



**BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF SCIENCE EDUCATION
DEPARTMENT OF CURRICULUM AND EDUCATION MANAGEMENT STUDIES**

**ARTISANAL MINNING PRACTICES AND THEIR IMPACT ON ENVIRONMENTAL
MANAGEMENT: EXPERIENCES FROM CHIADZWA COMMUNITY**

BY

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**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS OF THE BACHELOR OF SCIENCE EDUCATION (HONOURS)
DEGREE IN GEOGRAPHY**

JUNE 2024

DECLARATION

I, Maguya Susan, hereby declared that, except for references to other people's work which have been duly acknowledged, this project is a result of my research and has neither in part nor in whole been presented in the education programme

Signed:



Date: 24.05.24

(student)

This research work was undertaken under the supervision of Dr. P. Chikuvadze.

Signed:



Date: 25.05.24

(Supervisor)

Chairperson: Dr. Mudavanhu

Signed:



Date: 08.10.24

DEDICATION

This research is dedicated to all my family members and my children (Zoey, Luckson and Tawananyasha) who gave me the courage and moral support throughout this research project.

ACKNOWLEDGEMENTS

Firstly, I acknowledge my sincere gratitude to the Almighty God for guiding me, providing for and protecting me throughout the entire process of my academic upgrading.

Secondly, I would like to express my sincere gratitude to Dr. Chikuvadze (Project supervisor) for his unwavering and tireless efforts in bringing the best out of me throughout this study. He guided me with his sterling support and motivation with patience to remain focused until the document was completed. Without his guidance, it would have been difficult for me to accomplish the task alone. I also acknowledge the Maguya family for their moral and spiritual support especially my brother Caleb, Gogo Chidziva and Matinya family.

A special thank you to all the respondents who were very cooperative in the data gathering. Without them, I would not be able to accomplish this goal alone.

ABSTRACT

This study sought to gain insight into the artisanal mining practices and their impact on environmental management in Chiadzwa Community. The study was grounded on the pragmatist paradigm and mixed method approach. This design enabled the study to inherently exploit the use of both qualitative and quantitative analysis procedure. The sample comprised 82 participants who were selected using stratified random sampling approach and 5 village heads purposively selected. The data were collected through semi-structured questionnaire and key informant interviews. Numerical data were analysed through the use of frequencies and percentages, with non-numerical data analysed according to emerging themes. From the analyzed and interpreted data, it was noted that the selected respondents had a diverse understanding of artisanal mining as a concept. Thus, some conceptualized it as an activity that is legal, with others highlighting it as an illegal activity. In artisanal mining various mining practices were engaged in extracting minerals. In these activities various challenges were encountered to the detriment of the environment. It is in this context that this study concluded that the artisanal mining practices being used in the selected community have to a larger extent a negative impact on the environment. From the conclusion, the researcher recommends that artisanal miners be educated on the most effective practices that can be used to extract minerals with minimum damage to the environment.

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CHAPTER 1: PROBLEM AND ITS SETTING

1.1 Introduction

This chapter provides an overview of the issue under investigation through the provision of the background to the study, statement of the research problem, and research objectives. In addition, assumptions of the study, significance of the study, delimitation of the study, limitations of the study, definition of key terms, chapters layout and chapter summary.

1.2 Background to the study

The history of artisanal mining in Zimbabwe dates back to the period well before colonisation in the late 1890s (Maponga & Ngorima 2003; Mberengwa, 2010). As in other African countries, mining can be considered as the basis for the wealth and power and this fueled growth of artisanal on the continent (Mawowa, 2013). These mining activities in most countries ranges from small, medium to large scale. These mining projects require huge capital investments which unfortunately many local investors cannot afford, most local miners fall within the small to medium scale category (Malinga 2018; Mkodzongi 2020). In other words, though artisanal mining is an important sector in the mineral production system in Zimbabwe, they often fall below the threshold levels of the larger operators.

Despite the immense growth of artisanal mining over the years, especially since independence in 1980, the sector has essentially remained subsistence and a significant complimentary activity to communal and small-scale resettlement agriculture (Murwendo et al., 2011). In Zimbabwe artisanal mining has been reported to have its negative side effect especially as it relates to sustainable environmental management, which is part of the integrated global efforts for environmentally friendly production processes (Ajusa, 2003). In the recent times, various environmental challenges have been perceived to be major threats in the Chiadzwa Community (Sibanda, 2016). While the subject of environmental management and its integration with development has become high on the community agenda, there have been growing human-induced environmental changes altering the ability of the natural environment to provide services (Mayher, 2016).

While mining legislation in Zimbabwe advocates due attention to be paid on environmental issues in the exploitation of minerals starting from project inception to development stages it seems there are some yawning gaps in official efforts to save the environment and local communities from the negative effects (Mabhena, 2012; Mkodzongi & Spiegel, 2019). Existing environmental management and development studies (Bendi Information Services, 2014), emphasize listing problems, making warnings and voicing advocacy; this study, however, offers a different perspective. It is against this background that this study sought to gain an insight to impact of artisanal mining practices on environmental management in Chiadzwa Community.

1.3 Statement of the problem

In Zimbabwe, mining developments and activities are highly characterized by profit motives (Malinga, 2008; Mkodzongi, 2020). This has resulted in conflicts and competition between various stakeholders (large scale, medium scale, small scale and the community (Malinga, 2018; Mkodzongi, 2020). Hence, the crafting of various policy frameworks (i.e., Mines and Minerals Act (Chapter 21:05); Environmental Management Act (2002), the Atmospheric Pollution Prevention Act (1971); Hazardous Substances and Articles Act (1977); etc. to regulate the mining activities. These mining activities are characterized by range from the small scale to large scale. Despite the existence of policy frameworks, there has been rampant uncontrolled artisanal mining activities in the Chiadzwa Community. However, there is dearth in research studies on the impact of artisanal mining practices on the environmental management in the targeted area. It is in this regard that this study sought to contribute towards the closure of the identified gap guided by the following main research objective: To establish the impact of artisanal mining practices on the environmental management.

1.4 Research objectives

From the above main research objective, the following sub-objectives were derived:

- 1 To establish the targeted community' conceptualization of artisanal mining.
- 2 To identify the mining practices used in the artisanal mining activities in the targeted community.

- 3 To establish how these practices are implemented in artisanal mining practices in the targeted community.
- 4 To identify challenges encountered when these practices are implemented in artisanal mining activities in the targeted community.

1.5 Research questions

The following sub-research questions guided this study:

1. What is the community's conceptualization of artisanal mining?
- 2 What mining practices used in the artisanal mining activities in the targeted community?
- 3 How are these practices are implemented in artisanal mining practices in the targeted community?
- 4 What challenges encountered when these practices are implemented in artisanal mining activities in the targeted community?

1.6 Assumptions of the study

This study was grounded in the following assumptions:

- 1 The targeted respondents acknowledge the importance of this study hence are expected to contribute through giving authentic information.
- 2 The local leadership (District Development Co-ordinator's Office, traditional leadership, etc.) acknowledges the relevance of the issue under investigation such that they are expected to assist the researcher in processing the much-needed paperwork in order to access the targeted respondents.

1.7 Significance of the study

The study is significant to the following stakeholders:

1.6.1 Policy makers

The results from this study can be a resource material (empirical evidence) when it comes to policy formulation. Thus, the results can be used as the basis for policy shift or reform.

1.6.2 Chiadzwa Community

The results from this study will avail to the community the activities being undertaken in their community and the possible dangers to environmental management.

1.6.3 Artisanal miners

The results will let them know the current artisanal mining practices and their dangers to environmental management. It is from this that they can be conscientized on the best practices to avert damage to the environment.

1.6.4 Researcher

This will give the researcher the opportunity to put into practice the theory acquired through the research methods module. In addition, this project is a requirement for the completion of the researcher's studies.

1.8 Delimitation of the study

Manicaland province has 5 administrative districts namely: Buhera, Mutare Urban, Mutasa, Nyanga, Chipinge, Chimanimani and Mutare Rural. This study was done in Mutare Rural district which is involved in various activities (i.e., agricultural, mining, etc.). In terms of mining activities, they range from small scale to large scale. The focus of this study was to gain an insight into the impact of artisanal (small scale) mining practices on environmental management in the Chiadzwa Community.

1.9 Limitations of the study

The targeted area is restricted or is considered as a highly protected area. Hence gaining access to the respondents can be a hustle. The researcher sought assistance from the relevant offices such as the District Development Coordinator's Office, Ministry of Mines Office and local leadership. The research was affected by the policy guidelines that controlled on the interactions and conduct of people due to the cholera outbreak still hovering in Chiadzwa community. Thus, this affected interactions between the researcher and the targeted respondents, since the responsible authority discouraged too much interactions with respondents to carry out data collection. The researcher assured the responsible authorities that safe methods (questionnaire administration and interviews of at least 10 village heads) were going to be used. It was against this background that permission to carry out the study was granted.

1.10 Definition of key terms

In this section the following terms are defined contextually:

1.10.1 Artisanal mining practices

It is viewed as an informal and unregulated system of small-scale mining which is mostly illegal (Prasetyo et al., 2010.). Artisanal mining practices are mainly a poverty driven activity, mostly done in the most remote rural areas of most developing countries by a largely poorly educated populace with little employment alternatives (Aryee, et al., 2003). Artisanal mining practices can have negative impacts on the artisanal miners, their families and the environment.

1.10.2 Environmental management

According to Barrow (2005) Environmental management is defined as keeping control of the community's activities so that communities safeguard their surroundings, natural resources and avoid environmental degradation. The main focus of environmental management deals with the activities of people and organizations in line with environmental standards, criteria, principles and legal framework (Strydom & King, 2009).

1.10.3 Impact

It refers to the effect that artisanal mining has on the environment, the economy and the community. Artisanal mining can have both positive and negative impacts.

