	2	6%

Most of the participants (71%) reported a severe decline in agricultural output, saying drought affected their ability to secure food through farming. They also reported on water scarcity, saying it further weakened crop productivity, impacting local food supply chains.

During interviews, one of the respondents said that:

“...we planted our crops as usual, but were harvested nothing due to extreme dryness. Due to the absence effective rain, even our traditional drought-resistant crops are failing.”

This showcased a deep concern over worsening agricultural conditions, where people are getting nothing from their fields.

4.4.2 Food access and challenges

On food access and challenges, the results are as indicated in Fig 4.2

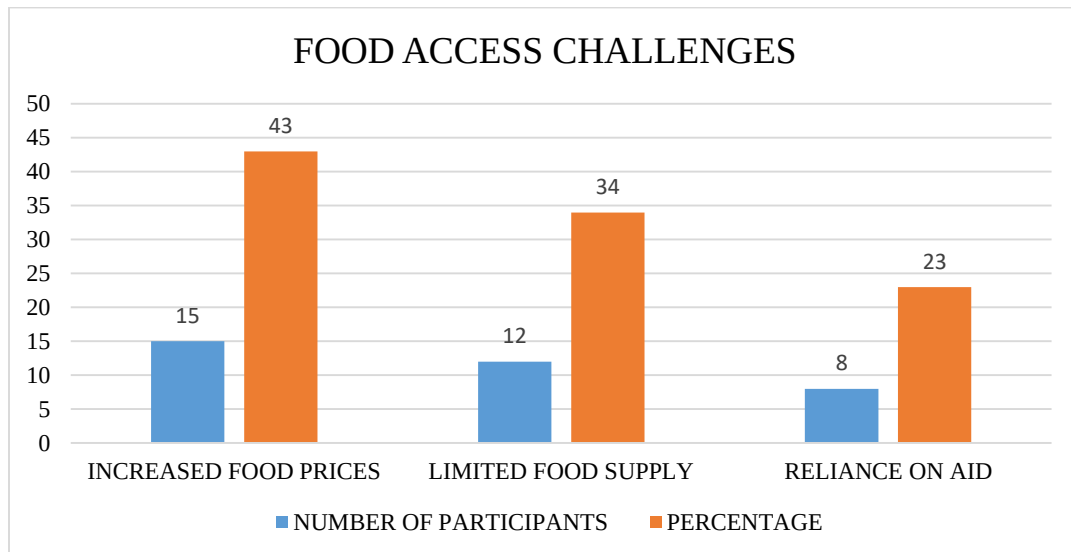


Figure 2: Ratings on Food Accessibility Challenges

Most of the participants (43%) reported that they are struggling with high food prices, making basic meals harder to afford; 34% noted food shortages in the local markets, and 23% showed that there forcing reliance on alternative source, like food aid. Some households have shifted to consuming cheaper, less nutritious food options, including grain-based diets.

Insights from key informant interviews highlighted the economic strain households face, showing food security is tightly linked to market stability. One of the participants said that:

“...due to these droughts, many people have no food in stock, especially maize. This has led to the increase of maize price at the markets because it is on high demand and its availability is limited. Therefore, most of the people are now failing to afford it. On a normal season maize used to cost \$2 or \$3 per 20 kg but during these drought conditions the prices rise to \$10 or \$12 per 20 kg.”

These findings showcased how people are being affected by El Nino-induced drought toward food security.

4.5 FINDINGS OF OBJECTIVE 2: Identifying the contribution of artisanal miners to household food security

This section presents findings on objective 2 which focused on the role of artisanal mining in enhancing household food security, especially in response to El Nino-induced droughts.

4.5.1 Mining as the Primary Economic Driver for Food Security

This theme present findings from examined mining earnings that influence food security, particularly in comparison to farming income.

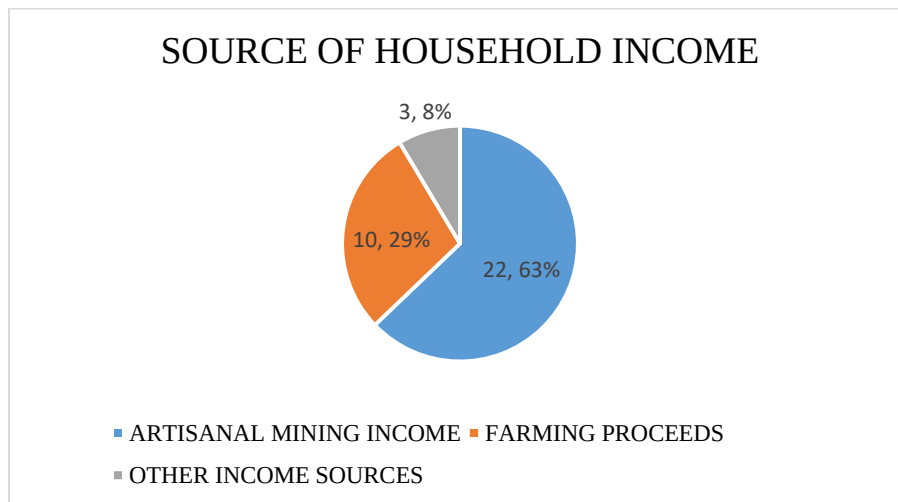


Figure 3: Ratings on Source of Household Income

From Fig 4.2 the majority (63%) of households rely on artisanal mining as their primary income source. Only 20% depend on agriculture, and 8% of them use other means of surviving.

