

BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF SCIENCE EDUCATION



***Integrating Indigenous Knowledge Systems into Disaster Preparedness:
A Case Study of Ward 15, Bikita District in Masvingo of Zimbabwe.***

A dissertation submitted in partial fulfillment of the requirements for the degree of Masters of
Science Education Curriculum Studies

By

CHIONAMORGEN

In the

Department of Curriculum and Educational Management Studies

Supervisor: DRDZIVA

RELEASE FORM

NAME OF AUTHOR

CHIONA MORGEN

STUDENT NUMBER

B1336758

PROJECT TITLE:

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SIGNED.....CHIONA MORGEN.....

SILVEIRA MISSION HOSPITAL, WARD 15, BIKITA DISTRICT.

DATE.....09 JANUARY 2026.....

DECLARATION

I, CHIONA MORGEN, declare that this dissertation is my original work and affirm that it has not been submitted to this or any other University in support of any application for a degree or any other qualification.

Signed CHIONA MORGEN.....

Date 09 JANUARY 2026.....

APPROVAL FORM

The undersigned certify that hehas read and recommended to the Bindura University of Science Education for acceptance, a dissertation entitled, “Integrating Indigenous Knowledge into Disaster Preparedness: A case of Ward 15 in Bikita District, Masvingo Province of Zimbabwe”, submitted by CHIONA MORGEN in partial fulfillment of the of the requirements of the Masters of Science Education Degree in Geography.



.....
(Signature of Supervisor)

19/01/2025

.....
(Date)

DEDICATION

To the resilient communities of Ward 15, Bikita District, Masvingo, who have lived and thrived with the land for generations, sharing their wisdom and strength. And to my family, for their unwavering support and encouragement

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I would like to express my gratitude to the community of Ward 15, Bikita District, Masvingo, for sharing their invaluable indigenous knowledge and experiences. I also want to sincerely thank the traditional leaders, local authorities, and community members who participated in this study. I also appreciate the assistance of my research supervisor, Doc Dziva, colleagues, and the Bikita Rural District Council. The success of this research would not have been possible without the collaboration and insights of these stakeholders.

Abstract

This study examines critically the integration of Indigenous Knowledge Systems (IKS) into disaster preparedness in Ward 15, Bikita District, and Masvingo, Zimbabwe. The study aimed to produce a disaster preparedness plan that is feasible and socio-economically and ecologically sustainable. The study employed mixed-methods research design for data collection. In this study, questionnaires, interviews and focus group discussions were used to gather and document data from the respondents. Field data was collected through a survey of 145 respondents. Complementing the survey were Interviews and Focus group discussions. The analysis and interpretation of data was done through various statistical packages such as Chi Square and ANOVA. These were used to interpret the findings and draw conclusions on the set assumptions. The findings from this study show the different way communities use and interpret traditional knowledge to mitigate and respond to disasters. The findings provide a basis on how this knowledge can inform modern disaster management strategies. In the study, data obtained from questionnaires, interviews and focus group discussions from the Ward 15 of Bikita District demonstrate the importance of incorporating IKS into disaster preparedness plans. It further revealed how IKS enhances community resilience and adaptive capacity. Based on the findings from questionnaires and interviews reveal there is need for a move beyond simple and basic scientific approach to integration of IKS in disaster management and preparedness. In addition, they reveal that integrating IKS with scientific conventional methods improve early warning systems and ultimately reduce vulnerability to disasters. With the increasing intensity of natural hazards, the marginalization of IKS in addressing the underlying causes and impacts of disasters reveals that more needs to be done. The studies further reveal that while current disaster management techniques are commendable, they fail to address the sustainability of disaster preparedness. The research findings suggest ways to improve disaster preparedness. The study recommends a national disaster management plan that is Ward 15 specific and comprehensive enough. There is need to establish strong institutions such as Civil Protection Unit CPU or Teams responsible for disaster management that comprises IKS holders. The starting point would be to establish District Disaster Management Teams (DDMT) that should comprise of 10-15 project implementers. Their mandate would be crafting a Disaster Risk Reduction Framework that integrates IKS and maintaining disaster response mechanisms. These teams can be employed on a fulltime basis. The study proposes a model for collaborative disaster preparedness plan called the Disaster Risk Reduction Sustainability Pillars Framework Matrix (DRRSPF). This study contributes to the growing discourse on the value of indigenous knowledge in disaster risk reduction.

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LIST OF ACRONYMS

EWS	EARLY WARNING SYSTEMS
IKS	INDIGENOUS KNOWLEDGE SYSTEMS
CBPR	COMMUNITY BASED PARTICIPATORY RESEARCH
CPU	CIVIL PROTECTION UNIT
DRR	DISASTER RISK REDUCTION
FGD	FOCUS GROUP DISCUSSION
FPIC	FREE PRIOR INFORMED CONSENT
IPCC	INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE
NGO	NON GOVERNMENTAL ORGANISATION
SOP	STANDARD OPERATING PROCEDURES
TEK	TRADITIONAL ECOLOGICAL KNOWLEDGE
UNDRR	UNITED NATIONS DISASTER RISK REDUCTION
UNESCO	UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANISATION

CHAPTER ONE: INTRODUCTION

1.1 Introduction

This chapter establishes the overall scope and organization of the study on integrating Indigenous Knowledge Systems (IKS) into disaster preparedness. It provides the background and rationale of the study outlining the increasing occurrences of natural disasters. The background also further highlights the growing recognition of indigenous knowledge as a valuable resource for enhancing community-based disaster risk reduction. The chapter presents the statement of the problem, research objectives, key research questions, and significance of the study. It also provides a clear framework for understanding the structure and direction of the research. In addition, it briefly describes and defines key terms used throughout the study, thereby setting the foundation for the coming review of literature, methodology, findings and conclusions.

1.2 Background to the study

Communities living in vulnerable regions need to prepare and respond to disasters to minimize their impacts. The current spate of increasing frequency and intensity of disasters exacerbated by climate change calls for effective and holistic disaster preparedness measures. Indigenous knowledge systems are key towards disaster preparedness as they are often rooted in cultural traditions and environmental adaptations. Indigenous knowledge has enabled adaptation to environmental changes and disasters through knowledge systems developed over generations. Such knowledge includes resource management practices, early warning systems and social structures that foster resilience. However, these systems are frequently marginalized in modern disaster management framework, leading to ineffective responses and recovery efforts. In many cases worldwide, (IKS) have proven effective in disaster preparedness across various contexts.

Observations of natural signs, such as animal behaviour and changes in ice patterns have been used to predict weather over generations. For instance, the Inuit of Canada observe sea ice conditions to predict harsh winter conditions and avoid dangerous ice. It is the same with The Moken Sea Nomads of Thailand that have a deep understanding of marine and coastal ecosystems allowing them to anticipate changes in sea conditions. Their traditional knowledge of tides and weather patterns helped them evacuate to higher ground before the 2004 tsunami resulting in fewer casualties compared to neighboring communities (Mikulecky, 2023).

The most prevalent and damaging natural hazards in Southern Africa are hydrological disasters, with droughts and floods occurring frequently. Their occurrences are exacerbated by climate variability and change, and greatly induced by the El Nino-Southern Oscillation (ENSO) phenomenon. The most chronic and devastating disaster often happening on a large scale and protracted is drought. Recurrent droughts, with significant events occurred approximately every decade (e.g., early 1990's 2002/3, 2015/2016 region. The 2015-2016 El Nino induced droughts was one of the most severe in 35 years, affecting over 40 million people (IPCC, 2022).

Floods are frequent, often localized, but intense, causing sudden and severe damage. Seasonal flooding occurs annually in many countries with major events often linked to tropical cyclones in the Indian Ocean (e.g., Cyclones Idai, Kenneth, and Freddy). For example, Cyclone Idai in 2019 triggered massive flooding across Mozambique, Malawi, and Zimbabwe affecting 3 million people (WWA, 2022).

Indigenous Knowledge Systems offer practical context specific tools for enhancing community resilience to floods and droughts in Southern Africa, primarily through localized early warning

and sustainable land management practices. For droughts, observing animal behavior, fruiting patterns of specific trees are indicators of a good or bad season. Using traditional seed preservation mixed cropping and moisture-retaining techniques and land management through pasture zoning and water conservation through terracing. For flood prediction, observing animal behavior (e.g., hippos relocating, intense hissing of pythons) and changes in wind patterns are early warning signs. These signs can be used to trigger predetermined community response plans. Building homes on elevated ground and designing settlements informed by historical flood memory

IKS is not a replacement of scientific forecasting, but a crucial complementary system, especially where technology is inaccessible

1.3 Statement of the Problem

Disaster preparedness is a critical component of community resilience, yet many contemporary strategies often overlook the rich and diverse Indigenous knowledge systems that have historically guided local populations in managing environmental challenges. In Ward 15 of Bikita District, Masvingo, the integration of Indigenous knowledge into formal disaster preparedness frameworks remains limited.

There exist some barriers to Integrating Indigenous Knowledge Systems (IKS) into Disaster preparedness. One of it is lack of formal policies or guidelines for integrating IKS into disaster preparedness frameworks. For example, The District Civil Protection Unit (CPU) policy document (2020) makes no mention of IKS or indigenous knowledge holders in disaster planning. Epistemic barriers exist where there is limited recognition and validation of IKS as a

legitimate source of knowledge in disaster management and dominance of Western scientific approaches, marginalizing local knowledge and practices. Logistic barriers include limited resources (financial, human, and technical) to support the integration of IKS into disaster preparedness plans and inadequate representation of indigenous knowledge holders in District CPU decision-making processes. Also in Ward 15, Bikita District, there is limited integration which means that there are no formal protocols for incorporating IKS into disaster preparedness plans, no representation of indigenous knowledge holders in the District CPU and IKS is not systematically documented or considered in disaster risk assessments.

In the Disaster Risk Management Plan (2020) for Bikita, traditional knowledge and community-based initiatives are omitted while focusing on modern early warning systems. This greatly affects the effectiveness of disaster response initiatives and also alienates local communities from the processes that affect their lives. In the face of increasing frequency and intensity of natural disasters, there is no clear path on how indigenous practices can complement modern disaster management approaches. In light of the above, there is need to explore the challenges and strategies for integrating Indigenous Knowledge Systems into disaster preparedness in Ward 15. This highlights the need for a more inclusive strategy.

Addressing the gap in understanding how indigenous practices can be integrated to complement modern disaster management remains fundamental to this study. The main thrust is moving beyond simple acknowledgement to developing an inclusive, hybrid strategy for Ward 15.

1.4 Research Questions

- (1) What Indigenous Knowledge Systems indicators and practices do households in Ward 15, Bikita District use to predict/prepare for droughts and floods?
- (2) How do community members perceive IKS effectiveness in reducing losses?
- (3) What strategies can operationalize the integration of Indigenous Knowledge Systems with formal DRR in Ward 15?
- (4) What policy instruments can be introduced to formalize hybrid governance and early warning validation?

1.5 Objectives

- (1) Document and categorize Indigenous Knowledge Systems (IKS) indicators and practices used in Ward 15 for early warning systems and resource management.
- (2) Assess the perceived effectiveness and corroborate IKS predictions with available meteorological/district records
- (3) Examine the strategies for integrating IKS into contemporary disaster management frameworks at the local level.
- (4) Co-develop with community stakeholders, a practical integration and pilot communication protocol for the Ward CPU.

1.6 Assumptions of the study

The study is predicated on a set of core assumptions that frame the research problem and guide the

investigation.

The primary assumption is that IKS exists in Ward 15 in identifiable and documentable forms. Communities in Ward 15 hold specific, localized knowledge about environmental indicators (e.g., animal behaviour, plant phenology, weather patterns). In addition, the study assumes that community members in Ward 15 will share IKS if confidentiality and IP safeguards are provided. Proper protocols of FPIC will ensure participants share their knowledge willingly and honestly. Furthermore, the study assumes that hybrid validation is feasible with available data hence IKS and meteorological data can co-produce early warning system. This assumption is based on that respectful, ethical, and bidirectional integration with scientific patterns is not only possible but necessary for building truly resilient communities in the era of escalating climate change and disasters.

1.7 Significance of the Study

This study brings with it invaluable insights to Zimbabwe as a nation. By incorporating IKS in the National Climate Policy, Zimbabwe can create more culturally relevant and acceptable policies that resonate with local communities. Again this research will provide local adaptation strategies to indigenous communities in the face of climate patterns and natural resource management. These insights can enhance disaster preparedness strategies, making them more effective in addressing specific local vulnerabilities.

This study is not only aligned with the principles of the Sendai Framework for Disaster Risk Reduction (SFDRR). It moves to enhance inclusivity, promote culturally relevant strategies and strengthen local capacities in DRR approaches. This will bring in more effective and sustainable disaster preparedness globally. This study will provide a framework for IKS integration into

contemporary DRR frameworks. This will be of benefit to the Bikita Civil Protection Unit

This study seeks to enhance early warning precision, community trust, and agricultural resilience through the integration of IKS. This will directly address key vulnerabilities in the district. Locally accessible indicators (e.g., bird calls, animal behavior, and plant phenology) will fill gaps between formal forecasts and community action. For instance, in Mutasa District, Zimbabwe, communities use IKS indicators like bird calls and insect behavior for early warning which are trusted and understood locally (Mavhura et al, 2021). This study will benefit local communities in Bikita to adopt traditional seed varieties and sustainable agricultural practices that are more resilient to local climate variability. Studies across Southern Africa highlight that IKS based agronomic practices reduce crop failure risk during erratic rains (Mubaya et al, 2022).

Schools in Bikita District would benefit from this study by making them safer, more resilient, and better able to maintain education during floods and droughts. Thus schools can identify locally relevant, cost effective, and trusted systems for early warning and proactive action. Integrating IKS will help students and staff by enhancing local early warning systems and preparedness plans. Schools can incorporate observable local signs into safety protocols to provide early warnings that are understandable even when formal forecasts are inaccessible. Local forecasts can help schools to pre-plan responses in a timely manner. Schools can choose to close or dismiss before a flood makes roads impassable or adjust the school calendar and meal programs ahead of a predicted drought. IKS integration would help schools to do hazard mapping and create emergency plans.

1.8 Limitations of the study

Siyakwazi (2012) views a limitation as some aspect of the study that the researcher knows may negatively affect the results of the study. When researching the integration of indigenous

knowledge systems in disaster preparedness, several limitations arose. Gaining access to indigenous knowledge was a bit challenging due to historical mistrust, confidentiality, or gate keeping by community elders. This gate keeping was mitigated by spending the initial two weeks of data collection on trust-building, seeking endorsement from Sabhukus and Chief. The researcher put in place ethical considerations of confidentiality and informed consent to generate trust from research participants. It was critical that the researcher explicitly outlined the purpose of the research and guarantees confidentiality. The use of FPIC protocol will also be undertaken.

In addition, limited funding and resources hindered comprehensive studies, especially in remote indigenous communities. Poor transport network significantly affected. Accessibility to some areas was a challenge due to poor transport network. In such cases, the researcher had to use private vehicles to reach out to participants. In this regard the researcher had to walk in some cases making sure the study lives within budget lines. In some cases, making use of community gatherings was a cost cutting initiative. Methodological challenges arose where traditional research methods did not adequately capture the nuances of indigenous knowledge, leading to potential bias or oversights. There was need for piloting of research methods or instruments to ensure reliability of the study. Purely quantitative methods like surveys may fail to capture the narrative-based and holistic nature of IKS. To mitigate against this, the study adopted a mixed methods design, prioritizing qualitative interviews and FGDs.

Indigenous knowledge systems vary widely between different communities complicating efforts to create unified framework for disaster preparedness. The researcher had limited time considering the congested schedule of an administrator. The researcher had to balance the work schedule and the research study times and in some cases making use of weekends to reach to participants. Addressing

these limitations required careful consideration, collaboration with indigenous communities, and respect for their knowledge systems.

1.9 Delimitations of the study

Delimitation ensures that the study is relevant to a given context and in this regard reference is made to Ward 15 in Bikita District of Masvingo Province. The study was carried out in Ward 15 (4 selected villages). The study focused specifically on Ward 15 in Bikita District, and findings to this area cannot be generalized to other regions or communities. The focus of the study will be on traditional indigenous knowledge systems related to climate-related and geophysical disasters most relevant to Ward 15. These include droughts and floods primarily engaging with local indigenous communities. The study employed both qualitative (interviews, focus groups) as well as quantitative methods and will purposively seek knowledge from recognized custodians of community knowledge. Due to resources and limited funding, the study will focus on a smaller sample size within Ward 15 rather than a comprehensive survey of all community members. These delimitations help clarify the specific focus and boundaries of the research, ensuring that the findings are contextually relevant and manageable.

1.10. Definition of key terms

1.10.1. Indigenous Knowledge Systems

Are the knowledge, practices and beliefs developed by local communities with long histories of interaction with their environment. They are often passed down orally or through demonstration and are crucial for understanding cultural contexts, resource management, agriculture, and health

care and survival strategies. Mapara (2009) asserts that Indigenous Knowledge Systems are a body of knowledge, or bodies of knowledge of the indigenous people of particular geographical areas that they have survived on for a very long time. IKS are forms of knowledge that have been generated over time and are unique to a given culture or society.

1.10.2. Effectiveness of IKS

The effectiveness of IKS in disaster preparedness refers to the ability of indigenous knowledge and practices to reduce vulnerability, enhance resilience, and support adaptive capacity in the face of disasters. This includes:

- Accurate prediction and interpretation of environmental indicators (e.g., weather patterns, animal behavior).
- Traditional coping mechanisms and resource management strategies.
- Community-led initiatives and social networks that support disaster response and recovery.

1.10.3 Disaster

Is an event that causes significant harm, damage, or suffering, particularly when the affected community cannot handle it. It can be caused by natural phenomena like earthquakes and floods, or by human actions like accidents or deliberate acts. A disaster is a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to human, economic and environmental losses and impacts (UNDRR, 2017).

1.10.4 Preparedness

Is a set of actions that are taken as precautionary measures in the face of potential disasters. The UNDRR (2017) also views preparedness as the knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely imminent or current disasters.

1.10.5 Disaster Preparedness

Involve proactive measures taken by individuals and governments to reduce the impact of disasters. These are actions that aim to minimize loss of life and livelihoods by developing contingency plans, training for emergencies and stockpiling.