1.11 Chapters layout

The structure of this research pursues the following outline: Chapter one as presented above involves the contextualization of the problem under investigation, research objectives, the delimitation of the study, limitations of the study, definition of terms, chapters layout and chapter summary. The second chapter covers the literature review and presents available literature that is related to the topic of study. Chapter three presents the methodology and the methods used in the collection of empirical data. In Chapter four, the empirical findings from the research on the field are presented and analyzed in the light of the conceptual framework that is outlined in the literature review. In Chapter five, conclusions are drawn and recommendations are made.

1.12 Chapter summary

In this chapter, the problem under investigation was put into context through the interrogation of the background to the study, statement of the problem, and research objectives. In addition, assumptions of the study, significance of the study, delimitation of the study, limitations of the study, definition of key terms, chapters layout and chapter summary were articulated.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 Introduction

The previous chapter was centered on the problem and putting it into context; thus, this chapter will be focusing on identifying the gaps to be filled by the study. The chapter will be guided by the following; theoretic framework, conceptualization of artisanal mining; identifying the mining practices used in artisanal mining activities; establish how these practices are implemented in artisanal mining activities and the chapter summary.

2.2 Theoretical framework

This section focuses on theories that contribute to the perspective through which the issue under discussion will be interrogated. The following theories will be discussed: Marxist and Resource Curse theories. Thus, these theories contribute toward the formation of a lens through which the issue under discussion was observed.

2.2.1 Marxist theory

Marxist perspective on environmental degradation Mining also goes along with the Marxist perspective on environmental and social degradation (Jahan, 2008) which views the capitalistic economic system as the major cause of environmental and social degradation. Jahan (2008) points to the capitalistic mode of resource extraction as the chief culprits. By their very nature, industrial activities (of which mining is part) which are promoted in the developing world are not environmentally friendly and not conducive to sustainable development. Transnational Companies and Government Institutions which operate most of these mines turn a blind when it comes to welfare of the environment and the surrounding people on host communities and nations (Boer, 2023). All they are concerned about is reaping maximum profits out of their operations. Without strict regulations and constant monitoring from the government or any responsible authorities, these companies cause extensive environmental degradation and at the same time negatively affecting the socio-economic way of life of the surrounding communities and host nations (Manyunga, 2012).

2.2.2 Resource curse theory

The subject of mining in Africa and the rest of the developing world has ushered in the notion of the ‘Resource curse theory’ which postulates that the existence of mineral resources in many third world countries turned out more to be curses rather than blessings (Gómez-Barris, 2017). It suggests that nations which have rich, yet finite, natural resources may fail to develop in other sectors, ultimately bringing about financial problems (Bebbington et al., 2008). According to Hawkins (2009) export-driven natural resource sectors such as oil, gas, minerals, precious metals and gemstones generate substantial revenues both for the state and foreign owned multinational businesses. Yet these do not translate into broad-based economic development benefiting all sectors of the population especially the poor (Zheng et al., 2023). This is because powerful actors such as politicians, foreign-owned capitalistic companies and other actors siphon away their wealth leaving the developing countries with a medley of socio-economic and environmental challenges which sometimes lead to social unrest, conflicts, health problems, climate change and many more (Alssadek & Benhin, 2023). Also, transnational companies and government run Companies also have their fair contribution as most of them turn a blind eye to the development of the host communities (Badeeb et al., 2023). All they are worried about is maximum extraction of minerals to achieve as much profits as possible at the expense of the socio-economic and environmental management of the host communities. The fact that in as much as a country might have an abundant natural resource base, competition over access and use of natural resources can trigger conflicts, local socio-economic development and environmental management challenges (Ozcan et al., 2023).

2.3 Conceptualization of artisanal mining practices

In Sub-Saharan Africa, mining forms the major economic activity, especially in rural areas (Aryee et al., 2003; Hinton et al., 2003; Owusu-Nimo et al., 2018). Artisanal mining targets precious minerals like gold, diamonds and any other minerals which are high in demand and in most cases over a small scale (Hinton et al., 2003; Gandiwa & Gandiwa 2012; Wilson et al., 2015). Artisanal mining dates back to 2009 where illegal artisanal miners used simple hand-held tools like panning dishes, shovels, picks and hoes. Around the year 2014, the miners started using advanced equipment such as metal detectors, industrial mining compressors, crushers and the mining was intense within the protected area (Takyiet al., 2021). Thus, artisanal mining

involves individuals or small enterprises involved in mining, using rudimentary machines, with low production and in some cases moving from one site to the other depending on the mineral availability (Owusu-Nimo et al., 2018). In other words, artisanal mining shapes significantly the socio-economic lives of people and communities involved directly or indirectly (Laing & Pinto, 2023). Artisanal mining in most cases is not regulated, it is informal and, in some cases, it is done illegally (Dethier et al., 2019). In Zimbabwe, artisanal mining is mostly driven by poverty and high unemployment challenges (Matsa, 2011). Mining involves the use of very simple technologies, limited use of experts in planning, in some cases, it is seasonal and temporal (Sauerwein, 2023). Illegal mining is most pronounced in poor remote areas, major rivers and abandoned mine shafts in some towns (Achina-Obeng & Aram, 2022).

2.4 Mining practices and their use in artisanal activities

Surface mining, the commonly used method of mining, is defined as a broad category of mining in which the soils and rocks overlying the mineral deposit are removed (Nti et al., 2023). It includes strip mining, open pit or open cast mining, quarrying, alluvial mining and mountaintop removal among others (Ngom et al., 2023). According to Montrie (2003) surface mining which began in the mid-sixteenth century and is now being practiced across the world entails the use of heavy and sophisticated equipment. For example, bull dozers and earthmovers first of all remove the vegetation and overburden to expose the mineral. Thereafter huge machines which include dragline excavators, or the bucket wheel excavator are used to extract the mineral. In Zimbabwe open cast mining is the widely used method of mining where the mineral belt is close to the surface (Rushemuka & Côte, 2024).

Mathe and Phiri (2016), states that open cast mining in Zimbabwe impacted the topography of the earth, the plants and water which contributed to the loss of biodiversity around mines. Surface mining involves extensive deforestation and environmental damage which normally results in the creation of open pits which would in future act as water holding reservoirs, sometimes harboring disease-causing parasites such as mosquitoes (Bansah et al, 2023). Artisanal miners often operate under hazardous, labor-intensive and highly disorganized conditions and have few concerns for the environment (Manuel, 2011). The mining activities are mainly poverty driven and the majority of the miners are rural people, lacking sufficient knowledge in mining techniques and safety measures (Pereira, 2009).

The depletion of water resources, increased levels of siltation, turbidity and heavy metal content and the disturbance of aquatic life and its habitats (Goliath & Campbell, 2024). This type of mining, which is very harsh to the environment and ‘unsustainable’, is also well-known for destruction of the natural landscape and mountains (where quarrying is done) then replacing it with artificial hills and heaps of the soil cleared from the residual material (Manyunga, 2012). It also promotes soil erosion and siltation of water bodies where alluvial mining is carried out as well as air, water, land and noise pollution to surrounding communities (Bester & Uys, 2023). The unregulated nature of ASM often leads to outdated and environmentally damaging mining methods (Essalhi & Toummite, 2016).

The detrimental effects of industrial mining on the environment and public health have garnered more attention, highlighting the potential health risks of exposure to high concentrations of certain heavy metals, which can lead to conditions like liver damage, anemia, and cognitive impairments (Fashola et al., 2016). Artisanal mining activities release significant amounts of pollutants into the environment, some of which occur naturally, while others result from human activities, with potential harm to ecosystems and human health (Akabzaa & Darimani, 2001). Generally, illegal artisanal mining within protected areas poses direct and indirect ecological threats (Tranquilli et al., 2014). Most of the activities’ impacts are very unsustainable to the environment due to the unavailability of evaluated mining plans and land reclamation strategies (Achina-Obeng & Aram, 2022; Amankwah & Amin-Sackey, 2003).

2.5 Challenges encountered when using these practices in artisanal mining

In this section challenges encountered when using the above-mentioned artisanal mining practices are discussed as follows:

2.5.1 Deforestation

Trees are an important component of the environment, and their uncontrolled cutting negatively affects the environment (Ladewig et al., 2023). Since mining is one of the principal causes of deforestation, there is need for introduction of mining methods that save the vegetation and lower the effects associated with deforestation (Giljum et al., 2022). Artisanal mining practices promote deforestation especially through open cast mining which involves the removal of

vegetation and the topsoil. Dreschler (2001) notes that when the miners discover a lucrative area, they resort to clearing the vegetation cover first to pave way for extraction of the resource.

In support of the same view, Phiri (2011) also argued that small scale and informal miners, resort to extensive vegetation clearance for the purposes of firewood, settlement and extraction. Rapid loss of vegetation is very serious issue in the face of increasing environmental problems such as climate change (Yu et al., 2024). Vegetation is a crucial component of the hydrological cycle and its absence means that the whole process is disturbed and in turn implicating on the amount of rainfall to be received (Castro & Peterka, 2023). Mensah et al (2015) who found that mining operations by illegal small scale carried out in the open air without appropriate safeguards and environmental standards released contaminated water into the surrounding environment, thereby polluting nearby rivers, soils and vegetation

2.5.2 Land degradation

Closely related to deforestation is environmental or land degradation. This term is used to refer to the deterioration of the natural environment as a result of the depletion of resources such as clean air, water, fertile soil and wildlife habitats (Odumo et al., 2018). According to Meutia et al (2023) land degradation is a composite term defined as sustained loss in the quality and the productive capacity of the land. Where land degradation occurs, the environment deteriorates in quality and becomes less valuable and less productive (Manyunga, 2012). Land degradation is a barrier to economic growth and physical and social survival and can lead to serious food insecurity in many countries (Miththapala, 2008). Common observable evidence of environmental degradation includes soil erosion, siltation of water bodies, reduction of vegetation cover and changes in vegetation composition.

