BINDURA UNIVERSITY OF SCIENCE EDUCATION

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EXPLORING THE IMPACT OF CLIMATE CHANGE ON NON-FARM LIVELIHOOD PORTFOLIOS IN DOMBOSHAVA WARD 4, ZIMBABWE

By

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A Dissertation Submitted to Bindura University of Science Education in Partial Fulfilment of the Requirements of the Master of Science Degree in Disaster Risk Management

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APPROVAL FORM

The undersigned certify that they have read and recommend to the Bindura University of Science Education for acceptance a research project titled: **"Exploring the effects of climate change on non-farm livelihood portfolios in Domboshava Ward 4, Zimbabwe,"** submitted by **Takudzwa Dydmus Marwa** Student Number **B225634B** in partial fulfilment of the requirements of the degree of **Master of Science in Disaster Risk Management.**

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DECLARATION

I, Takudzwa Dydmus Marwa do hereby declare that the work submitted here is the result of my own independent investigation and that all the source I have quoted have been indicated and acknowledged by means of complete references. I further declare that the work is submitted for the first time at this university or faculty and that it has never been submitted to any university or faculty for the purpose of obtaining a degree.

DEDICATION

I proudly dedicate this work to the Almighty God, it would not have been possible to complete this research. I would also like to dedicate it to my beloved son Jayden Tanaka Marwa and daughter Janelle Makanaka Marwa who continues to give me the impetus to aim higher.

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ABSTRACT

Millions of people in several rural communities in Africa continue to face starvation each year as a result of persistent dry seasons and floods brought on by climate variability and change. This research was premised on exploring the effects of climate change on non-farm livelihood portfolios in Domboshava Ward 4, Zimbabwe. The research adopted a qualitative research design where direct observations, key informant and semi-structured interviews were used for data collection. Thematic analysis, content quotes, narratives and pictures were utilized to explore the effects of climate change on non-farm livelihood portfolios in Domboshava Ward 4. A sum of 31 interviews were done comprising of 08 with key informants from government line ministries, local government, traditional leadership and NGO field stuff, as well as 23 with Domboshava Ward 4 inhabitants. In addition, a total of 11 pictures were taken direct from the field. The findings revealed that people are engaging in various non-farm livelihood practices such as brick moulding, fishing, and vending, *inter alia*. Most of the livelihood options were found to be climate-sensitive as they depend on natural resources within the vicinity. The study recommended the mainstreaming of climate education to debunk some climate change myths and denialism; anticipatory action which is a proactive response to impending disasters; investment in renewable energy to mitigate climate change and enhance livelihood resilience; afforestation and reforestation programmes to improve vegetation cover, enhance carbon sinks and bio-diversity; and the regulation of the use of land through proper planning and preserving the environment.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

The study hinged upon exploring the impact of climate change on non-farm livelihood portfolios in Domboshava Ward 4, Zimbabwe. It took place under the Goromonzi Rural District Council where the Domboshava Ward 4 has become an epicentre of a severe food crisis. In response, people have resorted to non-farm livelihood portfolios. The research is qualitative in nature and was underpinned by the progression of vulnerability and the sustainable livelihoods theoretical frameworks. This study is significantly important as it forms the basis of both policy-making, and future programming of the humanitarian relief and sustainable development interventions. This is about taking anticipatory action, that is, a proactive response to impending crisis which entails taking swift, informed steps before disasters strike, safeguarding communities, and preserving livelihoods. The next section to follow is research background.

1.2 Background of the Study

As per the United Nations, climate change alludes to protracted shifts in temperatures and average weather patterns of a particular geographical area. These shifts can be caused by volcanic eruptions. In any case, climate change has been mainly caused by human activities since the 1800s, principally due to the consumption of fossil fuels. Greenhouse gas (GHG) emissions are produced when non-renewable energy sources are used, trapping the sun's hotness and increasing temperatures on Earth like a blanket. The critical ozone depleting substances that are causing the change of weather patterns encompass carbon dioxide and methane. They are emitted from, for example, using petrol to drive a car or coal to warm a house. Cutting down trees and clearing land can also produce carbon dioxide. Cultivation, oil and gas tasks are critical causes of methane discharges. Energy manufacturing, transportation, agronomy and the use of land are some of the essential areas causing ozone exhausting substances.

Climate change has become a global phenomenon which requires urgent attention from various stakeholders. It is a major disaster risk driver as evidenced by the increase in frequency, intensity and impact of hydro-meteorological hazards which includes tropical cyclones, floods, droughts, heat waves, and wild fires, among others. Hundreds of thousands of people around

the world are substantially susceptible to the current environmental change-related calamities. However, poor communities and poor people are the ones bearing the burden of climate change despite contributing less towards such a phenomenon. Among the impacts of climate change include those on the global food production and supply chains, leading to acute livelihood insecurity and famine.

With reference to the yearly report of Weather, Climate and Catastrophe Insight, catastrophic events unaided have triggered monetary exceeding USD 225 billion throughout the globe in the year of 2018 and beginning around 2016 the mishaps in light of disastrous events have exceeded USD 200 billion consistently. Around 95 per cent of such disasters are ascribed to atmospheric condition-related events, of which typhoons, floods and dry spells are the vital participants and are straightforwardly connected with environmental change. By and large, the impact of the climate variability and change is exceptionally complex, its extensive effects are right now plainly observable on the agrarian arena, which is necessary for the production of food and the universal economy. It is moreover significant that worldwide population is projected to land at 9.7 billion by 2050 which would enhance the pressure on farming land to quench the food requirements previously affected by the impact of ecological change. As climate change and cultivation have indistinguishable associations, unforeseen changes in climatic conditions at such a swift speed has compromised the food security at international scale.

The World Food Program (WFP) 2018 report disclosed that development in crop harvest per hectare is significantly sluggish when weighed contrary to the speeds of rising population. As per Food and Agricultural Organization of the United Nations data disseminated in 2016, if the continuous state of greenhouse gas outflows and climate change remain unabated, then by the year 2100 there will be decrease in the production of the main cereal crops such as maize yields, wheat and rice. Thus expecting that the patterns continue, in near future harvest losses could rise at an extraordinary rate which will significantly add to diminished production, hiked food costs, and it will turn out to be difficult to adjust to rising requirements of a growing population.

As of Raza et al. (2019), climate change is affecting agriculture and its products, which is causing global disruption. Industrialization and hurtful gases cause an unnatural weather change, which finally disturbs the world's current circumstance. The development and yield of plants are profoundly affected by climate change. Extreme signs of environmental stress include fluctuations in temperature and rainfall patterns. Overall, weather changes have both good and bad effects, but the bad ones are more interesting. Overcoming the difference caused by climate change in agriculture is extremely difficult. We are not yet acquainted with how to disentangle this problem or what approaches we should take.

Another study by Kangalawe, Mung'ong'o, Mwakaje, Kalumanga, and Yanda, (2017) observed that there is high reliance on farming, and consequently on natural assets, which makes the occupations of these societies possibly suscptible against adverse consequences of environmental change related with diminished agrarian efficiency, food uncertainty and obliged water accessibility. The region is particularly concerned about the increased temperature and the uneven seasonal distribution of rainfall. The natural systems, phonological processes in vegetation, evapotranspiration proportions, and dangers of yield pests and disease plagues have all been impacted by the steady increase in typical temperatures, as evidenced by meteorological records. However, there is still a lack of research on how climate change affects the portfolios of non-farm livelihoods in Zimbabwe's peri-urban communities. To this end, this study sought to make a significant contribution to the developing writings on climate change mitigation and adaptation as a way to enhance community-based disaster risk resilience.

1.3 Statement of the Problem

The world is grappling with climate change which is affecting all facets of life. Chief among them being global hunger crisis. Despite the interventions, ending hunger, reducing poverty, and achieving food security in line with sustainable development goals remains elusive. This phenomenon is increasing poor countries' and poor communities' vulnerability to disasters. In Zimbabwe, change in terms of average weather patterns has been worrisome as the country has been devastated by extreme events like cyclones, heat waves, and floods, among others. These have upset the country's food system and livelihood security due to the excessive reliance on agricultural systems that depends of rainwater, as well as livelihood portfolios which are delicate to variations in climate. In response, the government of Zimbabwe has implemented

various programmes such as the pfumvudza programme, command livestock programme, and input support scheme. Nevertheless, climate change, food insecurity and rising poverty levels have continued to be a cause of concern across the country and Domboshava Ward 4 has not been spared. With the aim of informing interventions and policies to lessen the disaster risk, the problem statement of this research is to explore the influence of climate variation on non-farm livelihood portfolios.

1.4 Aim of the Research

The research intended to explore the impact of climate variability on non-farm livelihood portfolios in Domboshava Ward 4 in Zimbabwe.

1.5 Objectives of the Study

1. To establish the typical non-farm livelihood portfolios in Domboshava Ward 4 amid climate variability.
2. To examine the impact of climate variation on the non-farm livelihood portfolios in Domboshava Ward 4.
3. To assess household strategies employed towards reducing the impact of climate variation and change on the non-farm livelihood portfolios in Domboshava Ward 4.

1.6 Research Questions

1. What are the typical non-farm livelihood portfolios in Domboshava Ward 4 amid climate variability?
2. How are the impact of climate variability and change on the non-farm livelihood portfolios in Domboshava Ward 4?
3. How are the household stratagems being employed towards decreasing the impact of climate variability and change on non-farm livelihood portfolios in Domboshava Ward 4?

1.7 Significance of the Study

This research aimed to explore the impact of climate variability and change on non-farm livelihood portfolios, which is an important and timely topic given the intertwined triple

planetary crisis comprising of climate change, loss of bio-diversity and pollution which humanity is currently seized with. Despite the growing concern over the influence of changing climate on food and livelihood security, there is lack of practical research on the specific mechanisms underlying this relationship. This research targeted to fill this gap by scrutinizing the role of livelihood resources, structures and procedures, and household livelihood stratagems in the association between natural shocks and livelihood outcomes. The results of this research could have significant recommendations for the development of strategies to alleviate the adverse effects of climate change variation on food security and livelihoods. For example, reducing pollution, preserving wetlands, and afforestation may be effective strategies for mitigating and adapting to the effect of the changing climate on different livelihood practices. Given the widespread effects of climate change, the results could have important suggestions for the food self-sufficiency, poverty alleviation, and the disaster risk resilience of this vulnerable population. Humanitarian relief agencies, development partners, academics and policy makers may all benefit from an improved knowledge on the relationship between average weather variations and livelihood security.

1.8 Validity and Reliability of the Study

To ensure legitimacy and dependability of research results, different data collection tools were adopted and different sampling techniques were also applied. In research, there is need to use different data collection instruments and check consistency of results thereby making them reliable and acceptable.

1.9 Assumptions of the Study

Because they address beliefs that cannot be proven, assumptions are an essential component of a case study research project (Simon and Goes, 2013).

1) The first assumption was that the research participants would give a true reflection of the magnitude of the changing climate was upsetting different non-farm livelihood portfolios.
2) The second assumption was that Domboshava Ward 4 residents' vulnerability to disasters is increasing due to climate change.

3) The third assumption was that women, children, the elderly and people with disabilities are less resilient to climatic shocks as compared to able-bodied men.

1.10 Limitations of the Study

In the case of the influence of the changing climate on the non-farm livelihood portfolio the community comprised of people from different backgrounds wherein culture, norms, beliefs are different. To get women being interviewed in such circumstances was a challenge. To overcome the challenge, the researcher managed to convince the participants that the study was for educational purposes only and no woman would be subjected to any form of sexual exploitation and abuse during the process.

1.11 Delimitations of the Study

The study took place within Domboshava Ward 4. The study did not explore the impact of other factors that may affect household food and livelihood security. The study included participants who are above the age of 18 years. In addition, the research did not cover the impact of the changing climate change on the non-farm livelihood portfolios in other surrounding communities. This helped the researcher to get relevant participants and respondents who got the first hand experiences of the climate crisis and the associated food and livelihood security challenges. More so, the researcher resides adjacent to the research area which made data collection easier and more convenient.

1.12 Definitions of Key Terms

Climate – This is referred as the normal weather patterns of the study area over a specified period, this is usually measured over three decades or more.

Climate Change – This is referred as the variation in terms of the normal weather patterns of a particular place over a specified period of time, usually measured over three decades or more.

Vulnerability – This is referred as the state of being susceptible to attack or injury in the face of both natural and manmade hazards.

Food Security – This is referred as the condition of continuous access to food at an individual, household, and community level.

Livelihood – This is referred as the means to earn a living or a source of income for an individual, household or community.

Livelihood Portfolios – This is referred as the different sources of income or means to earn a living for an individual, household and/or community.

Sustainable Livelihoods – This is referred as means to earn a living whose benefits cannot diminish over time.

1.13 Chapter Summary

The study was hinged upon exploring the impact of the continuously changing climate on non-farm livelihood practices in Domboshava Ward 4. The chapter forms the foundation of the study in question. The next chapter to follow is chapter 2, which is review of relevant scholarly articles.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This segment encompasses the review of the writings from different scholars across the world with regard to the variation in terms of climate and its adverse influence on non-farm livelihood portfolios. The chapter commences by looking at the theories supporting the study. Furthermore, it explores the main concepts of the study and finding out how they are intertwined in explaining the nexus between the climate crisis and the livelihood insecurity of different people. More so, the chapter addresses the three objectives which acts as the main thematic areas of the research. The chapter concludes with a chapter summary.

2.2 Theoretical Framework

In this study, the two primary theories that will direct the exploration of the influence of climate change on off-farm livelihood portfolios in Domboshava Ward 4 are the Pressure and Release Model and the Sustainable Livelihoods Approach.

2.2.1 Progression of Vulnerability Model

The progression of vulnerability model is a theoretical framework utilized in disaster management which assists explaining the causes and underlying forces of disasters (Stainton, 2023). It was propounded by the Canadian geographer and disaster expert, Ben Wisner, in the late 1990s. The PAR model comprises of four intertwined phases consisting of root causes, dynamic pressures, and unsafe conditions. Social, economic, political, and environmental factors, like climate change, environmental degradation, and bad governance, may be root causes. Dynamic tensions includes the quick and direct triggers of catastrophe, like regular risks, innovative mishaps and clashes. Unsafe conditions acknowledge the specific vulnerabilities that place individuals and communities at risk of disaster. The PAR model offers a worthwhile starting point for considerate multifarious and interrelated aspects that contribute to disaster risk, and for guiding effective disaster risk reduction and management stratagems. This is relevant to the current study in the senses that climate change which is a root cause, as well as food and livelihood insecurity (unsafe condition) increases vulnerability to disasters. Therefore, addressing climate change, and livelihood insecurity is of paramount importance towards resilience capacity building.

2.2.2 Sustainable Livelihoods Approach

A sustainable livelihoods approach (SLA) in this context is about bringing the philosophy and exercise of poverty reduction stratagems, sustainable growth, and involvement and enablement processes into an agenda for policy scrutiny and indoctrination. The SLA is a procedure of examining and changing the existences of individuals encountering neediness and inconvenience. It is a hands-on approach premised on the acknowledgement that all individuals have capabilities and endowments that can be advanced to assist them enhance their survival. A principal idea is that diverse families have varied access to earn a living that the SLA objects to develop. The resource endowments, which the underprivileged need to make compromises and make choices around, consists of livelihood assets. The SLA inspires thinking out of the box and liberates humanitarian relief and development practitioners from orthodox approaches that are usually limited to detecting problems and finding way out, which is applicable to this research.