During interviews respondents highlighted mining's financial significance in household food access. One of the respondents highlighted that:

"...due to unpredictable farming, mining is now our priority livelihood strategy. Without mining income, we cannot afford food. Most of use mining earning to buy basic food stuff like maize, cooking oil, and relevant food for the families." (Participant C)

4.5.2 Income Stability from Mining and its Impact on Food Accessibility

Table 4 Income stability from mining

Regularity of mining income for food purchases	Number of respondents	Percentage
Provides stable food security	19	54%
Somewhat reliable, but inconsistency	12	34%
Not reliable for food purchases	4	12%

Table 4.3 shows that 54% find mining as a stable financial source of income. However, 34% experience income fluctuations and 12% find mining unreliable.

Miners shared their experiences with income stability during key informant interviews shows. One of the experienced miner said that:

“...mining gives us consistent money most of the time and we can manage to buy food, but some days earnings fluctuate. This is different from farming, mining allows us to buy food throughout the year, even when the drought worsens.” (Participant A)

4.5.3 Mining as a Household Strategy to Bridge the Food Gap

This theme presents findings on how artisanal mining enables dietary improvements, allowing families to access a broader range of food items compared to farming.

Table 5: Use of mining income for food

Use of Mining Income for Food	Number of Participants (n=35)	Percentage (%)
Mining solely to secure food	14	40%
Mining partly for food security, partly for other needs	12	34%
Not involved in mining for food security	9	26%

Table 4.4 shows 40% of households mine specifically to secure food, 34% balance mining with other expenses and 26% do not engage in mining for food security

During interviews, key participants highlighted their reliance on mining for survival. One of the miners mentioned that:

“...we started mining because drought made farming impossible, we need money for food.”
(Participant B)

Additionally, participant E mentioned that:

“...when food shortages strike, mining became our way to make sure we did not starve.”
(Participant E)

4.6 FINDINGS OF OBJECTIVE 3: Challenges faced by artisanal miners in contributing to household food security

This section presents findings from Objective 3 which examined major obstacles limiting artisanal miner’s ability to sustain household food security, especially amid El Nino-induced droughts. It found out **economic and operational challenges and institutional and legal constraints**

4.6.1 Economic and Operational Challenges

Table 4.5. Presents the economic and operational challenges

Table 6: Key challenges limiting mining income

Key challenges limiting mining income	Frequency	Percentage
Low mineral yields affecting earnings	14	40%
Limited mining equipment reducing productivity	12	34%
High operational costs affecting profitability	9	26%

As shown in Table 4.5 40% cited low mineral yields, 34% said lack proper mining equipment, and 26% cited struggle with high operational costs.

Miners described how these operational difficulties affect their ability to secure food during key informant interviews:

“...sometimes gold deposits become harder to find, which means less money for food and without proper tools, we cannot work efficiently, and that reduces our earnings.”
(Participant D)

4.6.3 Institutional and Legal Constraints

As illustrated in Table 4.5 many institutional and legal challenges which limit miner’s ability to secure food were cited.

Table 7: Institutional challenges affecting mining sustainability

Institutional Challenges Affecting Mining Sustainability	Frequency	Percentage
Frequent police crackdowns	16	46%

Lack of formal recognition for artisanal miners	12	34%
Land disputes limiting access to mining sites	7	20%

As shown in Table 4.6 46% of the respondents reported facing police crackdowns, 34% stated the lack of government recognition hinders access to formal mining rights and protection. 20% struggle with land disputes.

During interviews miners expressed concerns over restrictive policies. One of the miners mentioned that:

“...the ministry of mines put policies that do not even apply on use, like for me to get a land from ministry of mines I have to pay a \$1 million and we also do not have mining license, police is always after us. If we discover gold deposits in someone’s field, that farmer will complain about invading his or her land.” (Participant A)

Miners also mentioned that:

“...we are always being chased away by authorities, yet mining is our only way to earn money now days.” (Participant C)

4.7 Findings of Objective 4: Ways these challenges can be mitigated to enhance household security amid El Nino induced droughts

This section presents findings on objective 4 which sought solutions to improve artisanal miner’s ability to sustain food security despite climate-induced agricultural losses. Table 4.7. Shows the proposed solutions

4.7.1 Addressing Economic and Operational Constraints

Proposed solutions to economic and operations challenges are presented in table 4.7

Table 8: Proposed Solutions for Economic and Operational Challenges

Proposed Solutions to Economic and Operational Challenges	Number of Participants	Percentage (%)
Access to improved mining equipment	14	40%
Training programs to enhance efficiency	12	34%
Financial support to stabilize mining income	9	26%

Table 4.7 shows that the majority (40%) highlight the need for better mining equipment. 34% suggested training programs. 26% favor financial support.

During interviews, miners described how these interventions could help sustain their livelihoods. One of the participants mentioned that:

“...if we had proper tools, we could work faster and earn more to buy food.” (Participant C)

One of the miners also mentioned that:

“...training would help us to mine safely and productively, increasing our ability to secure food.” (Participant A)

4.7.2 Overcoming Institutional and Legal Barriers

Table 4.8 illustrate ways that can be used to overcome institutional and legal barriers.