2.5.3 Soil erosion

Soils are among the most crucial natural resources which help ensure sustainable agricultural production in any nation (Bekele & Gemi, 2021; Kamuju, 2016). Rapid soil erosion is also a serious problem all over the world. A serious effect of vegetation loss in mined and surrounding areas is soil erosion. Increased surface runoff washes away some topsoil with it, which is then deposited into rivers and dams in a process known as siltation. Pertaining siltation, Shoko (2002) asserts that it 'reduces river conveyance and the storage capacity of reservoirs, which in turn

makes areas downstream prone to flooding. Pereira (2009) also made the remark that siltation in Zimbabwe, Mozambique and Tanzania has been increasing at the rate of more than 5% per annum and argued that this is a direct result of environmental destruction committed by mining among other related economic activities.

2.5.4 Pollution

Environmental degradation also leads to destruction of natural habitats through contamination or pollution and misuse or over-use of natural resources (Casso-Hartmann et al., 2022). It results in the negative effect of prejudicing the populace of critical necessities such as water, food, quality air and other resources needed for the perpetuation of life. One of the most common effects of mining is pollution. Jande (2005) defined pollution as to make something dirty or no longer pure, especially by adding harmful or unpleasant substances to it. Pollution can be classified as land, water, air pollution and disturbance of peace and quiet in communities through noisy mining blasts and heavy machinery. It is important to note that artisanal mining activities are usually associated with pollution agents above. Dreschler (2001) noted that dust and fumes generated by blasting during mining are dispersed into the atmosphere and thus making the air not only unsafe for breathing but aiding in the depletion of the ozone layer. While dust and fumes cause respiratory diseases to human being, they are also ingredients of global warming which significantly causes climate change (Shahzad, 2015).

2.5.5 Open pits

Despite artisanal mining's positive contribution to poverty alleviation and rural development, it is often associated with a range of environmental problems, including surface water pollution, land degradation, and some socioeconomic conditions that may significantly impact human health (Hilson et al., 2010; Miguel, 2016). The mine pits which are often left uncovered by mining companies are a threat not only to livestock and wildlife but to human life as well. They hold water and may result in children or even elders drowning since some of the pits are very deep. In some cases, water is contaminated and therefore exposing people to a health risk. Stagnant water supports the breeding of mosquitoes which in turn spread malaria. Mwakesi et al (2021) revealed that open pits below groundwater level, horizontal tunnels and shafts resulted in deforestation and immense damage on soil, vegetation and grassland thereby altering the

topography in the mined areas. Mensah et al (2015) postulated that mining operations by illegal small scale carried out in the open air without appropriate safeguards and environmental standards released contaminated water into the surrounding environment, thereby polluting nearby rivers, soils and vegetation.

2.6 Chapter summary

Chapter two underlined the theoretical base on which the study took reference. The chapter also looked at the conceptualization of artisanal mining practices, mining practices and their use in artisanal activities and challenges encountered when using these practices in artisanal mining. The following chapter looks at the research methodology used to provide answers to the formulated research questions.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The previous chapter was based on the theoretical framework out of which the gaps to be filled were observed. This chapter focuses on research design, research paradigm and research approach, sample and sampling procedure, instruments, document analysis, research integrity and chapter summary.

3.2 Research paradigm

A research paradigm is the set of common beliefs shared between researchers about how the issue under investigation should be understood and addressed (Rehman & Alharthi, 2016). Thus, it provides a philosophical guide to the interrogation of the issue under investigation (Kaushik & Walsh, 2019). This concurs with Park et al (2020), who says that a research paradigm is a method, pattern or model for conducting research. It is a set of ideas, beliefs or understandings within which theories and practices can function. This research followed the pragmatist paradigm which advocates that knowledge should be based on observable and measurable facts (Creswell, 2012) supports that, only factual knowledge gained through observation, including measurement is valid and reliable. This paradigm enabled the researcher to use its argument to interrogate the issue under investigation with the view to provide answers to objectives outlined in chapter 1. Thus, it gave the researcher the opportunity to generate explanatory associations that ultimately lead to interpretation of the phenomena in question.

3.3 Research approach

According to Creswell (2014) a research approach can be defined as a plan and procedure that encompasses the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation. In this study data collection, presentation, analysis and interpretation was quantitative in nature. It is in this context that this study placed emphasis on numbers and figures in the collection and analysis of data (Eyisi, 2016). Thus, in this study there was ‘researcher detachment,’ which gave strength to the data collection, analysis and interpretation phases. Imperatively, the mixed method approach in this case was considered to scientific in nature and

called for the use of statistical and non-numerical data. So, this study was grounded in deep descriptions and analysis to reduce the time and effort which the researcher would have invested in describing results (Tabron & Thomas, 2023). The collected data was presented in calculated numbers, percentages and measurable figures; as well as the nonnumerical data. The issue of researcher being bias with either his data collection or data analysis was eliminated when the researcher limited the direct contact with the respondents, through the use either telephone or distributed questionnaire (Farghaly, 2018).

3.2.3 Sample and sampling procedures

A sample is a subset of a population that is studied to gain information about the entire population (Mutshiyami, 2002). According to Kamuren et al (2017) sampling is defined as seeking of information about a population by observing a part of this population in order to extrapolate the findings to the entire population. In this study the researcher employed the stratified random sampling technique with the aim to generate information that enabled the results to be generalized (Gul, 2023). Hence, the need for the sample to be representative of the targeted population (artisanal miners) in the Chiadzwa Community. In this study the targeted population was grouped according to the location of the mining activities in the Chiadzwa Community.

Table 3.1: Distribution of respondents according to location of mining activities (n=82)

Location of mining activities	Number of potential respondents	Selected respondents
A	100	20
B	150	30
C	65	13
D	95	19

In coming up with the 82 respondents for this study as shown in table 3.1 above, the researcher used the stratified random sampling technique. This is a sampling process that divides the population into non-overlapping subpopulations (strata) and then simple random sampling is carried out on each stratum (Keith et al., 2023). Thus, the potential respondents were divided into

subgroups or strata (A - D) based on their location of mining activities. Thereafter, selection a random sampling was done in each stratum (location of mining activities) (Makwana et al., 2023). This technique was used as aa way of ensuring that the sample was representative of the targeted population (Mayasari & Usmeldi, 2023). As a way of ensuring anonymity the researcher opted to use pseudonyms (A - D) to identify the location of mining activities. For the purpose of data triangulation 10 village heads were purposively selected to be part of the sample.

3.3 Research instruments

Research instruments are the tools used by the researcher to collect data, relevant to the objectives and research questions of the study (Falk et al., 2023). In collecting data from the target population, the following instruments will be used:

3.3.1 Document analysis

Document analysis is a form of qualitative research in which documents are interpreted by the researcher to give voice and meaning to an assessment topic (Karemba, 2014). This document analysis involves coding content generated from various documentary evidence (Wilson, 2015) such as policy documents, books, journals or previous studies on the research topic in order to gain insight into the topic. These documents provided the researcher with the platform to understand the context and history of the research topic, identifying trends or compare different perspectives (Sankofa, 2023).

3.3.2 Interview

An interview is a conversation between two or more people where questions are asked by the interviewer to draw out facts or statements from the interviewees as stated (Dudoviskiy, 2017). A structured standardized interview is structured where specific questions are asked in a set order and in a set manner to ensure no variation between interviews (Cleave, 2023). Interviews schedules consisting of self-developed questions were adopted to generate relevant research data from face-to-face encounters with respondents (Berg, 2006). This instrument was ideal for the study as it allowed for the clarification of questions, probing and use of non-verbal cues for in depth data generation (Marshall, 2014). In triangulating the data collected through the questionnaire, interviews were conducted with 10 village heads are the custodians of the

environment and cultural issues. Interviews are included in this research because they allowed the researcher to gather first-hand information on the village heads views on the concept under study. The interviews were comprised of the following themes around uncovering the impact of artisanal mining practices in the concerned community. In these interviews open-ended questions around the highlighted themes were preferred as they allowed the researcher to gain a deeper understanding of the phenomenon of the study (Denzin & Lincoln, 2011).

3.3.2 Semi-structured questionnaire

Semi-structured questionnaire as a data collection instrument in which the researcher asked respondents a series of predetermined but closed-ended questions (Berg, 2006). The semi-structured questionnaire includes some predefined closed ended questions because they generate data that is easy to analyze and spot trends. Also, close ended questions tend to be more objective and less biased, and they provide specific response options (Cleave 2023). The semi-structured questionnaire was crafted as follows: Section A centered on the demographic characteristics of the respondents, Section B conceptualization of artisanal mining, Section C mining practices and their use in artisanal mining activities and Section D looked at the challenges of artisanal mining practices. In this study questionnaires were distributed to the selected 82 respondents and they completed the questionnaires. According to Cleave (2023), the researcher had more control over the interview topics as it allowed the researcher to administer some of their own questions that have been not planned in advance. The study used the semi-structured questionnaire because it offered a fast, efficient, and inexpensive means of gathering huge amounts of information from sizeable sample volumes (Adey & Cornllius, 2016).

3.4 Data collection procedure

Data collection refers to gathering specific information aimed at proving facts (Orodho, 2004). It includes developing a research design, creating a sampling plan, choosing data collection methods and deciding how to store, analyze data to ensure validity and reliability of the data. Secondary data formed the first stage of data collection through review of related literature in chapter 2 of the research. Primary data was the information that the researcher obtained from the field through the interviews and administration of questionnaire on the targeted population. The researcher followed the necessary protocols to ensure smooth flow of the data collection process.

The protocols includes: liaising with relevant responsible authorities (Bindura University of Science Education, District Development Coordinator) to obtain data collection permits, conducted courtesy calls with local leaders informing on the study and the planning schedule. Semi structured questionnaires were used where similar questions were asked to all sampled and targeted groups. Thus, a good data collection procedure was crucial to ensure that the reliability estimate is trustworthy. Administration of the semi-structured questionnaire to the targeted respondents was done and ethical considerations were adhered to during the study.