2.3 Conceptual Framework

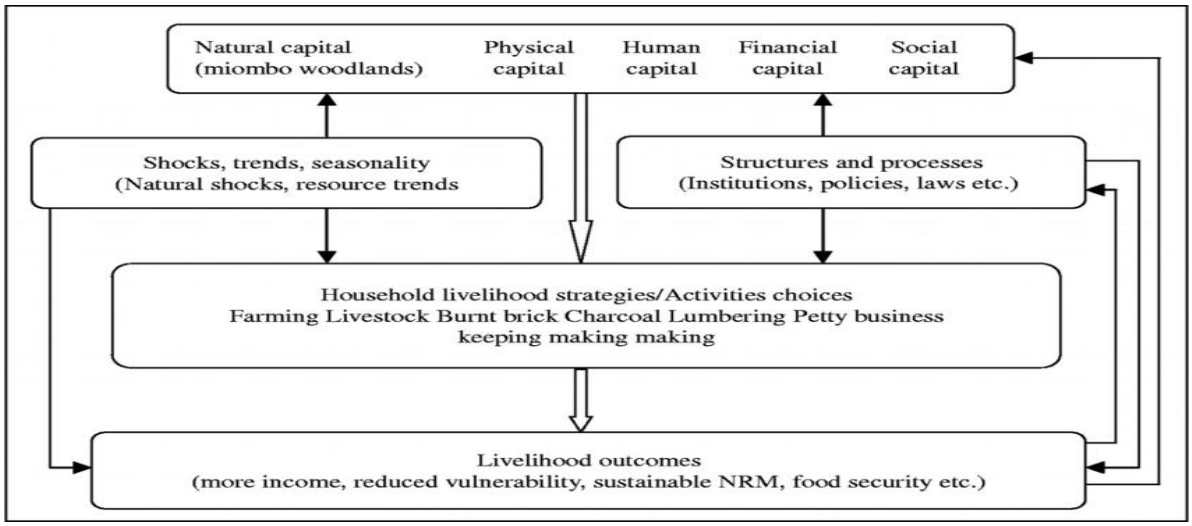

Figure 2.1: Sustainable livelihoods conceptual framework.

Source: Carney 1998. Carney, D, ed. 1998

The conceptual framework is premised on the Sustainable Livelihoods Model and shows the assumed associations between **natural shocks** (independent variable), **livelihood assets** (mediator variable), **structures and processes** (mediator variable), **household livelihood**

strategies (mediator variable), and **livelihood outcomes** (dependent variable). Tropical storms, floods, droughts, and heat waves, among others are hereby referred to as natural shocks. Livelihood assets are the resource base of a community such as wetlands, livestock and survival skills. Regulations, institutions, and policies, among others, are referred as the structures and processes. Household livelihood strategies are referred to a set of activities done by different families to earn a living such as horticulture, vending, and moulding bricks. Improved food security, increased household income, and reduced vulnerability to disasters, among others, are hereby referred to as livelihood outcomes.

2.4 Typical non-farm livelihood portfolios amid climate change.

As indicated by Iqbal, Rizwan, Abbas, Makhdum, Kousar, Nazam, Samie and Nadeem (2021), non-farm livelihood portfolios are food and income generating activities that goes beyond farming. These incorporate collection of wild fruits, weaving, brick moulding, carpentry, fishing, and hunting, among others. Individuals can get pay or food from such livelihoods to support themselves for some time. Be that as it may, with climate change causing significant damage, food insecurity and worldwide hunger is rising. Imperative to note is the fact that disasters only occur when a hazard meets a point of vulnerability. In the short term, climate-driven hazards cannot be reduced, a cocktail; of measures can be put in place to reduce vulnerability and exposure of the most at risk.

Among the 17 sustainable development goals is the need to take immediate action to fight climate variability and change as well as its consequences. The objectives are to increase all nations' resilience and adaptability to hazards and natural disasters caused by changing climate; incorporating measures to combat climate variability into national policies; further developing instruction, raising consciousness and human and institutional limit on ecological change relief, variability, influence reduction and prompt warning; putting into action the pledge made by developed countries that are parties to the UNFCCC to mobilize $100 billion per annum by the year 2020 from all sources to meet the requirements of third world countries on the backdrop of significant alleviation activities and openness over the execution, and ensuring that the Green Climate Fund is fully operational through its capitalization; advancing components of raising limit of compelling environmental change-related arranging and administration in least advanced nations (United Nations, Zimbabwe, n.d.).

Numerous farmers around the world pick different income earning choices for expanding their household income for of hazard avoidance, social security, and, most importantly, to fund agrarian activities. Off-farm livelihood practice among farming families has turned into a basic piece of livelihood attaining stratagems lately in the midst of quick developing climatic and socio-segment changes. Iqbal et al.'s research in Pakistan's southern Punjab, (2021) tried to distinguish the examples and financial elements liable for the take-up of different non-farm generation among agrarian families figured out that roughly 79 per cent of the overviewed farmers were associated with off-farm earnings, though, the pay from these sources represented around 15 per cent of complete family emolument. Additionally, the bulk of participants presented non-farm employment, followed by self-employment. The desire to increase family income and the need to reduce the dangers related with farming, as well as the low income from agriculture, were the primary motivations for choosing non-farm employment. The choice to take part in a particular off-farm activity was influenced by a variety of socio-economic and infrastructure factors, including family size, education, and age. As a result, it was expected that technical assistance would be provided to boost farm incomes as a way to limit migration and guarantee food security. Nonetheless, professional preparation could upgrade the countryside inhabitants' range of abilities to enhance on-the-farm through agricultural business advancement in countryside, empowering them to hire neighbours as opposed to crowding metropolitan areas.

Despite the fact that countryside economies are generally casual, they have made various emolument, work prospects and food security for grassroots people. In most non-industrial nations countryside markets consist monetary exercises in areas like farming, the travel industry and fisheries among others. However, the beginning of climate variability in recent years has led to the downfall of some countryside businesses and an increase in the redundancy rate across the majority of rural economic sectors. As of late, environmental modification has been connected with outrageous incidents of increasing ocean levels. The rural economic sectors have suffered a significant amount of damage due to hurricanes, droughts, and floods, among others. Madzivhandila and Niyimbanira (2020) conducted a study to look at the potential effects of climate variability on rural employment trends and the economy. It attempted to respond to the following inquiries: How much of an impact does climate change have on the economy of rural areas, including livelihood activities? The exploration technique utilized depended on hypothetical information got from writing material like scholarly articles,

books and different wellsprings of scholastic distributions. According to the study, the rise of climate variability and change recently may also be related to the slow expansion of the rural economy, the unpredictability of one's means of subsistence, and the absence of new employment opportunities. For instance, the majority of rural livelihood activities and agricultural products have been destroyed by drought and floods, as have tourism and fishing businesses, resulting in fewer jobs and job losses. The study came to the conclusion that if job prospect are to be generated for grassroots communities, a diversity of responses to the impact of climate variability on the rural economy must be developed.

As past writing shows, off-farm revenue addresses up to 50% of rural family emolument in agrarian societies. For the most part because of an absence of emissary data on typical weather and household organizations, two vital elements have remained outlawed in past examinations on pay expansion: (I) the job of intra-occasional environment fluctuation (impacted by environmental change), and (ii) the job of family linkages situated in far off regions (progressively significant given populace versatility because of unseen struggles and further developed streets and correspondences).

The influence of these factors on off-farm livelihood shares and working hours in the Peruvian Andes was examined in a study by Ponce (2023). The study found that, after governing for other possessions and ecological factors, households with strong, distant networks engage in more activities other than farming. Across sub regions, the effects of rises in intra-seasonal climate unpredictability, which is measured by the temperature range throughout the core crop planting period, are diverse. While the study found no direct effect on households in the Southern Andes, which are more remote and native, families in the cooler Central and Northern Andes incline to boost their off-farm earnings as climate change rises (below 13 degrees celsius through the crop production period). The review recommends that far off, solid ties expedite off-farm prospects for families confronting rising temperature unpredictability in central and southern regions.

The safety of families in Ethiopia's countryside hemisphere is impacted by a variety of susceptibilities that frequently disturb rural livelihoods. Despite this, rural farm families

employ a variety of coping mechanisms to increase their resilience. As a result, the susceptibility context, contributing elements, and coping stratagems of Takusa Woreda in North Western Ethiopia were examined in Mengistu's (2022) study. The review utilized multistage inspecting methods to choose 200 examined respondents, and expressive insights and log-it model were utilized for investigation. On-farm activities, according to the outcome, include: the production of crops and livestock was extremely at risk. Despite the fact that non-farm livelihood portfolios are vulnerable, families opt for these alternatives in addition to the on-farm strategy. Sex, livestock production, and income risk were all considerably associated with the model result (p 0.01). Also significant (p 0.05) were the agricultural production risk and total livestock component. Rural farm families used a variety of coping mechanisms based on their level of exposure and the nature of their means of subsistence. Accordingly, Ethiopian work programs were encouraged to consider family financial settings and consolidate farm families' methods for dealing with especially difficult times in approach planning to accomplish livelihood security.

From the reviewed literature, it has been noted that previous researches are more focused on livelihood diversification from farm-based activities. There is no agreement on what are the typical sources of non-farm livelihood amidst climate change. Furthermore, the conditions obtaining from various study areas may not best represent the Zimbabwean context as well as that of Domboshava Ward 4. Consequently, this research sought to feel this knowledge gap.

2.5 Effects of climate change on the non-farm livelihood portfolios.

Normal assets are significant in supporting the occupations of rural families and the environs. Nevertheless, numerous developing nations are experiencing alarming resource depletion as a result of overexploitation. At the same time, non-farm employment opportunities have emerged as a result of the region's rapid economic expansion. It is possible to reduce resource extraction and enhance the well-being of rural households by studying the nexus between non-farm occupation and resource extraction. A dataset of 1780 similar families from three analysis waves conducted in 2010, 2013, and 2016 in Vietnam was used by Do, Nguyen, Halkos, and Grote (2022) to (i) find the elements of rural families' involvement in non-farm undertakings, (ii) look at the nexus between non-farm livelihood and physical resource extraction, and (iii) scrutinise the effect of non-farm livelihood portfolios on rural families' well-being. The

discoveries from combined test assessments uncovered that (I) satellite web at home and provincial street quality emphatically influence families' choices to take part in non-farm business; (ii) There is a negative correlation between income from natural resource extraction and income from other sources; (iii) Non-farm earnings meaningfully contributes to the comparative and complete reduction of insufficiency. Their discoveries proposed that superior arrangement of non-farm prospects and expanded interest in foundation and telecom are expected to work on rural families' government assistance and subsequently lessen their natural resource misuse.

Viable means to earn a living in less advanced nations are compromised by human, regular, physical, social and monetary elements. Pakistan remains additionally confronting extreme adverse consequences of these elements as climate disturbances, economic defects and deficient conventional credit accessibility on provincial vocations. A study by Habib, Rankin, Alauddin, and Cramb (2023) looked at the aspects that led to the adoption of specific livelihood diversification stratagems including how rural Pakistanis responded to these threats. The review depended on a quantitative study of 295 families in three locale of downpour took care of country districts of Pakistan's Punjab with contrasting yearly precipitation. The results demonstrated that having a variety of income sources protected households from potential threats to their means of subsistence. Besides, fractional multinomial regression modelling uncovered that more noteworthy tutelage was related with a further enhanced occupation system, where emolument was prevalently gotten from non-farm and off-farm employment practices. In contrast, families with other elderly individuals, extra domesticated animals, and a bigger smallholding size either mostly diversified into an off-farm approach by being employed on other farms or concentrated their means to earn a living on their private farms. These discoveries highlight the significance of further developed admittance to schooling and foundation for work expansion. A strategy that spotlights on decreasing low proficiency rates in countryside Pakistan may likewise furnish new roads of job expansions with improvement of countryside education rate to moderate the dangers related with job techniques of smallholders.

In Western Africa, rain-fed farmers have long adjusted to varying planting state of affairs. Such farmers are currently occupied to construct more robust means to earn a living in reaction to

traversing forces from globalization, soil potency loss, and socioeconomic transformation. A study by Voss (2022) looked at farmers' insights of ecological change and socioeconomic transformation in Senegal, as well as the factors that influenced as well as limited their adaptive reactions. It paid precise consideration to how non-farm and on-farm means to earn a living interacted with fears about changing weather patterns. Surveys and multinomial regression using statistics from around 500 agrarians revealed wide-ranging patterns in insights and adaptive approaches, while semi-structured conversations with 47 farmers shed light on personal experiences. The discoveries demonstrate that most Senegalese smallholders see significant ecological change that is enhancing progressing cycles of agricultural transformation, expanding dependence on off-farm occupations and early life migration specifically. The utmost poor farmers primarily depend on prayer, probably as a result of a lack of other options, but the most concerned farmers turn to an assortment of ways of earning a living. The study showed how farmers' relationships with non-agrarian work changed as socioeconomic and climatic conditions changed in African countryside. This has repercussions for climate change adaptation programs for farmers.

The livelihood strategies that husbands and their counterparts in the same homestead use to deal with climate-prompted food uncertainty in Southeast Nigeria were examined in a study by Anugwa, Agwu, Suvedi, and Babu (2020). Collective and bargaining approaches were used to collect personal and family-level statistics from 120 couples in Southeast Nigeria; distinct interviews were conducted for husbands and wives. The respondents' responses were obtained through the use of key informant interviews, and household surveys, and focus group discussions. For the purpose of the study, percentages, mean scores, and multinomial log it regression analysis were used to examine the quantitative data. Ninety percent of the wives (79.2 per cent) had higher levels of food insecurity as compared to their spouses. The participants noticed that the noticed variations in the environment subsidized colossally to their food uncertainty circumstance. To adapt to food instability, a marginally higher extent (47.3 per cent and 14.2 per cent) of spouses embraced non-farm and on-farm techniques, separately, whereas men (39.8 per cent) took on more off-farm procedures (38.5 per cent). Moreover, consequences of the multinomial log it relapse uncovered that marketplace remoteness and credit accessibility altogether impacted the selection of married couples' commitment to off-cultivate work methodology; Women's choice to get involved in a non-farm or an off-farm strategy was significantly influenced by where they obtained information about climate change

issues; also, getting settlements altogether affected males' decision of commitment in non-farm system. The study came to the conclusion that, despite the fact that women perform important protagonists in terms of eradicating food insecurity in their homesteads, sex orientation-specific barriers frequently hinder their capacity to address climate-prompted food shortage.

In developing nations, non-farm occupation in rural societies partakes considerable attention. Nonetheless, its job in executing environmental variation methodologies is seldom examined. Danso-Abbeam, Ojo, Baiyegunhi, and Ogundeji (2021) conducted a cross-sectional study to determine whether non-farm employment by the countryside families in Southwest Nigeria increased the magnitude of climate variability and change adaptation actions. To represent selectivity inclination, the review utilized endogenous treatment impact for count information model expanded with the converse likelihood weighted-relapse change assessor. Both estimators found that the contributors would have used fewer adaptation methods if they had not partaken in off-farm work in countryside areas. Smallholder farmers' adaptive capacities were also found to increase when they worked in rural non-farm jobs. Farmers need more employment opportunities during the off-cropping season if rural development efforts are to succeed. This will assist ranchers with working on their capacity to embrace more environmental change transformation methodologies and, therefore enhance farm efficiency.