1.10.6 Integration

Refer to the deliberate process of bringing together indigenous knowledge systems which include community-based practices, traditional forecasting methods, local coping mechanisms and cultural values with modern scientific and institutional approaches to disaster preparedness. It means creating a harmonized framework where indigenous insights are not sidelined but recognized, validated, and applied alongside formal disaster risk reduction (DRR) strategies. Integration: presence of at least one formal SOP or protocol co-signed by District CPU and community leadership OR documented co-validation exercise in the community.

1.11 Organization of the Study

The study is organized into five chapters and each chapter being distinct in structure, purpose and scope but all the chapters are closely linked in a logical manner. Chapter one is an introductory chapter that introduces the research problem in a broad setting starting with

introduction followed by the background to study, the statement of the problem, aims and objectives, research questions and the significance of the study. Chapter two reviews the related literature on integrating IKS globally, regionally and locally. The purpose is to establish what others said about the subject and highlight knowledge gaps which the current study seeks to fill. Chapter three outlines the various research methodology detailing the paradigm, research approach, design, population, sampling, and data collection instruments. Chapter four presents analyses and discusses the findings from the field data directly addressing the research questions. Lastly chapter five presented the summary, conclusions and recommendations from the study.

1.12 Chapter Summary

The chapter provided the basis for the study on integrating Indigenous Knowledge Systems (IKS) into disaster preparedness. The chapter presented the background of the study which pointed out the increasing frequency and impact of disasters. It is also brought in the limitations of relying on conventional, top-down disaster management approaches. The chapter further looked into the value of IKS. They are seen as locally grounded, experience-based practices that have enabled communities to anticipate, prepare for and respond to disasters over generations. The gap between formal disaster preparedness strategies and the underutilization of IKS in policy and practice emerged as the statement of the problem. This is a critical gap that underscores the need for a more inclusive and culturally responsive disaster preparedness framework. The objectives and research questions guide the study focusing on identifying relevant indigenous practices and exploring the ways of integrating them with modern disaster management systems. The chapter set the direction of the study and provided a coherent basis for understanding how IKS can strengthen disaster preparedness efforts. The next chapter will focus on the review of extensive related literature in

particular to integration of IKS into disaster preparedness.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter aims to review and analyze previous studies related to the topic, identifying gaps in literature. The chapter also presents the theories that underpin the research, explaining how they relate to the study's objectives. The chapter will also discuss the following aspects: indigenous knowledge employed for disaster preparedness, effectiveness of the IKS in mitigating disasters, challenges and opportunities for integrating indigenous knowledge systems into contemporary disaster management frameworks and proposals for policy recommendations to bridge IKS and formal disaster preparedness frameworks.

2.2 Theoretical Framework

The study stands guided by the Resilience Theory initially developed by Holling (1973) who describes it as the ability of systems-ecological, social, or socio-ecological to absorb disturbances, reorganize, and continue to function and develop. Within the context of disaster preparedness, resilience refers to a community's capacity to anticipate, cope with, and recover from hazards while maintaining or transforming its identity, structures and functions.

The Resilience theory seeks to provide an in-depth analysis of how communities can withstand, adapt to, and recover from disasters. Indigenous Knowledge Systems (IKS) can be effective in preparing and building resilient communities. The theory underscores the ability of a community to sustain its main functions and identity in the face of disturbances. With reference to disaster preparedness, resilience does not only mean bouncing back. It entails bouncing forward to a new

improved state through adaptation and learning.

The theory emphasizes moving away from reactive approaches to proactive and adaptive strategies in disaster risk management. This is where Indigenous Knowledge Systems become highly relevant. Nakashima (2012) describes IKS as a body of knowledge innovations, and practices developed by indigenous communities through interaction with their environment over generations. In traditional communities, resilience is closely linked to their cultural identity and spiritual ties to the land. The theory values the maintenance of cultural practices, languages and traditional knowledge systems. This inculcates a sense of belonging, collective efficacy, and resilience in the face of adversity. It emphasizes that disaster preparedness initiatives should respect and support indigenous cultural values and practices, recognizing their integral role in building resilience.

Resilience does not only provide for physical survival, but it is also about cultural continuity and community cohesion (Mercer et al (2010)). Building on IKS, communities often have social structures that facilitate mutual aid and collective action in times of crisis, strengthening communal resilience. The effectiveness and sustainability of disaster preparedness strategies is built upon inclusive policies that are grounded in local realities. This is achievable when IKS is integrated into formal disaster planning.

In the Resilience theory, communities are encouraged to transform. This means they should be able to create new systems when existing ones are no longer working. This is particularly important in communities facing recurrent climate-related disasters. When indigenous and scientific knowledge are blended, this allows for more innovative and flexible adaptation pathways (Folke et al, 2010). Encouraging transformative resilience is critical rather than merely bouncing back to a vulnerable state. While this is critical such integration process requires addressing power imbalances and epistemological biases. Historically disaster risk reduction has been dominated by top-down,

technocratic approaches that marginalize local voices. A resilience-based framework recognizes the value of diverse knowledge systems and promotes co-production, participatory governance, and inclusive decision making (Nunn et al, 2017).

The table below show resilience constructs from the RQ “What Knowledge Systems indicators and practices do households in Ward 15, Bikita District use to predict/ prepare for droughts and floods?”

Table 2.1: Resilience Theory Constructs and Indicators.

Construct	Definition	Research Question and operational indicators
Absorptive Capacity (Pre-impact preparedness)	The ability of a system to prepare for, anticipate and absorb shock while maintaining core function	Examine how IKS indicators (e.g. biotic signs) enable households to anticipate and buffer against drought /floods before they cause damage. Documented biotic signs-specific tree species, flowering patterns, animal behavior cited in forecasts. Documented abiotic signs: changes in wind patterns, temperature, or celestial observations. Preparedness actions involve stockpiling of drought resistant seeds, grain, pre-emptive livestock management (early sale or movement).
Adaptive Capacity (Livelihood adjustments)	The ability to make adjustments to minimize exposure to hazards or moderate damages	Analyzes how households change their practices (e.g., planting dates, crop choices) based on IKS forecasts to reduce vulnerability. Diversification strategies. Temporary or permanent shifts to nonfarm income activities (e.g., crafts, trade) Collection and use of wild foods during crises
Transformative Capacity (Social & Institutional change)	The ability to address the root causes of vulnerability by reconfiguring social, economic, and governance structures	Investigates how IKS-based collective action can challenge top-DRR models and advocate for community-led, culturally grounded preparedness. Social capital and collective action. Existence of labor-sharing groups (nhimbe) for post disaster recovery. Community shared resource management during crises (e.g., water points, grazing land)

In addition, the Decoloniality theory also guides this research as it provides a powerful and fuller lens for power, legitimacy and ethics. Decoloniality is a liberative philosophy which emphasizes that

colonization did not occur in the physical state, but it extended to the mental state. The European colonizers made Africans believe that their language, religion and cultural practices were outdated (Ndlovu-Gatsheni, 2020; Ranawan, 2023). The theory is against universalism and ownership of knowledge by the Europeans. It argues that European epistemology is hegemonic in its attempt to disregard and belittle other forms of knowledge. Ranawan (2023) says, in essence, the pursuit for knowledge, justice involves confirming that the living knowledge and traditions of formerly colonized communities possess authoritative knowledge when it comes to identifying what counts as a problem and what it means to redress it.

The Decolonial theory significantly guides the study of integrating IKS in disaster preparedness. It dismisses the view that IKS is a simple “add-on” to existing scientific models. It calls for a critical review of the power dynamics and historical imbalances that have marginalized these systems. Decolonial theory is against epistemological colonialism. This system views Western scientific models as superior to indigenous and community based knowledge systems. In Zimbabwe, Decoloniality would consider embracing the philosophy of Ubuntu. This philosophy frames resilience as a collective, moral obligation rooted in mutual care and community networks. All is done to restore the legitimacy and strength of indigenous ways of knowing. Community led governance should be supported where indigenous institutions (like village councils) are recognized as essential actors in planning and implementing disaster preparedness plans.

Resilience and Decoloniality theories are closely linked concepts in the integration of indigenous knowledge into disaster preparedness. Resilience goes beyond the power of bouncing back from shocks. Rather, it involves gaining control and autonomy, continued transmission of core values, and sustainable relationships with the environment. Decoloniality provides the framework to achieve this by challenging the power structures and epistemic injustices that have historically marginalized

indigenous ways of knowing and governing. True resilience for indigenous communities is unattainable without decolonial actions that restore authority over land, knowledge and decision-making. Validating and integrating IKS is both a decolonial act (countering epistemic injustice) and a direct enhancement of resilience (providing localized early warning and adaptation strategies). Overton (2023) asserts that authentic resilience in disaster preparedness is a decolonial outcome achieved through recognizing sovereignty, practicing epistemic justice, and supporting land-based community-led systems.

2.2 Indigenous Knowledge Systems and Disaster Preparedness

Globally, communities informed by IKS have developed many effective methods in disaster management, enabling them to achieve sustainable livelihoods. The methods used by indigenous communities in different disaster and risk management lead to differences in vulnerable impacts, resilience growth, capacity building and community preparedness (Gopal et al, 2023). Thus IKS is critical for disaster preparedness by providing early warnings and coping mechanisms, and the following sections will explore this from global, regional, and local perspectives.

2.2.1 Global Perspective on indigenous knowledge Systems and Disaster Preparedness

IKS, also known as Traditional Knowledge or local knowledge, refers to the complex body of knowledge, skills, philosophies, and practices developed by societies and indigenous peoples through long time interaction with their natural environment (INISDR, 2015). Globally, there is growing recognition within institutions like the United Nations that IKS is not merely anecdotal,

but a valid and crucial component of building community resilience. International Frameworks like the Sendai Framework for Disaster Risk Reduction (2015-2030) emphasize the importance of integrating traditional and local knowledge in DRR initiatives (UNDRR, 2021). These may include natural indicators (animal behavior, plant phenology, changes in wind or stars), land-use practices, water harvesting methods, community-based early warning signs, spiritual or ritual practices tied to environmental signs, and customary rules for settlement, migration or resource sharing (UNESCO, Harnessing Indigenous Knowledge).

Indigenous Knowledge Systems into Disaster Preparedness

Tsunami and Cyclone Preparedness in Asia and the Pacific:

In Thailand, the Moken People applied Indigenous Knowledge Systems to escape the devastating effects of the 2004 tsunami. This knowledge generated through observation of receding ocean water and animal behavior, helped them to move to higher ground before the tsunami, saving many lives (Rungmanee& Cruz, 2021). Their accurate predictions illustrated the life-saving potential of IKS in some areas. Through indigenous knowledge nearly all 78000 Moken residents survived the disaster. They used an ancestral story (smong) passed down through songs and poems that precisely describes events leading to a tsunami. This proved the effectiveness of IKS in disaster preparedness.

Indigenous Knowledge systems have unique and specific attributes that are not inherent in formal systems. Cultural knowledge that is transmitted orally is trusted implicitly. Communities are likely to embrace it faster and make collective action without hesitations. IKS is context specific, based on centuries of observation of a specific environment. This involves noting subtle signs like animal behaviour, cloud formations, or water patterns. However, IKS developed for

one location may not apply to another makes it a challenge to solely rely on. Furthermore, oral traditions can be lost due to cultural assimilation, displacement, or the passing of elders. Shifting weather patterns and sea level rise exacerbated by climate change has led to the creation of hazards outside the scope of historical experiences. These shortcomings demonstrate that IKS cannot be used in isolation. The best way forward is respectful integration. IKS and scientific systems should inform and strengthen each other to build communities that are more resilient, prepared, and adaptive.

The flowering and fruiting patterns of native trees, such as the *Barringtonia asiatica*, are used to predict cyclone seasons. In the Solomon Islands, their abundance indicates a high-energy weather period ahead (McMillen et al., 2021). Observations on the flowering and fruiting cycles of native trees offer accurate and reliable form of indigenous knowledge for disaster preparedness. These signs offer a unique way of monitoring the environment, providing early warnings. They are highly effective for slow-onset climate disasters like droughts and changes in seasonal patterns.

It can be noted that the context specific knowledge directly enhances community resilience by enabling anticipation and adaptation. Therefore if a community observes abnormal fruiting, it can proactively manage food storage, adjust planting schedules, or initiate water conservation practices. Its effectiveness lies in its specificity and deep ecological understanding, offering invaluable insights for building resilient and adaptable communities.

Drought and Flood Prediction in the Americas:

Inca and pre-Inca societies in the Andes constructed sophisticated hydraulic systems and terraces that reduced erosion and managed water flow, mitigating the impacts of both droughts and floods. Their knowledge of micro-climates allowed for the cultivation of diverse crop varieties, a

form of biological insurance (UNESCO, 2020).

Indigenous communities in the Amazon use knowledge of river color, current speed, and the behavior of river dolphins and specific bird species to predict seasonal flooding, informing their planting and settlement cycles. In some indigenous Australian and Arctic traditions, the way stars twinkle (scintillate) is observed and used to infer upcoming weather changes (e.g. wind, humidity)

Integration with Modern Science:

The Sendai Framework for Disaster Risk Reduction 2015-2030 explicitly calls for the use of IKS, stating that DRR requires a ‘multi-hazard approach and inclusive risk-informed decision-making based on the open exchange and dissemination of disaggregated data, including indigenous and local knowledge’(UNISDR,2015). This marks a significant shift from earlier, purely technocratic approaches.

2.2.2 Indigenous Knowledge Systems in Southern Africa

Indigenous Knowledge (IK) is widely used in Africa in disaster preparedness and resilience, offering valuable insights into local environments and traditional practices for managing risks. The knowledge includes the knowledge, skills and beliefs developed by communities through historical interaction with their environment vital for predicting and responding to local hazards, including drought, floods and cyclones.

Indigenous Knowledge Systems in Southern Africa are deeply immersed into the cultural fabric of many communities. In this region, livelihoods are heavily dependent on rain-fed agriculture. Communities use IKS for predicting droughts, floods, and managing climate variability. Mavhura

(2021) acknowledges that this experiential knowledge is intrinsically tied to specific landscapes and ecosystems, forming a holistic understanding built on continuous observation of the environment.

Key Examples and Applications:

Some communities make use of celestial bodies to predict the quality of a season. Muguti & Maposa (2012) note that some communities use the rising and setting of stars, constellations, and the moon's appearance to forecast the onset and quality of the rainy season. For instance, a hazy or dim appearance of certain stars may predict a poor season. Studies confirm that astronomical observations provide credible early warning, especially climate related disasters like droughts and floods. However, the effectiveness of Astro-meteorology faces challenges as this knowledge is often oral and at risk due to generational shifts, the passing of elders and changing lifestyles.

Phenological Indicators: the behavior of specific plants and animals is a common indicator. For instance, the prolific fruiting of the Marula tree (*Sclerocarya birrea*) is widely believed to signal an impending drought, as if the tree is 'racing to reproduce.' Unusual bird calls, such as the Ground Hornbill, the raven or the migration patterns of certain species such as the Stock Bird, are interpreted as warnings of seasonal changes. However, climate change and environmental degradation can alter the very signals that IKS relies upon, potentially affecting its reliability. Thus to say, the most promising path forward is not choosing one system over the other, but creating complementary frameworks.

Zoological Indicators: The nesting behavior of ants, the movement of reptiles, and the fat content of gathered insects are all used as proxies for soil moisture and seasonal forecasts. Climatic variability is affecting these IKS are heavily by altering weather patterns rendering some of the bird

species to extinction.

Social Governance for Drought Management:

Communal social structures led by chiefs and headman controlled and organized communal grain reserves and identified areas reserved for pastures through grazing schemes. This was meant to prevent overexploitation during dry periods, a practice that enhanced community resilience (Shizha& Mthethwa, 2021). Studies on this reflected that effective social governance centered on inclusive, participatory, and multi-level coordination. This is crucial yet often insufficiently implemented for proactive drought preparedness.

2.2.3 Local Perspectives on IKS and Disaster Preparedness

The world over, disaster occurrences are increasingly becoming a global concern. It is very difficult to detect given their onset, duration and the areas that will be affected. Kugara et al (2022) acknowledges that in Zimbabwe, the disproportionate impacts of drought are indicative of lack of inherent capacities to prepare and proactively respond to the hazard shocks. Zimbabwe has experienced frequent droughts notably: 1982-1984, 1986-1987, 1991-1992, 2002-2003, 2004-2005, 2007-2008, 2011-2012, 2015-2016 and 2018-2019 seasons whose implications reflects the state of preparedness to absorb shock (Kugara,2022).Zimbabwe, prone to droughts, floods, and occasional earthquakes, has a rich tapestry of IKS employed by its various ethnic groups, primarily the Shona and the Ndebele.

Key Examples and Applications:

Drought Prediction and Management:

Astronomical observations in Shona communities of the star Nyamazinda (Venus) believe that if it

appears very bright and close to the moon early in the season, it is interpreted as a sign of good rains. A faint or distant appearance signals drought (Mavhura et al., 2013). Shona societies describe the lunar eclipse as a spiritual disturbance or a sign of impending hardship like famine. Astronomical signs form a significant but not dominant part of IKS toolkit. Formal disaster management often privileges scientific data, sometimes dismissing IKS as anecdotal or superstitious leading to what scholars term ‘epistemic injustices’.

Biological Indicators:

The call of the Hadebe bird is considered a rain herald. In Bikita District, particularly Ward 15, the call of the Ground Hornbill and the wailing and shrieking of a giant rock rabbit (Tsvito) signals impending rains (Paddy, 2023). Conversely, the persistent chirping of crickets at an unusual time is seen as a sign of dryness. The flowering pattern of the Musasa tree (*Brachystegiaspiciformis*) is a also key indicator. In Bikita, the abundance of loquats (mazhanje) is a sign of a bad rainy season

Cultural and Spiritual Practices:

Ceremonies like Mukwerera (rainmaking ceremonies) also practiced in Bikita, were not just pleas for rain, but also community-wide events that reinforced social cohesion, assessed communal food stocks, and planned for the coming season under the guidance of the chiefs and spirit mediums (svikiros) (Mushore, 2020). These ceremonies often coincided with the leaders’ own readings of environmental signs. In other words, cultural and spiritual practices can be highly effective in disaster preparedness and response, primarily by strengthening community resilience, social cohesion and psychological coping mechanisms. These practices offered opportunities for community gathering, information dissemination, and organizing aid, strengthening local networks and solidarity that are crucial during a crisis. More so, religious and traditional leaders are often

highly trusted within their communities making them effective in disseminating disaster preparedness information. However traditional practices often conflict with modern, technocratic disaster management policies.