3.5 Data analysis

Stevens (2021) defines data analysis as the process of collecting, modelling, and analyzing raw data to extract meaningful insights that support decision making. The goal of data analysis was to gain a better understanding of the data and to find patterns and trends that can be used to make decisions (Rukuni, 2014). According to Shitto (2012) a data analysis is a process of bringing order to the data, organizing what is produced into patterns categories and basic descriptive units. Statistical analysis was carried out to answer the research objectives as viewed in chapter 1. According to Creswell (2012) data collected was cleaned, validated and transformed to ensure accuracy with which data have been entered.

3.5.1 Quantitative analysis

According to Kothari (2004), quantitative data analysis is a process of presenting numerical data. Quantitative data in this study used descriptive statistics, hence the process involved cleaning of data to make sure that the data was correctly identified in order to gain knowledge about the data, lists of data were made to produce descriptive statistics (Bingham, 2023). In this study numerical data was analyzed through frequencies and percentages.

3.5.2 Qualitative analysis

Data from interviews were converted into written texts, followed by selecting, coding, simplifying units into themes, making clusters of partitions and condensation of data in order to sharpen, sort, discard and organize in such a way that final conclusions was derived (Pyo et al., 2023). Thematic analysis is a method that is used to identify, analyze and report ideas (themes) within data (Braun & Clarke, 2006). The approach is inductive in nature as it sought to derive meanings from the texts instead of imposing meanings on the gathered data (Hatch, 2023). The

qualitative approach involved interviewing the respondents to know the impact of artisanal mining activities in the community (Flick, 2014). By using a qualitative approach, the aim was to collect detailed data from a small sample of representatives to gain insight in the phenomenon (Cooper & Schindlr, 2011).

3.6 Research integrity

In this study research integrity was grounded on the trustworthiness of the study and ethical considerations that are discussed in detail below:

3.6.1 Validity and reliability

According to Mugenda and Mugenda (2003), validity involves determining the degree to which researchers' claims about knowledge correspond to the reality (or research participants' construction of reality) being studied. To ensure the validity of the instruments, the researcher sought the opinion of colleagues, other researchers and supervisors on the proposed instruments. Lomawaima and Tsianina-McCarthy (2007) state that a reliable method or instrument gives consistent results in different applications of the research investigation. Consistency, however, says nothing about being right or wrong. Reliability of the instrument concerns the degree to which a particular measuring procedure gives similar results over a number of repeated trials (Orodha, 2003). The author of this research study explored the accuracy of the investigation by employing triangulation. The researcher intended to gain insight into the impact of artisanal mining practices on environmental management.

3.6.2 Ethical issues

Matula et al (2018) defined ethical issues refers to intangible set of values, standards and institutional schemes that help to establish and control scientific activity. Ethics are systems of moral values that are concerned with the degree to which research procedures adhere to professional, legal and social obligations (Saunders & Thornhill, 2012).

3.6.2.1 Privacy

Privacy is about access, use, and collection of data, and the data subject's legal right to the data. Ethical issues related to privacy can change how a group of people thinks about data dissemination (Zankl, 2014). Thus, the researcher ensured that all information and data gathered

remains private. Nijhawa et al (2013) reiterates that informed consent is a process in which a participant is informed about the details of the study and any potential risks and benefits. It is an ethical and legal requirement for any research involving human participants.

3.6.2.2 Confidentiality

Informed consent was obtained from all participants, guaranteeing their voluntary participation and confidentiality. Anonymization procedures were implemented to protect participants' identities (Stocker, 2012). Confidentiality involves keeping participant confidences and safeguarding confidential information consistent with the law (Kushantha, 2022). Thus, the researcher ensured that the participants are familiarized with the concept of confidentiality in order not to do any harm to the participants.

3.6.2.3 Anonymity

This refers to the state of an individual's personal identity, or personally identifiable information, being publicly unknown. The researcher informed the respondents not to mention their names in the information that they provided for the purpose of this research. Thus, individuals should not be exposed to harm that is above that which they receive in day to day lives or be asked to participate in research that may result in violation of ethical standards (Leedy & Omrod, 2014). Therefore, identities of individual respondents were concealed through the use of codes.

3.6.2.4 Informed consent

Informed consent means research respondents know all the information related to the research they wish to participate in (Chinyoka, 2013). The benefits, harms and other issues about research are disclosed to the participants so that they choose whether to participate or not. In this way the respondents were informed about the study and also receive a description on the intended use of data that was collected. No one was coerced to participate in the research study. The researcher sought permission from District Development Co Ordinator to enter the restricted Chiadzwa zone and the local leadership permission carry out the research findings. Once permission was granted, personal visits were made to contact personal interviews and administer questionnaires. Respondents need to be asked to complete consent forms to confirm their willingness to take part in the research process (Lo Biondo-Wood & Harber, 2010) prior to their participation in the data collection.

3.7 Chapter summary

The previous chapter outlined the research methodology that the study is going to follow. This chapter outlined the following issues: research paradigm and research approach, sample and sampling procedures, research instruments, data collection procedure, data analysis and research integrity. The next chapter will focus on data presentation, analysis and interpretation.

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presented and discussed the data generated from questionnaire survey and interviews in line with the study aim, research objectives and statement of the problem. The data is presented and analyzed using thematic analysis under the following themes: target community conceptualization of artisanal mining, mining practices used in the artisanal mining activities, establishing how these practices are implemented in artisanal mining practices and challenges encountered when these practices are implemented in artisanal activities. A chapter summary is presented at the end

4.2 Demographic characteristics of the respondents

This section focused and presents the characteristics of the selected research respondents who were interviewed using semi-structured questionnaires and personal interviews. Such characteristics include research participants' sex, age, professional qualifications and period of stay in Chiadzwa of the selected key informants and artisanal miners.

Table 4.1: Characteristics of the selected respondents (n=82)

Attribute(s)	(n)	(%)
Sex		
Male	62	75.6
Female	20	24.4
Age range (years)		
25-29	10	12.2
30-34	28	34.1
35-40	15	18.3
41-45	15	18.3
46-50	12	14.6
51-55	2	2.4
Above 55	0	
Level of Education		
Primary	35	42.7
Secondary	30	36.6
Tertiary	17	20.7
Period staying in the area (years)		
Below 1	5	6.1
1-5	22	26.8
5- 10	20	24.4
11-15	30	36.6
Above 15	5	6.1

From the information presented in Table 4.1 it can be noted that most of artisanal mining activities is male dominated with (75.6%) being males, and the remainder being females (24.4%). Females do not actively participate in artisanal mining as it is labour intensive thereby favoring males. The selected respondents were between the age range of 25 years and above. From the data above it shows most artisanal miners with (34.1%) were drawn from the aged 30-35 years, followed by (18.1%) for ages between 35-40years and 41-45years. Artisanal miners aged 45-50 also showed (14.1%) and lastly a (2.4%) for miners age 51-55 years. The economically active group is dominant in conducting artisanal mining in Chiadzwa and a few are

elderly. In terms of level of education, most of the Artisanal miners (42.7%) attained primary education, (36.6%) secondary education and the remaining (20.7%) were tertiary education. Taking into consideration artisanal miners' level of education, it can be significant to note that most artisanal miners and key informants had reached O-Level (36.6%), and 20.7% were tertiary trained thus educated enough to conceptualize artisanal mining

In addition, the selected artisanal miners are of varying period of stay in Chiadzwa ranging from 1- 20 years which shows that there is vast knowledge of artisanal activities. Looking closely 11- 15 years period of stay in Chiadzwa had (36.6%), followed by (26.8%) for period of stay between 1-5 years, 5-10 years had 24.4% and a period of stay of 15-20 years had 6.1%. This gives an indication that the artisanal miners having above 5 years period of stay in Chiadzwa had the necessary knowledge which they could have acquired during their stay and experience as they execute their artisanal mining activities.

4.3 Respondents' conceptualization of artisanal mining

In this section, the results are presented under the theme respondents' conceptualization of artisanal mining. Table 4.2 below presents the opinions of artisanal miners who participated in the questionnaire survey.

Table 4.2: Respondents' opinion about artisanal mining as a concept (n=82)

Attribute(s)	Strongly Agree		Agree		Strongly Disagree		Disagree	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Illegal extraction of minerals	40	48.8	20	24.4	5	6.1	17	20.7
Open pits	65	79.3	17	20.7	0	0	0	0
Mining without protective clothing	75	91.5	7	8.5	0	0	0	0
Promotes rural development	0	0	22	26.8	30	36.6	30	36.6
Alleviates poverty	40	48.8	25	30.5	10	12.2	7	8.5

4.3.1 *Illegal extraction of minerals*

Table 4.3 shows that most respondents (48.8%) strongly agree that artisanal mining is illegal extraction of minerals followed by (24.4%) who agree, whilst only 6.1% disagree and 20.7% strongly disagree. Therefore, the presented statistics reveal that the majority of artisanal miners and key informants (73.2%) conceptualize artisanal mining is illegal extraction of mineral. This concurs with the following in-depth interview response from one village head in ward 30:

Chigweja (artisanal mining) has been going on since around 2006 and a lot of reactions (state security ambushes on illegal miners) have been going on leading to a lot of arrests of the gwejas and buyers (people who buy the diamond from the artisanal miners (Village Head 1)

From the above analogue it can be deduced that artisanal miners and key informants conceptualize artisanal mining is illegal extraction of minerals. This concurs with Dethiere et al (2019) who postulated that artisanal mining in most cases is not regulated, it is informal and in some cases is done illegally.