The livelihood and food security of smallholder farmers have been significantly impacted by climate change. However, a non-existence of methodical and context-based evidence hinders efforts to support farmer adaptation. In Ethiopia, Gebru, Ichoku, and Phil-Eze (2020) investigated the aspects that led to the implementation of the most important climate variability and change adaptation approaches. Three-stage inspecting method was utilized to choose the review locales and test families. Duplicates of 485 polls were directed and supplemented with information from key informant interviews and focus group discussions. Aftereffects of the enlightening examination recognized that utilization of water abs soil protection works, establishing trees, further developed crop seeds, water system and utilization of non-farm earnings producing exercises were the most used variation procedures to environmental change. Livestock holding, education, extension services, cooperative membership farmers' income, and households' perception of climate variability were found to have an encouraging and noteworthy influence on households' adaptation to climate change in the multinomial

logistic regression (MNL) results. Running against the norm, the family head's age, distance to showcase and agro-biology were found adversely and genuinely influencing smallholder ranchers reception of variation techniques to environmental change. Therefore, as a way of reducing the potential undesirable effects of climate variability and change on farmers' portfolios of livelihoods, public policy on climate variability adaptation has to take into consideration the resource base and lifelong perspectives of local people.

Regardless of a flood of writing on emigration and climate variability, proof on the effect of climate variation and fluctuation on relocation is uncertain and the jobs of in-situ transformation procedures in relocation choices are hazy. Zeroing in on smallholder farmers in central Ethiopia, a study by Dula et al (2022) scrutinized the effects of environment factors and the utilization of in-situ transformation methodologies on families' movement choices. Using a multi-level discrete-time event-history model, the data were analyzed. Migration decreases during the short raining period and increases during the long raining period season (June–September), according to the findings. Beginning stage of downpour during the two seasons diminishes movement though late beginning increments relocation. The affinity to move was low for families utilizing crop enhancement however high for those changing harvest type and taking part in non-farm exercises. According to the findings, the adverse effects of rainfall on crop production and food availability cause vulnerable farmers to migrate for survival. Through agro-specialized supports of climate change adaptation, encouraging lucrative jobs in the countryside, enhancing of income-generation aptitudes of prospective travellers, and expanding pro-poor job prospects around urban centres, livelihood issues related to rainfall can be addressed and distress movement avoided.

Diversification is a typical livelihood stratagem for countryside families in non-industrial nations, with diversification being either a decision or need contingent upon individual family settings. Utilizing two white caps of information for 1773 families from eight nations in Southern Africa, Musumba, Palm, Komarek, Mutuo and Kaya (2022) analyzed job diversification and its drivers. The researchers looked at livelihood diversification by looking at how much household participation there was in three different activities: harvest, domesticated animals, and non-farm. The findings indicated that forty percent of households engaged in all three means of subsistence, though diversity levels varied widely. The scientists

utilized a corresponded irregular impacts exemplary to distinguish the variables that pushed or pulled families to expand their activities. Admittance to non-agrarian acknowledge was emphatically related for livelihood variety as it can catalyze contribution in non-farm practices. Dry season adversely affected business variety. Area of yield land decidedly affected the quantity of job exercises directed. Between 2009 and 2011, 53 percent of families added or removed at least one means of earning a living, with non-farm activities being the most common addition. The outcomes showed the unique idea of jobs and significance of shocks (like dry season) and asset gifts (land) in figuring out family occupation broadening.

The effects of climate variability have been felt through food production network because of floods, storms and dry spells. Accordingly, it has prompted food security chances coming about because of food production and cost unpredictability. Environment is currently the essential determinant of horticultural efficiency and, in this regard, environment and food accessibility are profoundly entwined. Nyathi, Ndlovu, Phiri, and Muzvaba, (2022) led a review whose objective was to question the ramifications of environment fluctuation on food security on provincial families in Bulilima Locale of Zimbabwe. In particular, the review tried to talk about the drivers of harvest losses in Bulilima Region and look at the ramifications of environmental change on family food production and food accessibility. The review embraced a blended strategy approach where in-depth interviews, focus group discussions, and document analysis were directed with key informants. The findings indicate that livestock production as well as crop yields and local food supplies have decreased as an outcome of climate variability. Such repercussions have a ramifications on family earnings and buying power equality. Families have turned to the broadening of their business enterprises trying to deal with the compensations of food safety and environmental change. The review reasoned that for families to work on their means of earning a living, they have to zero-in on portfolios that can build their access to food and enhance their family earnings to adjust and endure the dangers of average weather change. The study suggested cultivating crops that can withstand high temperatures as a response to climate risks. To assist them with adjusting to environmental change, rural less-privileged folks should be given assets that help non-farm and farm practices.

After the review of literature, it has been noted that previous studies were more concerned about the impact of average weather changes on farm-based livelihood portfolios, which is a

direct opposite to the focal point of this study. Additionally, the previous studies were more focused on the impact of changing climate on livelihood security in general, not on non-farm livelihood portfolios in particular. Furthermore, there are no currently accessible documents from a research that was previously conducted in Zimbabwe which details about the impact of average weather changes on non-farm sources of livelihoods. Therefore, this research sought to fill such a knowledge gap.

2.5 Household strategies employed towards reducing the effects of climate change on non-farm livelihood portfolios.

The majority of smallholder farmers' primary source of income is agribusiness. Agrarians who rely on agricultural systems which are depends on rainwater face a significant setback from a change in climatic condition. A study by Sisay and Ibsa (2021) examined smallholder farmers' adaptation stratagems for improving livestock and crop production in response to shifting climatic conditions. The precise intents included a review of existing crop and livestock production adaptation stratagems, opportunities for alteration, challenges for adjustment, and factors that affect livestock and crop production adjustment schemes in face of shifting climatic circumstances. Smallholder farmers have utilized various harvest and domesticated animals' production variation procedures to decrease the effect of average weather changes and inconstancy linked risks. Capacity developments and awareness raising were the main substantial adjustment prospects for mitigating the impact of average weather changes. Population development (huge household size), improper use of land and woods arrangements, procedures, and projects, low formal limit of neighbourhood bodies, underestimation of nearby networks, overgrazing, soil disintegration, deforestation, and decrease in soil ripeness are aspects that make it challenging for smallholders to adjust with the impacts of average weather variations. Smallholders' decision of adjustment stratagems is affected by means of agro-biology, admittance to environment data, orientation, and age of the family head, and education level, farm earnings, off-farm earnings, credit utilization, expansion administration, and remoteness from the economic place.

Average weather variation is one of the stern worries that have a huge effect in every aspect of social development. Amongst these areas, agribusiness is the most exceedingly awful hit area. In the Nawalpur District of Nepal, a study by Dhungana, Vikash Kumar, Khand, and Dhungana

(2020) sought to investigate the factors that influence households' practices of adjustment to the impact of climate change on off-farm undertakings. It used the information gathered from two Village Development Committees (VDCs) of Nawalpur locale of Nepal, i.e., Tamsaria and Jaubari. 433 of the 3106 households were selected for the survey. The respondents were chosen through a method of systematic random sampling. The information was gathered via direct interviews with the family head who had lived in that area for 15 years or more using a structured questionnaire that had already been tested. Paired strategic relapse investigation was done. Age was not a factor in determining how the households adapt to specific off-farm activities. It was discovered that single women and married people were less likely to adapt to off-farm activities. Compared to people who were illiterate, people who were literate had a greater chance of adaptation, or changing their food consumption habits. Females, contrasted with male, non-Hindu individuals, joint family and Janajati contrasted with supposed upper position were bound to adjust non-farm practices. The predominant household occupation of non-agricultural activities has a significant impact on adaptation to off-farm activities. The practices of adaptation were also determined by the size of the household.

Rural scientists have fostered various horticultural advances and practices, better referred to as climate-smart farming as a component of average weather variation and moderation struggles. Improvement specialists put resources into scaling these to have a more extensive effect. Hellin and Eleanor (2019) involved the case of the Western Highlands in Guatemala to outline the way an emphasis on the quantity of smallholders embracing climate-smart farming can encourage a propensity to regulate farmers, rather than perceiving separation inside agricultural populaces. The Western Highlands are rife with poverty, and due to unequal land distribution, farmers average 0.06 hectares per person. For some farmers, horticulture as such doesn't address a way out of destitution, and they remain progressively dependent on non-agrarian livelihood portfolios. As a result, smallholder households' various capabilities for livelihood alteration are ignored by ineffective CSA targeting. These capacities are linked to the prospects and restrictions provided through various agronomic and non-agrarian livelihood conduits. Environment shrewd mediations will frequently require a more extensive and more extreme plan that incorporates supporting farm families' capacity to construct non-agrarian-based jobs. Options for climate risk management that include changing agronomic and non-agrarian ways of making a living will need coordinated cross-disciplinary research and development that goes beyond what has typically been the case in the context of CSA so far.

Average weather change is the most perplexing ecological issue looked by this present reality. The farming arena is defenceless against the changing climate because of its monstrous reliance on environment. As a result, farmers must implement adaptation stratagems in a way to lessen the influence of climate variability. From a review led by Anjani, Debashis and Amar (2019) in India, it was reasoned that farmers have been adjusting to the effects of climatic changes in their own specific manners of living. Various techniques are being utilized by farmers; the significant ones incorporate the utilization of various harvest assortments, moving trimming designs, and deferred planting and so on. The main obstacles to climate variability and change adaptation were the high cost of adaptation, a lack of knowledge about adaptation policies, and outdated technology. Hence it is suggested that opportune data scattering ought to be finished about prompt forewarnings of average weather changes and furthermore, consciousness crusades and preparation phases should be coordinated to upgrade the smallholders' versatile limit.

Climate fluctuation and change have strongly impacted agrarian frameworks, which are the significant foundations of earnings for countryside families in agrarian nations. The ability to bounce back of countryside families and the harmonising options they have for adapting to climate variability must be addressed because it is anticipated that climate events will become more widespread. Although farming families in developing nations are increasingly aware of the need to improve their climate resilience, the least is well-known about the issues that shape this elasticity. In this way, a review research was directed in Upper east Iran to act as a contextual investigation in a non-industrial nation. A multistage delineated irregular examining procedure was utilized to research the environment versatility of 224 cultivating people. Whereas the outcomes uncovered small, temperate, and elevated degrees of type of weather flexibility, most cultivating individuals were viewed as incapable to get through climatic strains. Toward upgrading climate flexibility, a lot of agrarians had taken on a cocktail of absorptive and versatile measures. Forward-looking and ground-breaking strategies were less rehearsed. The primary factors that contributed to farming families' resilience to extreme events were time of life, adjustment strategies, family size, tenure, reaction effectiveness, and earnings. It is necessary to plan proper resilience-development inventiveness, develop efficient proactive, adjustable, and transformative stratagems, equitably distribute technical and

financial resources support, and increase the countryside households' awareness regarding viable farm management in a way to enhance their resilience to climate variability and change.

Agribusiness-based means to earn a living, prevailing in countryside of emerging nations, continue to confront the difficulties to adapt to average weather change and outrageous climatic events. Hence, livelihood investigation alongside weakness to climatic change is a significant perspective to address the average weather changing issues. The business status of prevailing ranch work gatherings and their weakness in both waterfront and non-seaside biological systems in Odisha, an Indian state tormented by environment actuated catastrophic events, were the subject of a proposed study by Das, Ansari, and Ghosh (2023). It likewise meant to depict livelihood resources deciding climatic weakness of farmstead families. The differential degree of physical, social, human, monetary, and regular resources covering an irregular example of 200 ranch families addressing three prevalent homestead job gatherings was analysed using the sustainable livelihood framework. Farmers who simultaneously raise livestock and grow crops, as well as farmers who do both. Beginning around 2011, the Indian Chamber of Horticultural Exploration's public advancements in environment versatile agribusiness program has helped the farmers under study. The standard of living did not significantly differ between the groups. Crop and livestock farmers had a higher-than-average level of overall livelihood and the highest contribution from social assets. In any case, with occupation status file upsides of 51.73 and 62.72 in waterfront and non-seaside locale, harvest and animals ranchers fundamentally beat yield and domesticated animals' ranchers. The means of earning a living indicators depicted as elements of susceptibility of smallholding families to environmental modification would assist in environment strategy promotion in regards to institutional developments. Environment brilliant mechanical and institutional advancements, organization between the partners and expanded vocation choices gave farm families better versatility to average weather variation as mirrored from lesser susceptibility index values in beach front districts. This necessitates activism on the part of policymakers for the development and implementation of climate-conscious technological and social innovations to offer farm families a wider range of livelihood options and improved protection against climate variability vulnerability in a particular agro ecosystem. Farmers would be able to adopt climate-smart agronomic innovations, build viable livelihoods, and improve elasticity to the influences of average weather changes with the assistance of the government in the form of monetary support, sponsorships, extension service, insurance, and enough formal infrastructure.

On a regional and local scale, a variety of manifestations of the effect of changing climate on farmers' means of subsistence have been observed. According to the fundamental knowledge of farmers in the Himalayas, it is common knowledge that typical weather change has an impact on the region. Paudel, Wang, Zhang, Rai, and Paul (2021) led a poll based overview of 747 families to get more familiar with environmental change and its belongings. The trans-boundary Koshi River Basin (KRB)'s four physiographic regions were the focus of the survey. Additionally, climatic information were utilized to compute climatic patterns somewhere in the range of 1980 and 2018. In order to examine the climatic trends between years over time, the Mann–Kendall trend test was carried out and the Sen's slope was deliberated. As per the study, the bowl has encountered an expansion in temperature, environment prompted crop sicknesses, and an expansion in bother recurrence, dry season, floods, and a diminishing in precipitation — all solid marks of environmental change. Crop creation (89.4 percent), human wellbeing (82.5 percent), domesticated animals (68.7 percent), and vegetation (52.1 percent) were believed to be harmed by these pointers. The observed climatic trends for all physiographic regions were an increase in temperature and a decrease in rainfall. The fact that the rate of change varied by region strongly supports the farmers' local knowledge of climate change. The most raised growing example of temperature noted in the slant region at 0.0975 °C/a ($p = 0.0002$) and most sharpened reducing example of precipitation in the mountain locale by −10.424 mm/a ($p = 0.016$) some place in the scope of 1980 and 2018. If appropriate adaptation strategies are developed in accordance with physiographic region, the effects of climate change may be lessened. The improvement of yield seeds that are better ready to endure dry season, nuisances, and infections, as well as the development of nearby clinics to serve cultivating networks, were among the new transformation moves toward that were proposed.