Table 9: Policy and institutional reforms to support miners

Policy and institutional reforms to support miners	Number of Participants	Percentage (%)
Formal recognition of artisanal miners	16	46%

Government intervention to regulate mining	12	34%
Secure land access for artisanal mining	7	20%

Table 4.8 shows that most respondents (46%) advocate for formal recognition of artisanal miners, 34% favor government regulation, and 20% stress the need for secure land access.

During interviews with key informant they point out the necessity of policy reforms. One of the participants mentioned that:

“...legal recognition would allow us to mine without fear and secure food income.”
(Participant D)

One of the participants mentioned that:

“...the government must intervene to regulate mining and ensure fair prices for gold.”
(Participant A)

4.7.3 Integrating Mining Policy with Food Security Programs

This theme present findings on proposed policy support that support collaborating mining policies with food provision initiatives.

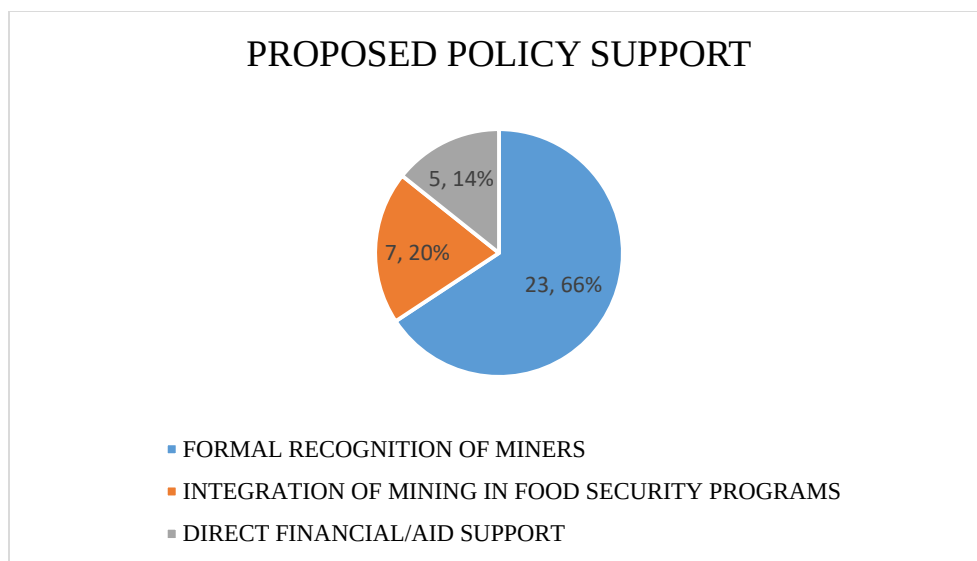


Figure 4: Ratings on Proposed Policy Support

From Figure 4.6 above the above, the majority (66%) advocated for formal recognition of artisanal miners, ensuring legal protection. 20% suggested integrating mining activities into food security programs, creating structured support systems for mining-dependent families.

During interviews, miners mentioned the role of policy changes. One of the respondents mentioned that:

“...we want the government to acknowledge artisanal mining as a legitimate sector, we can operate more freely and securely. On the issue of providing miners with food security programs can actually help to sustain families without relying more on unstable incomes.” (Participant E)

4.8 SUMMARY

Chapter 4 presented findings on the role of artisanal mining on food insecurity caused by El Nino-induced droughts in Makaha Ward 14. The chapter was structured into four sections corresponding to research objectives. The chapter presented findings on identified food insecurity situations caused by drought, it also presented findings on the contributions of artisanal mining to food security. Challenges miners face were also presented and proposed strategies to mitigate mining challenges were also presented. This concludes Chapter 4’s findings, setting the foundation for discussions and recommendations in subsequent chapters.

CHAPTER 5: DISCUSSION, IMPLICATION AND LIMITATIONS.

5.1 Introduction

This chapter serves as the core of the research, moving beyond the presentation of raw data to synthesize and critically examine the findings concerning the role of artisanal and small-scale mining (ASM) in sustainable household food security during the acute stress of an El Nino-induced drought in Makaha Ward 14, Mudzi District, Zimbabwe. It revisits the study's foundational aim to determine the viability of ASM as a buffer against climate-induced food insecurity and assesses the extent to which the collected evidence provides answers. The chapter delves into the complex meanings embedded within the quantitative statistics and qualitative narratives, exploring their

interconnectedness and contradictions. Furthermore, it explicitly addresses the study's theoretical underpinnings, evaluates its contribution to existing knowledge, confronts its methodological and conceptual boundaries and translates the findings into actionable implications for policy makers, development practitioners and affected communities themselves. The ultimate objective is to provide a comprehensive understanding of the complex dynamics at play, acknowledging both the lifeline ASM provides and the significant constraints hindering its potential.