4.3.2 *Open pits*

Table 4.3 shows that most respondents (79.3.3%) strongly agree that artisanal mining results in formation of open pits in the environment of Chiadzwa community and 20.7% of the respondents agree, whilst 0% disagree and strongly disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners and key informants (100%) conceptualize that artisanal mining results in creation of open pits. This concurs with the following response from one village head in Chiadzwa:

Kumakomba (open pits) are a common phenomenon in Chiadzwa. Chikwarukwaru (open cast mining) has led to vast land degradation with the open pits causing sickness in people as the stagnant water in the open pits breeds mosquitoes which causes malaria in our people. We have lost our livestock to these makomba and they pose danger to our children too as we have cases of drowning of our children in the open pits (Village Head 2)

In addition, another village head revealed that:

The open pits are mostly found in villages, Chiadzwa, Tarindwa, Kuhudzehwe, Tonhorai, Chirasika, Rombe and Dzoma. Most common makomba areas are maChina, Silverdam, Dumber and Guard room. In these areas very big pits can be found and remain unfilled posing danger to our people. The nyamundas (land owners) only care about the money they get at the expense of the environment (Village Head 1)

From the above analogue it can be deduced that artisanal miners and key informants conceptualize artisanal mining creates open pits. This concurs with Hilson et al (2010); Miguel, (2016) who stated that artisanal mining is often associated with a range of environmental problems, including surface water pollution, land degradation, and some socio-economic conditions that may significantly impact human health. Bansah et al (2023) concurs with the later that surface mining involves extensive deforestation and environmental damage which normally results in the creation of open pits which would in future act as water holding reservoirs, sometimes harboring disease-causing parasites such as mosquitoes.

4.3.3 Mining without protective clothing

Table 4.3 shows that majority of respondents (91.5%) strongly agree that artisanal mining involves mining without protective clothing with 8.5% of the respondents agreeing, whilst 0% disagree and strongly disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners and key informants (100%) conceptualize artisanal mining as mining without protective clothing. This concurs with the following in-depth interview response from one village head in Chiadzwa ward 30:

Vakomana (artisanal miners) do not care about their health and wellbeing, all they care about is the money. They mine without helmets or masks. A lot of deaths due to suffocation in the so called mingwawawa (strip mining) continue to happen (Village Head 3)

Another participant added that:

These gwejas (artisanal miners) are suicidal, they do not wear any protective clothing when doing their thing. (Village Head 4)

From the above analogue it can be deduced that artisanal miners and key informants conceptualize artisanal mining involve mining without protective clothing. This concurs with Manuel, (2011) who postulated that artisanal miners often operate under hazardous, labor-intensive and highly disorganized conditions and have few concerns for the environment.

4.3.4 Promotes rural development

Table 4.3 shows that some respondents (0%) strongly agree and (26.8%) agree that artisanal mining promotes rural development in Chiadzwa community, whilst majority of respondents (26.8%) strongly disagree and (36.6%) disagree. Therefore, the presented statistics reveal that some of the respondents and key informants (26.8%) conceptualize that artisanal mining promote rural development whilst (73.2%) of the respondents differ with this notion. This concurs with the following in-depth interview response from the respondent in Chiadzwa community:

Chiadzwa people are tired of hoping for a better life out of diamonds. Lots of promises have been made but no action. Our children walk many kilometers to schools, the clinics are few and far away with limited medication. Our roads are the worst roads, no tar to talk about (Village Head1)

From the analyzed data it can be noted that if the extracted minerals are channeled through the legal marketing processes there are high chances of the community benefiting from the proceeds from sales. This will result in the community having access to quality health delivery system, contemporary education infrastructure, among other developmental activities.

4.3.5 Alleviates poverty

Table 4.3 shows that most respondents (48.8%) strongly agree that artisanal mining alleviates poverty in Chiadzwa community with 30.5% agree, whilst only 12.2% strongly disagree and 2.1% disagree. Therefore, the presented statistics reveal that the majority of artisanal miners and key informants (79.3%) conceptualize artisanal mining as a drive to alleviate poverty in Chiadzwa community. This concurs with the following in-depth interview response from one village head in Chiadzwa:

Due to high levels of unemployment rate and climate change most people have resorted to artisanal as an alternative livelihood strategy. Besides donor assistance people in Chiadzwa depend on artisanal mining for survival (Village Head 2)

Another respondent added that:

With this drought in Chiadzwa only artisanal mining can help our people as the donors only aid a limited number of people and they only bring food aid yet we want money for school fees and others (Village Head 3)

From the above analogue it can be deduced that artisanal miners and key informants conceptualize artisanal mining alleviates poverty. This concurs with Matsa (2011) who postulated that in Zimbabwe, artisanal mining is mostly driven by poverty and high unemployment challenges.

4.4 Minerals prospected in the selected rural community

This section centers on the analysis and interpretation on minerals being prospected by artisanal miners in the area under study

Table 4.3: Minerals prospected through artisanal mining activities (n=82)

Attribute(s)	Strongly Agree		Agree		Strongly Disagree		Disagree	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Gold	0	0	45	54.9	15	18.3	22	26.8
Diamond	80	97.6	2	2.4	0	0	0	0
Copper	0	0	0	0	79	96.3	3	3.7
Lithium	0	0	0	0	81	98.8	1	1.2
Coal	0	0	0	0	82	100	0	0

4.4.1 Gold

From the above table it can be acknowledged that some respondents (54.9%) agree that gold is mined in Chiadzwa community. whilst 18.3% strongly disagree and 26.8 disagree. Therefore, artisanal miners conceptualize that traces of gold are found in Chiadzwa community mostly in areas where there are rivers. and this concurs with information from one of the village heads in Chiadzwa.

Traces of gold are found in Save river beds but the artisanal miners in Chiadzwa mainly mine diamond (Village Head 4)

4.4.2 Diamond

Mining in Chiadzwa, the table shows that the majority of respondents 97.6% strongly agree that diamond is mined in Chiadzwa followed by 2.4% of the respondents agreeing the same aspect. This concurs with the following in-depth interview response from one village head in Chiadzwa:

Diamond is the major mineral mined in Chiadzwa and the market is readily available, the buyers, nyamunda (land owner), gweja (artisanal miner) work in collaboration in the diamond deals (Village Head 5)

4.4.3 Copper, lithium and coal

The following minerals had 0% on disagree and strongly disagree respectively, this showed that Copper, Lithium and Coal minerals are not mined in Chiadzwa community, Therefore, the presented statistics reveal that the majority of artisanal miners and key informants (100%) conceptualize diamond is the major mineral mined in Chiadzwa community with traces of gold here and there. This concurs with the following in-depth interview response from one village head:

Diamond is the main mineral mined in Chiadzwa. We have no evidence of coal, copper or lithium in Chiadzwa (Village Head 4)

From the above analogues it can be deduced that artisanal miners and key informants conceptualize artisanal mining in Chiadzwa to diamond mining and some traces of gold. This concurs with Hinton et al (2003); Gandiwa and Gandiwa (2012); Wilson et al (2015) who stated that artisanal mining targets precious minerals like gold, diamonds and any other minerals which are high in demand and in most cases over a small scale.

4.5 Mining practices used in artisanal mining activities in the targeted location

In this section, the results are presented under the theme mining practices used in artisanal mining activities. Table 4.5 below presents the opinions of artisanal miners and key informants who participated in the questionnaire survey.

Table 4.4: Mining practices carried at the targeted location (n=82)

Attribute(s)	Strongly Agree		Agree		Strongly Disagree		Disagree	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Open cast mining	70	87.8	12	12.2	0	0	0	0
Strip mining	50	60.9	28	34.1	0	0	4	4.9
Placer mining (mining in rivers)	17	20.7	40	48.8	0	0	25	30.5
Underground mining	0	0	30	36.6	20	24.4	32	39.0

4.5.1 Open cast mining

Table 4.5 shows that most respondents (87.8%) strongly agree that open cast mining is the common method of mining used in artisanal mining with 12.2% of the respondents agreeing

whilst 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners and key informants (100%) generally agree that open cast mining is the major method used in artisanal mining. This concurs with the following in-depth interview response from one village head in Chiadzwa community:

Open cast mining has been the widely used method of mining since the discovery of diamond in Chiadzwa and later strip mining as the diamond was no longer found on the surface. A lot of open pits can be found all over Chiadzwa as a result of open cast mining with detrimental effects to both the people and the environment (Village Head 1)

From the above analogues it can be deduced that artisanal miners and key informants are in agreement that open cast mining is a common method in artisanal mining practices in Chiadzwa. This concurs with Rushemuka and Côte (2024) who postulates that in Zimbabwe open cast mining is the widely used method of mining where the mineral belt is close to the surface.

4.5.2 Strip mining

Table 4.4 shows that most respondents (60.9%) strongly agree that strip mining is used in artisanal mining with some respondents 29.6% agreeing, whilst 0% strongly disagree and 4.9% disagree. Therefore, the presented statistics reveal that the majority of artisanal miners and key informants (90.5%) generally agree that strip mining is a method used in mining activities. This concurs with the following in-depth interview response from one village head in Chiadzwa community:

Madeep (strip mining) is another common method of mining after open cast mining. Strip mining is when the artisanal miners go underground and follow bhande (belt or strip) where the diamond is following. Strip mining is mainly practiced in villages like Tinoengana, Mwaora, Makotamo and Chibiya (Village Head 3)

Another respondent added that:

In strip mining, mine collapse is a very big challenge. A lot of deaths resulting from mine collapses have been recorded with most cases not reported to the responsible authorities since it is an illegal practice. Also, the gwejas live in the tunnels, drink water in the tunnels as well as relieve themselves in the tunnels thus contaminating the underground water posing danger to their health and the villagers health. Cholera outbreaks are the order of the day in Chiadzwa community (Village Head 4)

From the above analogues it can be deduced that artisanal miners and key informants are in agreement that strip mining is a common method in artisanal mining practices in Chiadzwa. This concurs with Ngom et al (2023) stating that artisanal mining includes strip mining, open pit or open cast mining, quarrying, alluvial mining and mountaintop removal among others.