Flood and Cyclone Preparedness

Traditionally settlements were avoided in low-lying areas (mapani/matoro) and along river banks, which are recognized as floodplains. Homes were built on higher ground, using locally available materials that were more resilient to wind and water. They build or reinforced shelters using local, hazard resistant materials like bamboo. Communities used early warning systems to move to higher ground during floods. However, an integrated approach combining these IKS with modern practices could enhance community preparedness and risk reduction strategies (Uchenna et al, 2025).

Knowledge of Wind Patterns:

Communities in Manicaland, which is prone to cyclones, have specific knowledge of wind patterns that precede severe storms. Similarly, in Bikita a wind pattern that blows from the North towards the South (nhuruka) is a sign of strong impending rains.

The Zunde raMambo (The Chief's Granary):

This a very profound IKS-based social safety net. The chief would designate a field to be worked communally. The harvest was stored in a communal granary to be used during the times of famine, for travelers, and supporting widows, orphans and the disabled. This system was a critical tool for disaster preparedness and response, ensuring food security at the community level (Muguti and Maposa, 2012). In the same way, the practice enhanced social cohesion and solidarity

Modernization and migration is greatly affecting and eroding the perceived value of IKS. Due to

migration to urban areas, young people lose connection with this knowledge. Additionally, the changes in climate patterns have altered the occurrences of some of the traditional indicators, reducing their reliability. Policymakers and technical experts often dismiss IKS as unscientific. The way forward lies in co-production of knowledge. Creating robust, localized and culturally acceptable early warning systems lies with integrating IKS with scientific methods. This is supported by Mavhura et al (2013) who posit that combining meteorology data with elders' interpretations of biological signs can lead to more trusted and actionable community advisories (Mavhura et al., 2013).

Key examples provided from the 2004 tsunami occurrences in Asia to the drought stricken plains of Zimbabwe demonstrates the effectiveness of IKS. It provides resilience through locally generated layer of intelligence for disaster preparedness. They are a result of cultural practices, social structures, and a deep generational understanding of the environment. The Sendai Framework acknowledges that effective disaster risk reduction cannot be achieved by science alone. This marks a global shift in understanding and valuing IKS. An integrated approach that respects, validates, and integrates IKS with modern scientific methods is the most promising path toward. These will truly build resilient communities in Zimbabwe, the Southern Africa Region, and the world over.

2.3Enhancing Disaster Preparedness through IKS

It is naïve to underestimate the critical role that Indigenous Knowledge Systems (IKS) play in enhancing communities' abilities to prepare, respond, and adapt to disasters. IKS, developed through generations of interaction with the environment, IKSoffer unique and locally relevant solutions for disaster reduction. Indigenous knowledge Systems are not static practices, but are changing and

living bodies of knowledge that provide communities with practical strategies for dealing with disasters. They capacitate and enhance community resilience across entire disaster management cycle: from immediate response, through long-term recovery, to transformative adaptation.

2.3.1 IKS and Disaster Response, Recovery and Adaptation (Worldview)

Response (During and Immediately After a Disaster)

In the advent of a disaster and when external help is not readily available, IKS provides locally available and quick actionable strategies that save lives and organize collective action.

Indigenous communities often have knowledge and finer details and geography of their territories that includes safe routes, water sources and shelter locations. This knowledge can provide ways of search and rescue during a disaster. This is supported by Gaillard et al (2008) in his study of the Orang Simalur in Indonesia. During the 2004 tsunami, they used their knowledge of the island's topography to navigate the devastated landscape and find survivors, often reaching areas before official rescue teams.

During a disaster, food and medicinal provisions are critical. Local communities have knowledge of non-cultivated foods, emergency water sources (e.g. from specific vines or tree roots) and medicinal plants for treating injuries. It is important to have food and medicinal help in the critical first 72 hours post-disaster. Mercer et al. (2010) gives an instance of many Pacific Island communities who know how to find water in coconuts and food in coastal ecosystems after the cyclone.

Recovery (Rebuilding Social, Economic, and Physical Systems)

Post disaster there is need for a culturally appropriate and psychologically supportive recovery process. This helps to rebuild social capital alongside physical infrastructure. IKS provides for cultural practices and rituals following a disaster. These are not merely symbolic. They are very

important for communal grieving, reaffirming social bonds, and re-establishing a sense of order and control. Ceremonies honoring the dead, as practiced by many indigenous communities from the Philippines to the Americas, help process collective trauma (UNISDR, 2015). In many indigenous communities, traditional authorities and kinship often dictate mutual aid obligations. The idea of ‘Bayanihan’ in the Philippines where community members collectively help to relocate and rebuild a family’s house is a prime example of a social IKS mechanism that accelerates physical recovery (Heijmans, 2009).

Adaptation (Long –Term Learning and Adjustment)

Indigenous communities have learnt about the fundamental ways of adaptation gained after generations of generations of learning about environmental variability. One of the significant examples of local adaptation is the Ifugao rice terraces in the Philippines. They are a UNESCO World Heritage site and a reflection of IKS-based adaptation. The site has stone terracing that prevents erosion during heavy rains. It demonstrates a nuanced understanding of water sharing and pest management that has ensured sustainability for over 2 000 years, adapting to both climatic and social changes (UNESCO, 2017). Indigenous agricultural systems throughout the world have high agro-biodiversity. By planting multiple crop varieties, with different tolerances to drought, flood, or pests, communities ensure that even in a bad year, some harvest will survive. This is a foundational strategy for adapting to climate uncertainty (Makondo& Thomas, 2018)

2.3.2. IKS and Disaster Response, Recovery and Adaptation in Africa

In Southern Africa, IKS provides a crucial buffer against the region’s primary disasters: drought and flooding.

Response:

Drought coping Mechanisms:

During periods of food scarcity, communities turn to IKS to identify drought-resistant edible plants, roots, insects (e.g. mopane worms, ishwa, majuru and mice) that are not part of the regular diet but provide critical nutrition during famine. Knowledge of hidden or perennial water sources is also vital (Muguti & Maposa, 2012).

Recovery

The *Sebetsa* and *Ilima* systems

Similar to the Zimbabwe's Zunde raMambo, many Southern African communities have traditional work parties (*Ilima* in isiZulu/ Ndebele, *Sebetsa* in Sesotho). After a disaster like a flood that destroys fields, the community would work collectively to replant and rehabilitate the land of affected families, ensuring that no one is left behind and accelerating agricultural recovery (Shizha& Mthethwa, 2021).

Livestock Restocking through *Kuronzera*

In some cultures, after a drought that decimates herds, a traditional practice exists where a wealthy family or chief gives cattle to those who lost theirs, not on sale, but as a trust (*Kuronzera*) to help them rebuild their livelihoods. This strengthens social solidarity and economic recovery.

Adaptation; Dryland Farming Techniques

Practices like *pfumvudza* or conservation agriculture (though now promoted scientifically) have their roots in IKS. Techniques such as deep planting basins (*matenganyika*) that harvest water and intercropping cereals with drought tolerant legumes like cowpeas or bambara nuts, are time-tested adaptations to low and erratic rainfall (Mavhura et al., 2013). In some indigenous communities, they practice dry planting (*Kuwarira*) as a way of beating short seasons

Settlement

Settlement in flood-prone areas (vleis or matoro) is not allowed as traditional norms in some communities. This demonstrates an adaptive land-use planning strategy passed down through generations.

2.3.3. Zimbabwe's Perspective

Indigenous communities in Zimbabwe have different systems for disaster management that are embedded into the social and environmental fabric

Response

In the immediate aftermath of a flood, for example, village heads (*sabhuku*) and chiefs, guided by spirit mediums in some cases, can quickly mobilize community labor for search and rescue, using their authority to command collective action far more efficiently than external agents might initially achieve (Mavhura, 2017).

Use of local materials for emergency shelter- knowledge of how temporary shelters (*danga*, *matsekwe*) using locally available materials like poles, grass and mud provides immediate refuge for displaced families.

Recovery

The Zunde raMambo in Action

This system is the quintessential IKS-based recovery mechanism. Following a poor harvest due to droughts or floods, the grain from the chief's granary is distributed to the most vulnerable households. This prevents distress migration, reduces dependency on external aid, and ensures the community's food security is managed according to its own social priorities (Mushore, 2020).

Psycho-social Healing: Ceremonies such as *Bira* (a spirit possession ceremony) are convened not only to ask for rain, but also seek for guidance after a community-wide trauma. This helps victims to recover spiritually and provide for social equilibrium, which is very important for recovery.

Adaptation

In some societies farmers carefully select crops and seed for planting. Households in Zimbabwe maintain and selectively plant indigenous seed varieties known for their drought tolerance (e.g., rapoko/finger millet, mhunga/pearl millet) or early maturity. These seed and crop varieties are adaptable to shorter growing seasons.

Indigenous knowledge systems are dynamic and communities continuously reinterpret IKS within a changing climate. Some of the traditional signals may no longer be applicable because of shifting weather patterns. For instance, a certain bird call for example the Ground Hornbill may have traditionally signaled rain. Elders now observe it in conjunction with other signs such as radio weather forecasts. This creates a hybrid knowledge system that enhances their adaptive capacity. This demonstrates that IKS is not rigid but evolves.

In general, it can be noted from given examples that IKS demonstrably enhances community capacity across disaster continuum. Communities can use to provide on the response part, immediate locally-managed lifesaving skills and social organization. IKS also offers practical mechanisms for physical rebuilding and psycho-social healing that reinforce social capital. This is essential for recovery. On adaptation, IKS is a ‘memory book’ of proven, sustainable practices for living with environmental variability which is increasingly critical in the era of climate change.

2.4. Strategies for Integrating IKS in Contemporary Disaster Management

Frameworks

The use and integration of IKS cannot be generalized to fit in all contexts. Some aspects of IKS may not fit all processes. This requires distinct yet interconnected strategies at the global, regional, and local levels. Policy provisions and frameworks must be context specific that allows for community led participation. The fundamental goal is to move from extraction to collaboration. This should lead to creating braided knowledge system for enhanced resilience.

2.4.1. Creating a Global Enabling Environment

Efforts at this level should be rolling out strategies focus on setting norms, providing workable frameworks, and securing international resources to legitimize and guide IKS integration.

Strategy 1: Mainstreaming IKS into International Policy Frameworks and Funding Mechanisms

Indigenous Knowledge systems should be included as a critically fundable component in projects and national reporting. International bodies like the UN Office for Disaster Risk Reduction (UNDRR) and the Green Climate Fund (GCF) must recognize mobilize funding for this critical component.

Implementation: Policy Mandate

In The Sendai Framework for Disaster Risk Reduction (2015-2030), the inclusion of IKS has already been set as precedent. In the implementation and monitoring framework, there is need to include specific indicators on IKS use. Member states should be compelled to report on progress (UNISDR, 2015).

Criteria for funding should to require demonstrable collaboration with indigenous communities and the use of IKS in project design for DRR and climate adaptation. International agencies should revise their grant and loan criteria. This will create a powerful incentive for national governments and will increase the uptake of IKS.

Strategy 2: Establishing Global Platforms for Knowledge Exchange and Ethical Protocol Development.

There is need to create and fund dedicated global repositories and exchange forums, such as the UNESCO Local and Indigenous Knowledge Systems (LINKS) program, to facilitate learning between regions and develop global standards for ethical engagement. The implementation of this strategy would come through digital repositories that support platforms which allow communities to share their IKS-based DRR solutions (e.g., the Moken Indigenous Knowledge' solution for tsunami preparedness.) (UNESCO, 2017). It would require to develop and promote global ethical guideline based on the United Nations Declaration on the Rights of Indigenous People (UNDRIP), particularly the principle of Free Prior, and Informed Consent to ensure IKS integration does not lead to exploitation or misappropriation.

Strategy 3: Promoting Co-Production of Knowledge in International Scientific Assessments

Indigenous knowledge holders should actively be included as authors and contributors in major international reports, such as those by the Intergovernmental Panel on Climate Change (IPCC).

The IPCC's Special Report on the Ocean and Cryosphere (2019) was a step forward citing indigenous knowledge of changing ice and weather patterns. This should be an ongoing practice where IKS is interwoven with scientific data throughout assessments. This 2019 report affirms that

indigenous knowledge is critical for understanding climate change impacts. The report incorporated observations from Arctic and SIDS communities, setting a precedent for future assessments.

2.4.2. Contextualizing and Harmonizing IKS Integration in Africa

It is critical for regional bodies to implement global mandates into context specific strategies. This will facilitate cross-border learning and addressing shared regional hazards like drought and cyclones.

Strategy 1: Developing Regional IKS-DRR Policy Harmonization and Knowledge Hubs.

As a regional strategy on IKS and DRR, regional bodies such as SADC must encourage member states to align their national policies and create a dedicated IKS hub for the region. In their analysis of African IKS, Shizha& Mthethwa (2021) advocated for regional cooperation in knowledge sharing. They called on regional bodies like the African Union and SADC to create frameworks that protect and promote IKS across national boundaries. A regional protocol could standardize how member states recognize the role of traditional leaders in disaster management. This facilitates cross-border pastoralist communities' access to early warning.

Strategy 2: Supporting Regional Training Programs

Workshops and training programs must be organized and funded on a regular basis. These should bring together traditional leaders, meteorologists, disaster managers, and NGO workers from across the region. Makondo& Thomas (2022) assert that creating platforms for dialogue at regional levels can help in scaling up successful integrations of IKS and science. This creates a platform for moving

beyond isolated local successes to regional resilience. SADC funded workshops and training on Indigenous Early Warning could meet annually to compare indicators with scientific forecasts. For example, the behavior of the *Madlebe* fish in the Zambezi vs. animal behavior in Kalahari and develop hybrid forecasting models for regional hazards like El Nino-induced droughts.

2.4.3. Community and National Strategies: Grounding Integration in Practice

National and community strategies must be participatory; respectful and emphasize practical application. At this level the integration process becomes tangible.

Strategy 1: Formalizing the Role of Traditional Governance in National Disaster Management Institutions

Governments should legally mandate the inclusion of traditional leaders (Chiefs, Headmen) and recognized knowledge holders (e.g., spirit mediums, elders) in District and Provincial Civil Protection Unit Structures. This is also supported by Mavhura (2017) in his study of Muzarabani who found out that traditional leaders are de facto disaster managers whose role is informal and recommended formalizing the role of traditional institutions in DRR governance to enhance their effectiveness and ensure their knowledge is systematically utilized.

Strategy 2: Implementing Participatory Vulnerability and Capacity Assessment (PVCA) with Two-way Dialogue

There is need to replace extractive data collection with facilitated PVCA processes where community members map their risks and capacities using IKS, which is then directly combined with scientific data like GIS maps and weather forecasts. Mercer et al (2010) propose first a detailed

framework for integration where the first step is “participatory rural appraisal” to build trust and jointly identify hazards, ensuring the process is community owned and driven. The implementation could be done through community mapping through use of 3D hazard maps where locals use local materials to mark IKS-based risk zones (e.g., historical flood lines remembered by elders, animal migration paths) alongside GPS coordinates

The two –way forecast interpretation is that when national meteorological services issue a seasonal forecast, present it to council of elders for interpretation. The disseminated warning could state how scientific models align with observations by elders (e.g., scientific model predicts a 70% chance of below normal rainfall which aligns with the elders observations who note the late nesting of the *Gatawa* bird and abundant fruit of the Marula tree both signs of incoming drought)

Strategy 3: Revitalizing and Co-designing IKS-based Social Safety Nets

There is need to provide strategic support (e.g., seed funding, agricultural extension services) to revitalize and adapt traditional systems like Zunde raMambo for modern contexts. Mushore (2020) notes that IKS –based practices like Zunde raMambo are fading due to modernization and argues for policies that support the revitalization of such practices through integration with modern social protection schemes that ensure they remain viable and effective. The government should support chiefs in establishing community grain banks with strong storage technology and by including drought tolerant seed varieties identified by both IKS and agricultural science.

IKS should be documented and protected and governments should complement efforts on this. Communities should be encouraged to document their knowledge in community owned archives (e.g., videos, illustrated booklets in local languages). This should be done in a way that ensures

intellectual property rights are protected and intergenerational transmission is strengthened.

For successful integration there is need for a framework that brings together IK and scientific systems. At the Global level there is need for policy mandates and ethical guardrails. Regional bodies then need to enable contextualize and shared learning. Nations and communities explore participatory, ownership, practical application and the preservation of knowledge integrity. There is need for a paradigm shift where IKS is viewed not as a data set. Rather, it is a knowledge system that can be engaged in a respectful and equitable partnership with scientific knowledge. This creates a more robust, culturally acceptable and resilient approach to disaster management for all.

2.5 Knowledge Gaps

Indigenous Knowledge Systems (IKS) can be effectively used to build community resilience. The use and effective integration into formal Disaster Risk Reduction framework remains elusive. This standoff is a result of critical, unaddressed gaps in knowledge and practice. There is need to really identify these gaps in knowledge and proposing robust strategies to bridge. This will be a fundamental step towards creating a synergistic and effective disaster management system that respects and utilizes local wisdom (Mavhura et al, 2013).

Indigenous Knowledge Systems lack epistemic validation. Despite it being trusted locally, its predictive accuracy and efficacy have not been systematically tested or validated against scientific data within the specific micro-climates of Bikita. For instance, the reliability of specific animal behaviors or plant indicators as forecasts for seasonal rainfall is not quantitatively established. External agencies and scientifically-trained officials easily dismiss IK because of lack of empirical evidence. This knowledge is viewed as anecdotal, preventing its acceptance as a legitimate data source in formal planning.

Very few studies have been conducted on how IK-based early warnings can complement scientific forecasts. Scenarios where the two knowledge systems contradict each other are not well documented or understood. In other words, there are no synergies and contradictions established. This leaves communities and officials confused about which warning to prioritize (Muchenje&Muringaniza, 2023). It is against this background that opportunities for creating a more robust system are missed, and potential conflicts between knowledge systems can lead to inaction.