5.2 Re-evaluation of the central question and study objectives

The central research question “can artisanal mining enhance food security amid El Nino induced droughts in Makaha ward 14?” demands a complex answer grounded in the empirical findings. The study unequivocally demonstrates that ASM does enhance household food security in the immediate term during severe droughts. The quantitative data revealing 63 % reliance on mining as a primary income source for food purchases, coupled with qualitative accounts of miners using earnings to buy maize and other staples when their own fields, provides robust evidence for this function. Mining income hunger (reported by 43% despite mining)

However, the term “enhance” requires critical qualification. The findings related to objective 3 and 4 reveals that ASM's contribution is fundamentally unstable and limited. Enhancement is not synonymous with sustainability or adequacy. While mining provided access to food, it did so amidst significant volatility (low mineral yields reported by 40%), pervasive insecurity (police harassment affecting 46%) and operational hurdles (equipment lack cited by 34%). The “enhancement” is thus relative to the catastrophic alternative, nutritious food security. ASM prevents starvation for many, but it does not necessarily ensure dietary or long-term nutritional wellbeing.

Therefore, the central question is best answered affirmatively but with critical conditions: Yes. ASM significantly enhances household food security during acute El Nino drought providing essential cash income for food purchases, acting as a vital coping mechanism when agriculture collapses, and external threats, limiting its scope, sustainability and potential to foster genuine resilience.

The research aims to assess the contribution of artisanal mining to household food security amid El Nino induced drought in Makaha Ward 14, Mudzi District. In line with the research question

the specific objectives were to identify food insecurity situation caused by El Nino-induced droughts in Makaha Ward 14, Mudzi District, to evaluate the contribution of artisanal miners to enhance household food security, to examine the challenges faced by artisanal miners in their efforts to contribute to household food security and to propose strategies for mitigating the challenges faced by artisanal miners to enhance household food security amid El Nino-induced droughts. These objectives aim to provide a comprehensive understanding of the interplay between artisanal mining and food security in the context of environmental stressors.

5.3 Significance of the study

As pointed out in chapter one the results of this study will be of interest to various sectors. The significance of this study extends beyond the specific context of Makaha Ward 14, offering insights relevant to multiple stakeholders grappling with the intersecting challenges of climate vulnerability, food insecurity and informal economies across the global South.

For policy makers (National and Local), this study provide compelling evidence that criminalizing or ignoring ASM during climate crisis is counterproductive to food security goals. The findings demand a paradigm shift towards formalization and integration. Evidence of widespread harassment highlights the urgent need for legal framework that recognize miners' rights and roles. Data showing mining as the primary route underscores the necessity of integrating ASM communities into national food security and social protection strategies, such as including them as beneficiaries in drought-response cash transfer programs. The call for policy integration (mining, agriculture and climate adaptation) is not theoretical but a practical imperative reviewed by community struggles

For Development Practitioners (NGOs, Agencies), the research offers a concrete blueprint for intervention design. The identification of specific challenges, lack of equipment, market access issues and land conflicts points directly to areas where NGOs can provide targeted support such as facilitating equipment leasing schemes, promoting miners' cooperatives for better bargaining power or mediating land disputes. The expressed community needs (formal recognition, training, diversification support) provide a clear agenda for resilience-building programs. Crucially, the study shows that supporting ASM in this context, is a food security intervention.

Furthermore, for local communities, beyond validating their lived experience, the study empowers community by documenting their coping strategies and voicing their demands (for example, 66% supporting policy integration). It provides an evidence-based platform for advocacy, showing local leaders and community organizations the tangible link between mining formalization, reduced harassment and improved food access stability. Understanding the constraints also helps communities prioritize their own collective action efforts.

In addition, for academic research, this work addresses a critical gap in the literature concerning the ASM food security climate change nexus, particularly in the under-researched context of Zimbabwe and similar semi-arid regions. It moves beyond simplistic narratives of ASM as either purely destructive or purely beneficial, providing a nuanced picture of its complex, content-specific role as a survival strategy. The application and critical evaluation of Malthusian theory in this specific context contribute to theoretical debates on scarcity and adaptation. It provides a methodological template (mixed-methods, purposive sampling in hard to reach areas) and a set of research questions for replication in other ASM dependent, climate-vulnerable regions.

5.4 Study Summary

The study employed a mixed-methods approach, combining quantitative surveys (n=35 households) with qualitative techniques (key informant interviews with 5 individuals and focus group discussions), yielding a total of 40 participants from a target population of 50 artisanal mining households in Makaha Ward 14. This approach, detailed in chapter 3, was chosen deliberately to capture both the breadth of experiences (quantified patterns of income, food access, challenges) and the depth of understanding (lived experiences, coping mechanisms, and contextual nuances).

The use of purposive sampling was essential and justified given the highly specific target population (households actively engaged in ASM and affected by the drought) and the challenging operational environment. It ensures access to participants possessing the rich, relevant knowledge needed to address the research objectives directly. However the achieved sample size of 40 (70% response rate) and the inherent nature of purposive sampling impose significant limitations on generalizability. The findings are deeply contextual and representative of Makaha Ward 14 during this specific drought period but caution is required in extrapolating them to other wards, districts, or non-drought periods. The sample size, while adequate for providing rich insights and identifying

clear trends within this group, limits sophisticated statistical analyses and the ability to make definitive claims about the entire population of ASM households in Mudzi, Zimbabwe.