4.5.3 Placer mining

Table 4.5 shows that most respondents (20.7%) strongly agree that placer mining is a method used in artisanal mining activities in Chiadzwa community with respondents 48.8% agreeing, whilst only 0% strongly disagree and 30.5% disagreeing. Therefore, the presented statistics reveal that the majority of artisanal miners and key informants (69.5%) generally agree that placer mining is a method used in mining activities. This concurs with the following in-depth interview response from village head in Chiadzwa:

Artisanal miners do the scattering of their mutaka (diamond soil) in the rivers which leads to siltation of our rivers and river water contamination. The aqua life is affected and the river water is not safe for household use. Women artisanal miners go to the rivers after the scatted soil to look for diamond. Also, gold traces can be found in Save river which would have been washed along (Village Head 5)

From the above analogues it can be deduced that artisanal miners and key informants view placer mining as a method used in artisanal mining but is used at a very low scale. Mostly open cast and strip-mining methods are commonly used.

4.6 Artisanal mining contributes to livelihoods and infrastructure

This section focuses on the respondents' opinions towards the artisanal mining's contribution to issues around livelihoods and infrastructure development in the community under investigation.

Table 4.5: Opinions towards contribution of artisanal mining towards livelihoods and infrastructure development (n=82)

Attribute(s)	Strongly Agree		Agree		Strongly Disagree		Disagree	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Roads	0	0	0	0	20	24.4	62	75.6
Schools	0	0	0	0	10	12.2	72	87.8
Clinics	0	0	5	6.1	29	35.4	48	58.5
Sanitation	0	0	10	12.2	5	6.1	67	81.7
Household standard of living	10	12.2	70	85.4	0	0	2	2.4

4.6.1 Roads

Table 4.5 shows that most respondents (0%) strongly agree and agree respectively that artisanal mining does not contribute to road construction in Chiadzwa community whilst a majority of respondents 24.4% strongly disagree and 75.6% disagree. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) generally disagree that artisanal mining contribute to road construction in Chiadzwa community.

4.6.2 Schools

Table 4.5 shows that most respondents (0%) strongly agree and agree respectively that artisanal mining does not contribute to school development in Chiadzwa community whilst a majority of respondents 12.2% strongly disagree and 87.8% disagree. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) generally disagree that artisanal mining contribute to schools' development in Chiadzwa community.

4.6.3 Clinics

Table 4.5 shows that most respondents (0%) strongly agree and 6.1% agree that artisanal mining contribute to schools' development in Chiadzwa community whilst a majority of respondents 35.4% strongly disagree and 58.5% disagree. Therefore, the presented statistics reveal that the majority of artisanal miners (93.9%) generally disagree that artisanal mining contribute to clinics development in Chiadzwa community

4.6.4 Sanitation

Table 4.5 shows that most respondents (0%) strongly agree and 10% agree that artisanal mining contribute to improved sanitation in Chiadzwa community whilst a majority of respondents 6.1% strongly disagree and 81.7% disagree. Therefore, the presented statistics reveal that the majority of artisanal miners (87.8%) generally disagree that artisanal mining contribute to improved sanitation in Chiadzwa community

4.6.5 Household standard of living

Table 4.5 shows that most respondents (12.2%) strongly agree and 85.4% agree that artisanal mining contribute to improved household standard of living in Chiadzwa community whilst a few respondents 0% strongly disagree and 2.4% disagree. Therefore, the presented statistics reveal that the majority of artisanal miners (97.6%) generally agree that artisanal mining

contribute to improved household standard of living in Chiadzwa community. This concurs with the following in-depth interview response from one village head in Chiadzwa:

Vabvakure (people not from Chiadzwa) constitute the largest portion of artisanal miners and this hinders progress and development in our community because once vakabata (get diamond) they sell and go enjoy the profits back to their communities and come back for more looting. Our roads, schools and clinics remain underdeveloped and this is not fair to us as a community (Village Head 1)

Another respondent added that:

At least our local artisanal miners are building better houses of asbestos and sending their children to school and providing nutritious food to their families but this is for a limited number of people as some of us can no longer withstand the hard labor in artisanal mining activities (Village Head 2)

Therefore, these findings have revealed that the majority of respondents and key informants agree that artisanal mining does not contribute to improved livelihood and infrastructure in terms of roads, clinics, schools and sanitation in Chiadzwa community. Household standards of living for local artisanal miners has improved Chiadzwa community. Further descriptive statistical analysis revealed that the vast diamond in Chiadzwa is not benefiting the host community. Poor infrastructure continues to rule the day despite a lot of diamond being siphoned daily by the artisanal miners. This concurs with Alssadek and Benhin (2023) who postulates that powerful actors such as politicians, foreign-owned capitalistic companies and other actors siphon away their wealth leaving the developing countries with a medley of socio-economic and environmental challenges which sometimes lead to social unrest, conflicts, health problems, climate change and many more.

4.7 Respondents' opinions on tools used in artisanal mining activities

In this section presents respondents' contributions pertaining tools that are used in artisanal mining practices.

Table 4.6: Tools used in artisanal mining activities (n=82)

Attribute(s)	Strongly Agree		Agree		Strongly Disagree		Disagree	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Shovels	82	100	0	0	0	0	0	0
Picks	75	91.5	7	8.5	0	0	0	0
Ranges	80	97.6	2	2.4	0	0	0	0
Graders	0	0	0	0	82	100	0	0
Axes	30	36.6	52	63.4	0	0	0	0
Helmets	0	0	0	0	0	0	82	100

4.7.1 Shovels

Table 4.6 shows that most respondents (100%) strongly agree that artisanal mining use shovels in their artisanal mining activities whilst 0% agree, strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) generally agree that artisanal mining use shovels in artisanal mining activities in Chiadzwa community.

4.7.2 Picks

Table 4.6 shows that most respondents (91.5%) strongly agree and 8.5% agree that artisanal mining use picks in their artisanal mining activities whilst 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) generally agree that artisanal mining use picks in artisanal mining activities in Chiadzwa community.

4.7.3 Ranges

Table 4.6 shows that most respondents (97.6%) strongly agree and 2.4% agree that artisanal mining use ranges in their artisanal mining activities whilst 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) generally agree that artisanal mining use ranges in artisanal mining activities in Chiadzwa community.

4.7.4 Graders

Table 4.6 shows that nil respondents (0%) strongly agree and 0% agree that artisanal mining use graders in their artisanal mining activities whilst the majority of respondents 100% strongly disagree and 0% disagree. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) strongly disagree that artisanal mining use graders in artisanal mining activities in Chiadzwa community

4.7.5 Axes

Table 4.6 shows that most respondents (36.6%) strongly agree and (63.4%) agree that artisanal mining use axes in their artisanal mining activities whilst nil respondents 0% strongly disagree and 0% disagree. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) strongly agree that artisanal mining use axes in artisanal mining activities in Chiadzwa community

4.7.6 Helmets

Table 4.6 shows that nil respondents (0%) strongly agree and (0%) agree that artisanal mining use helmets in their artisanal mining activities whilst most respondents 0% strongly disagree and 100% disagree. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) strongly disagree that artisanal mining use helmets in artisanal mining activities in Chiadzwa community. Therefore, the overall presented statistics reveal that majority of respondents (100%) generally agree that artisanal miners use shovels, picks, ranges and axes in their artisanal mining activities whilst 100% strongly disagree that artisanal miners use graders in their mining activities and 100% generally disagree that artisanal mining use helmets in their artisanal mining activities This concurs with the following in-depth interview response from village head in Chiadzwa:

You can easily identify a gweja by the tools they carry like picks ranges and axes. Also, a gweja coming from the deeps and makomba can be identified by muddy, dusty and dirty clothing with dust eyelids, face and nostrils (Village Head 5)

Another respondent added that:

Only simple tools are used by these gwejas, heavy machinery can only be seen in Zimbabwe Consolidated Diamond Company (Village Head 4)

From the above analogues it can be deduced that artisanal miners and key informants are in agreement that artisanal mining use simple tools like shovels, picks, ranges, and axes in their mining activities in Chiadzwa. Limited access to advanced machinery like graders is used in artisanal mining and there is no use of protective clothing like helmets. This concurs with Takyi et al. (2021) who postulates that artisanal mining dates back to 2009 where illegal artisanal miners used simple hand-held tools like panning dishes, shovels, picks and hoes. Around the year 2014, the miners started using advanced equipment such as metal detectors, industrial mining compressors, crushers and the mining was intense within the protected area.

4.8 Challenges encountered when these practices are implemented in artisanal mining activities

In this section, the results are presented under the theme challenges encountered when these practices are implemented in artisanal mining activities. Table 4.2 below presents the opinions of artisanal miners and key informants who participated in the questionnaire survey.

Table 4.7: Areas affected by artisanal mining practices (n=82)

Attribute(s)	Strongly Agree		Agree		Strongly Disagree		Disagree	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Land	80	97.6	2	2.4	0	0	0	0
Water	20	24.4	62	75.6	0	0	0	0
Climate	20	24.4	62	75.6	0	0	0	0
Air	82	100	0	0	0	0	0	0

4.8.1 Land degradation

Table 4.7 shows that most respondents (97.6%) strongly agree and 2.4% agree that land is affected by artisanal mining practices in Chiadzwa community whilst respondents 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) strongly agree that land is affected by artisanal mining practices. Therefore, these findings have revealed that the respondents and key informants agreed that land degradation is caused by artisanal mining practices in Chiadzwa community. Further descriptive statistical analysis revealed land pollution is the order of the day as you can find litter all over the

area especially around their bases. Since there are no toilets, the gwejas use bush system posing danger to the health and wellbeing of both livestock and people in Chiadzwa community

4.8.2 Water pollution

Table 4.7 shows that most respondents (24.4%) strongly agree and (75.6%) agree that water is affected by artisanal mining practices in Chiadzwa community whilst respondents 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) strongly agree that water is affected by artisanal mining practices.