Average weather is perhaps of the main factors in agrarian efficiency, which could straightforwardly or in a roundabout way impact efficiency since the environment is connected to physiological cycles. Therefore, it is essential to have an understanding of the various tactics farmers employ to mitigate the adverse effects of climate change, as well as the factors that influence smallholder maize farmers in South-West Nigeria's adoption and intensity of climate change adaptation strategies. A sum of 330 smallholder maize farmers, or smallholders, were surveyed (Adeagbo, Ojo, and Adetoro, 2021). A twofold obstacle count information model was utilized to gauge the elements impacting ranchers' reception of variation techniques while representing determination predisposition with the stopping of inverse mill ratio (IMR) as a

regressor. The implementation of climate variability and change adjustment policies by smallholders was influenced by significant variables like the size of the household, the devaluation ratio, the rate of recurrence of visits to the extension office, entitlement to the extension office, and non-farm earnings. The intensity of climate variability and change adjustment tactics was significantly influenced by the respondent's age, age range, family size, faith-based organization, off-farm earnings, climate statistics, entitlement to credit, farmers living in Osun State, and remoteness to market. As a result, the study came to the conclusion that, especially during the off-growing period, farm-level policy efforts aimed at enhancing rural development should prioritize farmer membership in FBO, increase extension agent visits, and promote off-farm earnings and entitlement to climate variability statistics. Approaches and venture systems of the public authority ought to be equipped towards supporting superior expansion administration, giving on-ranch showing preparing, and spreading data about average weather change and variation methodologies, especially for smallholder ranchers in Nigeria.

In study areas where agriculture is a major source of income, changing climate is having serious effects on the environment, economy, and society. A review was started by Assaye, Ketema and Bekele (2020) to recognize the current transformation systems convinced by smallholder farmers, and elements influencing the decisions of variation methodologies against environmental modification in Ankesha Guagusa locale. Essential information were gathered from a haphazardly chosen 156 example families in the region through dialog technique and focus group discussion while optional information were gathered from various associations and distributed sources. To achieve the stated goals, distinct measurements as well as an econometric model were utilized. The results of the multivariate probity model showed that households were 46.79 per cent, 52.26 per cent, 45.51 per cent, 69.68 per cent, and 78.20 per cent more likely to use crop diversification, implement irrigation, use improved crop varieties, adjust the planting date, and conserve soil and water, respectively. Additionally, the result demonstrates the combined likelihood of utilizing all of the adjustment tactics was 11.53 per cent, while the combined likelihood of failing to implement all of the methods was 7.7 per cent. The typical outcome additionally affirms that gender, academic level, household size, animal-holding, land ownership, non-farm earnings, farm returns, augmentation contact, credit utilized, admittance to environment data, space to showcase, and agro-biological zone affected average weather change and variation techniques. As a result, new varieties of crops that are

better appropriate to the native environs will be used and improved credit and irrigation facilities, updated extension services, and the mechanical capability of smallholders will be the primary focuses of future policies.

The means to earn a living of agrarians in the third world countries are under threat from average weather change. Climate-prompted livelihood insecurity is a major concern in semi-desert northern side of Ghana, where 73% of the inhabitants is involved in smallholder farming. Through risk spreading, diversification of means of earning a living is known to have the impetus to enhance climate rigidity in smallholder agrarian schemes. That in any case, little is had some significant awareness of the connections between work enhancement procedures and environment flexibility in such at risk situations. Drawing information from a cross-sectional review with 1100 smallholder families in semi-parched northern Ghana, a study by Mohammed, Batung, Kansanga, Nyantakyi-Frimpong and Luginaah, (2021) added to the writing by looking at the nexus between livelihood enhancement and average weather change flexibility. According to the results of a logistic regression analysis, smallholder agricultural families that only used farm diversification had an OR of 4.66; p 0.001), and farm and non-farm diversification in combination (OR = 6.28; $p \leq 0.001$) had essentially higher chances of detailing more grounded versatility to changing climate contrasted with the individuals who utilized no enhancement methodology. The study also established that smallholder agrarians' insights of their resilience to climate variability were considerably influenced by land preparation methods, the basis of climate statistics, and religious conviction. These discoveries highlight the requirement for agrarian approach to advance both homestead and non-farm livelihoods as correlative gamble spreading systems. In semi-arid agrarian settings, examining the interactions between on-farm and non-farm means to earn a living may be advantageous. In doing as such, basic context oriented elements, for example, source of draught power and origins of climate data should never be ignored.

Changing climate and the risks that come with it pose significant challenges to Ethiopia's agrarian sector. Farm-level adaptation may be a useful tool for controlling these production risks. To chart individual insights of climate variability and its prompted risks, adjustment tactics, and concomitant elements, a study used the incident of a vulnerable agrarian community in the Tigray region of Ethiopia. A section of 397 smallholding families from the

research area was selected through a multi-stage sampling strategy and analyzed with the help of inferential as well as descriptive statistics. According to the findings, farm households perceived significant climate shifts, including an overall increase in hotness, a reduction in rainfall, and modifications in rainwater patterns. Droughts, floods, and rise in the cases of pest as well as disease attacks on crops are also among the risks that farmers have reported. Farmers, in light of climate changeability, were embracing different transformation measures to oversee environment gambles at the homestead level. Mulching (88 per cent), water and soil management activities (78 per cent), and unconventional tillage activities (74 per cent) were testified as the widely used adaptation stratagems. On the other hand, the utilization of better-quality seed (27 per cent), growing trees (26 per cent), diversified farming (12 per cent), and homestead activities (3 per cent) were testified as the smallest amount of widely used adjustment tactics. Aftereffects of the paired log it model revealed how old that family leader might have been, proficiency level, usage of credit administration, use of augmentation administrations, and admittance to cultivate water were the critical determinants of significant variation methodologies. The study suggested expanding rural households' access to a variety of services provided by institutions, such as climate statistics, consultative services, and loan, in order to enhance their capacity for adjustment and livelihood flexibility.

A review was done by Yiridomoh, Appiah, Owusu, and Bonye, (2021) to research ladies smallholder ranchers' non-farm transformation methodologies to climate changeability in the countryside of Ghana. The review embraced a contextual investigation plan technique with a section of 187 ladies smallholders. Multi-stage examining was utilized to choose the networks and ladies participants for the review. Surveys and meetings were utilized to gather the information. SPSS software was utilized to perform descriptive analyses on the quantitative data, while a thematic approach was used to analyze the interviews. Climate vulnerability perception index (CVPI) was done to decide the responsiveness as well as openness of ladies to environment fluctuation and the requirement for non-farm transformation. Once more, the Adaptation Strategy Index (ASI), test of linearity, and Kendall's Coefficient of Concordance were used to find effective and important non-farm adaptation approaches for the women. Women in their communities were found to be at risk from dry seasons, excessive rains, and veld fires, according to CVPI results. The outcomes further demonstrated that, because of ladies responsiveness and openness to environment fluctuation, they have participated in numerous non-farm variation techniques to incorporate poultry and animals keeping, petty

business, and agro-handling to answer the differing environment framework. The trial of linearity uncovered that, the vast majority of the non-farm transformation techniques were fundamentally connected with environment changeability. Agro-processing was found to be the utmost viable off-farm adjustment stratagem for women smallholders, according to the ASI results. Conversely, ladies referenced restricted monetary assets, poultry and animals sicknesses and irritations, and low market requests as limitations in their reaction to environment fluctuation.

From the reviewed literature, it has been noted that previous studies were more concerned about on- farm-based approaches to curtail the effects of climate variability on means to earn a living such as crop diversification, and climate smart agriculture. This does not apply to non-farm sources of livelihoods. In addition, the studies were conducted elsewhere other than the current study area. Therefore, this study sought to fill such an important knowledge gap.

2.7 Chapter Summary

The main focus of this section was to provide an evaluation of various scholarly articles on climate change and the effects it has on non-farm livelihood portfolios within Domboshava Ward 4. The section commenced by providing the theories that supports the study. The section went further by providing the conceptual framework where the main concepts of the study were defined and to what extent are they related to the study. More so, the section explained on the main themes which were obtained from the research objectives, providing literature from various scholars on each and every objective. The section concludes with chapter summary. The next chapter to follow is chapter three, which is the methodology section.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This section lays the processes on how the data was collected. It commences with an introduction, then followed by research design which simply means the blue print of the study. The chapter also is comprised of population, targeted population the sampling methods used, the size of the sample of the research followed by data gathering tools involved. Finally, the chapter explores on data analysis, presentations and interpretations.

3.1 Research Paradigm

As this research intended to uncover the impact of climate variability and change on non-farm livelihood portfolios, the interpretive research paradigm was more appropriate. As indicated by Creswell (2003), the interpretive exploration configuration depends on the assessments of the members with respects the review region and this assists the scientist with getting a comprehension of the universe of human experience. Interpretive exploration worldview additionally depends on mixing subjective information assortment with quantitative information techniques. The combination of these two informational collections assists with extending the comprehension of the genuine circumstance confronting peri-metropolitan individuals in attempting to get by in the midst of the climate crisis. This additionally puts forward the viewpoints more successful and more coherent (Mackenzie and Knipe, 2006). Therefore, this research is based on qualitative research method.

3.2 Research Design

A case study is one of multiple approaches to do research whether it is associated with sociology or socially correlated in light of the fact that its argument is to figure out people in a collective setting by interpreting their undertakings as a self-contained congregation, local area or a self-contained occasion or a case. A case study, according to Burges (1984), is an investigation to answer questions pertaining to research that try to find a multiplicity of evidences from the case settings. Case study, with regard to Ying (2003), is a practical enquiry that scrutinizes a present day occurrence in a real-world context, mostly when the margins between the occurrence and the background are blurred. When the contextual conditions of the event being studied are crucial and the research has no control over how the event unfolds, the case study method is especially useful.

3.3 Population and Targeted Population

According to Barnen (2004), the term "population" refers to any and all subjects or objects that are to be studied and share certain characteristics. Population infers the whole subjects having normal trademark that is being contemplated, it very well might be subjects. The subjects for this study encompassed all the residents of Domboshava Ward 4 regardless of their educational status, gender, the place of origin, the ethnicity, race and level of income. Hence the targeted population for the study comprised of all people aged 18 years and above who resides in Domboshava Ward 4. Moreover, the officials from the government line ministries such as the Ministry of Lands; Ministry of Women Affairs; and the NGO officials who are instrumental for community development; as well as local government officials were also part of the targeted population. All of them were interviewed using purposive and convenience sampling techniques. According to ZIMSTAT (2022), Domboshava consist of a population of 3,139. The community is the home of 0.02 per cent of Zimbabwe's population according to the 2022 census.

3.4 Sampling Techniques

This study adopted the non-probability sampling techniques for their unique advantages of including every one for participation which added more validity to the study. The non-probability sampling techniques in question are purposive and convenient sampling techniques. The purposive sampling technique was meant for key informants such as those from government line ministries, local government employees and traditional leaders with vast knowledge about the study area, whilst the convenience sampling method was meant for the general public, that is, the grassroots people inhabitant to the study area.

3.5 Sampling Procedure

Settling on a sample for study is one of the significant phases of the exploration cycle and will in general impact generalizability or outside legitimacy, which can likewise be portrayed as similarity, adaptability or aggregation of the outcomes. Examining is characterized by Merriam (1998: 60) as the choice of a field research location, time, people, and events. According to Pressle and le Compte (1993: 57), examining has to do with portrayal of people and subsets making up the populace bunch from which results can be summed up. Since Domboshava Ward 4 has a large population, a sample was most appropriate. This study was conducted on a sample

of 31 participants. In this research, purposive sampling and convenient sampling techniques were utilized to choose participants. The researcher adopted convenient sampling for its advantages it had during the data collection period. Convenient sampling is when samples are selected on availability basis at a particular place (Raji, 2011). For example, a researcher may choose to interview people who are readily available at a homestead, shopping centre and/or place of worship, among others. One of the benefits of such a method is that it gave chances of meeting people with different views pertaining to the research topic. For example, different participants at a market point were interviewed pertaining to their views on climate change and its adverse impact non-farm livelihood portfolios. In this case both old people, the youth and women also had a chance to give air their views concerning the research topic. The chances of missing some people were high using these methods, since the research was not scheduled according to the respondent's time. This is one of disadvantages of convenient sampling techniques. Purposive sampling method was also used to complement the convenience sampling method. Purposive sampling is selection of key respondents purposively. It involves focusing on particular social groups, such as experts, policymakers, traditional leaders, physicians, and others, or key informants (Chromo, 2009). The advantage of this sampling method is that it did not waste much of resources such as time. The researcher targeted his participants hence saving time among other resources. However, there are some chances of missing very essential people who have very important information. For example, in this study those people that work far away from their homes were not considered since they were absent during the research process. It gave an impression that people who spend much of their time outside the community do not have first-hand information with regards to the research topic.

3.6 Sampling Size

The sample size was 31 participants comprising of 01 representative from the Ministry Lands, 01 representative from the Ministry of Women Affairs, 01 official from Ministry of Environment, 01 official from local government, 02 representatives from NGOs, 02 traditional leaders, and 23 community residents.

3.7 Data Collection Techniques

Dobbie (2010) defines research instruments as tools for gathering research data. The choice of assessment tool depends upon the possibility of investigation if it is abstract, quantitative or

combination of methods. Interviews, discussions in focus groups, and observations are some common examination tools used in data collection. Below are the research instruments that were used in this research which are discussed in further detail.

3.7.1 Key Informant Interviews

Key informant interviews (KII), as defined by The Access Project (1999), are one-on-one conversations about a particular issue or topic with a person who is recognized as a community leader or expert in a particular field. Derma (1990) says that key informant interviews can be used to find out how people or social groups see themselves and how they interact with the environment. The researcher held eight key informant interviews with three (03) officials from the central government line ministries, one (01) from the local government, two (02) from NGO staff, and two (02) from traditional leadership to elicit their views with regard to the impact of the changing average weather patterns on non-farm livelihood portfolios in Domboshava Ward 4. To this end, the research participants were assigned quasi names as part of observing research ethics. The names assigned are as follows: The government representative from the Ministry of Lands was identified as **MLAFWRR**; the representative from the Ministry of Women Affairs was identified as **MWACSMED**; the official from the Ministry of Environment was identified as **MECTHI**; a representative from the local government were identified as **LG**; the NGOs field staff were identified as **NGO_1** and **NGO_2**; and traditional leaders were identified as **TL_1** and **TL_2**.

3.7.2 Semi-structured Interviews

According to Quinlan (2015), an interview is the process of directly interacting with a subject in order to collect research data. Face-to-face interviews, phone interviews, or computer terminal video conferencing are all options for this. According to Patton (2002), semi-structured interviews enable the researcher to gain insight into the individual perspective of the interviewee. The exploratory idea of semi-structured interviews fits with the interpretive way of thinking and epistemology of this examination. The meetings give a rich and itemized set of information that empowers the disentangling of intricate and dynamic peculiarities through giving chances to dive into specific regions while building an image of the setting inside which the activity or circumstance happens (Saunders et al., 2009). In addition, semi-structured interviews offer the researcher, in contrast to structured interviews or surveys, the

chance to establish rapport and trust with the interviewee through a more conversational approach. Through the possibility of two-way conservations, this also gives the interviewee some power and control, increasing the validity of the obtained data. The scientist figured out how to hold 23 semi-organized top to bottom meetings consequently arriving at information immersion.