There exists a documentation and codification gap because IKS cannot be easily accessed. In other words, there is no centralized and accessible IK repository. The IKS in Bikita is oral, fragmented, and held in memories of specific families and individuals (elders and traditional healers). There hasn't been comprehensively documented information on IKS in any format (e.g., databases, guidebooks, maps) that is accessible to DRR practitioners, scientists, and the younger generation (Dube &Masiya, 2024). These attributes places IKS at high risk of being lost. Furthermore, it cannot be easily referenced or incorporated into official district contingency plans or training materials.

There are no clear integration pathways, mechanisms and policy mandates. Clear operational guidelines or legal frameworks that mandate how IK should be integrated should be in place. Questions about the role of traditional leaders in district CPU meetings, how to compensate knowledge holders and protocols for collaboration remain unanswered (Chanza, 2014). Efforts at integration should institutionalize into standard operating procedures. These should not be mere projects dependent on individual champions.

Another critical area exists in understanding how to go about the power imbalance between formal government structures and traditional leadership systems. Furthermore, effective communication

channels for translating and disseminating blended warnings (both IK and scientific) to the entire community are underdeveloped. Consequently, knowledge integration fails in practice due to social and political friction, and warnings do not reach all community members in a trusted and understandable manner.

IKS is also facing accelerated erosion of intergenerational knowledge transfer. The drivers and rate of IKS loss among the youth are not fully quantified or addressed. The influence of formal education, migration, and modern media in devaluing IK is understood anecdotally, but not systematically countered within the local context (Mugambiwa, 2018). The very resource intended for integration is disappearing making the integration process a race against time.

2.5.1 Bridging Strategies

A number of strategies can be adopted that offer pragmatic pathways to address the identified gaps. Firstly, co-production of knowledge can effectively bridge the validation gap. By establishing Participatory Action Research projects that involve elders, community members, local universities (e.g., Great Zimbabwe University), and the Meteorological Services Department, this will go a long way. This can be done by systematically recording IK forecasts and track them against seasonal scientific data over 3-5 years to identify patterns, correlations, and reliability (Muchenje & Muringaniza, 2023). Also it would be ideal to create a combined seasonal calendar that visually integrates both IK indicators and scientific forecasts, clearly showing areas of agreement.

Systematic documentation and mobilization will also help with the codification gap. There is need to employ culturally sensitive methods to document IK and create accessible resources. This can be

done by creating a Bikita IK-DRR Digital Repository that utilizes audio-visual recordings, GIS mapping of sacred forests and water sources and multilingual transcripts to create a living database hosted by the District Administrator's office (Dube & Masiya, 2024). Communities can produce simple, illustrated manuals in ChiShona that outline indigenous early warning signs and coping mechanisms. These can be used by community volunteers and schools.

Mainstreaming IK through formal policy and structured collaboration can only be achieved through institutional reforms. The criteria for the inclusion of chiefs and designated knowledge custodians as voting members in the District CPU must be formalized. Organizing workshops where government officials are trained on the value of IKS by elders would be quite prudent. On the other hand, training elders on the science behind meteorological forecasts fostering mutual respect.

IKS transmission and knowledge transfer can be achieved by making IK relevant and accessible to the youth through modern and formal channels. The Ministry of Education should integrate IK into school curricula. This can be done by developing local studies modules for schools in Bikita that teach indigenous environmental knowledge as a valid science.

There is need to develop culturally appropriate communication systems to bridge the communication gap. This can be done through designing early warning communication protocols that prioritize both modern technology and trusted traditional channels. A system of blended communication protocol must be established that disseminate warnings via SMS/ radio or calls from the Sabhuku or Headmen. Community radio stations can be used to produce programs where elders and meteorological officers jointly discuss seasonal forecasts and preparedness measures.

In conclusion successful integration in Bikita District requires a deliberate, respectful and collaborative approach that moves beyond mere recognition of IK. Efforts should be in place for active co-production, validation and institutionalization. The implementation of these bridging strategies can transform the current paradigm from one of conflict and marginalization to one of synergy. This will empower the community of Bikita to face disasters with full arsenal of knowledge at its disposal- both the wisdom of our ancestors and the tools of modern science.

2.6. Chapter Summary

The chapter discussed the literature related to the integration of indigenous knowledge systems in disaster preparedness from global, regional and local perspectives. The chapter managed to discuss the theoretical framework that underpinned this study. Two theoretical frameworks namely the Resilience and Decolonial theories were discussed. Studies confirmed that resilience and Decoloniality are fundamentally interconnected concepts. The chapter also discussed existing literature on indigenous knowledge indicators and practices that are used from global to local perspectives. Furthermore, the chapter discussed the assessment on the perceived effectiveness of IKS and how they corroborate with meteorological forecasts. Furthermore, the chapter discussed literature on strategies for operationalizing IKS with formal disaster risk reduction frameworks. The strategies included funding mechanisms, promoting co-production of knowledge in international Scientific Assessments. The chapter also discussed literature on policy instruments that can formalize hybrid governance and early warning co-validation. Although IKS has been perceived as effective, locally trusted, its predictive accuracy and efficacy have not been systematically tested and validated against scientific meteorological data. The lack of empirical evidence makes it easy for external agencies and scientifically trained officials to dismiss IKS as anecdotal. The next chapter

will discuss the research paradigm and design, describing and justifying the research methods that were used to gather the necessary data that was used to critically reflect on the integration of IKS in Disaster Preparedness in Ward 15, Bikita District, in Masvingo Province of Zimbabwe.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

This chapter outlines the research methodology adopted to address the research questions guiding this study. It presents the methodological framework designed to ethically and systematically explore the integration of IKS into disaster preparedness, with particular emphasis on ensuring that community voices, experiences, and knowledge systems are central to the inquiry. In line with the study's aim of examining both the value of IKS and the challenges of its incorporation into formal disaster risk reduction frameworks, the chapter details the research paradigm and design, target population, sample size and sampling techniques. It further describes the data collection methods and instruments, procedures for ensuring validity and reliability, data collection and analysis procedures, ethical considerations, and the approach to the presentation of findings. Together, these methodological choices are intended to generate rigorous, contextually grounded evidence capable of informing culturally appropriate and sustainable disaster preparedness interventions.

3.2 Research Paradigm

This study is guided by a Transformative research paradigm, within which a constructivist–interpretivist epistemological stance is embedded. This deliberate positioning reflects both the nature of the research problem and the ethical commitments of the study. The paradigm choice acknowledges that while understanding community-based meanings of disaster preparedness is essential, such understanding alone is insufficient in contexts where Indigenous Knowledge Systems (IKS) have been historically marginalized.

At a foundational level, the study adopts a constructivist–interpretivist orientation to knowledge. Indigenous knowledge related to disaster preparedness is understood as socially constructed, context-specific, and shaped by historical, cultural, and environmental interactions. Ontologically, reality is viewed as multiple and subjective, grounded in the lived experiences of community members. For example, indigenous interpretations of environmental signs, rooted in relationships among people, land, and ancestral belief systems—constitute legitimate realities through which disaster risks are understood and managed. Epistemologically, knowledge is co-constructed through interaction between the researcher and participants, requiring trust, dialogue, and prolonged engagement with the community (Kovach, 2021).

However, simply interpreting these subjective realities is insufficient given the study’s broader purpose. This research is inherently value-laden and seeks to address historical power imbalances that have excluded IKS from formal disaster preparedness frameworks. For this reason, the constructivist–interpretivist stance is nested within a Transformative paradigm, which provides the overarching ethical and political orientation of the study.

The Transformative paradigm frames research as a tool for social justice, empowerment, and decolonization. Axiologically, the study is grounded in values of respect, reciprocity, equity, and community benefit. The aim is not only to document indigenous knowledge but to challenge its marginalization and contribute to more inclusive and culturally grounded disaster risk reduction policies (Chilisa, 2020). Epistemologically, the paradigm recognizes that power relations shape what is considered legitimate knowledge and therefore actively seeks to elevate indigenous ways of knowing to an equal footing with scientific knowledge. As argued by Smith (2012), research involving Indigenous communities must enable reclaiming control over how knowledge is

generated, represented, and used.

By positioning constructivist–interpretivist inquiry within a Transformative paradigm, this study responds directly to the research problem: the exclusion of IKS from formal disaster preparedness despite its proven local relevance. This integrated paradigm supports community-based participatory research (CBPR) principles, emphasizes Free, Prior, and Informed Consent (FPIC), and aligns with the study’s intention to produce actionable outcomes, including policy-relevant recommendations and co-produced early warning strategies. Rather than representing a paradigmatic weakness, this nested approach strengthens the study by ensuring methodological rigor while maintaining ethical accountability and transformative intent.

3.3 Research Design

Guided by the Transformative paradigm, this study adopts a Community-Based Participatory Research (CBPR) design to examine and validate Indigenous Knowledge Systems (IKS) for disaster preparedness and to co-produce pathways for their integration into formal disaster risk reduction frameworks. CBPR is particularly appropriate because it positions community members as active partners in knowledge generation, rather than as passive subjects, thereby ensuring cultural safety, ethical integrity, and contextual relevance (Israel et al., 2012).

The CBPR design is inherently iterative, flexible, and participatory, allowing the research process to respond to community priorities while maintaining methodological rigor. It aligns directly with the study objectives by enabling the documentation of indigenous disaster preparedness practices, the assessment of their perceived effectiveness, and the collaborative identification of mechanisms for

integrating IKS with scientific early warning systems. Qualitative methods—specifically interviews and Focus Group Discussions—are used to generate in-depth, contextualized understandings of the **what** and **how** of IKS from community perspectives, while a household questionnaire quantifies the prevalence, use, and trust of IKS across the ward. Together, these methods produce a robust evidence base capable of informing both policy and practice.

To operationalize the CBPR design, the study was implemented in four sequential and interconnected phases, as summarized in Table 3.1. Each phase has clearly defined activities, outputs, and indicative timelines to ensure transparency, accountability, and alignment with the research objectives.

Table 3.1: Phases, Activities, Outputs and Timeline

Phase	Focus and Activities	Key Outputs / Deliverables	Indicative Timeline
Phase 1: Community Entry and Mapping	Ethical clearance; engagement with authorities, traditional leaders, and community members; Free, Prior and Informed Consent (FPIC); identification of key knowledge holders	Community consent agreements; stakeholder map; preliminary list of IKS holders	Month 1
Phase 2: Instrument Co-Development and Piloting	Co-development of interview guides, FGD protocols, and questionnaire informed by community input; translation into ChiShona; pilot testing and refinement	Finalized and culturally validated data collection instruments	Month 2
Phase 3: Data Collection	Conducting FGDs, key informant interviews, and household surveys; ongoing reflexive engagement with community partners	Audio recordings, field notes, completed questionnaires	Months 3–4
Phase 4: Validation and Co-Interpretation	Preliminary analysis; community feedback meetings to validate findings; refinement of interpretations and integration pathways	Validated findings; community-endorsed integration strategies	Month 5

3.4 Population

The target populations for this study comprises all residents of four selected villages who possess, practice, or are involved in the use and transmission of indigenous knowledge systems related to disaster preparedness. The population includes several categories of participants whose experiences and knowledge are directly relevant to the study objectives. First, it comprises primary custodians of Indigenous Knowledge Systems, including male and female elders, traditional leaders, traditional healers, and experienced farmers and herders, who possess long-standing knowledge of local environmental indicators and disaster preparedness practices. Second, it includes active community members and households, such as heads of households (male and female) and youths aged 18–35 years, whose perspectives are essential for understanding the intergenerational transmission, transformation, or erosion of indigenous knowledge. The population also encompasses community members with specific vulnerabilities, whose lived experiences provide insight into localized coping mechanisms and risk reduction strategies.

Finally, the target population includes institutional stakeholders who interact with the community on disaster-related issues and influence formal preparedness and response mechanisms. These stakeholders comprise officials from the District Civil Protection Unit (CPU), Agricultural Extension (AREX) officers and village health workers, representatives of local non-governmental organizations, teachers, and religious leaders. Including both community-based and institutional actors ensures that the study captures the full spectrum of knowledge systems and governance structures relevant to the integration of Indigenous Knowledge Systems into disaster preparedness

3.5 Sample

This study employed a mixed-methods sampling strategy, primarily using purposive and stratified random sampling to ensure both the depth of qualitative insights and the breadth of quantitative data.

3.5.1 Sample Size Determination

The target population for this study comprises approximately 200 adult residents across the four selected villages of Ward 15, Bikita District. These individuals include elders, traditional leaders, healers, experienced farmers and herders, heads of households, youths (aged 18–35), and institutional stakeholders. The focus on individuals rather than households allows the study to capture perspectives from those with first-hand knowledge of Indigenous Knowledge Systems (IKS) and disaster preparedness.

To determine the appropriate sample size of individual respondents, Cochran's formula for sample size estimation for finite populations was applied:

$$n_0 = \frac{(z)^2 p (1 - p)}{d^2}$$

where

$z = 1.96$ (95% confidence level)

$p = 0.5$ (maximum variability)

$d = 0.05$ (margin of error)

Given the finite population of 200 individuals, the finite population correction (FPC) was applied:

$$n_0 = \frac{(1.96)^2 \times 0.5 \times 0.5}{0.05^2} = 384.16$$

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

$$n = \frac{384.16}{1 + \frac{383.16}{200}}$$

$$n \approx 132$$

Allowing for potential non-response of about 10%, the final target sample size was set at 145 individual respondents. This ensures sufficient statistical power to quantify patterns of IKS use, while remaining manageable within the CBPR design.

3.5.2. Sampling Strategy

A mixed sampling approach was adopted to align with the Community-Based Participatory Research (CBPR) design, combining probability sampling for the survey with purposive sampling for qualitative methods.

Quantitative Sampling (Survey)

For the questionnaire, stratified random sampling was used to ensure representation across the four villages. Each village acted as a stratum. The total sample of 145 respondents was distributed proportionally based on population size per village. Within each village, respondents were randomly selected from community registers of adult residents. This approach ensures

broad coverage of perspectives on IKS use across the ward.

Qualitative Sampling (Interviews and FGDs)

For the qualitative strand, purposive and snowball sampling identified participants with rich knowledge of IKS and disaster preparedness:

Key informant interviews: ~20 individuals, including traditional leaders, elders, healers, experienced farmers/herders, and institutional stakeholders. Purposive sampling was used to select key informants who were considered knowledgeable and experienced in indigenous knowledge systems and disaster preparedness, the participants were deliberately chosen based on their roles, experience and length of residence in the community. This sampling approach was appropriate for the study as it enabled the researcher to obtain in-depth insights from participants with relevant expertise.

In this study, snowballing was conducted by asking few key informants such as traditional leaders and community elders who were known to possess relevant indigenous knowledge. After interviewing them, these individuals were asked to recommend others within the community who also held valuable knowledge. Each new participant, in turn, referred the researcher to additional knowledgeable individuals

Focus Group Discussions (FGDs): 4–6 groups, with 6–10 participants each, grouped to minimize power imbalances (e.g., separate FGDs for women, youth, elders, and vulnerable populations). Participants in the discussions were selected by deliberately selecting individuals who were knowledgeable and experienced in IKS. Snowballing was also used after initial purposive

selection and then asking these participants to recommend others who also possess relevant IKS or have been involved in disaster related community actions. This referral process helped to identify hidden or less visible knowledge holders.

These sampling strategies ensured depth of insight while reflecting the community-engaged principles of CBPR.

3.6. Data Collection Instruments

In carrying out this study, the researcher used various data gathering instruments that included interview guide (Appendix 4) , focus group discussions guide(Appendix 5) and questionnaires (Appendix 1).

3.6.1. Questionnaires

A questionnaire is a list of questions for which answers are being sought. A questionnaire can be defined as a set of printed or written questions with a choice of answers devised for the purpose of a survey or statistical study. For this study, structured questionnaire with close ended questions will be used. A closed ended questionnaire is the one in which the respondents can fill in answers such as yes or no, agree or disagree. This makes it easy for pupils who are participants to this study to answer quickly and it will simplify the data analysis process. A questionnaire is objective in nature (Taherdoost, 2016).

3.6.1.1 Advantages of a Questionnaire

Wilson (2013) asserts that the questionnaire makes it possible to give similar or standardized questions to the respondents. Hunter (2012) notes that many participants can be reached out in a short period of time, thereby allowing the collection of vast amounts of information. The results can usually be quickly and easily quantified by either a researcher or using a software package. Questionnaires also reduce the chances of evaluation bias as the same questions are asked to all respondents. Also, administration is comparatively inexpensive and easy when gathering data even from a large sample. Data on a questionnaire is easy to represent on different methods of representing the data such as bar charts, pie charts and line graphs. The data will show a continuous distribution. The questionnaire can be answered online using different social media platforms. Questionnaires can be sent, answered and sent back to the researcher.

3.6.1.2 Disadvantages of a Questionnaire

Questionnaires have their own limitations. A major setback is that the meaning of the question can be distorted. Patten (2016) argues that people may read differently into each question and therefore respond basing on their own interpretation of the question. Non-structured questionnaires may restrict the respondents to specify answers.

The researcher will, however, ensure that the return rate is high by delivering the questionnaires to participants for them to respond in time. Participants will be told why the information is being collected and how the results will be beneficial so as to erase any suspicion in them. This will make them respond honestly with a positive opinion. The questionnaires will also be anonymous.

Table 3.2: Sampling of Participants

Role in the Community	Frequency	Percentage
Elder/ knowledge custodian	27	18,7
Head of household	45	31
Local government official	14	9,7
Traditional leader (chief/headman)	9	6,2
Herbalist/Healer/Spiritual leader	5	3,4
Local government/ CPU Representative	3	2,0
Youth Representative(18-35)	17	11,7
Teacher/ Health worker/ NGO worker	25	17,3
Total	145	100

The questionnaire (Appendix 3) was validated for content after an extensive review of relevant literature on indigenous knowledge systems, disaster risk reduction and community based preparedness. The draft instrument was then reviewed by the supervisor, indigenous knowledge practitioners and their feedback ensured all sections adequately covered all key dimensions of the study and were culturally appropriate, clear and relevant. Questionnaire items were aligned with the study's conceptual framework and each section of the document was designed to measure specific constructs such as indigenous early warning indicators, traditional coping mechanisms, community participation and institutional support.