The mixed-methods design proved synergistic. Quantitative data starkly illustrated the prevalence of mining as an income source and the severity of food insecurity. Qualitative data then explained how mining income was used for food, why challenges like police harassment were so detrimental (fear, confiscation of ore/tools, lost income) and what specific forms of support the community desired (formalization, equipment). Thematic analysis of interviews and FGDs provided the narrative flesh to the statistical bones, offering a holistic picture. Nevertheless, reliance on self-reported data for sensitive topics like income, food shortages and encounters with authorities introduces potential for recall bias (exaggerating or minimizing past experiences) and social desirability bias (portraying situations in a manner perceived as more acceptable). While triangulation between methods helped mitigate this, it remains an inherent limitation. The lack of direct environmental impact measurements also means the study captures perceptions of degradation but not quantifiable data on soil erosion or water contamination directly attributable to ASM in this locale.

CHAPTER 6: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 Comprehensive Summary of Findings and Conclusions

Objective 1: identify food insecurity situations caused by El Nino-induced drought.

The El Nino induced drought inflicted severe and widespread damage on agriculture production, the traditional bedrock of food security in Makaha ward 14. A staggering 71% of surveyed households reported a severe decline in crop yields, rendering subsistence farming virtually impossible for most. This agriculture collapse triggered a cascade of effects: a dramatic surge in staple food prices, particularly maize, which increased by 300-400% in local markets, placing purchased food far beyond the reach of many households relying solely on diminished farm output or petty trade. Consequently, 43% of households experienced periods of acute food shortages, characterized by skilled meals, reduced portion sizes and consumption of less preferred or less nutritious food. This forced a fundamental shift in food access strategies, with households being heavily dependent on market purchases (financed by whatever means available) or humanitarian food aid, where available. In conclusion the El Nino drought catastrophically undermined local food production and market stability, precipitating a severe food security crisis within the ward.

6.2 Objective 2: Assess the contribution of artisanal mining to household food security.

Amidst the agriculture devastation, artisanal mining emerged as the critical economic lifeline for a majority of surveyed households. For 63% of respondents, ASM constituted their primary source

of income specifically used to purchase food during the drought period. Mining income, derived predominantly from gold panning and small-scale excavations. Provided the essential cash flow that enabled households to access market food when their own production failed. Qualitative data reinforced this, with participants consistently describing mining as their “only hope” or “last resort” for buying maize meal during the worst months. This finding strongly supports the study’s hypothesis (H1 and H2) posting a link between ASM engaged and improved food access and dietary diversity during the climate shock. Ultimately ASM played an indispensable and direct role in mitigating acute food insecurity for mining dependent households in Makaha Ward 14 during the El Nino drought by generating vital food procurement.

6.3 Objective 3: Examine challenges faced by artisanal miners in supporting food security.

Despite its critical role, the capacity of ASM to reliably support food security was significantly hampered by complex web of challenges. *Institutional and security challenges*, nearly half 46% of respondents reported experiencing harassment, extortion, or violence from police or other authorities creating an environment of fear and unpredictability. Operations were frequently disrupted and income or ore confiscated, directly undermining food purchasing power. The pervasive informality of the sector exacerbated this vulnerability, leaving miners without legal recourse or protection. *Operational and Economical challenges* include low mineral yields, reported by 40% of miners, led to highly volatile and often insufficient incomes. A significant lack of basic tool and equipment, cited by 34%, further constrained productivity and earnings. *Resource and social challenges* included competition over limited mining sites fueled land conflicts, while environmental degradation associated with some mining practices (noted qualitatively) posed long-term risks to agricultural recovery and community health. The conclusion is that these multifaceted challenges, particularly institutional harassment and operational constraints create a context of instability that severely limits the sustainability of ASM as a food security strategy, even while it remains essential for immediate survival.

6.4 Objective 4: propose mitigation strategies to enhance food security.

The study identified strong community-endorsed pathways for overcoming the identified challenges and strengthening the food security contribution of ASM. The most prominent demand was for formalization of the sector (supported by 46%), encompassing simplified licensing procedures, clear designation of community mining zones, and the establishment of accessible,

fair dispute resolution mechanisms. This was seen as the fundamental step towards reducing harassment and providing miners with legal security. Direct operational support, requested by 40% focused on improving access to basic tools and equipment, potentially through cooperative loans or affordable hire schemes, alongside training or safer and more effective. This includes explicitly including ASM households in social safety nets like drought-triggered cash transfers and developing programs that support livelihood diversification. In conclusion, mitigating the constraints requires a multi-prolonged approach centered on formalization to provide security, operational support to boost and stabilize incomes and policy integration to provide security, operational support to boost and stabilize incomes and policy integration to harness ASM's potential within broader resilience strategies.

6.5 Relevance and Evaluation of the Theoretical Framework (Malthusian Theory)

The study explicitly adopted the Malthusian theory, in chapter 2, as a lens to understand food security crisis triggered by drought. Malthus's core proposition, that population growth tends to outstrip the growth of resource (particularly food), leading to scarcity, famine and checks on population, finds resonance in the context of Makaha Ward 14. The El Nino drought acted as a potent "Malthusian positive check," drastically reducing the primary local resource (agricultural output) and triggering scarcity (food shortages, price spikes) that threatened widespread hardship.

However, the findings also necessitate a critical evaluation and extension of Malthusian thoughts. While Malthus emphasized inevitable famine as the primary check, this study demonstrates human agency and adaptation as critical response. Faced with agricultural collapse (the Malthusian trigger), households did not passively succumb to famine. Instead, they actively diversified their livelihoods, shifting labor into artisanal mining to generate income and access food markets, a form of "preventing check" through economic adaptation. This challenges Malthus's deterministic view by highlighting the capacity of communities to innovate and mobilize alternative resources under pressure.