The top to bottom meetings led for this examination followed a meeting guide outlined around three meeting subjects. These topics were contrived in light of the general point and goals of this exploration project. Depending on the participant's willingness to elaborate on their responses and the amount of information provided, each interview lasted anywhere from 20 minutes to 45 minutes. Interviews were, for the most part, conducted at people's homesteads upon their invitation. Some were conducted via telephone calls. The researcher drew up a semi-structured interview guide and it was checked by the research supervisor for applicability. The researcher identified eligible participants conveniently, explained what the research was all about, and elicited consent from those interested to participate. For the sake of observing the research ethics and within the context of data protection participants were ascribed with quasi names as follows: **DR_1** to **DR_{23}**.

3.7.3 Observations

Observation is one of the data collection methods which is easy and cheap. The methods involve the researcher to move around the area under study and observe by himself the real situation on the ground. It can be participant observation where the researcher takes an active role together with the research participants, or non-participant observation where the researcher watches the situation as it unfolds from a distance. Concerning this study, the research had to adopt the non-participant direct observation method as he went about watching the natural environment and how it has been transformed. The researcher had a camera which he used to take pictures as he saw massive environmental degradation, deforestation and destruction of wetlands taking place within the community. The method was very effective as it gave the researcher an opportunity to see the current situation by himself which enhanced the validity of the study.

3.7.4 Secondary Data

Apart from the primary sources of data collection mentioned above, there were also secondary sources of data. This method involved the use of data from already published documents, review of the journals from the library and use of internet. These helped the researcher to compare the related literature pertaining to the subject under consideration. Secondary data revealed study gaps, flaws, and the additional information that needed to be collected, which helped to make primary data collecting more focused (Saunders et al., 2017). Reading the literature from earlier investigations aided the researcher in developing a deeper understanding of the issue. The drawback, however, was that some of the information was incorrect and out-of-date, and therefore, time-consuming.

3.8 Data Presentation and Analysis

3.8.1 Data Presentation

Yin (2003) says that trustworthiness is how true a portion of enquiry is. A research project is dependable when it mirrors the truth and thoughts of the members involved (Miles, 2004). Lincoln and Guba propose that reliability of the exploration relies upon the degree to which it dives into the member's experience separated from their hypothetical information. In this study, the researcher demonstrated honesty by abandoning his preconceived notions regarding the relationship between portfolios of non-farm livelihoods and climate change.

3.8.2 Credibility

Credibility alludes to the befitting display of the changes of the common world under study (Richey, 1993). Lincoln and Guba (1985) advocated for a lot of activities that would help with working on the legitimacy of the exploration results. In line with this, the researcher was engaged in the field of study with the view of exploring the impact of climate variability and change on non-farm livelihood portfolios in Domboshava Ward 4. More so, the researcher persistently observed the phenomenon of shrinking wetlands and massive environmental degradation as he observed by his own eyes.

3.8.3 Transferability

As indicated by Lincoln and Guba (1985), adaptability implies that discoveries of the examination can be relevant to comparable circumstances or members. A different researcher

who conducts enquiry in an unalike setting will be capable to apply certain notions that were previously developed because the knowledge that was gained in that background will be pertinent to that researcher. Generalizability and transferability are similar concepts. "As the naturalist can't determine the outer legitimacy of a request, she can give a tick portrayal important to empower somebody keen on making a move to arrive at a determination about whether an exchange can be considered as a chance," as per Yin (1994). The specialist gave a thick portrayal about the setting, the members as well as the strategy for information assortment. According to Seale (1999:45), transferability is achieved by providing a rich, in-depth description of the studied settings to enable the reader to assess the findings' applicability to other settings they are familiar with. In this regard, transferability was achieved by giving detailed and rich description of Domboshava Ward 4 which was the study site.

3.8.4 Ethical Considerations

As per Greener (2008), morals connects with moral decisions influencing choices, principles and conduct. According to Israel and Hay (2006), ethics is all about doing what is right, good, and moral, and it aims to protect others, reduce harm, and increase the sum of the good. There may be a temptation to compromise morals, choices, and behaviour because the study involves interaction with various stakeholders. In planning and gathering information for this study suitable exploration morals were noticed. There was educated assent from all members required after they were told of the reason and utilization of the data gathered. According to Richard and Godfrey (2003), it is always essential to prepare some documentation for research that explains the purpose of the study, the respondent's role, and what will happen to the collected data. The educated assent underlined that the data gathered was for scholarly purposes just and was utilized to address the examination questions. The meeting guide had such data at the top in striking and it was the beginning stage of which the respondent got to comprehend the reasons for the concentrate and how the data they would give would be utilized by the specialist. When interacting with and approaching the participants, voluntary participation was at the forefront of the data collection process. In this process, undue influence and coercion were completely avoided; rather, the participants participated according to their own free will and were not forced to disclose certain information that they considered to be sensitive. No unnecessary strain was welcomed on any member or watchman as the specialist expected that such a methodology would negate the outcomes since the respondent would wind up giving data just to dispose of the scientist. As a result, every participant contributed freely; rather, the

participants took part at their own discretion and were not compelled to reveal particular details. Because it is a fundamental requirement of research, participants' anonymity has been maintained in this study. In order to adhere to the previously stated ethic of collecting information solely for the purpose of the study, participant anonymity was intended to outline the respondents' confidentiality. Rather, titles were utilized in extraordinary cases however no members were recognized by name. Pseudonyms have been utilized in some instances to enhance the discussions. In this regard the researcher sought to be objective by only collecting the information in relation to the study and not ascribing it to any particular individual.

3.9 Chapter Summary

The study involved exploring the consequence of the changing average weather conditions on non-farm livelihood portfolios. This section explored on how data was collected to examine such studies. It consisted of research paradigm and research design wherein it explained that the study was qualitative in nature. More so, the study explored on the people involved in this study and targeted population. Furthermore, the study explained on the sampling techniques used in order to collect the data. It also involved sampling size of which it was limited to only 31 participants. The data collection methods, including the data collection procedure were all explained in detail. The issues of credibility and transferability were also explained. The ethics are the cornerstone of each and every study as such to get valid information the dos and don’ts on data collection were also followed. The chapter concludes with chapter summary. The next chapter to follow is chapter four which is comprising of data analysis, interpretation and discussion.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This section dealt with the actual exhibition, breakdown and clarification of the results that were generated through the research methodology outlined in chapter 3 above. The study targeted to explore the consequences of the changing weather conditions on non-farm livelihood portfolios in Domboshava Ward 4, Zimbabwe. The qualitative methodology involved conducting content-mining interviews with a diverse group of people to gain insights into the typical livelihood portfolios amid climate change, the influence of climate variability on non-farm means to earn a living, and the household strategies being deployed towards decreasing the climate variation effects. Thematic analysis was employed to analyse the interview transcripts. The data were initially coded line by line, and subsequently, codes were grouped into categories based on their similarities. Themes were identified from side to side with a process of iterative comparison and discussion. Three major themes that came out from the exploration are: (1) the typical livelihood portfolios amid climate variability, (2) the impact of climate change on non-farm livelihood portfolios, and (3) household strategies employed towards decreasing the effects on climate variability and change. The chapter concludes with a chapter summary. **Figure 4.1** is an illustration of the study area.

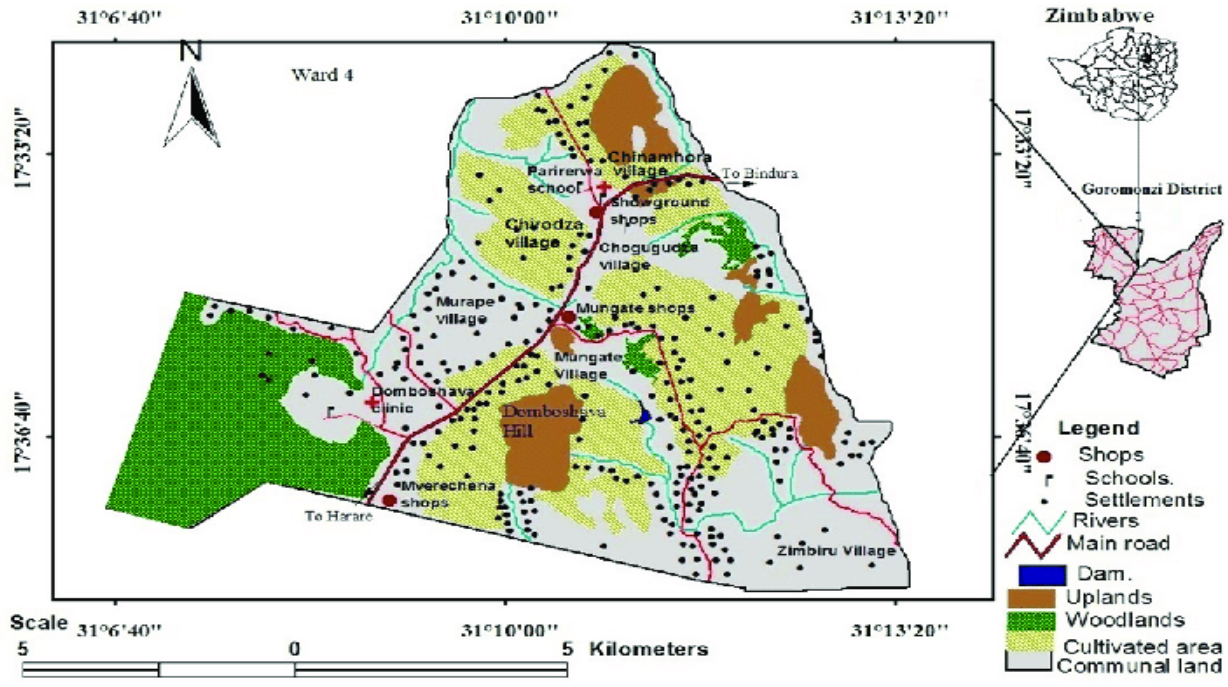

Figure 4.1: Study area, Domboshava Ward 4

Source*:* Marambanyika, Sakarombe, Musasa, and Defe (2020).

4.2 Demographic Information of Participants

The researcher included demographic data to justify the adoption of suggestions offered by participants on the current phenomenon. The variables inform the researcher on the nature and character of participants. Thus, the researcher would be enlightened on the depth and type of questions to ask the respondents. Participants were given quasi names to protect their true identities as a way of observing the research ethics as follows:

Table 4.1 Distribution of Participants (n=31)

Participants	**Quasi Names**	**Number of Participants**
Government Ministry of Lands	**MLAFWRR**	01
Government Ministry of Women Affairs	**MWACSMED**	01
Government Ministry of Environment	**MECTHI**	01
Local Government (Goromonzi Rural District Council)	**LG**	01
Non-governmental organizations	**NGO_1** & **NGO_2**	02
Traditional Leadership	**TL_1** & **TL_2**	02
Domboshava Residents	**DR_1** to **DR_{23}**	23

***Source*: Primary Data (2023)**

The data gathered in **Table 4.1** clearly shows that 03 participants were from government line Ministries, 01 was from local government, 02 were from NGOs, and 02 were from the traditional leadership, while 23 were Domboshava Ward 4 community residents.

4.2.1 Educational Status

Table 4.2 Participant Distribution by Level of Education (n=31)

Education Level	Number of Participants
Master's Degree and above	02
Bachelor's Degree	08
Diploma	04
Advanced Level	02
Ordinary Level and below	15

Source: *Primary* Data (2023)

The data gathered shows that two participants had accomplished at least a master's degree and above, eight had accomplished a bachelor's degree, four had attained a diploma, and two had attained an advanced level, whilst 15 had attained an ordinary level certificate. This shows that the chosen participants had a broad understanding of how to critically analyze their surroundings and provide accurate information and opinions regarding the subject of the study. Consequently, the analyst could set standard inquiries for the educated members.

4.2.2 Gender Distribution (n=31)

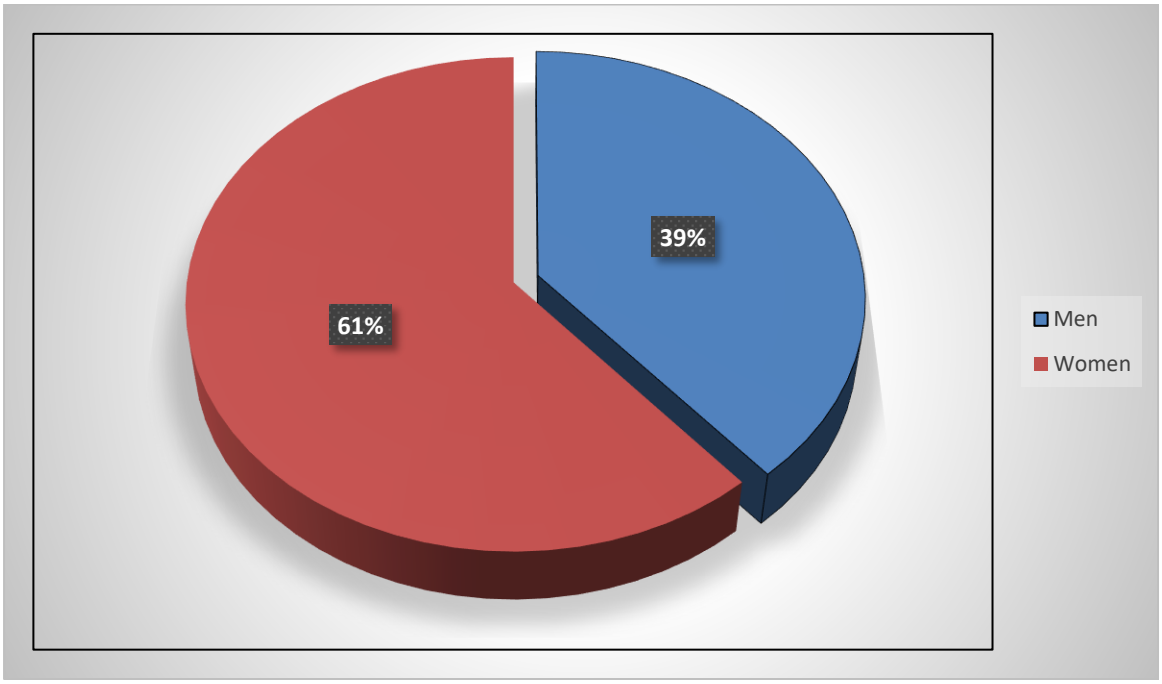

Figure 4.2: Pie chart showing the distribution of participants by gender

Source: Primary Data (2023)

This research has revealed that the majority, that is, 61% of all the research participants were actually women, while 39% were men. This can be generalized that more men are working far away from their homes than their female counterparts due to the nature of their jobs and family responsibilities. Women are more likely to work at home or at least closer to their homes as they will be looking after children as compared to men. On the other side, according to the latest Zimbabwean national population census report which was conduct in 2022, the country has got more women compared to men, thus, this could also be taken into consideration as the higher turnout of women.