3.6.2 Focus Group Discussions Guide

In this study, Focus Group Discussions (FGDs) (Appendix 5) were employed as a structured protocol to capture collective perspectives on Indigenous Knowledge Systems (IKS) and disaster preparedness. A Focus Group Discussion Guide is a structured but flexible tool used to facilitate group discussions and generate rich qualitative data on participant's experiences, perceptions and beliefs. It is a carefully designed document that outlines the topics, questions and probing strategies a moderator uses to steer group interactions towards the research objectives. It does not function as a

rigid questionnaire but a roadmap that ensures consistency across discussions while allowing participants to express their views freely (Krueger and Casey, 2021).

3.6.2. Interview Guide

An interview guide is a structured tool used in qualitative research to direct and support the interview process while allowing flexibility for in-depth exploration of participants' perspectives. It serves as a roadmap for the interviewer, ensuring that all key topics relevant to the research objectives are systematically covered, while still permitting follow-up questions and probes based on participants' responses. It has written list of topics, questions, and prompts that an interviewer uses. Unlike structured questionnaires an interview guide does not require questions to be asked in a fixed order or wording, instead, it supports conversational interaction and allows the interviewer to adapt questions to the context and flow of the interview (Kvale and Brinkmann, 2015).

The primary purpose of an interview guide is to ensure consistency and comparability across interviews while preserving the depth and richness of qualitative data. It helps the researcher to remain focuses on the study objectives and theoretical framework, reducing the risk of omitting critical issues (Creswell & Poth, 2018).

For this study, the interview guide (Appendix 4) was developed as the central instrument to collect qualitative data on Indigenous Knowledge Systems (IKS) and disaster preparedness. The guide was structured into thematic sections to ensure consistency across interviews while allowing flexibility for participants to elaborate. Each section was designed to elicit both factual information and personal narratives, aligning with the constructivist emphasis on subjective experience (Kovach, 2021).

3.7 Data Collection Procedures

This procedure was designed to be ethical, sequential, and culturally respectful; ensuring that the communities were partners in the research process rather than passive subjects. The pre-data collection and community entry phase formed the foundation of the study and was critical for establishing trust and legitimacy. Ethical clearance was first obtained from the University, which enabled the researcher to secure a research permit from the Ministry of Local Government. At district level, the researcher met with the Civil Protection Unit and the District Administrator to introduce the study and seek their support. This was followed by a meeting with the Ward 15 Councilor to explain the purpose and anticipated benefits of the research. Community consent was then sought through a meeting with the chief and headman of Ward 15, where the study's aims, methods, and potential benefits were explained in ChiShona. This process was guided by the principle of free, prior, and informed consent, as emphasized by Smith (2012), and also served to identify initial key informants. At this stage, the researcher finalized the questionnaires, interview guides, and focus group discussion guides, which were translated from English into ChiShona. Care was taken to ensure that key concepts such as “disaster preparedness” and “indigenous knowledge” were expressed in terms that were locally understood and culturally appropriate.

The second phase involved sequential data collection, allowing findings from one method to inform the next. Focus group discussions were conducted first to secure key themes, community-specific terminology, and relevant disaster experiences. These discussions also helped refine the questionnaires and interview guides. FGDs were scheduled in central, accessible locations such as schools and held at times convenient to participants. Interviews followed, conducted in private spaces at times agreed upon with participants. After obtaining informed consent, the interviewer used a semi-structured interview guide with open-ended questions to capture detailed narratives. To quantify the prevalence and usage of IKS identified in FGDs and interviews, questionnaires were

then administered to randomly selected households across the villages. These were conducted as structured interviews rather than self-completion, in order to mitigate literacy challenges and ensure a high response rate (Chilisa, 2020).

The final phase involved post-data collection activities, including data management and validation. Audio recordings from FGDs and interviews conducted in ChiShona were translated into English for analysis. Questionnaire data were cleaned and entered into a statistical software package. To ensure accuracy and authenticity, a preliminary summary of findings was presented back to the community for validation, enabling participants to verify that the results reflected their voices and experiences, as recommended by Israel (2012).

Fieldwork was organized according to a clear timetable. The first week was dedicated to community entry meetings with district and local leaders. The second week focused on enumerator training and pilot testing of instruments. Weeks three and four were allocated to FGDs, while weeks five and six were devoted to semi-structured interviews with elders, knowledge custodians, and institutional stakeholders. Weeks seven and eight were used for administering structured questionnaires to randomly selected households. Week nine was reserved for translation, transcription, and data cleaning, and week ten concluded with a community validation meeting and preliminary feedback.

Enumerator training was conducted over three days and covered ethical research practices, confidentiality, and the administration of questionnaires as structured interviews. Training also included guidance on the use of probes, neutral facilitation techniques, and translation consistency between English and ChiShona. Enumerators were trained in note-taking protocols for FGDs and interviews, as well as procedures for obtaining informed consent and handling sensitive information.

Role-play exercises and a pilot test in one village were used to refine instruments before full deployment.

Data security and storage were prioritized throughout the study. Audio recordings were stored on encrypted devices and backed up to password-protected external drives. Transcripts and translations were anonymized, with identifiers replaced by codes. Questionnaire data were entered into statistical software with restricted access, and only the researcher and supervisory team had access to raw data. In line with University policy, data will be retained securely for five years before being destroyed.

Consent procedures were carefully designed to ensure ethical participation. Before each FGD, interview, or questionnaire, participants were briefed in ChiShona about the study's purpose, methods, potential risks, and benefits. They were informed of their right to withdraw at any time without penalty. Consent was documented either in writing or verbally, depending on literacy levels. Sensitive Indigenous Knowledge, particularly sacred rituals or restricted narratives, was anonymized in transcripts and excluded from direct publication unless explicit permission was granted by both the participant and community leadership.

Through this phased approach, supported by a clear timetable, enumerator training, robust data security measures, and culturally respectful consent procedures, the research ensured that data collection was both rigorous and ethical, while safeguarding the integrity of Indigenous Knowledge and the dignity of participants.

3.8 Data Analysis Procedures

The study employed a mixed-methods approach in which qualitative and quantitative data were analyzed separately and then integrated. Analysis was guided by the transformative paradigm to ensure that community voices and contexts were prioritized.

Qualitative data from interviews and FGDs were transcribed in ChiShona, translated into English, and imported into NVivo 14. An inductive coding protocol was followed, beginning with open coding and progressing to categories and themes. Inter-coder reliability was established by double-coding a subset of transcripts and calculating Cohen's Kappa, with a threshold of 0.75 used to confirm consistency before applying the framework to the full dataset. Themes such as Indigenous Early Warning Systems, intergenerational transmission, and barriers to integration were developed. Quantitative data from questionnaires were cleaned, coded, and analyzed in SPSS 29. Descriptive statistics summarized categorical data (frequencies and percentages) and continuous data (means, medians, modes). Inferential analyses were conducted where relevant, including Chi-square tests to examine associations between demographic variables and reliance on IKS, and t-tests/ANOVA to compare mean differences across groups. Significance was set at $p < 0.05$.

Integration of findings was achieved through joint displays that placed qualitative themes and illustrative quotes alongside quantitative statistics. This allowed qualitative narratives to explain quantitative patterns and highlighted areas of convergence or divergence. Triangulation was operationalized by systematically comparing results across interviews, FGDs, and questionnaires to identify convergence (agreement across methods), complementarity (qualitative depth enriching quantitative patterns), and dissonance (contradictions between sources). These steps were documented in analytic memos and informed the final interpretation.

3.9 Presentation of Findings

The findings of this study were presented in a manner that combines clarity, accessibility, and sensitivity to the nature of Indigenous Knowledge Systems. Quantitative results have been displayed through tables that summarize demographic data and detailed statistical outputs, while bar charts and pie charts will be used to illustrate distributions and comparisons, such as the prevalence of IKS use or levels of trust in different sources of disaster warnings. These visualizations are intended to provide readers with a clear overview of patterns across households and communities.

Qualitative findings will be presented through thematic diagrams that illustrate the relationships between different IKS indicators and specific disasters, highlighting how local knowledge is organized and interpreted. To ensure that community voices remain central, anonymized quotes from interviews and focus group discussions will be included. These quotations will be carefully selected to illustrate key themes while protecting participant identity; names and identifying details will be removed, and pseudonyms or codes will be used to ensure confidentiality.

Integration of qualitative and quantitative findings will be achieved through joint displays. These will take the form of tables or figures that place qualitative themes or anonymized quotes directly alongside related quantitative statistics. This approach allows the richness of narrative accounts to explain the patterns observed in survey data, thereby demonstrating convergence, complementarities, or dissonance between different sources of evidence.

Finally, the chapter will present a clear visual model of the proposed integration framework, showing how Indigenous Knowledge Systems can be systematically linked with formal disaster management practices. This model will synthesize the findings into a practical representation that can inform both policy and community-level action.

Supporting materials will be included in the appendices to enhance transparency and rigor. These will comprise the full interview guide, focus group discussion guide, and questionnaire instruments; the coding framework and codebook used in thematic analysis; and selected anonymized transcripts to illustrate the analytic process. By presenting findings in this structured way, while safeguarding sensitive content and providing access to supporting materials, the study ensures that results are both academically robust and ethically respectful.

3.10 Ethical Considerations

Ethical clearance to conduct this study in Ward 15Bikita was obtained from the Bikita Rural District Council. (See Appendix 2)

3.10.1 Informed Consent

All participants will provide informed consent before participating in the study. This means that participants will be fully informed about the purpose of the study, what their participation will involve, any potential risks or benefits, and their right to withdraw at any time without any negative consequences. For the minors (under 18), consent will also be obtained from their parents or guardians.

3.10.2 Confidentiality and Anonymity

The study will ensure that the privacy and confidentiality of all participants are maintained. This includes anonymizing data so that individual participants cannot be identified in any reports or publications arising from the study. Personal information and data will be securely stored and only accessible to authorized personnel to protect the participants' privacy.

3.10.3 Minimization of Harm

The research will be designed in such a way that it does not cause any psychological, emotional, or physical harm to the participants. For instance, this study should not put undue stress on students or make them feel uncomfortable or anxious about their performance or understanding of mathematics.

3.10.4 Voluntary Participation

Participation in the study will be voluntary, and students will not be coerced or pressured into taking part. They should be free to decline or withdraw from this study at any point without any repercussions, and this will be clearly communicated to them.

3.10.5 Right to Withdraw

Participants will be allowed to withdraw from the study at any stage without providing a reason. This right will be communicated clearly to ensure participants understand that their decision to withdraw will not affect their standing in their educational institution or any future participation in other studies.

3.10.6 Avoiding Conflicts of Interest

The researcher by all means tries to avoid any conflicts of interest that could influence the study's design, implementation, or interpretation of results. This includes ensuring that any relationships between the researcher and participants (such as teacher-student relationships) do not impact the participants' decision to participate or the researchers' objectivity.

3.10.7 Fair Treatment

All participants should be treated fairly and without discrimination. The study should not exclude any students based on gender, ethnicity, socioeconomic status, or any other characteristic unless there is a scientifically justified reason for doing so.

3.10.8 Transparency and Honesty

The researcher will be transparent about the study's aims, methods, and potential impact. This includes being honest with participants about what the study entails and ensuring that the research findings are reported accurately and truthfully without fabricating or falsifying data.

3.10.9 Debriefing

After the study, participants will be provided with a debriefing session to explain the study's findings, its purpose, and how their data will be used. This helps participants understand the value of their contribution and can provide educational benefits, particularly in an educational study context.

3.11 Summary

The chapter identified the methods and procedures used by the researcher to gather information. Both quantitative and qualitative methods were used to collect data relating to the integration of indigenous knowledge systems in Ward 15 of Bikita District in Masvingo Province. Questionnaires, focus group discussions and interviews were used as instruments to collect data. The data was collected specifically from a target population, which was purposively and randomly sampled. The target population comprised of youths, elders of Ward 15. Be specific in this sections on issues raised in key sections of the chapter. The chapter discussed data collection procedures as well as the presentation of data which would include tables, bar charts and pie charts.

CHAPTER 4: DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents, analyzes and discusses the findings gathered from the fieldwork conducted on the topic ‘Integrating Indigenous Knowledge Systems into Disaster Preparedness’. The chapter begins by outlining the demographic characteristics of participants, followed by a detailed presentation of data collected through interviews, questionnaires and focus group discussions (FGDs). Findings from the study were analyzed according to the objectives of the study and literature reviewed. The data was examined to get insights into key themes, trends and to establish relationships. Existing theories and framework linked the discussion with data gathered. In addition, the discussion ushers the role, barriers and opportunities of IKS in fostering disaster preparedness within communities.

4.2 Demographics

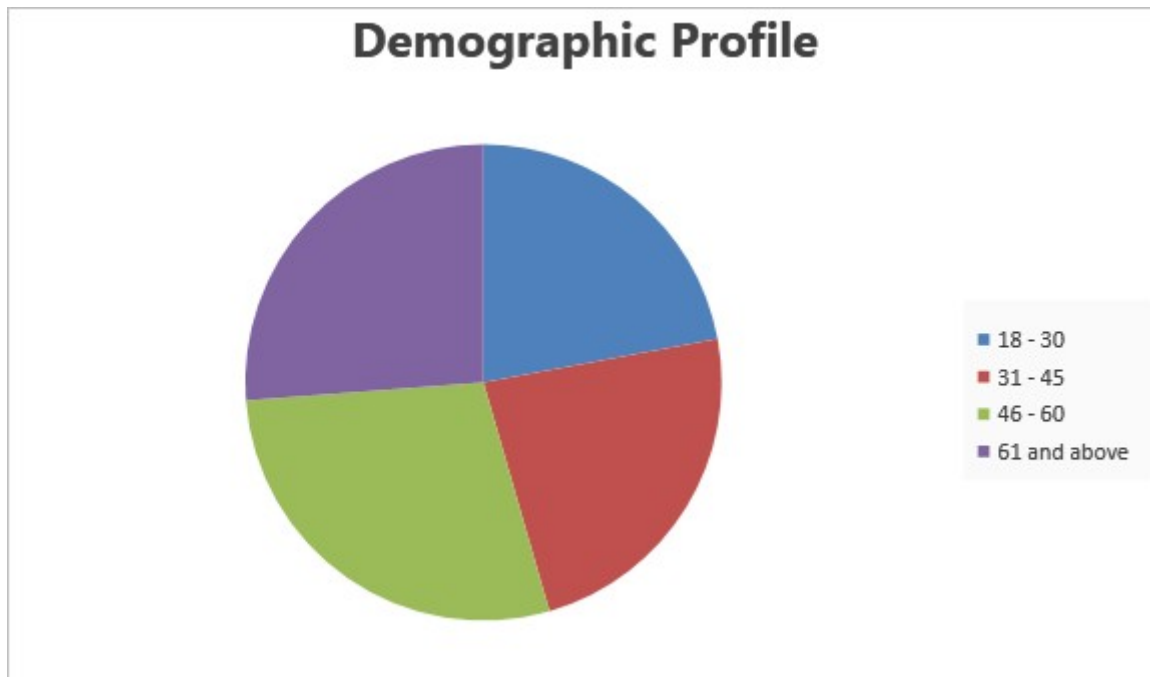


Figure 4.1 Demographic Profiles (Fieldwork Research)

Indigenous knowledge is mostly held by elders who are also the primary transmitters. It is because they have gone through several disaster events. They also understand fully the traditional warning signs, rituals and survival strategies. Chanza (2016) asserts that elders are often seen as repositories of oral traditions. However, this knowledge risks being lost because of lack of documentation and youth disinterest. It is also because younger generations are now exposed to formal education and global culture. In this way traditional practices are no longer valued. Hlwasaki et al (2020) posit that the generational gap puts barriers for IKS continuity. The youths must be involved in cultural preservation and disaster planning.

In this study, 26.2% of the respondents were elderly people aged 61 years and above. The profile resonates with Marambanyika et al (2012), who articulated that the average age of peasant farmers was 57 years. This is quite a significant age group that showed potential to integrate IKS into

disaster preparedness as compared to the younger generation. It is because their interaction with the environment and generated knowledge enabled them to give evidence and views of adaptive and resilient strategies.

The trends of selective migration further account for rural demographics. It is because more males migrate than their female counterparts. They migrate to towns to look for employment while leaving behind the elderly, women and children. Consequently, the population in rural areas features aging households and labour shortages. This scenario also affects the transmission and utilization of Indigenous Knowledge Systems.

The remaining age groups that participated in this study were: 23,5% being aged between 31-45years, 46-60 years accounted for 28, 3% and lastly 22% were between 18-30 years. Their contribution brought valuable views. However, responses from the elderly (61+) were quite significant. This is so because their contributions represent a repository of indigenous practices. These included early warning systems and indicators, communal responses to disasters and coping mechanisms.

Conclusively, the integration of Indigenous Knowledge Systems into disaster preparedness is dependent on the age factor. The decreasing rural population, migration patterns and ageing households derail the process. However, this shows the essence of cultural preservation and utilization of IKS held by the elderly. This important knowledge is critical in disaster management. It also strengthens the community's resilience to natural disasters as floods, drought and storms.

Table 4.1 Level of Education of Respondents

Education Level	Perception towards Indigenous Knowledge Systems			
	Reliable	Indifferent	Unreliable	Total
No formal education	5	2	1	8
Primary education	10	6	9	25
Secondary education	15	40	25	80
Tertiary education	6	1	25	32
Total	36	49	60	145

The respondent's level of education is important with regard to integration of indigenous knowledge in disaster preparedness. Data from the interviews shows that most of the interviewees (55%) have attained secondary qualification, which is much higher than interviewees with primary school education constituting 17%. Respondents with a tertiary qualification constitute 22%. Those with no formal education constitute 6%. These figures are not surprising considering that Zimbabwe has one of the highest literacy rates in Africa. The educated members of ward 15 in Bikita District such as teachers, agricultural extension workers and nurses have a better understanding of integration of indigenous knowledge in disaster preparedness. Furthermore, this high level of literacy should provide a strong driving force for disaster management in general and preparedness practices in particular.

It can be noted that formally educated participants express skepticism toward IKS in disaster preparedness. This is not just personal but derives from deep –seated epistemic, institutional and social factors that shape how knowledge is valued and validated. Nyahunda (2024) points out that standardized education often marginalizes local knowledge, presenting universal modern science as the sole legitimate paradigm. Decoloniality theory explains the skepticism of formally educated participants as a direct result of the colonality of knowledge. This is the power structure that establishes Western science as the universal standard of truth. This internalized bias leads to the

sidelining of proven, hyper-local IKS. The Resilience theory also challenges Western views as it believes that disaster preparedness carries forward lessons from past disturbances through stories, rituals and practices.