Therefore, the relevance of Malthusian theory is twofold: 1) it effectively frames the problem, the drought-induced resource scarcity that created acute food insecurity. 2) It provides a backdrop against which the adaptive response (ASM) can be understood as a deliberate strategy to circumvent the predicted Malthusian outcome (famine). The study demonstrates that in context of environmental shock, livelihood diversification, particularly into extractive activities like ASM,

can be a crucial adaptive mechanism that mitigates, though does not eliminate, Malthusian pressured. The theory remains relevant for diagnosing the scarcity trigger but require incorporating adaptation and institutional factors (like policies affecting ASM) to fully explain outcomes.

6.6 Contribution to knowledge

This research makes several significant contributions to academic understanding and policy discourse:

1. Empirically validating ASM as a Critical Drought Coping Mechanism - it provides the first robust, mixed methods evidence specifically within Zimbabwe, quantitatively and qualitatively demonstrating that ASM becomes a primary income source for food purchases during severe El Nino drought when agriculture fails. This moves beyond informal accounts to establish ASM as a statistically significant factor in household survival strategies in this context.
2. Nuanced Analysis of Institutional Constraints – the study moves beyond simply noting informality to empirically document the tangible, detrimental impacts of institutional harassment (police actions) on food security outcomes. It clearly links the lack of formal recognition and protection to income volatility and insecurity, providing strong evidence that formalization is not just a regulatory issue but a fundamental food security intervention.
3. Articulating a policy integration imperative – the research clearly demonstrates the disconnection between policy silos (mining, agriculture, social protection) and community reality. By showing how mining income directly substitutes for lost agricultural income during climate shocks, it provides a compelling argument for integrating ASM considerations into national food security strategies, climate adaptation plans (for example, NAPs), and social safety nets, a model applicable for similar contexts globally.
4. Contextualizing Malthusian theory – it offers a contemporary, applied case study demonstrating both the relevance of Malthusian scarcity triggered by climate events and the critical role of human agency (livelihood diversification into ASM) in mitigating its dire predictions, enriching theoretical discussions on population, resources and adaptation.

6.8 Policy Recommendations

Based on the synthesis of findings and their implications, the following concrete policy recommendations are proposed to enhance that food security contribution of ASM and build resilience in climate-vulnerable mining communities:

1. Accelerate and Simplify ASM formalization – **Action-** Develop and implement a streamlined, accessible and affordable licensing system specifically for artisanal miners at the district level. Designate clearly demarcated Community Mining Areas (CMAs) within Makaha Ward 14 and similar locations, providing secure access rights. Establish local Mining Committees with representation from miners, traditional leaders and government to manage CMAs and resolve disputes swiftly. **Rationale** – Addresses the core issues of harassment and insecurity (46% reported), provides legal recognition, reduces conflicts and creates a fundamental for regulation and support.
2. Integrate ASM Households into Food Security and Social Protection Frameworks – **Action-** Explicitly include artisanal mining households as targeted beneficiaries in Zimbabwe’s national food security strategies and social protection programs such as the Harmonized Social Cash Transfer (HSCT). Develop mechanisms for rapid scaling up of cash transfers or food-for-work programs specifically triggered by climate disasters like El Nino droughts in ASM-prone areas. **Rationale** - Recognizes ASM’s role as a primary food access strategy (63% dependence) during shocks but acknowledges its volatility, provides a direct safety net complementing mining income.
3. Enhance Operational Capacity and Market Access – **Action** – facilitate access to appropriate and affordable mining equipment through cooperative-based revolving loan funds or equipment hire schemes managed by local institutions. Provide targeted training on efficient, mercury-free mineral processing techniques and basic ore valuation to improve yields (addressing 40% reporting low yields) and income stability. Support the formation of marketing cooperatives to help miners achieve better prices and reduce exploitation by middlemen. **Rationale-** Directly tackles operational constraints (34% lack equipment, 40% low yields), improving income levels and stability and enhances the efficiency and safety of mining activities.
4. Strengthen Environmental Governance and Rehabilitation – **Action** – Enforce existing bans o mercury use strictly within the ASM sector, providing training and support for

alternative techniques. Develop and implement mandatory community-involved land rehabilitation plans for mixed-out areas within CMAs, potentially linking rehabilitation effort to access to support services or conditional elements of social protection. Integrate basic environmental management training into miner support programs. **Rationale** – Mitigates long-term environmental damage that threatens future agricultural recovery and community health, promoting sustainable resource use.

5. Promote Climate-Resilient Livelihood Diversification – **Action** – Invest in programs that support diversification beyond ASM. Promote climate agricultural practices (drought-resistant seeds, water harvesting, conservation farming) to rebuild agricultural resilience alongside mining. Support the development of viable non-mining, non-agricultural enterprises within the ward through skills training, microfinance access, and market linkage development. **Rationale** – Reduces over-reliance on the inherently volatile ASM sector, builds long-term resilience by spreading risk and supports sustainable recovery of the agricultural base.