4.2.3 Distribution of Participants by Age (n=31)

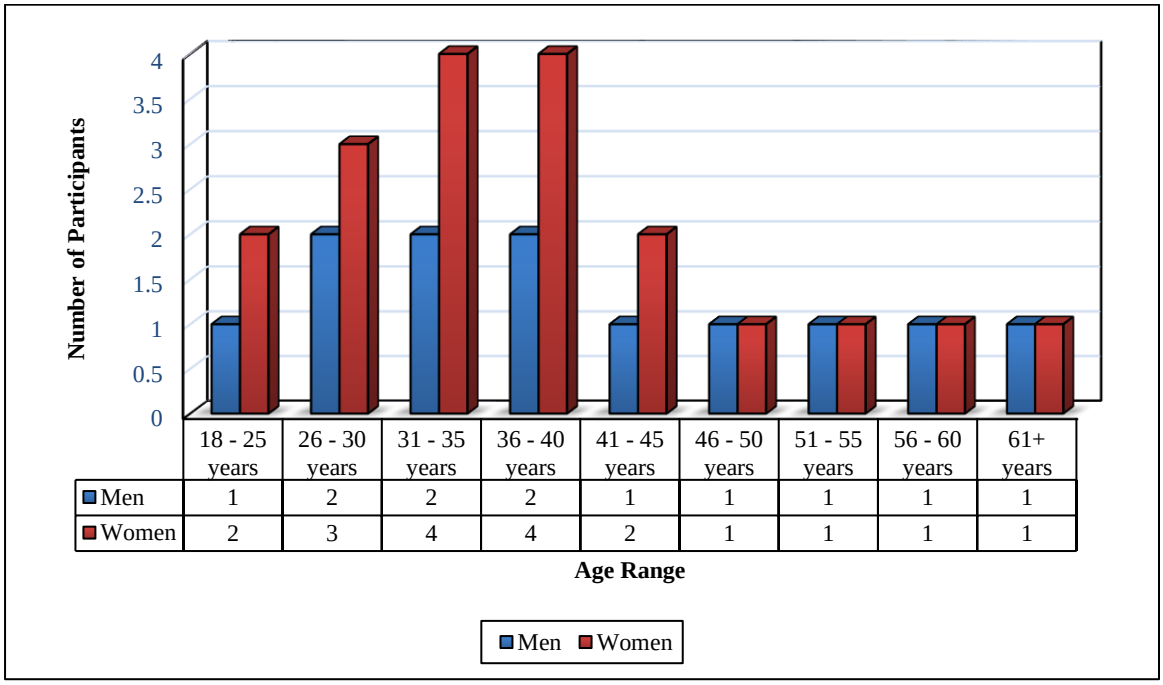

Figure 4.3: Bar Graph depicting the Distribution of Participants by Age

Source: Primary Data (2023).

Figure 4.3 clearly demonstrates that the overall age range of the participants were between the ages of 18 and 60 with only two people who were over the age of 61. It also clearly shows that those between 18 and 45 years are the most economically active group, taking up a wide range of non-farm means to earn a living some of which are at risk in the face of climate variability and change.

4.3 Typical non-farm livelihood portfolios in the face of climate change and variability in Domboshava Ward 4.

Iqbal, Rizwan, Abbas, Makhdum, Kousar, Nazam, Samie, and Nadeem (2021) define non-farm livelihood portfolios as gathering wild fruits, informal trading, firewood collection, brick molding, cross-border trading, carpentry, fishing, and hunting. These activities generate economic or income outside of agriculture. Individuals can get income or food from such sources of livelihood to support themselves over time. The Sustainable Livelihood Approach (SLA) and the Pressure and Release (PAR) methods were used to examine the impact of climate variability on non-farm means to earn a living in Domboshava Ward 4. The degree of vulnerability and adaptation to the impact of changing weather scenarios in rural areas is determined by the availability of various assets. Through the differed information assortment strategies utilized (**direct observation, key informant and semi-structured interviews**), the examination of the reactions uncovered the livelihood asset status in the study area. To assist in the description of particular aspects, pictures were also exhibited. This thematic presentation emphasized means to earn a living in relation to family characteristics, household involvement time in carrying out the undertakings, the quantity of produced product varieties, and other peri-urban livelihood-related issues. **Individual responses** on non-farm means to earn a living are framed in **Figure 4.4**.

(n=31)

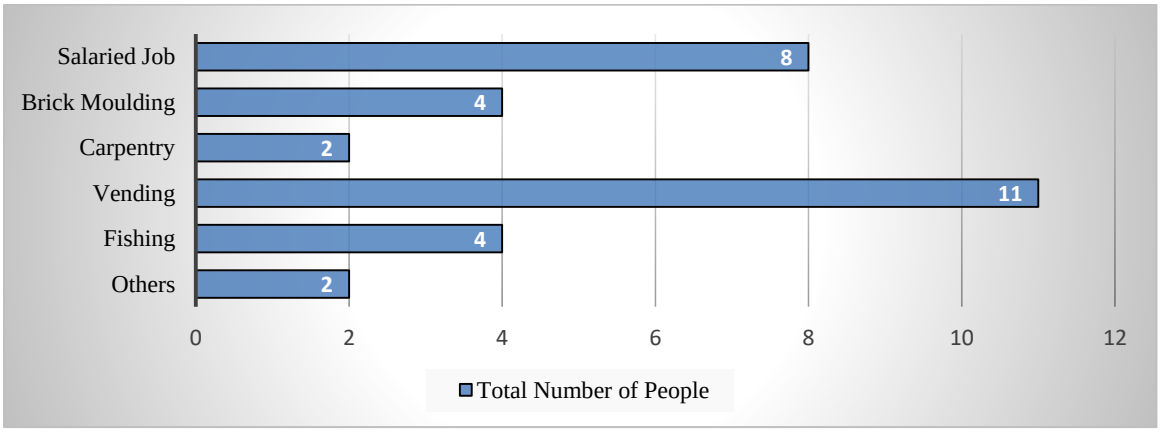

Figure 4.4 Typical non-farm livelihood portfolios in Domboshava Ward 4

Source: Primary Data (2023)

Figure 4.4 clearly illustrates that the major livelihood portfolios undertaken by the inhabitants of Domboshava Ward 4 is vending with 11 out of 31 confirming this, thereby representing 35.5% of the research participants. This is followed by salaried jobs (25.8%), brick moulding

(12.9%), fishing (12.9%), carpentry (6.5%) and others (6.5%). In the wake of rapid climatic and socio-demographic shifts, non-farm rewards among farm families has become an essential component of livelihood earning strategies (Iqbal et al., 2021). The yearn to raise household income and the need to lessen the dangers concomitant with farming, as well as the low income from agriculture, were the primary motivations for choosing non-farm employment. A scope of financial and foundation related factors are related with the choice to partake in unambiguous off-ranch action, for example, age, training, family size, ranch pay, reliance trouble, cultivating experience, and distance to the principal city. This study revealed that there are various livelihood assets outside farming from which the Domboshava Ward 4 community derives its food security. The livelihood assets include: (**1**) woodlands which are mainly concentrated in Murape, Chogugudza and Mungate Villages; (**2**) water bodies such as the dam in Mutsvati Village, and numerous rivers such as the Nyaure River; (**3**) uplands such as the famous Domboshava Hill which is located in Mungate Village, as well as other uplands which are found in Chogugudza and Chinamhora Villages; (**4**) a major road which links the study area with Harare city and Bindura town; and (**5**) various shopping centres which are dotted around the area such as Showground, Mverechena and Mungate shops.

Vending as the major non-farm livelihood practice is usually carried out along the major road, that is, Domboshava road, and it is mainly concentrated at Chinamhora, Showground, Mungate and Mverechena business centres. Street vending is typically widespread and deliberated with regard to third world countries (Recchi, 2021). In Domboshava Ward 4, people sell various products such as wild fruits, cobra and handcrafts in order to earn a living as shown in **figure 4.5** which is a culmination of **direct observations** from the field of study.

Figure 4.5: Vending of wild loquat fruits (Mazhanje)

Source: Field Survey (2023)

Wild loquat is one of the key non-farm livelihood options within Domboshava Ward 4. This was confirmed through one of the **key informant interviews** held where the research participant added:

> *The economy here is heavily informal with a lot of people being involved in income generating activities such as carpentry, welding, vending of wild fruits and other horticultural products. Only a handful people are operating as registered small and medium enterprises such as retail shops at Showground, Mungate and Mverechema shopping centres, said* ***MWACSMED****.*

Through a **semi-structure interview** another participant added that:

> *I collect wild fruits such as mazhanje in order to feed my family. I travel as far as Harare and Bindura to sell these wild fruits and provide for my family. On a good day, I make about US$9 as my net profit. However, on a bad day, I struggle to go back home, said* ***DR_3***

In addition during a **key informant interview**, a participant highlighted that:

> *People are earning a living through various means which include vending where they sell mazhanje as you can see. Those wild fruits are found in abundance here. Some people go as far as Harare to sell these wild fruits in order to send their children to school and put decent food on the table, said* ***TL_1.***

Meanwhile, some people are into brick moulding down in the villages and they obtain firewood from the remaining woodlands and uplands which they use to burn their bricks for them to be stronger and therefore, marketable. Bricks are some of the important building resources utilized for various kinds of development which are prepared fundamentally from clay soil with the expansion of added substances to expand its solidarity. Yearly brick moulding between the year 2017 and 2019 was practically 32.4 billion bricks and the development pace of 5-6% in the earlier 10 years (Mamun-Or-Rashid and Bari, 2023). The increased production of farm bricks has been necessitated by the rapid urbanization process currently unfolding in Domboshava Ward 4. **Figure 4.6** is a product of **direct observation** on brick moulding as a form of non-farm livelihood practice.

Figure 4.6: Brick moulding in progress

Source: Field survey (2023)

From the research undertaken, brick moulding is one of the typical sources of non-farm means to earn a living within Domboshava Ward 4. This was confirmed by research participant **DR15** during an interview. The bricks are later sold to those that will be constructing their houses as the area currently urbanizing. During a **semi-structured interview**, a research participant posited that:

> *I am into brick moulding and I have been in this livelihood for the past 15 years. We used to supply our bricks to some parts of Harare. However, with this area rapidly turning urban, there is an emerging new market for farm bricks and we have increased our production to match the current high demand, said* ***DR15***

Another non-farm livelihood practice is fishing. It takes place in some water bodies such as the Nyaure River and Mutsvati dam. Millions of people can get essential micronutrients like iron, zinc, vitamin A, and omega-3 from fish, which shows that fisheries can help alleviate malnutrition (Maire, Graham, MacNeil, Lam, Robinson, Cheung, and Hicks, 2021). Notwithstanding, environmental change and overfishing compromise worldwide fisheries. The consolidated impact of environmental transformation and overfishing on the wholesome commitment of worldwide fish species has not been evaluated at this point is basic to figuring out examples of weakness in supplement supplies from worldwide fisheries. Fishing is a very important livelihood option in Domboshava Ward 4. This is in line with what was said by research participant **DR22** during a **semi-structured interview**. The research participant said:

> *I normally catch fish to feed my family. I also sell excess fish to get some money to pay for other household bills including schools fees for my children and medical expenses.*

Figure 4.7 clearly shows three people who were **observed** whilst they were catching fish with

some make-shift nets in a dam in Mutsvati village.

Figure 4.7: People catching fish

Source: Field Survey (2023)

Salaried jobs also constitute an important non-farm livelihood practice within Domboshava Ward 4 in the face of climate change. A worker's compensation, otherwise called pay, is illuminated in a business contract as a type of irregular pay from the business to the representative. According to Chaudhry, Sabir, Rafi, and Kalyar (2011), it is weighed against piece compensation, in which each work, time of work (timings), or other unit is paid in a distinct manner rather than on an irregular basis. Some of the salaried jobs that were found during **interviews** include agricultural extension, humanitarian relief, and local government work, among others. However, some participants were also involved into other income generating activities to supplement their income. A research participant had this to say:

> *I have a white colour job, but am also into cross border trading where I buy clothes from Zambia and sell them both locally here in Domboshava. I normally do the errants when I am off from my full-time job. That is how I have been able to sustain my family.*

This is presented as **Figure 4.8** below

Figure 4.8: Clothes on display at a flea market

Source: Field Survey (2023)

Other livelihood strategies presented by participants were remittances from relatives who are in the diaspora, and craft work (carpentry, basketry, mats and handbag weaving) as shown on **Figure 4.9**. Research participant **DR$_1$** stated that she was into vending where she would sell home-made brooms (mitsvairo), as well as home-made cobra. She said her husband was the one who creates the brooms from the local grass, whilst she was responsible for creating the cobra from a mixture of candle wax, kerosene and red or black oxide. During a **semi-structured interview,** she added:

> *I sell home-made brooms and cobra. I work together with my husband where we share responsibilities. I make the cobra through mixing candle wax, paraffin and red or black oxide, whilst my husband creates the brooms. Thereafter, I move around selling these end products. I can go as far as Harare to sell the products. That is where most of my customers reside, particularly in high- and medium-density suburbs," said **DR$_1$**.*

In addition, other **interviewees** had the following to say:

> *I create and sell baskets and mates (rupasa) from the reeds (tsanga) which are usually found within wetlands around Domboshava. I have been in this business for more than 10 years and have been able to send my children to school because of this livelihood, said **DR$_7$**.*

> *I have been into carpentry as a means to earn a living for the past 20 years. I create wooden spoons (migwaku) and vegetable cutting doughs from indigenous trees which are found here in Domboshava, said **DR$_{12}$**.*

> *My husband is in the diaspora and he sends me money on a monthly basis to cater for the family. That's my major source of living nowadays considering the fact that I am not employed, said **DR$_{14}$**.*

Figure 4.9: Handcrafts for sale

Source: Field Survey (2023)

It also emerged during **semi-structured interviews** that other participants were engaged in the gathering of wild fruits with wild loquat (*eribotrya japonica/mazhanje*) topping the list. Domboshava Ward is well-known for supplying such wild fruits around the country with Harare metropolitan city being the largest market. According to Mithöfer and Waibel (2003), wild fruits are frequently used by rural Africans to supplement their diet and generate cash income. The wild loquat supplement household food security and revenue as the fruits can be exchanged for cash or with other food and non-food items through the butter trade system. Through **observation** the researcher managed to identify one the wild loquat tree in Domboshava Ward 4 as shown in **Figure 4.10** below.

Figure 4.10: Wild loquat tree before the fruits are collected

Source: Field Survey (2023)

After the wild fruits in **Figure 4.10** are gathered, they are send to the market as shown in **Figure 4.5**. The prices in Domboshava Ward 4 are significantly lower as compared to those that are charged in Harare. As such, those that can make transport arrangements prefer the Harare market.

All the above key findings indicates that there are various sources of livelihoods being pursued by different people amid climate change in Domboshava Ward 4, Zimbabwe. This resonates with Iqbal, Rizwan, Abbas, Makhdum, Kousar, Nazam, Samie, and Nadeem's (2021), assertion

that numerous farmers worldwide are utilizing a variety of income-earning options to expand their means to earn income to avoid risk, provide social protection, and, most importantly, finance agricultural operations.

The sub-section deliberated on the **typical non-farm means to earn a living in Domboshava Ward 4**. The following sub-section focuses around **the impacts of changing weather conditions on non-farm livelihood portfolios** as found within the study area.

4.4 The effects of climate change on non-farm livelihood portfolios in Domboshava Ward 4.

The environment and the livelihoods of rural families are greatly aided by natural resources. However, overexploitation of resources is causing alarming resource depletion in many developing nations (Do, Nguyen, Halkos, and Grote, 2022). In this section, the non-farm livelihood portfolios were analyzed with respect to Domboshava Ward 4. Through the diverse tools of collecting data utilized consisting of **direct observations, key informant and semi-structured interviews** the analysis of the responses revealed the consequences of climate variability on livelihood assets. **Individual responses** are illustrated below.