CHI-SQUARE TEST OF INDEPENDENCE

A chi-square test of independence was conducted to examine the relationship between level of education and perceptions towards Indigenous Knowledge Systems (IKS). The test was evaluated at the 5% level of significance ($\alpha = 0.05$). There exists a strong association between the views on IKS and level of educational attainment, $\chi^2(6 \text{ n} = 145) = 38.78, p < 0.001$. This sees perceptions of IKS as reliable, indifferent, or unreliable vary significantly across different educational categories. IKS was more regarded as reliable by respondents with no formal and primary education. On the other hand, those with tertiary education predominantly perceived IKS as unreliable. Based on the magnitude of the Chi-square statistic, the observed differences in perceptions across education levels are not due to chance. This leads to the rejection of the null hypothesis of independence. The finding determines how formal education impacts on attitudes towards Indigenous Knowledge Systems.

In the Chi-square test, observed counts were compared with expected counts. It was based on what we would expect if education and perception were independent. In the test, respondents with secondary education were indifferent. Tertiary education had overrepresentation in the unreliable category. Slightly more respondents than expected in the reliable category A were those without formal education. This confirms a statistically significant association between education and perception towards indigenous knowledge systems at the 5% level of significance.

From the Chi-square test, cultural perceptions largely are shaped by one's level of formal education.

Tertiary education expressed most skepticism. Indigenous Knowledge systems reliance decreases as level of education increases. This suggests that integrating IKS into curricula could help bridge the gap between traditional knowledge and modern education, preventing alienation of indigenous practices. Education acts as a filter, influencing whether individuals valorize, dismiss, or remain neutral towards indigenous knowledge.

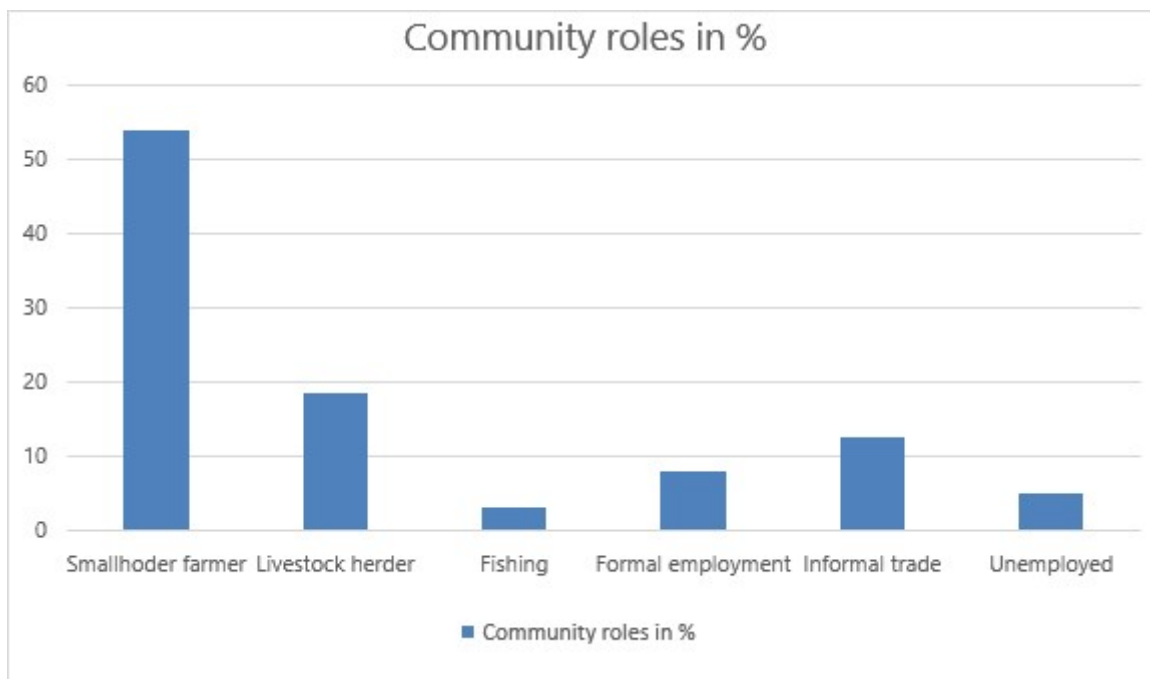


Figure 4.2 Community Roles (Fieldwork Findings)

4.3 Role in the community.

A significant number of the respondents, constituting 31% of the participants, were household heads. A household head means a person fending for the household and responsible for decision-making. For household heads the inclusion and inclusion criteria was who was responsible for decision making at household level. It was assumed that every household head had some on awareness and perception on integrating indigenous knowledge in disaster preparedness. The household heads are

key interviewees because their activities and decisions impact significantly on integrating indigenous knowledge in disaster preparedness. Moreover, they are key stockholders on disaster preparedness who need to be consulted as part of public participation approach. The other group of interviewees, which followed household heads, consisted of elders/ knowledge custodian these constituted 18,7 % of the total participants. Another group of interviewees, which followed are teacher/ health worker/ NGO worker these constituted 17,3 % of the total participants. Another group of interviewees, which constituted a significant portion are youth representative (18-35) these constituted 11, 7 % of the total participants. These segments of the society ultimately have an impact on disaster preparedness initiated in the communities because of their involvement as participants. However, local government representatives, traditional leaders, herbalist and CPU representatives with a cumulative 21,3 % were interviewed as part of the data triangulation process.

The study revealed several major livelihood strategies among the interviewees, with smallholder farming emerging as the dominant source of income (54%). Most rural communities rely on subsistence agriculture for their livelihoods. Their agricultural practices are guided by a cocktail of Indigenous Knowledge Systems. They use their traditional knowledge of soil fertility, crop rotation, seed selection, and seasonal cycles. This knowledge continue to shape smallholder farming, ensuring resilience in the face of limited access to modern inputs. Because of resource constraints, IKS are highly effective for smallholder farming. Early warning systems and weather indicators help these farmers to select drought resistant crops, determine planting and harvesting times. They also manage soil through organic methods like mulching and intercropping. These methods are cost-effective, sustainable and well suited to local climatic and ecological conditions (Altieri, 2024)

The study further showed that livestock herding (18.6%) similarly draws upon IKS. Communities

rely on indigenous veterinary practices, grazing patterns, and cultural norms of herd management. These practices not only sustain livelihoods but also help to protect the environment. Such practices include naming and categorizing pastures.

Local markets such as Nyika and Jerera growth points provide livelihoods to the informal trading sector (12.4%). This involves the sale of vegetables, fruits, and wares. These adaptive strategies are rooted in indigenous social networks. Trading is often supported by traditional reciprocity and communal trust, which remain central to rural economies.

Formal employment is limited accounting to only 8% and also 5% is unemployed. This makes access to cash is a persistent challenge. As coping strategies, households diversify into fishing (3%) and informal work, including piece jobs and part-time engagements. Fishing practices, for example, are informed by local ecological knowledge of rivers, breeding seasons, and sustainable harvesting methods.

There is a strong interdependence where livelihoods strategies are guided by Indigenous Knowledge Systems. Communities draw on indigenous coping mechanisms for disasters such as floods, droughts, fires and storms. They balance immediate survival needs with disaster preparedness. For instance, local ways of grain storages, traditional labor systems, and indigenous weather forecasting provide resilience against hazards. Nyong et al (2017) also asserts that these practices enhances resilience to shocks and reduces dependence on expensive external inputs. However, the tension between modern livelihood demands and indigenous practices remains acute, as socio-economic vulnerabilities often undermine disaster preparedness.

4.4. Awareness and Perception of Indigenous Knowledge Systems

Questionnaire results revealed that Ward 15 community in Bikita District possesses indigenous knowledge used to predict natural events (e.g., floods, droughts, storms, earthquakes). Whilst 58% said yes, about 38% said that they did not possess indigenous knowledge used to predict natural events. About 4% said they do. This strong awareness and perception of Indigenous Knowledge Systems helps to integrate IKS with conventional professional and scientific methods of preparing for natural hazards such as floods, droughts, storms, earthquakes.

Respondents identified a wide range of early warning signs involving birds, insects, plants, celestial patterns, winds and dreams. Most of the respondents revealed indicators such as animal behaviour especially bird calls and insects' prevalence or absence, plant signs such as flowering and fruiting 'mishuku', and atmospheric signs such as cloud form and appearance and wind patterns and directions are used in Bikita District to predict hazardous. The use of local names highlights the contextual and place-based nature of this knowledge. However, few respondents concurred that the celestial signs such as the moon and star galaxy shape and size and occasional dreams and visions of 'maguta' and famine can be used to predict and prepare for disasters.

Table 4.2: Perceived reliability of event indicators

Perceived reliability of event indicators	Frequency	Percentage
Very unreliable	9	6,2
Somewhat unreliable	15	10,3
Neither	20	13,7
Somewhat reliable	46	31,7
Very reliable	55	37,9
Total	145	100

Most of the responses given during the administration of the question (37,9%) show that these event indicators are very reliable. This perception underscores strong community trusts in indigenous forecasting systems. Therefore, most respondents expressed moderate to high trust in disaster warnings that combine indigenous indicators with scientific forecasts, suggesting strong potential for hybrid early warning systems. 31, 7 % of the respondents showed that the indicators are somewhat reliable. A small percentage of 6, 2 % and 10, 3 % consider that the event indicators are very unreliable and somewhat unreliable. The study found that IKS informs early detection of drought and response strategies in rural Umzingwane. In predicting drought hazards, communities rely on observing animal behavior, fruiting of trees and growth of certain species in certain seasons. The study recommends documentation of IKS and the establishment of platforms to disseminate indigenous knowledge to strengthen capacities of the drought exposed to proactively deal with the hazard.

While IKS indicators are trusted by local people, they are often seen as less precise when compared to scientific forecasting tools, especially for sudden-onset hazards like earthquakes or flash floods. However, for slow-onset hazards such as droughts or seasonal floods, indigenous indicators are often considered more relevant and timely at the community level (Orlove, 2020). The reliability of IKS indicators is being challenged by climate variability and environmental change, which can disrupt traditional patterns. In Zimbabwe, for example, some elders have noted that bird migrations or tree blooming-once reliable drought predictors-are now inconsistent due to shifting rainfall patterns (Chanza, 2016).

Table 4.3: Percentage degree of accuracy

Percentage degree of accuracy	Frequency	Percentage
Almost always (greater than 80% of times)	52	35,8
Often (50-80%)	41	28,2
Sometimes (20-50%)	24	16,5
Rarely (less than 20%)	18	12,4
I do not know	10	6,8
Total	145	100

During the data collection phase, community members of ward 15 in Bikita District were asked to show the degree of accuracy of the event indicators to predict an event. Indigenous Knowledge (IK) and practices are usually unwritten; relying on oral transmission and human memory and this usually leads to omission and inconsistency not just in interpretation, but also in application. The migration to neighboring nations such as South Africa and the death of those with IKS knowledge and tradition has created gaps making interpretation of IKS difficult by the younger generation.

Table 4.4: Primary holders of Knowledge

Knowledge Holders	Frequency	Percentage
Farmers/ Fishers	27	18,7
Healers/ Herbalists	45	31
Spiritual leaders/ Spirit mediums	14	9,7
Specific families	9	6,2
Everyone in the community	5	3,4
Other: (specify)	3	2,0
I do not know	17	11,7
Total	145	100

Indigenous knowledge was primarily associated with elders, farmers, healers, spiritual leaders and specific families. However, some respondents indicated that elements of this knowledge are shared widely within the community, particularly those that related to farming calendars. Indigenous people around the globe have relied upon their traditional knowledge to prepare for, cope with, and survive

disasters for millennia (Scott et al., 2013; Kelman and Næss, 2013; Motsumi and Nemaokonde, 2024).

Table 4.5: Indigenous Disaster Preparedness Practices

Preparedness Practice	Frequency (n)	Percentage (%)
Seed/grain storage	60	41,3
House reinforcement	19	13,1
Community grain banks	30	20,6
Indigenous planting calendars	12	7,2
Rituals / ceremonies	20	12,7
Relocation to safer areas	8	5,1
Total	145	100

Common preparedness practices included storing drought-resistant seeds and grains. Reinforcing houses and adjusting building styles. This is also supported by Twigg, (2021) who posits that IKS includes disaster-resilient housing design for example; traditional huts in flood prone areas are often build on stilts, while those in earthquake prone zones use flexible, lightweight materials. Other practices include creation of community grain banks such as Zunde raMambo, planting calendars guided by indigenous indicators and rituals and ceremonies for rain protection. Kelman et al (2022) asserts that knowledge about past floods, droughts, or a famine is shared through storytelling, helping communities remember safe areas, evacuation routes, or planting strategies. These practices were reported to be used every season or most years, indicating their institutionalization within community life.

Seeding and grain reserves revealed to be the most prevalent amongst disaster preparedness practices in Ward 15. This is common in most rural communities as this practice directly links to immediate food security. Having food and grain reserves translate to survival and sustenance. In other words, storing grain provides households with food during lean seasons and disaster- induced crop failures. The practice is a form of an immediate safety net. Storing grain after harvesting helps buffer the

effects of droughts, floods, and planting delays by ensuring food is available for consumption or sale.

In addition, seed/grain storage is an affordable and accessible way unlike house reinforcement or relocation. Seed storage is cost effective and locally actionable as households can store seeds using traditional or simple improved methods without external funding. Relocation or house reinforcements require significant resources and coordination. Community grain banks exist, however, families rely first on what they can control directly. Relocation is the least practiced because it is a high impact and rare due to costs and social dislocation. As propounded by Holling (1973) in the Resilience Theory, communities should be able to withstand and rebound from disturbances such as natural disasters, economic shocks and social upheaval. Governments should learn from this practice and prioritize stock piling during good seasons to ensure national food security in the face of recurrent droughts.

4.5 Indigenous Practices in Disaster Preparedness and Response.

Table 4.6: Indigenous Disaster Response Practices

Response Practice	Frequency (n)	Percentage (%)
Evacuation to safe sites	6	4,1
Drums / local warning systems	49	33,7
Food sharing	43	29,6
Mutual labor	36	24,8
Traditional medicine	11	7,5
Total	145	100

Most of the respondents indicated that few or none of the indigenous practices are included in formal disaster management plans. Where inclusion existed, it was often informal and dependent on individual officials rather than institutional policy. During disasters communities relied on

evacuation to locally recognized safe sites. Other members use drums, runners or verbal warnings. Food sharing was another common indigenous disaster response practice. Another method was the use of traditional medicines and healing practices. These response mechanisms emphasize collective action and social cohesion.

Table 4.7: Post Disaster Recovery Practices

Recovery Practice	Frequency (n)	Percentage (%)
Communal rebuilding	42	28,9
Community ceremonies	58	40
Use of medicinal plants	13	8,9
Livestock restocking	32	22
Total	145	100

Recovery practices included communal rebuilding, restocking of livestock through traditional systems, use of medicinal plants, and community ceremonies. Such practices facilitate both physical and psychological recovery rural and indigenous communities have relied on their own traditional knowledge to manage and recover from disasters long before the introduction of modern scientific methods. (Motsumi and NemaKonde, 2024)

4.6. Current Integration and Collaboration

The barriers to integration identified during the data collection process included absence of documentation. IKS is not well documented. There is also perceived conflict between scientific and indigenous knowledge. There is also knowledge erosion in the community through natural attrition. These barriers highlight both institutional and internal community challenges.

4.7: Barriers to Integrating Indigenous Knowledge

Table 4.8 Barriers to Integrating Indigenous Knowledge

Barrier	Frequency (n)	Percentage (%)
Lack of respect by officials	22	15,1
Language barriers	10	7
Knowledge not documented	40	27,6
Fear of misuse	11	7,6
Conflict with science	9	6,2
Knowledge loss	21	14,5
Lack of funding	32	22
Total	145	100

Most respondents indicated that few or none of the indigenous practices are included in the formal disaster management plans. Pursuing an integrated approach to the use of IK and modern expert knowledge on DRR would be a step forward in addressing the fragmentation of the two knowledge systems. (Motsumi and NemaKonde, 2024). Where the inclusion existed, it was often informal and dependent on individual officials rather than institutional policy of integrating IK into DRR because we believe the simultaneous use of IK and modern DRR measures could increase the resilience of rural communities. (Motsumi and NemaKonde, 2024) Combining advanced technology with local observation of impacts of droughts could generate important hybrid solution for sustainable drought management. Concerted policy advocacy is urgent to emphasize and make a business case for the integration of scientific and indigenous knowledge systems and practices.

One of the barriers to integration noted was fear of misuse. In this study, the Ward 15 community, through the Chief, Sabhukus and governance processes decided what scared knowledge was to be excluded. Excluding deeply sacred elements allowed the community to feel safe sharing knowledge. Sacred data that included ancestral spirits, sacred locations, spirit mediums and stories that included traumatic events was excluded. Thus the researcher acted in facilitation following community led

protocols to ensure knowledge was shared respectfully and on its own terms.

Table 4.9: Opportunities for Strengthening Indigenous Knowledge Integration

Opportunity	Frequency (n)	Percentage (%)
Training youth	33	22,7
Legal recognition	20	13,7
School curriculum inclusion	56	38,6
Joint scientific validation	15	10,3
Community-led funding	21	14,4
Total	145	100

Respondents identified key strengths as context specificity, cultural relevance, accessibility, and cost effectiveness. These attributes make indigenous knowledge particularly valuable in rural resource constrained settings. There have been calls for the integration of Indigenous Knowledge Systems (IKS) based climate services in seasonal climate forecasting to bolster the efficacy and accuracy of forecasts are increasing, (Dube et al. 2024). One strength of the IKS is that the indicators are located within, “owned” and understood by local communities. As a consequence, they are well trusted, having been used for centuries across generations. The IKS indicators are also timely as they can be interpreted from the local ecology well before making critical decisions.