4.8.3 Climate

Table 4.7 shows that most respondents (24.4%) strongly agree and (75.6%) agree that climate is affected by artisanal mining practices in Chiadzwa community whilst respondents 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) strongly agree that climate is affected by artisanal mining practices

4.8.4 Air pollution

Table 4.7 shows that all respondents (100%) strongly agree and 0% agree that air is affected by artisanal mining practices in Chiadzwa community whilst respondents 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) strongly agree that air is affected by artisanal mining practices

Therefore, the overall presented statistics reveal that land, water, climate and air are affected by artisanal mining activities. Majority of respondents (100%) generally agree that artisanal mining practices has detrimental effects on the land, water, climate and air of Chiadzwa community Land degradation, land pollution, water and air pollution is the order of the day in Chiadzwa community despite the policies and other strategies put in place to curb the effects and impact of artisanal mining on the environment of Chiadzwa community. This concurs with the following in-depth interview response from village head in Chiadzwa:

Artisanal miners live everywhere and anywhere. They live like squatters, very careless and not minding about their health and wellbeing. Land degradation through deforestation and litter can be found everywhere. There are dongers, gulley's and open pits all over Chiadzwa. The gwejas excessively cut down trees to carry out their mining activities promoting soil erosion and siltation of rivers. Human life and livestock is lost as people are drowning in the stagnant waters in the open pits and our cattle are falling in the open pits (Village Head 5)

Another respondent added that:

These gwejas are so animalistic that they relieve themselves anywhere (bush system) posing danger to our people. There are continuous cholera outbreaks in Chiadzwa owing to these gwejas negligence in their mining activities (Village Head 3)

Another respondent added that:

Policies are there that protect our environment like EMA and DRM and we have committees at ward and village level but these committees are not functional. Trainings have been done at district level but no implementation is being done due to negligence of duty by some village heads, corruption and some village heads are old such that implementation will be a challenge. No monitoring is being done in our villages on whether these village and ward committees are functional (Village Head 4)

From the above analogues it can be deduced that artisanal miners and key informants are in agreement that artisanal mining practices have detrimental effects on the land, water, climate and air of Chiadzwa community. There is death of people and animals due to the open pits, soil erosion and siltation are the order of the day due to deforestation and there are disease outbreaks due to the contamination of the waters in Chiadzwa community. This concurs with Casso-Hartmann et al (2022) who postulated that artisanal mining results in the negative effect of prejudicing the populace of critical necessities such as water, food, quality air and other resources needed for the perpetuation of life

Table 4.8: Effects of artisanal mining practices on the environment (n=82)

Attribute(s)	Strongly Agree		Agree		Strongly Disagree		Disagree	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Soil erosion	82	100	0	0	0	0	0	0
Deforestation	82	100	0	0	0	0	0	0
Water contamination	82	100	0	0	0	0	0	0
Drought	70	85.4	12	14.6	0	0	0	0
Open pits	82	100	0	0	0	0	0	0
Loss of Livestock	20	24.4	62	75.6	0	0	0	0

4.8.5 Soil erosion

Table 4.8 shows that all respondents (100%) strongly agree that artisanal mining causes soil erosion on the environment of Chiadzwa community whilst 0% strongly disagree and disagreed respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) generally agree that artisanal mining practices causes soil erosion on the Chiadzwa environment. This concurs with the following in-depth interview response from the village head:

Our soils are no longer productive, we now grow rapoko, sorghum, millet and groundnuts which are drought resistant. To get maize we barter exchange but we are mostly used with our small grain sadza. We also keep drought resistant animals like goats, sheep and cattle. Most of our land is now being used for artisanal mining activities at the expense of farming as artisanal mining is now major livelihood strategy in Chiadzwa. It's either one is involved in artisanal mining activities or he or she is selling wares to the artisanal miners (Village Head 1)

From the analogue above the artisanal miners and key informants deduced that artisanal mining practices used have led to vast soil erosion in Chiadzwa community. This concurs with Pereira (2009) who postulated that siltation in Zimbabwe, Mozambique and Tanzania has been increasing at the rate of more than 5% per annum and argued that this is a direct result of environmental destruction committed by mining among other related economic activities.

4.8.5 Deforestation

Table 4.4 shows that all respondents (100%) strongly agree that artisanal mining causes deforestation on the environment of Chiadzwa community whilst 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) strongly agree that artisanal mining practices causes deforestation on the Chiadzwa environment. This concurs with the following in-depth interview response from the village head:

Most of the gwejas(artisanal miners) live in the mountains and bushes of Chiadzwa except for a few who rent in the community. They are found all over the area. They live like squatters with no water and sanitation. They clear trees for building their shelter and for firewood. The artisanal mining activities involves clearing the land before carrying out their artisanal mining practices (Village Head 2)

From the analogue above the artisanal miners and key informants deduced that artisanal mining practices used have led to excessive deforestation posing detrimental effects on the environmental management in Chiadzwa community. This concurs with Giljum et al., (2022) who noted that artisanal mining practices promote deforestation especially through open cast mining which involves the removal of vegetation and the topsoil

4.8.6 Water contamination

Table 4.4 shows that all respondents (100%) strongly agree that artisanal mining contaminates the water of Chiadzwa community whilst 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) strongly agree that artisanal mining practices contaminates the waters of Chiadzwa environment. This concurs with the following in-depth interview response from the village head:

The gwejas (artisanal miners do the scatting of their mutaka(soil with diamonds) in the rivers thereby promoting siltation as well as making the water dirty for domestic use. Artisanal mining is the major source of livelihood to many people of Chiadzwa and outsiders that it is done on a very large scale and most of our water is not safe to drink. There are continuous Cholera outbreaks in Chiadzwa (Village Head 5)

From the analogue above the artisanal miners and key informants deduced that artisanal mining practices used by artisanal miners have led to water contamination in the water bodies around Chiadzwa community and this has led to limited supply of clean and safe water and outbreak of diseases, eg cholera, among others. This concurs with Jande (2005) who defined pollution as to make something dirty or no longer pure, especially by adding harmful or unpleasant substances to it. This results in the water in Chiadzwa not safe for human and animal consumption.

4.8.7 Drought

Table 4.8 shows that most respondents (85.4%) strongly agree and (14.6%) agree that artisanal mining promotes drought in Chiadzwa community whilst 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) generally agree that artisanal mining practices promotes drought on the Chiadzwa environment. This concurs with the following in-depth interview response from the village head:

We don't receive much rainfall in our area. Our climate as well as our soils are not conducive to crop production, the temperatures are always very high with limited rainfall, the soils are exhausted and infertile due to excess soil erosion. In Chiadzwa we grow drought resistant crops like mhunga (millet), sorghum (rukweza) and mapfunde and keep drought resistant animals for family consumption and or for sale the surplus (Village Head 1)

From the analogue above the artisanal miners and key informants deduced that artisanal mining practices used by artisanal miners have promoted drought in Chiadzwa community. The mining practices leads to siltation and deforestation, among others which have a negative effect on the climate in Chiadzwa. This concurs with Castro and Peter (2023) who notes that vegetation is a crucial component of the hydrological cycle and its absence means that the whole process is disturbed and in turn implicating on the amount of rainfall to be received.

4.8.8 Open pits

Table 4.4 shows that all respondents (100%) strongly agree that artisanal mining creates open pits on the environment of Chiadzwa community whilst 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) strongly agree that artisanal mining practices creates open pits on the environment of Chiadzwa community. This concurs with the following in-depth interview response from the village head:

A lot of open pits can be found all over Chiadzwa as a result of open cast mining with detrimental effects to both the people and the environment. We have lost our livestock to these pits and our children are drowning in the stagnant waters of the pits. Chiadzwa is no longer a safe place to live (Village Head 3)

From the analogue above the artisanal miners and key informants deduced that artisanal mining practices used by artisanal miners have led to creation of vast open pits around Chiadzwa community which are posing danger to both human and livestock around Chiadzwa. This concurs with Hilson et al (2010); Miguel, 2016) who noted that the mine pits which are often left uncovered by mining companies are a threat not only to livestock and wildlife but to human life as well. They hold water and may result in children or even elders drowning since some of the pits are very deep. In some cases, water is contaminated and therefore exposing people to a health risk. Stagnant water supports the breeding of mosquitoes which in turn spread malaria.

4.8.9 Loss of livestock

Table 4.4 shows that most respondents (24.4%) strongly agree and (75.6%) agree that artisanal mining leads to loss of livestock in Chiadzwa community whilst 0% strongly disagree and disagree respectively. Therefore, the presented statistics reveal that the majority of artisanal miners (100%) generally agree that artisanal mining practices leads to loss of livestock in Chiadzwa community. This concurs with the following in-depth interview response from the village head:

We keep cattle, sheep and goats in Chiadzwa, livestock is our source of wealth but the open pits have taken a lot of our livestock from us, some fall in the pits and some drown in the stagnant waters (Village Head 2)

From the analogue above the artisanal miners and key informants deduced that artisanal mining practices used by artisanal miners have led to villagers losing their livestock due to contaminated waters and open pits all over Chiadzwa community. This concurs with Hilson et al.,(2010) and Miguel (2016) who noted that mine pits which are often left uncovered by mining companies are a threat not only to livestock and wildlife but to human life as well.

4.9 Chapter summary

The chapter analyzed and interpreted the qualitative and quantitative results with the view to provide answers to the research objectives in chapter 1. Thus, chapter was grounded in quantitative and qualitative analysis in interrogating issues around the following: conceptualisation of artisanal mining; mining practices used in the artisanal mining activities; establishing how these practices are implemented in artisanal mining practices and challenges encountered when these practices are implemented in artisanal activities. In the analysis and interpretation of the results, views of others scholars were factored in, to create the platform for comparative analysis. This was targeted at contributing towards the closure of some of the gaps that were identified in chapter 2. The next chapter provides the summary of the project, conclusions and recommendations.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The previous chapter presented, analyzed and interpreted the research data. This chapter will focus on the summary, conclusion and recommendations. The conclusions highlight the results of data analysis and recommendations. Areas for further research will also be suggested. The chapter summary will also be given at the end of the chapter. In the previous chapter, data was analyzed and discussed. This current chapter focuses on the following: summary of the project, conclusion, recommendations, areas for further study, and chapter summary.