One of the **key informant interviewee** by the name **MLAFWRR** stated that as climate change continues to rack havoc, water bodies were fast shrinking (as clearly shown in **Figure 4.11**) with negative consequences on people's livelihoods that depends on fishing (as clearly shown on **Figure 4.12**), as well as other aquatic products and services. This resonates with Herrera-Pantoja and Hiscock's (2015) assertions that in most of the dry and semi-desert areas of the world, water insufficiency, population growth, and recent droughts are putting a significant strain on water resources. They also added that water resources' vulnerability is anticipated to increase due to climate variability and change, highlighting the need for appropriate adaptation strategies and sustainable water management policies. In Domboshava Ward 4, the quality of fisheries is also declining because of climate change as clearly shown on **Figure 4.13**. In addition, there is also the issue of water pollution and siltation of water bodies as clearly shown on **Figure 4.14**.

Figure 4.11: A receding water body (dam)

Source: Field Survey (2023)

Figure 4.12: People collecting fish from a net

Source: Field Survey (2023)

Figure 4.13: The quality of fish found in Mutsvati Dam

Source: Field Survey (2023)

Figure 4.14: Pollution and siltation of water bodies

Source: Field Survey (2023)

Fishing is an important non-farm livelihood practice in the study area. However, due to prolonged drought periods, one of the Dam in Mutsvati village once dried off. As a result, people's livelihoods that depend on fishing, as well as other aquatic services were negatively affected. Temperature, winds, vertical blending, saltiness, oxygen, pH, and various other physical and substance factors have different immediate and aberrant consequences for

fisheries. The immediate impacts follow up on the physiology, improvement rates, generation, conduct and endurance of people and can at times be concentrated tentatively and in controlled conditions (Brander, 2010). Some of the effects of the changing weather conditions on water availability and livelihood security were confirmed during a **key informant interview** where one participant elaborated this:

> *We used to have numerous wetlands in this area. However, due to incessant droughts being witnessed secondary to climate change, the wetlands are fast disappearing. This has also reduced the quantity and quality of water which is available in our water bodies. It has further led to the deterioration of fish species which constituted an important livelihood option, said **MLAFWRR**.*

During a **key informant interview** one participant contended that wild organic products were turning out to be scarce because of varieties and changes in climatic circumstances disrupting their normal restoration. Because the occupants use the barks of the wild organic product trees for healing purposes, the trees occasionally become dry as a result of persistent debarking. Sthapit, Ramanatha Rao, and Sthapit (2012) say that some tropical fruit species may spread outside of their current range and produce fruit in irregular patterns. Climate shifts are threatening the availability of food because they have a significant impact on perennial fruit crops (Medda, Fadda, and Mulas, 2022). These effects of climate change on non-farm livelihood practices were echoed during the **semi-structured interviews** as follows:

> *We have witnessed quite a number of extreme weather events that have negatively affected our food security and livelihoods, from farming to off-farm income generating activities. Examples of non-farm livelihood options that have been negatively affected include hunting of wild animals and bird species, gathering of wild fruits, and fishing. Some people are now shunning away from these livelihood options since they are no longer lucrative as they used to be about three decades ago. Some women and girls are now engaging into commercial sex work thereby putting their lives at risk. Men and boys are also into substance and alcohol abuse due to high unemployment rate necessitated by climate change, said **TL_2**.*

It came out during a **key informant interview** that almost all wild animals and some bird species have since migrated elsewhere due to the changing climate and variability. As food insecurity and water shortage increases, wild animals and birds are left with no other option, besides seeking refuge elsewhere, whilst others have gone into extinction. Population declines have been more conspicuous among transient species because of their shortcoming to ecological change and human strain (Kubelka, Sandercock, Székely and Freckleton, 2022). It

is feared that enormous wild animals will gradually disappear as their territories are attacked by expanding populations and environmental degradation, such as deforestation and waterway siltation, occurs (Sango and Godwell, 2015a). One participant during the **key informant interview** added:

> *Climate change has significantly affected household food security over the years. Quite a number of people used to rely on hunting as a livelihood practice. However, with the issue of climate change and rapid urbanization, various animal and bird species have since left this area. It is either they got finished or they have gone to other areas with abundance food and water for them to survive. This has negatively affected our livelihood security as a ward.*

It also emerged that climate change has cause environmental degradation through flood hazards and perennial droughts. Human activities such as the continuous cutting down of trees has also contributed towards the environmental degradation as people try to put food on the table through various unorthodox means. Prolonged power outages across the country have increased the demand for firewood resulting into massive deforestation. This has come at a cost to those into brick moulding as a livelihood practice. Paradoxically, this livelihood options also significantly contributes towards pollution, environmental degradation and ultimately, climate change. Vegetation, native trees, eatable bugs, little creatures and wild natural product trees have vanished from the environment (Goodwell, 2022). Environmental degradation has negatively affected other non-farm livelihood practices such as carpentry and firewood marketing. One **key informant interviewee** added that:

> *There has been much environmental degradation that has been taking place secondary to climate change. There is indiscriminate cutting down of trees for various purposes including firewood for brick making and domestic use. Some people are in the business of selling firewood as a means to earn a living. As climate change continue to rack havoc, it's now a survival of the fittest mode. This comes at a cost to the environment.*

Another participant added that:

> *Water bodies are being affected by siltation as a result of massive deforestation upstream. Perennial droughts are also to blame as one of our major dams where we catch fish once dried up recently during the year of 2020.*

Other non-farm livelihood portfolios that have been affected by climate change include basketry and reed mats weaving. The carrying of goods, aesthetics, and bartering of goods like maize meal are all reasons to use baskets. Despite the fact that basketry production continues to take place on the homestead, it is increasingly becoming a source of income for many people,

particularly in light of the variability caused by climate change (Chawe, 2022). While, reed mats are hand-made mats of plaited reed or other plant material. Because the materials for the bins and mats, like grass reeds and roots for shading, are obtained in the wild, basketry is heavily dependent on the biological system of the timberland. The continued availability of forest products like reed grass has become under siege as climate variability and change is taking a huge toll. One of the **semi-structured interviewee** pointed out that the raw materials which they use for weaving baskets and mats were increasingly becoming scarce due to extreme weather events. She had this to say:

> *Wetlands are fast disappearing yet our livelihoods depend entirely on them. It is hard to believe that the reed grass is fast disappearing due to incessant droughts, heat waves, and wild fires, among other hazards. We are in serious trouble and we actually do not know how we are going to fix this on our own*

The above findings from the **direct observations, and in-depth interviews** made from the field shows that climate change has negatively affected non-farm livelihood portfolios in Domboshava Ward 4. This is consistent with the assertion made by Ramirez and Kallarackal (2015), who state that global environmental change is anticipated culminated into higher temperatures, altered rainfall patterns, increased levels of carbon dioxide in the air, and a wide range of other climatic changes that will affect all life on this planet. It likewise concurs with Fahad and Wang (2020), who recommended that environmental change adversely affects the agribusiness area, ground and underground water, and bio-diversity.

The sub-section discussed **the effects of changing weather scenarios on non-farm livelihood portfolios in Domboshava Ward 4**. The sub-section that follows will look at **the household strategies being employed towards reducing the impacts of climate change on non-farm livelihoods in Domboshava Ward 4** as found in the study area.

4.5 Household strategies being employed towards reducing the effects of climate change on the non-farm livelihood portfolios in Domboshava Ward 4.

As per Kaczan and Orgill-Meyer (2020), forecasts of how individuals living in regions that are vulnerable to dry season, flood, and temperature changes will answer such occasions have come about because of worries with respect to the human effect of environmental change. Different households have different ways of responding to changing weather conditions depending on their resource endowments. In this regard, poor people have limited capacity to respond, making then more susceptible to climate change-related disasters. Through the wide-

ranging techniques of data collection utilized comprising of **direct observations, key informant and semi-structured interviews**, the enquiry of the reactions exposed the coping strategies in the study area as clearly illustrated on **Figure 4.15**.

The findings exposed that some families were implementing various strategies to cope with climate variability and change. These included a significant reduction of the number of meals being taken on a daily basis, reduction of the meal portion size, withdrawal of children from school, livelihood diversification, and migration as clearly shown in **Figure 4.15**.

(n=31)

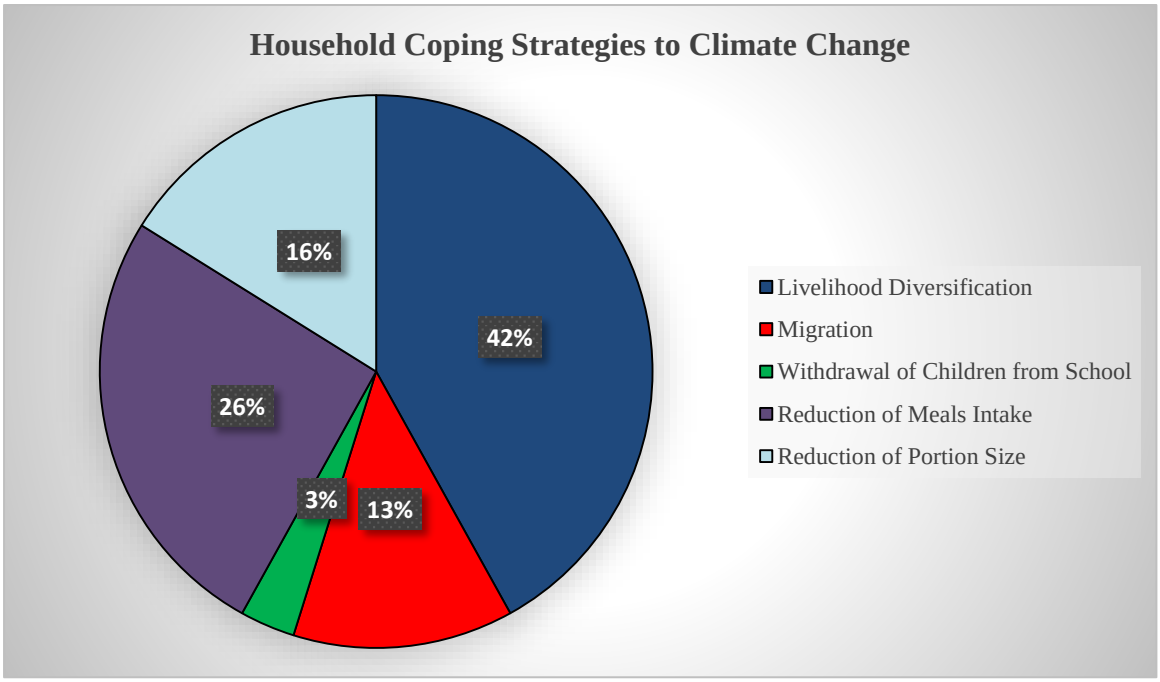

Figure 4.15: Household-based approaches to lessen the effects of climate change
Sources: Primary Data (2023)

Figure 4.15 clearly show that the major strategy being employed towards mitigating the effects of climate change is livelihood diversification with 42% of participants. This is followed by reduction of the number of meals taken per day (26%), reduction of meal portion size (16%), migration (13%) and withdrawal of children from school (3%). For the purpose of reducing poverty, preventing food insecurity, and enhancing the well-being of rural communities, diversification of income sources is essential (Abera, Yirgu, and Uncha, 2021). Livelihood diversification has both short-run usage gain and long-run overflow creation influence (Mahama, and Nkegbe, 2021). Exercises with significant yields are significant for the prosperity of a family (Mohammed, Batung, Kansanga, Nyantakyi-Frimpong, and Luginaah,

2021). Most of the participants who were on salaried jobs were also engaged in other income generating activities which are commonly referred to as side hustles, such as vending of perfumes at their workplaces during working hours, and cross border trading. These livelihoods were supported one **key informant** had this to say:

> *My salary is not enough to cater for all my basic needs. As such, I place an order for Inuka perfumes and sell them during my spare time, either when I am not busy at work or during my off days. Since I started selling these perfumes, my life has never been the same again. Because of that, I do not see myself stopping from engaging in side hustles come what may.*

It also emerged during a **semi-structured interview** that due to the seasonal nature of wild fruits gathering a significant number of people would be engaged in other activities such as part time jobs where women would perform house chores and men would do landscaping, among others. One participant had this to say:

> *I am into carpentry, but I also engage into instant shoe repairs and gathering wild fruits to supplement my income. It all depends on what is on demand as that particular time. I am jack of all trades. Gone are the days when one had to specialize in a certain trade due to the effects of climate change on our food security.*

In response to climate variability and change, some people are reducing the number of meals they are taking on a daily basis, whilst others are reducing their meal portions. The dietary diversity, feeding practices, and coping strategies used by households to deal with food insecurity are largely connected. Food-related coping strategies also reflect household food insecurity caused by climate change. This resonates with the findings from Elolu, Agako, and Okello (2023), who discovered that a variety of strategies to cope with the climate crisis are utilized. They added that the most common of these include depending on less-desired foods (54.9 per cent), limiting meal portions (35.2 per cent), decreasing the number of meals consumed each day (29.6 per cent), and gathering wild fruits and harvesting immature crops. One participant during the **key informant interview** added:

> *People have resorted to negative coping strategies which include reducing the number of meals taken by adults. In some cases, instead of eating at least three decent meals per day, there are people who are eating either one or two meals. Others are reducing their portion size in order to spread the meals evenly over the breakfast, lunch and supper.*

Migration has been in existence since time immemorial with people migrating from one place (source) due to push factors such as perennial droughts, toward the destination where there are better opportunities which act as pull factors. Movement for work stays an occupation

procedure in resource cultivating networks universally, particularly considering exceptional natural change (Gautam, 2017). According to Laczko and Piguet (2013), a renewed interest in the subject of climate change and migration is fuelled by the possibility that a large number of people will be forced to relocate due to the effects of environmental change. It is currently normal information that the changing environment will convey intimidations more regrettable, make individuals bound to relocate, and lopsidedly influence countless individuals who are as of now in danger (in the same place.). It came out during **semi-structured interviews** that people are migrating from the study area is search for better opportunities elsewhere including the United Kingdom. The migration patterns are, nevertheless, temporal in nature as people are leaving their close family and loved ones behind. One participant during the **key informant interview** added:

> *My husband has since left for the United Kingdom in search of greener pastures after completing his higher education. He usually sent me money on a weekly basis, sometimes monthly to cater for our needs including food, school fees for our kids, and medical bills. I am really grateful because of the bold decision he made to go abroad. We were almost laughing stocks in the community because my husband had basically nothing to show for his educational credentials.*

Whilst it is considered as a less common negative coping strategy, withdrawing children from school remains a popular practice in rural and peri-urban communities such as Domboshava Ward 4. From the reviewed literature, there is no evidence to support this standpoint. However, due to rising poverty and food insecurity secondary to climate change, it emerged from an exclusive **semi-structured interview** that withdrawing children from school was a measure to reduce household expenses, thereby mitigating the effects of climate change. One participant added:

> *I haven't been able to pay tuition fees for my four children for some time now since my livelihood has been ravaged by climate change. I have since decided to withdraw two of my children from school in order to reduce my expenses until a time when I get back on my feet again. My worry at the moment is to put food on the table. If I get well-wishers to send back my children to school, I would be proud as a parent. I hope one day my children would be in a position to understand my plight*

The above findings shows that there are various household-based strategies being employed towards reducing the impacts of climate change on non-farm livelihood portfolios. This is in accordance with Yiridomoh, Appiah, Owusu, and Bonye's (2021) attestation that because of awareness and openness to environment changeability, individuals have taken part in numerous

off-farm livelihoods to incorporate poultry and domesticated animals keeping, petty business, and agro processing to answer the differing climatic conditions.