6.7 Limitations of the study

While providing valuable insights, the study has inherent limitations that must be acknowledged:

- Sample Representativeness and Generalizability – the reliance on purposive sampling targeting 50 specific mining households and achieving a 70% response rate (n=40) limits the statistical generalizability of the findings. The sample, while rich in information, may not fully represent all artisanal miners in Makaha Ward 14, let alone in Mudzi District or other regions of Zimbabwe. Findings are highly context specific to this ward during this particular drought period.
- Temporal Snapshot – the research captured a moment of acute crisis (the El Nino drought). It does not speak to the dynamics of ASM's contribution to food security during non-drought periods, nor track how strategies evolve over multiple season or climate cycles. The long-term sustainability of ASM as a food security strategy remains an open question.
- Reliance on Self-Reported Data – key data points- income levels severity of food shortages, experiences with police, extent of crop losses, were collected through self-reporting. This introduces risks of recall bias (inaccurate memory of past events), social desirability bias

(portraying situations more favorably) and potential under-reporting of sensitive issues like illegal mining activities or harassment.

- Limited Environmental Impact Assessment - while environmental degradation was discussed qualitatively as a challenge, the study did not include direct scientific measurement of ASM's impact on soil qualitatively as a challenge, and study did not include direct scientific measurement of ASM's impact on soil quality, water contamination (for example, mercury levels), or deforestation in the specific area. The long-term environmental costs and their feedback loops on future agricultural potential and community health were not quantified.

Focus on Household level – the study primarily examined impacts at the household level. Broader community-level impacts, market dynamics (beyond price surges), or intra-household dynamics (for example, how mining income is controlled and allocated within the household) were not deeply explored

6.9 Directions for Future Research

To build upon this study and address its limitations, the following research avenues are recommended:

- I. Longitudinal Cohort Study – Track a panel of artisanal mining households in Makaha Ward 14 across multiple years, encompassing both drought and non-drought periods. This would provide invaluable data on the long-term environmental and social impacts.
- II. Gender-Disaggregated Analysis – conduct dedicated research focusing on the role, experiences, and specific challenges faced by women engaged in or affected by ASM in the context of food security. Explore intra-household dynamics of income control and food allocation related to mining earnings.
- III. Comprehensive Environmental impact Assessment – undertake detailed scientific studies to quantify the specific environmental impacts of ASM activities in Makaha Ward 14, including soil erosion, water pollution (heavy metals, turbidity), deforestation and land degradation. Assess the long-term implications for local ecosystems, water resources and agricultural potential.
- IV. ASM Value Chain Analysis – Map the local and regional gold value chains originating from Makaha Ward 14. Investigate market structures, actors, profit distribution, price

information and the extent of miner exploitation or dependence on intermediaries. Identify leverage points for improving miner incomes and market access.

- V. Comparative Regional Studies – replicate this research design in other artisanal mining hubs within Zimbabwe (for example, Penhalonga, Kwekwe) and across the region (for example Ghana, Malawi and DRC) experiencing similar climate vulnerabilities. This comparative approach would identify common patterns, context-specific variations and transferable lessons regarding ASM's role in climate adaptation and food security.
- VI. Impact Evaluation of Formalization Interventions – Rigorously assess the impacts of specific formalization initiatives (for example new licensing schemes, CMAs) and support programs (for example equipment loans, training) on miner incomes, security, environmental practices and ultimately household food security outcomes

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LIST OF APPENDIXES

APPENDIX 1: RESEARCH SUPPORT LETTER

APPENDIX 2 : APROVAL LETTER

APPENDIX 3 QUESTIONNAIRE

I am Tafadzwa D Chikwizo a fourth student at Bindura University of science education doing Bachelor of Science Honours Degree in Development Studies. It is a pre requisite for final year students to undertake research project and I am carrying out a research on **CONTRIBUTION OF ARTISINAL MINING TO HOUSEHOLD FOOD SECURITY AMID EL-NINO INDUCED DROUGHT**. I am appealing for your assistance, contributions and relevant information regarding the study. Responses will be strictly presented privately and confidential to pursue academic fulfilment.

Instructions:

- Please fill in the space provided
- Place a tick where appropriate

Questionnaire: Contribution of Artisanal Mining to Household Food Security amid El-Nino Induced Drought in Makaha Ward 14, Mudzi District

Section A: Demographic Information

1. Name (Optional): _____

2. Gender: ☐ Male ☐ Female ☐ Other

3. Age: _____

4. Occupation: _____

5. Household size: _____

Research Objective 1: To identify the food insecurity situation caused by El-Nino-induced droughts in Makaha Ward 14, Mudzi District

6. How has the El-Nino-induced drought affected your household's access to food?

☐ severe shortage ☐ Moderate shortage ☐ No significant impact

7. What are the main sources of food for your household during the drought? (Multiple answers allowed)

☐ Farming ☐ Market purchases ☐ Food aid ☐ Artisanal mining income ☐ Other (specify)

8. How frequently does your household experience food shortages due to drought?

☐ Daily ☐ Weekly ☐ Monthly ☐ Rarely

9. What coping strategies does your household use during food shortages?

☐ Reducing meal portions ☐ Selling assets ☐ Borrowing food/money ☐ Relying on mining income ☐ Other _____

10. Has the drought affected children and vulnerable groups in your household more severely?

☐ Yes ☐ No (If yes, explain how) _____

Research Objective 2: To identify the contribution of artisanal miners in enhancing household food security