4.7.1 Supporting Indigenous Knowledge Systems

Suggested support measures included funding community–led initiatives, training youth, legal recognition, and inclusion in school curricula, and joint validation projects with scientists. Supporting IKS requires deliberate efforts through policy, education, documentation, and respectful partnerships. The UN declaration on the Rights of Indigenous Peoples (UNDRIP) affirms indigenous people’s rights to maintain, control, and protect their traditional knowledge (UN, 20017). Countries

like South Africa have integrated IKS into their National Indigenous Knowledge Systems Policy to support its validation, protection and use (UN, 2017).

4.7.2 Documentation Preferences

Respondents expressed support for documentation in a variety of ways that included videos, formal education and written records. However, some were worrisome on the potential misuse of this knowledge. This suggests the need for ethical and community guided process of documentation. Documentation is critical as it fosters the preservation and transmission of IKS. It also facilitates the integration process into various aspects as development, disaster preparedness and environmental management. Effectively the documentation process should be led by locals themselves. This ensures cultural sensitivity, accuracy, and respect for knowledge ownership. Chanza (2016) is of the view that community-led approaches empower locals to record knowledge in their own languages and formats (videos, oral history, drawings, etc).

4.7.3 Willingness to participate

A majority of the respondents expressed willingness to participate in future dialogues, particularly as story tellers, facilitators, or recorders, indicating strong community interest in collaborative disaster governance. To motivate indigenous people to participate in the integration process there is need to recognize and respect their knowledge and also include indigenous leaders, elders and knowledge holders in planning and decision-making processes. This builds trust and ownership in disaster initiatives (Mercer et al, 2010). Motivating indigenous people to participate requires respect, inclusion, benefits, protection and capacity building. Valuing their knowledge and rewarding them spontaneously enhances their participation in the integration process.

4.8 Interview responses

One elder, Mr. Mashamba of Runesu Village described his role as a custodian of traditional knowledge, emphasizing that he guides the community in matters of farming, ceremonies, and disaster preparedness. He explained that: ***‘Isu tine zvakawanda zvinotiratidza kuti gore rino rakashata kana kuti rakatinakira. Tikanzwa matendera achirira, machiti munzizi uye nhuruka toziva kuti mvura iri pedopedo. Tikaonazve masvore shiri dziya nhema nechena dzichibhururuka mucherechedzo wemvura iri pedo. Dziva remvura pamwedzi kana pazuva ndezvimwe zvinotiradza kuuya kwemvura zhinji kana mafashama’***. He noted that these signs, in his experience, have proven reliable in most cases. Elders and headmen convene to interpret them, leading to actions like seed saving, relocation, rituals, and communal work such as Zunde raMambo. Chisadza et al (2018), Masekoameng and Molotja (2019) agree that IKS plays an important role in climate forecasting in Africa’s smallholder farming communities, particularly in occasionally predicting local weather information and frost. Effectively these measures have reduced harm in past events.

Knowledge transmission occurred orally through stories, songs, and fieldwork, with differences in what men, women, and youth learn. A lot has changed due to schooling, migration, and climate change. These factors have disrupted the continuity of transmission of IKS. One elder, of Museti Village noted, ***‘Isu zvatakadzidza kubva pakukura kwedu zvasiyana zvikuru nedzidzo dzamazuvano. Vakomana vaigara nevakuru manheru padare. Panga pasingadi kuonekwa musikana. Taidzidziswa zvakawanda nevakuru maererano netsika nemagariro emunzvimbo medu muno maIShe Mutsimba’***.

One of the household head of Chiswa Village acknowledged that while communities often trust traditional signs more than scientific forecasts, they value combined warnings. He stressed that some rituals are sacred and should not be documented, and insisted that any recording of knowledge must be community-controlled and beneficial. ***‘Pane zvakawanda zvashanduka munzvimbo medu muno.***

Zvimwe zvaitibetsera kutiudza nezvemamiriro ekunze.. Shiri nedzimwe mhuka hakuchina. Mazuva ano maredhiyo nemafooni ndoonyanya kutibetsera asi haawanikwi nemunhu wese. Saka tongoshandisa zvose asi hatifaniri kurasa tsika nemagariro zvatakakura nazvo’. He recommended respectful collaboration with formal agencies, pilot projects, and youth involvement, with traditional leaders guiding integration.

Chief Mutsimba described his role as that of safeguarding the community welfare and the natural resources that are found in his area of jurisdiction. In terms of disaster preparedness, he noted that his role encompasses organizing collective practices that included communal granaries and rituals to prepare for disasters. He noted *‘Basa rangu guru samambo kuchengetedza zviwanikwa zvedu, tsika nemagariro edu evanhu vatemala. Ndinogadzirisa makakava anomuka mukugarisana kwevanhu kubudikidza nedare rangu rine machinda anosvika matanhatu. Ndinoshanda pamwe chete namasabhuku kuona kuti mudunhu rangu vanhu vakagara zvakanaka murunyararo vachidyava chiguta. ChirongwacheZundechinobetserazvikurunhereranechirikadzimunguvayenzara’.* He noted that they predict impending weather events through indicators that include bird calls, tree flowering, and river changes. These are interpreted by elders and announced under customary law. In his area disaster risk management is organized through councils of elders (dare) in collaboration with Sabhukus. The chief noted that engagement with government and NGOs occurs during major hazards, citing Cyclone Eline as an example where traditional and scientific forecasts complemented. The chief professed ignorance on whether traditional knowledge has been documented. He asserted that much of the IKS remain oral and are passed down generations through elders. Sacred rituals, he insisted, must remain undocumented. The chief however recommended formal recognition of traditional leaders in disaster committees. He also called for the provision of resources such as seed banks and radios. On documentation, he noted that it should respect cultural

values and protocols.

The meteorological officer described their agency's mandate as that of providing forecasts, early warnings, and climate information to reduce risks. Their main responsibility is collaborating with communities and disseminating weather related information. Past collaborations included seasonal forecast dissemination in 2018 and CycloneIdai recovery training in 2020. These were documented in annual reports and improved community responses. The meteorological officer acknowledged barriers to integration of Indigenous Knowledge Systems. These included policy gaps, limited trust, building capacity, budget constraints, and insufficient staffing. He noted that indigenous indicators are sometimes compared informally with scientific models. This reveals that there is no formal framework that exists for validation. He noted that very little has been done in terms of pilot co-production projects. The officer suggested that government and institutions should formally recognize IKS as complementary to scientific systems. He recommended developing training programs for both communities and professionals. He also called upon the adoption of co-production approaches such as joint seasonal outlook workshops. He however noted that such initiatives required dedicated funding and policy support. The officer clearly reiterated the need to incorporate traditional leaders from the outset.

The views and opinions of interviewees together reveal a strong concurrence on the value of marrying indigenous knowledge systems and scientific knowledge in disaster preparedness. Elders, chiefs, and meteorological officers all emphasized Trust, ownership, and respect was a clarion call from elders, the chief and meteorological officers for essential integration. Barriers such as policy gaps, resource limitations, and generational shifts in knowledge transmission exist. These challenges can be overcome through formal recognition of traditional leaders, capacity-building

initiatives, and co-production frameworks. This will go a long way in bridging ancestral wisdom with modern science.

4.9. Focus group discussions

Initial activities during focus group discussions were introductions. The introductions entailed participants revealing period of residence, roles and main livelihood activities. Most of the participants noted crop cultivation, small-scale livestock rearing and gardening as the main activities. Participants revealed that household members collectively work during seasonal preparations. Their main activities included ploughing (land preparation), selection of seed, harvesting and food storage. Children were mostly engaged in herding livestock. There is a pronounced division of labour highlighting the collective nature of seasonal readiness.

During the discussions, quite a number of natural indicators were revealed that the community watches to anticipate droughts, floods, or poor seasons. These included the behavior of animals, unusual bird patterns, insect swarms, and the flowering or fruiting of certain plants. Besides these, other signs noted included cloud formations, wind direction, and the appearance of the moon. At Runesu Village Focus Group Discussion, some two participants referred to dreams, visions, or prophecies as additional sources of warning. Another sign not commonly mentioned was the observance of unusually high anthills which predicted intense rainfall. An example was recalled where ants built their nests unusually high in late 2021, which was followed by heavy rains and localized flooding. Participants noted that after observing these signs, households respond by moving grain stores and reinforcing homestead structures (*kupfurira dzimba*).

Participants revealed a wide range of actions triggered by these signs. Some explained that

households often save seed, adjust planting dates, or engage in dry planting (*kuwarira*). In some cases of drought families relocate their livestock to areas with palatable grass. Community level collective practices included contributing to the chief's granary (Zunde raMambo) and performing rituals. These decisions at family level were directed by household heads. Decisions at communal level were made by elders or the headmen.

On the issue of reliability of these indicators, several opinions and insights were brought forward. Many of the participants agreed that the signs were correct in the majority of cases. Some estimated that they had been accurate about six or seven times out of ten in the past decade. Many acknowledged that while the signs were not certain, they brought in a compelling voice of getting prepared. Their accurate predictive potential provided a trusted basis for preparation. The participants noted that comparisons had occasionally been made with meteorological forecasts. There were instances of agreement and also times when the forecasts contradicted local signs. In such cases, households tended to rely more on traditional indicators, though they recognized the value of combining both sources of information.

Participants also noted that IKS holders transmitted this knowledge traditionally through apprenticeship, storytelling, and rituals. This was often shared during communal gatherings or seasonal work. Participants noted the changes in the way IKS were transmitted. They attributed these changes to migration, schooling and commercialization. Climate change was cited as a reason why younger generations were less engaged with traditional knowledge. Many youths were said to be more focused on formal education and modern livelihoods. These reduced their exposure to indigenous practices.

Participants appreciated the integration of IKS and strongly supported the use of indigenous

knowledge alongside formal disaster risk management. They showed great interest and called for the integration of traditional knowledge in disaster risk assessments. FGD participants strongly felt that IKS should be incorporated in assessments. In this way, DRR strategies would be more contextually relevant and effective (Motsumi and NemaKonde, 2024). They advocated for combined warnings saying where elders were involved in validation. They also called for demonstration projects that would be conducted locally. They felt the integration process could be transparency and benefit-sharing was emphasized as a condition for trust. The discussion also looked into barriers to integration process. These were identified as lack of respect for traditional systems, risks of intellectual property theft, language differences, and institutional distrust. Respect and ownership of knowledge were considered the most critical issues.

The prioritization exercise saw participants identify the top three indicators they believed should be preserved and integrated into formal systems. The top three were animal behavior, plant flowering patterns, and sky-related signs such as moon rings and cloud movements. They were noted as the most occurring and widely considered across households. Participants noted that IKS is living knowledge that should not only be documented but continuously be practiced. They showed commitment and agreed to attend community meetings that would review findings and validate the study results.

4.10 Results Discussion and Framework

In this study results from Part A provide the foundation upon which other results will be discussed. In the survey a total of 145 respondents participated. These were drawn from four selected villages in Ward 15 namely Runesu, Maturure, Chiswa and Museti. The ages of the participants revealed that

respondents aged 61 years and above accounted for 26, 2%, and 31- 60 years accounted for 51.8% and the youths, 22% of the sample. This age distribution is important to the study because indigenous knowledge gained through observing the environment and predicting disasters was found to be more prevalent among older community members.

In view of the 61+ cohort (26, 2%) in this study, it is the one that holds critical, often irreplaceable IKS for disaster preparedness. This knowledge is orally transmitted and held by elders making it highly vulnerable to attrition. This group is very important and must not be treated as a mere demographic, but a living knowledge repository. UNDRR (2020) advocates for the mandated inclusion of elders (61+) as official knowledge holders in all DRR planning bodies, from local committees to national platforms. There is need to develop clear operational frameworks as advocated by UNDRR that specify how IKS and scientific early warnings will be combined in disaster management.

High levels of awareness of indigenous knowledge related to disaster prediction within the community were revealed by findings from Part B. In the study, most of the respondents confirmed that their community possesses indigenous methods for anticipating hazards such as droughts, floods, and storms. The indicators commonly mentioned included animal behaviour, plant phenology, atmospheric conditions, celestial observations, and dreams or visions. Animal and plant indicators were most frequently cited. Participants indicated that their daily livelihood activities were tied to indicators observed from the environment. Most respondents perceived the reliability of indigenous indicators as moderate to high. Many reported that such indicators often predicted events accurately. It was noted that the primary holders of indigenous knowledge were largely elders, farmers, healers, spiritual leaders, and specific families. However, some respondents indicated that certain forms of knowledge were widely shared across the community. The findings suggest that

indigenous knowledge remains both visible and trusted as a means of understanding environmental change and risk.

In Part C, indigenous knowledge translated into concrete practices across all stages of disaster management. Respondents noted quite a number of early warning signs linked to specific birds, insects, plants, winds, celestial patterns, and dreams. These were described using local terminology. Most IKS indicators are observable several months before the onset of the rainy season, thus enabling anticipatory planning (Chisadza et al., 2013). This demonstrated that indigenous knowledge functions as an integrated system encompassing anticipation, response, and recovery. Respondents who had lived in the area for many years, often since birth, and household sizes reflected extended family arrangements. This reinforced the collective nature of disaster risk and preparedness.

In this study findings indicated that there was limited formal integration of indigenous knowledge into official disaster management structures. Indigenous knowledge holders and government disaster management agencies did not frequently communicate. There is little and in most cases no communication. In spite of these challenges, 37, 9 % of respondents reported some and complete trust in disaster warnings that combine indigenous indicators with scientific forecasts. Respondents were welcome to and open to hybrid early warning systems. Similar studies by Mugambiwa (2018) and Grey and Manyani (2020) focusing on Chirumhanzu and Mutoko respectively sought to understand how indigenous knowledge systems could be used in seasonal climate forecasting to build smallholder farmers responses toward climate change.

There are significant opportunities for strengthening the role of indigenous knowledge in disaster preparedness from the results in Part E. Studies by researchers such as Dube et al. (2016) and Gwenzi et al. (2016) assessed the possibility of drawing forecasts from both IKS and scientific

climate forecasts. On the issue of documentation, majority of respondents supported video and audio recordings, written records in local languages, and curriculum integration. A smaller proportion of the respondents preferred that indigenous knowledge remain within oral tradition. They cited concerns over misuse and loss of control. Participants expressed willingness to participate in future dialogues. Respondents indicated readiness to engage as knowledge custodians, facilitators, or recorders. There is a strong community interest in participatory and ethically grounded integration processes.

4.11 Interpretation of Themes in Relation to Disaster Preparedness and Indigenous Knowledge Integration.

In this study, respondents had differing community roles. The roles identified ranged from elders, indigenous knowledge custodians, and heads of households, traditional leaders, youth representatives as well as local government and civil protection representatives. The elders and heads of households formed the largest proportion. This is reflective of their significant role in holding and transmitting indigenous knowledge related to environmental signs and disaster preparedness. Their views and suggestions align with the literature advocating for the integration of IK into DRR frameworks (Mercer et al., 2010; Molina and Neef, 2016; Zulfadrim et al., 2019).

The majority of respondents were above 31 years of age, with a notable representation of individuals aged 46 years and above. This demographic profile is essential as indigenous knowledge was found to be more concentrated among older community members. The study incorporated both males and females. However, males dominated females, as they occupy leadership and custodial roles. The level of education attainment varied among the respondents. Most of the respondents had primary or

secondary education. A smaller proportion attained tertiary qualifications or no formal education. Smallholder farming and livestock rearing dominated as livelihood activities. This was an indication of a strong dependence on climate-sensitive activities. These activities thrive upon indigenous knowledge systems. This shows the importance of IKS in effective disaster preparedness mechanisms rooted in local knowledge systems.

The period of residence of majority of respondents in the community spanned to more than ten years, with many being lifelong residents. The size of households varied from small to large extended families. This reinforced the communal nature of disaster risk and response. A significant number of respondents admitted that their community possessed indigenous knowledge used to predict natural hazards such as droughts, floods, and storms. A small proportion of the respondents reported that they were unaware of such knowledge. This suggested that indigenous forecasting remains widely recognized. In most instances, animal and plant indicators were the most frequently cited, reflecting their visibility and close link to everyday livelihoods. These indigenous indicators were rated as somewhat reliable to very reliable. A substantial proportion of respondents reported that these indicators correctly predict events “often” or “almost always.” These findings underscore a strong community trust in indigenous forecasting systems.

The findings from the study identified quite a number of recovery practices. Some of these included communal rebuilding, restocking of livestock through traditional systems, use of medicinal plants, and community ceremonies. These practices enabled both physical and psychosocial recovery.

In this study respondents mentioned a wide range of early warning signs that involved birds, insects, plants, celestial patterns, winds, and dreams. Respondents used local names and this underscored the

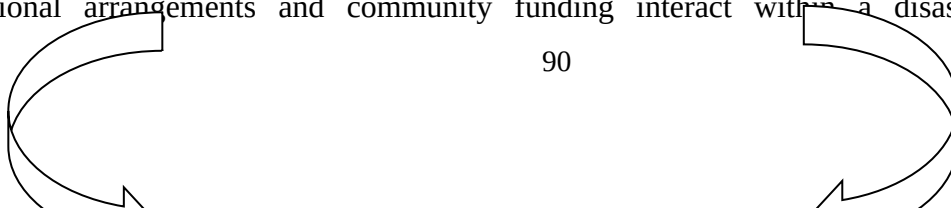
contextual and place-based nature of this knowledge. Most respondents indicated that few or none of the indigenous practices are included in formal disaster management plans. It was noted that where inclusion existed, it was often informal and dependent on individual officials rather than institutional policy. The locals described the relationship between indigenous knowledge holders and formal agencies as weak or occasional, with limited consultation and collaboration. Few respondents had attended meetings involving both elders and government officials. As gathered from most respondents, there was moderate to high trust in disaster warnings that combine indigenous indicators with scientific forecasts. This suggested strong potential for hybrid early warning systems.

Indigenous knowledge Systems are very effective in disaster preparedness. Key strengths identified by respondents include context specificity, cultural relevance, accessibility, and cost effectiveness. These characteristics make them particularly valuable in rural and resource-constrained setting. To support the use of IKS respondents suggested a raft of measures. These included funding community-led initiatives, training youth, and legal recognition. The inclusion of IKS in school curricula would also help preserve and transmit IKS. Respondents expressed the need to safeguard against misuse. This highlighted the need for ethical and community-controlled documentation processes. Respondents expressed willingness to participate in future dialogues, particularly as storytellers, facilitators, or recorders.