5.2 Summary of the project

In chapter 1, the researcher looked at the problem and its scope where the focus was on the background of the study, statement of the problem, the research questions, and research objectives, assumption of the study and significance of the study, limitations of the study, and delimitation of the study as well as definition of key terms. Followed by Chapter 2 which outlined the theoretical framework through which the gaps in the consulted literature were interrogated. Chapter 3 highlighted the strategy for data generation, presentation, analysis, and interpretation. Furthermore, in chapter 4, the researcher looked at the data presentation, data analysis, and conclusion. The results of the research were presented and analyzed based on the research questions. This chapter came up with the following major results:

- The respondents conceptualized artisanal mining diversely (ie., as an illegal mining activity that was above board.
- Diverse mining practices (open cast, strip mining etc) were used in artisanal mining activities.
- The above practices were used by artisanal miners to extract various minerals from underground. To a certain extent mining contributes to the livelihood of people but with limited contribution to infrastructure development.

- In pursuit of these practices, various challenges were encountered (i.e., land degradation and water pollution). This has resulted into soil erosion, deforestation, water contamination, drought, open pits, etc.).

5.3 Conclusion

From the analyzed and interpreted data, it was noted that the selected respondents had a diverse understanding of artisanal mining as a concept. Thus, some conceptualized it an activity that legal, with other highlighting it as an illegal activity. In artisanal mining various mining practices were engaged in extracting minerals. In these activities various challenges were encountered to the detriment of the environment. It is in this context that this study concluded that the artisanal mining practices being used in the selected community have to a larger extent a negative impact to the environmental management.

5.4 Recommendations

The researcher proposes the following recommendations:

- Community Awareness programs and campaigns (at community level) on sustainable environment management i.e., land reclamation (hole filling, planting of trees), enforcing legislation at community level to safeguard the forest, rivers and the land.
- Cooperation and synergy by all Local Authorities on developing strategies that can be used to curb artisanal mining effects on the environment

5.5 Areas for further research

As the study was only limited to 4 villages in ward 30 of Chiadzwa community, it will be necessary to carry out a wider study to other villages and wards, to appreciate the gravity on effects of artisanal mining activities have on the environment of Chiadzwa Community.

5.6 Chapter Summary

In this chapter, the research study was summarized, the conclusion was articulated, recommendations were made and the area for the study was identified.

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APPENDICES

Appendix 1: Introductory letter from Bindura University of Science Education

SAMED

**P Bag 1020
BINDURA
ZIMBABWE**

Tel: 0271 - 7531 ext 1038
Fax: 263 - 71 - 7616

BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date: 22/04/2024

TO WHOM IT MAY CONCERN

NAME: MAGUWA, S REGISTRATION NUMBER: B1438541

PROGRAMME: HBScEd - GEO PART: 3:2

This memo serves to confirm that the above is a bona fide student at Bindura University of Science Education in the Faculty of Science Education.

The student has to undertake research and thereafter present a Research Project in partial fulfillment of the HBScEd - GEO programme. The research topic is:

**ARTISANAL MINING PRACTICES AND THEIR IMPACT
ON ENVIRONMENTAL MANAGEMENT: EXPERIENCES
FROM CHIADZWA COMMUNITY.**

In this regard, the department kindly requests your permission to allow the student to carry out his/her research in your institutions.

Your co-operation and assistance is greatly appreciated.

Thank you.

Zindemo
Zindemo (Dr.)
CHAIRPERSON - SAMED

**BINDURA UNIVERSITY OF SCIENCE EDUCATION
DEPARTMENT OF EDUCATIONAL FOUNDATIONS**

9 APR 2024

P BAG 1020
BINDURA

Appendix 2: Approval letter from the responsible authority

MINISTRY OF LOCAL GOVERNMENT AND PUBLIC WORKS

*Correspondence should not
be addressed to individuals*

Telephone: 020-62925, 62289
Telefax: 020-62309
Email – damutare@comone.co.zw



ZIMBABWE

DISTRICT DEVELOPMENT COORDINATOR
P.O. BOX 940
MUTARE

Reference: C 37

Tuesday, April 22, 2024

TO WHOM IT MAY CONCERN

AUTHORITY FOR MAGUYA SUSAN TO CARRY OUT ACADEMIC RESEARCH INTERVIEWS WITH COMMUNITY MEMBERS IN CHIADZWA COMMUNITY IN MUTARE DISTRICT

The above matter is refers.

This letter serves to certify that Maguya Susan I.D Number 75-381572Q44 is a bona fide student at Bindura University of science education in faculty of Science Education intends to carry out research survey as part of the requirements needed in fulfilling her studies. We advise that authority has been granted to carry out academic research with community members in our district.

Her research topic is, "ARTISANAL MINING PRACTICES AND THEIR IMPACT ON ENVIRONMENTAL MANAGEMENT": EXPERIENCES FROM CHIADZWA COMMUNITY. Information generated from this research will only be used for academic purposes.

In this regard, please render her your maximum support during the period of her survey. The researcher is also advised to conduct her research topic within the prescribed rules and conditions as prescribed by the Institute and this office.

We wish her a successful implementation of her academic research topic project and ensure to adherence to Cholera regulations to prevent the spread of the pandemic.

Your usual co-operation is greatly appreciated.

T. KAPENZI
District Development Coordinator
MUTARE



District Development Coordinator -

Appendix 3: Questionnaire for selected artisanal miners

I am a final year Bachelor of Science Education (Geography) Honors degree student with the Bindura University of Science Education carrying out a study on artisanal mining practices and their impact on environmental management: experiences from Chiadzwa community.

Instructions

Kindly answer all the questions. Do not discuss with anyone. Your answers to this questionnaire will remain strictly confidential. Read each question carefully and respond as carefully and truthfully as possible. You may ask for assistance if you do not understand something or are not sure how to respond. Please fill in or tick all items that agree or are closest to your own opinion. If you decide to change your response to a question, put an 'X' over your first choice and put a tick on your own new choice. In order to maintain anonymity and confidentiality please do not write or sign your name.

Section A

1. Sex ☐ Female ☐ Male
2. What is your age range (years)? ☐ 25-29 ☐ 30-34 ☐ 35-40
☐ 41-45 ☐ 46-50 ☐ 51-55
☐ Above 55
3. Marital status Married ☐ Single ☐ Widowed ☐ Divorced ☐
4. Level of Education: ☐ Primary Education ☐ Secondary Education ☐ Tertiary Education
5. For how long have you been residing in Chiadzwa? (years) Less than 1 ☐ 1 - 5 ☐
6 - 10 ☐ 11 - 15 ☐ Above 15 ☐

Section B

6. Are you participating in artisanal mining activities? Yes ☐ No ☐
7. To what extent do you agree with the assertion that the following minerals are mined in Chiadzwa?

	Strongly Agree	Agree	Strongly Disagree	Disagree
Gold				
Diamond				
Copper				
Lithium				
Coal				

8. Indicate your opinion about how understand artisanal mining as a concept

	Strongly Agree	Agree	Strongly Disagree	Disagree
Illegal extraction of minerals				
Open pits				
Mining without protective clothing				
Promotes rural development				
Alleviates poverty				

9. To what extent do you agree to the assertion that artisanal mining contributes to infrastructure development and livelihood in the Chiadzwa community?

	Strongly Agree	Agree	Strongly Disagree	Disagree
Roads				
Schools				
Clinics				
Sanitation				
Household standard of living				

Section C

10. To what extent do you agree with the assertion that the following mining methods are practiced in Chiadzwa?

	Strongly Agree	Agree	Strongly Disagree	Disagree
Open cast mining				
Strip mining				
Placer mining (mining in rivers)				
Underground mining				

11. Are there any policies guiding the artisanal mining practices in the targeted area?
 Yes [] No [] (If Yes elaborate your answer)

12. The following some of the tools used by artisanal miners use in their mining activities

	Strongly Agree	Agree	Strongly Disagree	Disagree
Shovels				
Picks				
Ranges				
Graders				
Axes				
Helmets				

Section D

13. Artisanal mining activities are affecting the following:

	Strongly Agree	Agree	Strongly Disagree	Disagree
Land				
Water				
Climate				
Air				

14. Give your opinion to the following opinions around the effects of artisanal mining practices.

	Strongly Agree	Agree	Strongly Disagree	Disagree
Soil erosion				
Deforestation				
Water contamination				
Drought				
Open pits				
Loss of livestock				

Thank you

Appendix 4: Interview guide for the selected village heads

Welcome and thank you for coming forward to take part in this discussion. You have been requested to play a part as your point of view is important. This discussion is designed to gain insight into your current thoughts and feelings about your experiences in artisanal mining practices in the selected area. I am going to ask you some questions which you are free to elaborate on, in ways you consider fit. In case you do not feel like answering the question, you are at liberty to say so. I would like to let you know from the start that your personal and school details will not be included in the final report of this study.

1. In brief introduce yourself (age, role in the community)
2. In your own words briefly articulate what do you understand by artisanal mining?
3. Are there any policies guiding artisanal mining activities in your area? (If yes give examples)
4. Which group of people are mainly active in artisanal mining activities?
5. What type of minerals are mainly mined by the artisanal miners in your area?
6. In brief can you what are some of the methods by the artisanal miners to extract the precious minerals from the ground?
7. What is your opinion about the effects of these methods to the environment?
8. What measures can be put in place to curb the above-mentioned effects?
9. Do you have any other contribution to our discussion?
10. Thank you so much for participating in this interview