11. Are you or any household member involved in artisanal mining?

☐ Yes ☐ No (If no, skip to Q16)

12. How does income from artisanal mining contribute to your household's food security?

☐ Primary source of food purchases ☐ Secondary support ☐ Minimal impact

13. What percentage of your mining income is spent on food?

☐ Less than 25% ☐ 25-50% ☐ 51-75% ☐ Over 75%

14. Compared to farming, how reliable is mining income for securing food during droughts?

☐ More reliable ☐ Less reliable ☐ About the same

15. Have you been able to diversify food sources (e.g., buy more nutritious food) due to mining income?

☐ Yes ☐ No

Research Objective 3: To examine the challenges faced by artisanal miners in contributing to household food security

16. What are the major challenges you face as an artisanal miner in sustaining food security? (Multiple answers)

☐ Low mineral prices ☐ Lack of equipment ☐ Police/legal restrictions ☐ Environmental hazards ☐ Other _____

17. How does the instability of mining income affect your ability to buy food consistently?

☐ Highly unstable ☐ Moderately unstable ☐ Stable

18. Have you faced health risks (e.g., injuries, diseases) from mining that affect your ability to work and provide food?

☐ Yes ☐ No (If yes, explain) _____

19. Do you receive any support (e.g., training, loans) to improve mining productivity for better food security?

☐ Yes ☐ No

20. How do market fluctuations (e.g., mineral prices, food costs) impact your household's food access?

☐ Major impact ☐ Minor impact ☐ No impact

Research Objective 4: To propose ways to mitigate challenges and enhance household food security amid El-Nino droughts

21. What interventions would help miners improve food security? (Multiple answers)

☐ Access to fair markets ☐ Mining safety training ☐ Government support ☐ Alternative income sources ☐ Other _____

22. Should the government integrate mining policies with food security programs?

☐ Yes ☐ No (Why?) _____

23. Would forming mining cooperatives help stabilize income and food access?

☐ Yes ☐ No

24. What role can NGOs play in supporting artisanal miners during droughts?

☐ Food aid ☐ Skills training ☐ Equipment provision ☐ Other _____

25. Any other suggestions to improve food security for mining-dependent households?

Thank you for your participation!

APPENDIX 4: INTERVIEW GUIDE FOR KEY INFORMANTS

PROJECT TITE: CONTRIBUTION OF ARTISINAL MINING TO HOUSEHOLD FOOD SECURITY AMID EL-NINO INDUCED DROUGHT.

My name is Tafadzwa Delon Chikwizo. I am a student currently studying Bachelor of Science Honours in Development studies. This interview guide has been designed to collect information from representatives in the study area. You are requested to provide the following information to the best of your knowledge. The information will be treated with strict confidentiality.

Introduction:

Greeting & Purpose:

"Thank you for participating in this interview. We are researching how artisanal mining affects household food security during droughts in Makaha Ward 14. Your insights will help us understand challenges and solutions."

Confidentiality Assurance:

"Your responses will remain anonymous and used only for research purposes."

Duration & Consent:

"This will take about 30–45 minutes. Do you consent to proceed?"

Section 1: Background Information

1. Can you briefly describe your household (size, primary occupations)?
2. Are you or any household members engaged in artisanal mining? If yes, for how long?
3. What other income sources does your household rely on?

Research Objective 1: Food Insecurity Situation During El-Nino Droughts

4. How has the recent drought affected your household's food availability?
 - Probe: Frequency of shortages, changes in meal patterns, child malnutrition.
5. What are your main sources of food during droughts? (Farming, markets, aid, mining income?)
6. How do you typically cope when food is scarce? (Reduced meals, borrowing, selling assets?)
7. Compared to past years, how severe is the current food insecurity situation?
8. Are certain groups (children, elderly) more affected? How?

Research Objective 2: Contribution of Artisanal Mining to Food Security

9. How does income from mining help your household access food?

Probe: % of income spent on food, ability to buy diverse/nutritious foods.

10. Do you rely more on mining or farming for food security during droughts? Why?

11. Has mining income allowed you to build resilience (e.g., savings, livestock) against food shortages?

12. Can you share an example of how mining income directly prevented hunger in your household?

Research Objective 3: Challenges Faced by Artisanal Miners

13. What difficulties do you face in mining that limit your ability to support food security?

- Probe: Low mineral prices, lack of equipment, safety hazards, legal restrictions.

14. How does the unpredictability of mining income affect your food purchases?

15. Have you experienced health issues from mining that reduced your productivity?

16. Do you feel government policies or market systems disadvantage artisanal miners? How?

Research Objective 4: Mitigation Strategies

17. What support (e.g., training, loans, equipment) would help miners improve food security?

18. Should mining cooperatives be formed to stabilize incomes? Why/why not?

19. How can the government or NGOs better assist mining-dependent households during droughts?

20. What other solutions would you propose to strengthen food security in Makaha Ward 14?

Closing:

- "Thank you for your time! Your input is invaluable. Are there any other issues you'd like to share?"
- Next Steps: Explain how findings will be used (e.g., policy recommendations, community programs).

APPENDIX 5: PLAGIARISM REPORT

The page area is currently blank, intended for the Plagiarism Report content.