4.6 Chapter Summary

The chapter delved on the presentation, analysis, interpretation and discussion of the research dat. Themes, content quotes, pictures, and graphs were utilized in presenting data. The next chapter looks at synopsis of the study, major results, conclusions and future recommendations.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This is the last section of the research which outlines synopsis of the entire study and presents the conclusion to all the enquiry results. The study was based on discovering the effects of climate variability and change on non-farm livelihood portfolios in Zimbabwe where a case study was drawn from Domboshava Ward 4.

5.2 Summary

- **Chapter 01** highlighted the background of the study spelling out the issue of climate change from the world-wide, regional, and nationwide domains. It was revealed that climate change is negatively affecting every sphere of life including food and livelihood security. The objectives of the study were to establish the typical livelihood portfolios amid climate change, to examine the effects of climate change on the non-farm livelihood portfolios, and to assess household strategies being employed towards reducing the effects of climate change on non-farm livelihood portfolios.
- **Chapter 02** focused on the evaluation of scholarly articles which are relevant to the study. Theoretical framework was revealed, and it encompassed the Pressure and Release (PAR) Model, as well as the Sustainable Livelihoods Approach (SLA). These theories influenced the development of the Sustainable Livelihood conceptual framework. Empirical review focused on Pakistan, Bangladesh, and Senegal, among others. This led to the identification of the research knowledge gap.
- **Chapter 03** presented the research methodology covering a wide range of aspects including the research design chosen, sampling methods, data collection tools and procedures, data presentation and analysis as well as ethical considerations.
- **Chapter 04** highlighted the data presentation, analysis, interpretation, and discussion. To this end, themes, narratives, content quotes, and pictures were utilized in terms of data presentation and analysis.
- **Chapter 05** deliberated on the synopsis of the study, the conclusion of the results as guided by the research questions. The study also made recommendations from major findings of the study.

5.3 Conclusion

The results of this study have been presented as guided by the objectives of this study which are as follows:

5.3.1 Objective 1: To establish the typical livelihood portfolios amid climate change in Domboshava Ward 4.

The findings of this research revealed that participants depend on a cocktail of non-farm livelihood portfolios amid climate change. These are supported by the following livelihood assets: (**1**) woodlands which are mainly concentrated in Murape, Chogugudza and Mungate Villages; (**2**) water bodies such as the dam in Mungate Village, and numerous rivers found in Murape, Mungate, Zimbiru, Chogugudza, Chinamhora, and Chiridza Villages; (**3**) uplands such as the Domboshava Hill which is located in Mungate Village, as well as other uplands which are found in Chogugudza and Chinamhora Villages; (**4**) a major road which links the Ward with Harare and Bindura; and (**5**) various shopping centres which are dotted around the area such as Showground, Mverechena and Mungate shops.

The typical means to earn a living derived from these livelihood assets were found to be brick moulding, vending, and gathering of wild fruits, salaried jobs, and remittances from those in the diaspora. It was established that the study area is rapidly urbanizing, as such, there is high demand for farms bricks which are required for the construction of houses and other buildings. Timber and its products were being used in brick moulding business, as well as the construction of buildings. The timber is being obtained from the woodlands and other uplands. There are those people who are involved into gathering wild fruits such are wild loquat which are later being supplied to surrounding areas including Harare with the highest rate of consumption. Some people were earning a living through fishing from the nearby water bodies such as the Mutsvati dam along Nyaure River. On the other side, some people are involved into retail trading at various shopping centres including Mungate, Mverechena, Chogugudza, and Showground. Very few people confirmed that they received remittances from relatives abroad whereas, others were into cross border trading. There are also other people who sell second hand clothes to earn a living.

5.3.2 Objective 2: To examine the effects of climate change on the non-farm livelihood portfolios in Domboshava Ward 4.

The results of this research revealed that climate change has caused a significantly negative impact of different non-farm livelihood options, notwithstanding the fact that some livelihood portfolios have suffered more negative consequences as compared to others. Water bodies are fast shrinking with negative consequences on people's livelihoods that depends on fishing, as well as other aquatic products and services. People who into the trading of second hand clothes

have been dealt a huge blow by the climate crisis since they can no longer engage into butter trading with farm-based products. Climate change has accelerated the rate of environmental degradation which has upset the livelihood portfolios. There has been deforestation on a massive scale due to high demand for firewood. Incessant droughts, heat-waves and wild fires have negatively affected those who rely on basketry and reed mat weaving business. Some wild animals and bird species have migrated out of the study area due to climate change. These used to constitute an important non-farm livelihood option for the Domboshava Ward 4 inhabitants.

5.3.3 Objective 3: To assess household strategies being employed towards reducing the effects of climate change on non-farm livelihood portfolios.

The research findings revealed that there are various household-based strategies which are being employed to mitigate the impact of climate change. Some people are now diversifying their livelihoods from climate-sensitive natural resources with options such as salaried jobs, migration into the diaspora in search of greener pastures and part-time construction jobs. Those that have secured jobs abroad are looking after their families and close relatives back home through remittances. Some people have established multiple income streams including part-time jobs in Harare where they would wash clothes and does other house chores for people without housemaids, as well as vending where they sell cobra and brooms on a door-to-door basis. Others have engaged negative food-based coping strategies of skipping meals, reduction of meal portion size, and withdrawing children from school to reduce household expenses.

5.4 Recommendations

The purpose of the following recommendations is to provide actionable guidance for enhancing resilience of non-farm means to earn a living amidst the constantly changing climate based on the results of this study.

- Based on the analysis of participants' responses, it is recommended that within the context of climate action, climate education be mainstreamed into the national education curriculum. There are a lot of myths and misconception concerning the issue of climate change. Some people hold the belief that it is too late or pointless to take climate action, whilst others are still in climate change denialism. Both these standpoints only leads to inaction among the people. Some of the research participants were in denial about the existence of the current climate crisis, they believed that some "imaginary gods" were angry at them, hence, they were being punished through the occurrence of extreme weather events. Such myths and misconceptions needs to be

debunked. Climate education will go a long way in terms of raising awareness about the existence of climate change and the need to take urgent concerted efforts to mitigate and adapt to the effects thereof. It can also help to tackle the challenges posed by climate change and address the damages it has inflicted.

- The government of Zimbabwe should spearhead anticipatory action. This entails a proactive response to impending crises by taking swift, risk-informed steps before disasters strike, safeguarding communities from extreme weather events, and preserving livelihoods. An example of the anticipatory action include the enhancement of the early warning system. When there is an impending drought, for example, it helps to inform the community at risk to initiate early action such as evacuation to reduce the impact and magnitude of the impending disaster. It can be the difference between life and death, whether it is a rapid-onset hazard or the one that creeps up over time. By embracing anticipatory action, the government and its development partners can help vulnerable communities to prevent human suffering and pave way for a more resilient future for all.
- There is need for the preservation and restoration of wetlands. These are of paramount importance in terms providing ecosystem services. They host marine species such as fish which support livelihoods. Wetlands acts as carbon sinks which is important in as far as climate change mitigate is concerned. They help to absorb flood waters, and release them later during a drought, which in turn supports both farm-based and non-farm livelihood portfolios. The preservation and restoration of wetlands will also go a long way towards disaster risk reduction.
- The government should invest in renewable energy sources. The country has abundant sunshine almost throughout the year yet it is crippled with abnormal power outages, some of which are attributed to low water volumes at Lake Kariba due to incessant droughts. This has an indirect negative impact on food and livelihood security. Those people whose livelihood portfolios depend on electrical power such as grind milling, and welding are severely affected. Renewable energy does not only support such livelihoods, but also go a long way towards climate change mitigation. Thus, the country can harness its abundant sunshine to reduce power outages and enhance sustainable livelihoods. On the other hand, there is wind energy that can be equally harnessed for sustainable development of the country.
- There is need to embark on nation-wide afforestation and reforestation programmes, targeting those areas that have suffered more in terms of vegetation loss. Afforestation

and reforestation programmes should be aimed at increasing carbon sinks and ecosystems restoration. The programmes should include fruit trees in order to support different livelihood portfolios, improve nutrition and boost export earnings, at the same time building resilience against climate change.

- The government of Zimbabwe should regulate land use through land use planning and protecting the environment. Land-use planning is of paramount importance in terms of ensuring the sustainability of livelihoods and reducing disaster risk. It is a process that is carried out by public authorities, whether they are the central government or the local government, to identify and evaluate any options for the use of land. This includes taking into account long-term goals related to the economy, society, and environment, as well as the repercussions for various sections of the society. Plans that describe the permitted or acceptable uses are then developed and published (Mutsau, 2010). By preventing dwellings and the construction of critical infrastructure in hazard-prone areas like wetlands, land use planning can assist in disaster mitigation and risk reduction. In this regard, the Environmental Management Agency (EMA) needs to step up its efforts towards the regulation of land use and the protection of the environment. This will go a long way towards building the resilience capacity against climate change and enhancing the sustainability of non-farm livelihood portfolios.

5.5 Chapter Summary

This section involved summarizing, conclusions as well as recommendations of the study. The section commenced on summarizing each and every objective of the research. Later, the section provided conclusions of the research and recommendations which sets way forward for policy implementation were provided. Lastly, the sections ended with a summary.

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APPENDIX A: INTERVIEW GUIDE FOR KEY INFORMANTS

BINDURA UNIVERSITY OF SCIENCE EDUCATION

Introduction

Greetings, my name is **Takudzwa Dydmus Marwa**, a student at **Bindura University of Science Education** who is currently studying towards a **Master of Science Degree in Disaster Risk Management**. As part of my study, I am required to carry-out a research whose success relies upon your cooperation and commitment in terms of answering the research questions. I am carrying out a research which is titled, "**Exploring the effects of climate change on non-farm livelihood portfolios in Domboshava Ward 4, Zimbabwe**". I am kindly requesting you to answer all the questions that follows as honestly as possible.

Please be aware that your participation in this study is entirely up to you and that no personal information will be shared with anyone. All the data gathered here will be utilized for scholarly purposes only and information assembled will be treated as secret. You have been selected to serve as a key informant in this study. You are allowed to seek explanation, extend your reactions or get clarification on pressing issues. Kindly note that there are no dangers or direct rewards related with this exploration, however your precise commitments will assist with building knowledge that will be utilized to shape future humanitarian relief and sustainable development interventions. Please do not mention your name or address during the interview.

SECTION A

1.0 DEMOGRAPHIC INFORMATION OF PARTICIPANTS

1.1 How old are you?

AGE RANGE	TICK APPROPRIATE BOX
18 - 25 years	
26 - 30 years	
31 - 35 years	
36 - 40 years	
41 - 45 years	
46 - 50 years	
51 - 55 years	
56 - 60 years	
61 years and above	

1.2 What is your highest educational qualification?

LEVEL OF EDUCATION	TICK APPROPRIATE BOX
Master's Degree and Above	
Bachelor's Degree	
Diploma	
Certificate	
Advanced Level	
Ordinary Level and Below	

SECTION B

2.0 CLIMATE CHANGE AND NON-FARM LIVELIHOOD PORTFOLIOS

2.1 In your own understanding, what is climate change?

2.2 What are the typical sources of non-farm livelihoods in this community?

2.3 What are the effects of climate change on those livelihood options that you have mentioned?

2.4 What are the common climate-related hazards of disasters in this community?

HAZARD TYPE	TICK APPROPRIATE BOX
Tropical Cyclones	
Floods	
Drought	
Heat wave	
Wild fires	
Others (Specify)	

2.5 Which livelihood options do you perceive to be the hardest hit by the effects of climate change?

2.6 Are there any household level strategies that are being employed towards reducing the effects of climate change on non-farm livelihood portfolios?

2.7 In your own opinion, what are the measures that can be put in place to improve off-farm food and livelihood security?

This marks the end of the interview.

I THANK YOU FOR YOUR TIME AND CONTRIBUTION!

APPENDIX B: INTERVIEW GUIDE FOR DOMBOSHAVA RESIDENTS

BINDURA UNIVERSITY OF SCIENCE EDUCATION

Introduction

Greetings, my name is **Takudzwa Dydmus Marwa**, a student at the **Bindura University of Science Education** who is currently studying towards a **Master of Science Degree in Disaster Risk Management**. As part of my study, I am required to carry-out a research whose success relies upon your cooperation and commitment in terms of answering the research questions which I am going to ask you. I am carrying out a research which is titled, "**Exploring the effects of climate change on non-farm livelihood portfolios in Domboshava Ward 4, Zimbabwe**". I am kindly requesting you to answer all the questions that follows as honestly as possible.

Your participation in this research is voluntary and no personal information will be disclosed. All the information gathered here will be used for academic purposes only and data gathered will be treated as confidential. Kindly note that there are no risks or direct benefits associated with this research, but your accurate contributions will help build knowledge that will be used to shape future humanitarian relief and sustainable development interventions. Please do not mention your name or address during the interview.

SECTION A

1.0 DEMOGRAPHIC INFORMATION OF PARTICIPANTS

1.1 How old are you?

AGE RANGE	TICK APPROPRIATE BOX
18 - 25 years	
26 - 30 years	
31 - 35 years	
36 - 40 years	
41 - 45 years	

46 - 50 years	
51 - 55 years	
56 - 60 years	
61 years and above	

1.2 What is your highest educational qualification?

LEVEL OF EDUCATION	**TICK APPROPRIATE BOX**
Master's Degree and Above	
Bachelor's Degree	
Diploma	
Certificate	
Advanced Level	
Ordinary Level and Below	

SECTION B

2.0 CLIMATE CHANGE AND NON-FARM LIVELIHOOD PORTFOLIOS

2.1 For how long have you been staying in Domboshava?

0-5 years	**5-10 years**	**10+ years**

2.2 What are your sources of livelihoods apart from farming?

SOURCE OF INCOME	**TICK APPROPRIATE BOX**
Salaried Job	
Brick Molding	
Carpentry	
Vending	
Gathering Wild Fruits	

Fishing	
Brick Laying	
Hunting	
Others (Specify)	

2.3 Have you ever heard anything about climate change?

YES	**NO**

2.4 In your community, have you witnessed any climate-change related hazards or disasters?

YES	**NO**

2.5 How has climate change affected your non-farm sources of livelihoods that you have previously mentioned?

2.6 How bad was the situation?

2.7 Have you ever received support from the government or any other development partners such as NGOs to cushion the effects of climate change?

YES	**NO**

2.8 If you received support, was it enough to bounce back better after a climatic shock?

2.9 What strategies have you employed towards reducing the effects on climate change?

2.10 What are the measures that you think can be implemented by both the government and its development partners including NGOs to improve household food security and build resilient livelihoods in the face of climate change?

This marks the end of the interview.

I THANK YOU FOR YOUR VALUABLE TIME AND CONTRIBUTION!