Disaster Risk Reduction Sustainability Pillars Framework Matrix (DRRSPF)

Figure 4.3: Key Pillars in Integrating Indigenous Knowledge Systems into Disaster Preparedness

Figure 4.3 clearly demonstrates how the general concepts of Indigenous Knowledge Systems (IKS), institutional arrangements and community funding interact within a disaster risk reduction



framework. Disaster Risk Reduction works out effectively when all the pillars are aligned or integrated instead of being concentrated in a single actor. The Disaster Risk Reduction Sustainability Pillars Framework Matrix (DRRSPF) framework shows that the institution power matrix on IKS depends and is linked to the mean community funding % of total expected disaster management expenditure. This underscores the need for community involvement in disaster risk reduction grounded in IKS. Again The Disaster Risk Reduction Sustainability Pillars Framework Matrix (DRRSPF) framework shows that the CPU use of IKS power matrix on disaster management is also depended and linked to IKS documentation power matrix on disaster preparedness. IKS documentation is therefore key in disaster risk reduction.

Interaction of the Key Pillars in a DRR Framework

The indigenous and local knowledge (IKS) establishes knowledge developed over generations for predicting weather events. These could include animal behaviour, cloud patterns, oral histories about past disasters and adaptive strategies. This pillar is central to risk assessment and the choice of culturally relevant actions. Its inclusion enhances resilience and aligns with sustainable practices.

The institutional and documentation power matrix selects the knowledge that is valued, formalized and that which is going to be used in formal plans. In the DRR framework it acts as a gate keeping pillar. Where there is strong institutional support for IKS, its documentation is facilitated and used in disaster management. This means weak institutional power marginalizes the documentation and use of IKS in official plans.

The community funding is the provider of the necessary material resources to implement plans. They identify and prioritize certain actions. For instance, they can choose to go for physical rebuild over social cohesion. The pillar leverages implementation. This means funding must align with and advocate for IKS-based and community-driven activities for it to be rendered effective. The degree

of funding is critical. A high percentage shows that institutional power has been decentralized and that enables IKS to influence projects. On the other hand, low percentage shows a centralized power which may limit IKS influence.

The CPU IKS power matrix represents those who make decisions and also have influence of formal government authorities. They have authority over the recognition of Indigenous Knowledge Systems. This has also control over allocation of disaster risk reduction resources. They also decide or preside over the integration of IKS into official DRR plans. In the proposed framework, it determines whether IKS is legitimized or marginalized. They control policy adoption, regulatory support and budget approval.

For effective and resilient DRR framework, there is need for strong institutions that legitimize IKS and also funding mechanisms that capacitate communities to use it. The power matrices show if IKS is being considered. On the other hand, the funding percentages determine whether the fund can be translated into action on the ground.

To overcome these challenges of integration, the research suggests a need for stronger policy support and collaboration between traditional knowledge holders and formal institutions. This includes documenting IKS, training officials to respect and include local systems, and creating inclusive platforms for community participation. Recognizing IKS as a key pillar in DRR not only improves effectiveness and sustainability but also empowers communities and preserves cultural heritage. Integrating both systems can lead to a more holistic and adaptive disaster preparedness approach. Suggesting solutions to the challenge of integrating IK into DRR within their localities, a phenomenological study was considered the best-suited approach as it explores the lived experiences

of participants (Frechette et al., 2020). In summary, this chapter has shown that indigenous knowledge remains widely known, trusted, and actively used for disaster preparedness, response, and recovery at community level. However, its potential contribution to formal disaster risk reduction remains constrained by institutional, cultural, and structural barriers.

4.12 Outcomes of the Validation Meeting

The purpose of the meeting was to validate study findings, incorporate feedback from the community and agree on ways of integrating IKS in local disaster risk management. It was also meant to present preliminary findings and authenticate accuracy, relevance and cultural appropriateness from the views of the community. The community acknowledged that the presented Indigenous Knowledge Systems agreed with their usual practices used to anticipate, prepare for and respond to disasters notably drought and floods. Some of the validated key indicators included observation of environmental signs such as bird migration patterns, insect behavior, tree flowering cycles and wind patterns. Astronomical indicators such as moon phases, cultural practices such as rain ceremonies, seed selection practices were validated. Community members reiterated that these indicators enabled them to prepare even in the absence of formal systems.

The community also brought forward several challenges now affecting their locality. These were identified as erosion of IKS because of generational gaps and limited transmission to younger people. Additionally, they also noted climatic variability that has altered some the traditional indicators. The community recommended the inclusion of traditional leaders and elders in disaster preparedness. They further recommended use of local languages and culturally appropriate communication methods in disaster awareness campaigns. The meeting ended with agreements on that the community will support the identification of key knowledge holders for future interaction.

The meeting objectively strengthened community ownership of the study and reinforced participatory approaches. The community expressed appreciation for the engagement in validating the study showing willingness to participate in future initiatives that promote resilience.

4.13Chapter Summary

Chapter Four dealt with the presentation and analysis of the findings of the study on ‘Integrating Indigenous Knowledge Systems (IKS) into Disaster Preparedness. This was based on data that was collected through interviews, questionnaires and focus group discussions (FGDs). The data revealed that indigenous knowledge remains vital yet underutilized tool in community based disaster preparedness. The study identified traditional leaders and elder as key custodians of IKS. Practices such as interpreting natural signs, communal warnings and ritual-based preparedness measures are still in use. The findings also indicated limited documentation, generational gaps in knowledge transfer, and a lack of formal recognition by disaster management institutions. From the analyses communities still use and value IKS. However, its integration with scientific approaches remains minimal due to policy, capacity, and coordination challenges. The chapter highlights that successful integration of IKS requires inclusive, participatory strategies that respect cultural ownership. It also encouraged collaboration between communities and formal agencies and institutions and proposes a framework to achieving this(See Appendix6)

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter brings together significant outcomes from the study on integrating indigenous knowledge in disaster preparedness within Ward 15 of Bikita District, Masvingo Province, Zimbabwe. It demonstrates the relationship between socio-economic factors and the utilization of indigenous knowledge systems (IKS) in enhancing community resilience to disasters. The chapter also provides the summary of the whole study highlighting key takeaways from the various sections of the study. It also brings in conclusions drawn from a survey in which 145 respondents participated, interviews and focus group discussions. These were conducted between September and November 2025. They focused on demographic, social, and economic variables that influence awareness and perception of IKS in disaster preparedness. The chapter also ushers recommendations

formulated to guide policymakers, practitioners, and community stakeholders in the integration process

5.2 Summary of the Study

The study provided an exploration on the integration of Indigenous Knowledge Systems (IKS) into disaster preparedness. The study was grounded on the vital role that traditional knowledge plays in enhancing community resilience. In the first chapter, the background to the study was introduced. The chapter also brought in the statement of the problem, objectives and significance of the study. The review of relevant literature and theoretical frameworks was done in Chapter Two. Reviewed literature highlighted how IKS offers practical strategies such as early warning signs, community rituals and natural resource management for anticipating and mitigating disasters. Chapter Three outlined the methodology. This embedded qualitative and quantitative approaches that include purposive and snowball sampling to gather data from traditional leaders, community members and institutional stakeholders

The presentation and analysis of data was done in Chapter Four. The analysis revealed that IKS is widely respected and used at the community level. However, its integration into formal disaster preparedness remains limited due to lack of recognition, documentation, and institutional support. The final chapter concluded the study. The chapter emphasized the need for inclusive disaster management policies that respect and incorporate indigenous knowledge. The study called for an enhanced collaboration between communities and formal agencies (See Disaster Framework - Appendix 6). Protection of intellectual property and intergenerational transfer of IKS through education and documentation was also reiterated. The study affirms that integrating IKS with scientific methods can strengthen disaster preparedness, particularly in rural and vulnerable communities.

5.3 Conclusions

Overall, comprehensive disaster preparedness in Ward 15 is void without integrating indigenous knowledge systems with modern scientific approaches. There is great need of strengthening the transmission of IKS through generations. Household heads, community elders, and chiefs need to be empowered and included in formal disaster management. Leveraging the relatively high literacy rate within the community are essential steps toward building sustainable resilience. By bridging traditional practices with contemporary disaster management strategies, communities can develop preparedness frameworks. These frameworks should be both culturally grounded and scientifically informed. This enhances community capacity to withstand and recover from disasters.

5.3.1 Demographic Influence on IKS Utilization

The study found out that household heads, which constituted 31% of respondents, are primarily decision-makers regarding disaster preparedness. Basing on this, it is critical to target this group in awareness campaigns and capacity building initiatives. Elders and knowledge custodians, representing 18.7% of respondents, remain critical repositories of indigenous knowledge. It is worrisome that their involvement in formal disaster planning structures remains limited. This restricts the effective integration of their expertise. The youths aged between 18 and 35 years accounted for only 11.7% of interviewees. This highlights a significant gap in intergenerational knowledge transfer. This gap poses a risk on continued use and sustainability of IKS practices. Younger generations may not inherit or value these traditions without deliberate interventions.

5.3.2 Age Distribution

The utilization of Indigenous Knowledge Systems is influenced by the age of the respondents. Age is a fundamental axis of differentiation that shapes who knows what, who values it, and who will carry it forward? In this study, the majority were aged 61 years and above (26.2%), followed by those aged 46–60 years (28.3%) and 31–45 years (23.5%). These demographic dynamics illustrate that older generations possess a richer memory of indigenous knowledge systems. However, their capacity to actively contribute in disaster preparedness is constrained by rural depopulation and labor migration. Such demographic shifts reduce the availability of elders within communities. This weakens the transmission and application of IKS in disaster contexts. Conclusions indicate that without deliberate and respectful engagement of this age group, the most profound layers of IKS are inaccessible and risk permanent loss.

5.3.3 Education Level

Besides age, the utilization of indigenous knowledge is also shaped by levels of education of respondents. In this study, majority (55%) had attained secondary education; while 22% had tertiary education, 17% primary education, and 6% no formal education. The level of literacy contributes immensely to understanding scientific disaster management concepts. This study found out that tertiary educated respondents dismiss IKS. The dismissal of Indigenous Knowledge Systems by tertiary educated students reveals the enduring power of colonial epistemologies within formal education and disaster governance. From a decolonial viewpoint, this reflects epistemic injustice, internalized colonial mindset, and the failure of our education system to inculcate epistemic plurality, ultimately weakening inclusive disaster preparedness. Our system of education undermines disaster preparedness by ignoring locally grounded early warning systems and coping mechanisms.

5.3.4 Socioeconomic Factors

The socio-economic conditions of respondents interacted significantly with disaster risk. In the same way, livelihood strategies, especially reliance on wet-land agriculture, expose communities to heightened vulnerabilities. This underscores the importance of integrating IKS into sustainable resource management. Additionally, water management strategies and prevailing social norms emerged as critical factors influencing community resilience. These factors clearly show that disaster preparedness cannot be divorced from broader livelihood and cultural contexts. IKS offers valuable insights into managing these intersections.

5.3.5 Methodological Insights

In this study, the methodological approach used provided a great understanding into the relationship between education and awareness of IKS. The study results revealed significant associations between education levels and recognition of the benefits of indigenous knowledge in disaster preparedness. Additionally, focus group discussions enriched the dataset by capturing nuanced information that was not evident through structured interviews alone. The use of mixed methods strengthened the reliability of findings. This triangulation highlighted the complex interplay between demographic, educational, and socio-economic variables in shaping IKS utilization.

5.3.6 Theoretical Framework Insights

Based on the Decoloniality theory framing, a study integrating Indigenous Knowledge Systems (IKS) into Disaster Risk Reduction (DRR) institutions points to the following conclusions regarding power/knowledge hierarchies:

The study concludes that the current relation between ‘scientific’ DRR knowledge and IKS is not merely a difference of opinion but a reproduction of colonial power relations. IKS is viewed as anecdotal, cultural or complementary data while Western science is positioned as universal,

objective and authoritative. This hierarchy is sustained through institutional protocols, funding mechanisms and accreditation. DRR institutions have established procedures and career paths rooted in Western paradigms. The system itself is a problem. This requires fundamental restructuring of DRR institutions and institutionalizing indigenous data. In view of this, the current model of hierarchical extraction must be replaced by a collaborative partnership.

The Resilience constructs of absorptive, adaptive and transformative capacities have clearly been validated by data. The absorptive capacity, which is the ability to withstand shock using existing resources, has been evident through data that consistently shows that IKS provide highly absorptive capacities. The indicators highlighted by respondents that include animal behavior, plant phenology and atmospheric phenomena used to forecast weather and seasons allow communities to prepare in advance. They also help in planting drought resistant crops and directly reduce vulnerabilities. This data validates absorptive capacity as a construct by showing tangible, pre-existing knowledge and practices that buffer against disasters.

The adaptive capacity (the ability to adjust and learn in response to change). Findings from the study highlight dynamic and experiential learning at the heart of IKS. Communities engaged in crop diversification and rotational practices evolving in response to observed climatic shifts over generations.

5.4 Recommendations

A. Governance and Legal Reform

Governments need to mainstream IKS into National Disaster Management Legislation by amending national DRR policies and acts (e.g., Zimbabwe's Civil Protection Act) to include a mandatory clause for the integration of IKS in all phases of disaster management-preparedness, response, recovery and mitigation

Sample Legislative Text: *‘the development and implementation of the National Disaster Management Plan shall be conducted in consultation with, and shall actively incorporate, the knowledge, innovations, and practices of indigenous and local communities, following the principles of Free, Prior and Informed Consent.’*

While the proposal might some call for parliamentary processes and endorsements, the can be some challenges. There is a likelihood of established DRR institutions and professionals to be resistant to change including ministers. In addition, in a fiscally challenged like Zimbabwe resource constraints might present obstacles to this call. There is need to decolonize the DRR institutions and embrace genuine power sharing or reshape the decision making processes.

The rationale is to provide a legally binding foundation, compelling government agencies to allocate resources, report on progress, and create institutional space for IKS, moving it from a voluntary add-on to a standard operating procedure. This aligns with the global mandate of the Sendai Framework for Disaster Risk Reduction (UNISDR, 2015).

There is need to formalize Hybrid Governance Structures by legally establishing and funding District IKS-DRRasformalsub-committeesofexistingDistrictCivilProtection Units. In these committees, traditional leaders, knowledge custodians (elders, spirit mediums), local government officials, meteorologists, and NGO representatives must be included. Including traditional leaders in DRR plans requires that their participation is meaningful, resourced and influential, not merely symbolic. They should go through capacity building through joint capacity assessments, co-design training programs and continuous learning programs so that they gain confidence and authority. Remuneration should be anchored in role clarity and accountability. Paying traditional leaders signals that they are professionally valued. There is also need for genuine power sharing through rules, mandates and decision making authority and not goodwill.

When traditional leaders have decision making powers, their participation affects outcomes rather than merely endorsing them.

They would jointly oversee post-disaster needs assessments and resource distribution. This collaborative approach legitimizes traditional authority within the formal system. It also ensures decisions are both scientifically informed and culturally grounded. Mavhura (2017) explicitly recommends formalizing the role of traditional institutions in DRR governance based on evidence from Zimbabwe that shows their central, yet informal, role in community resilience.

B. Operational and Technical Integration.

Meteorological services and disaster management agencies should co-validate early warnings to create a standard operating procedure for producing and disseminating information. Authorities should direct and co-develop early warnings. The process would start with meteorological department issuing its scientific seasonal forecast, then presented to council of elders for interpretation and contextualization against IKS(e.g., plant phenology, animal behavior) and then final public warning is presented in local languages stating the convergence or divergence of both knowledge systems the dual validation increases credibility, comprehension and uptake of warnings, as the message resonates with both scientific data and locally trusted knowledge. Mushore (2020) argues that integrating IKS into modern weather forecasting can improve the communication and uptake of forecasts thereby enhancing community preparedness.

It is also critical to mandate Participatory Vulnerability and Capacity Mapping. This can be done by making funding a condition for all local level DRR projects to utilize Participatory GIS for community risk assessment. Community members can hold sessions using satellite imagery or

topographic maps to mark IKS-based risk zones (historical flood lines, sacred forests that act as windbreaks, landslide prone areas) and resources. The product is a hybrid hazard map that is both technically sound and socially relevant. Mercer (2010) champions participatory methods as crucial for bridging the gap and generating outputs that are both technically sound and socially relevant.

C. Integrate IKS into National Education Curricula

The Ministry of Education should integrate modules on local IKS related to environmental management and disaster preparedness into primary and secondary school subjects like Geography, History and Science. In addition, the National training institutes for public administrators, planners, and emergency responders, must include mandatory certification courses on IKS, its value, and protocols for ethical engagement. This fosters respect for IKS from a young age and ensures that future professionals are equipped to collaborate effectively, addressing the root cause of the knowledge system's marginalization. Shizha and Mthethwa (2021) advocate for this as a decolonizing imperative stating that integrating IKS into formal education is critical for sustainable development in Africa.

Establishing a National IKS Digital Repository with Ethical Safeguards is also important by creating a national, digital archive for IKS related to DRR, co-managed by a national institution (e.g., National Archives) and a council of traditional leaders. These must be publicly accessible general knowledge rather than restricted, sacred knowledge requiring community permission. Restricted knowledge constitutes spiritual, creation stories, rituals, or sacred sites. The source community retains copyright and the right to review, correct, or withdraw their knowledge. This means the repository acts as a custodian and not the owner. There should be clear protocols for

any commercial or scientific benefits derived from their knowledge. This preserves IKS for future generations while firmly establishing community ownership and control, preventing exploitation and biopiracy. This aligns with the principles of the Nagoya Protocol (2010) on Access and Benefits-Sharing and initiatives like the UNESCO LINKS programme (UNESCO, 2017) that promote community-controlled information systems. Any commercial or large-scale use of repository content triggers a benefit sharing mechanism (e.g., trust fund for community resilience programs)

D. Funding and Research

Creating dedicated funding streams for IKS-DRR initiatives where National Treasuries and international development partners (e.g., World Bank, Green Climate Fund) should create specific, accessible budget lines and grant windows for IKS-focused DRR projects.

Traditional social safety –nets (e.g., Zunde raMambo grain banks) while showing signs of fading due to Western and modernization influence should be reconsidered. This can be strengthened by empowering traditional leaders whose influence has been reduced as people rely more on formal government systems. Recurrent droughts and erratic rainfall reduce agricultural yields makes it difficult to maintain surplus grain. The government should fund community led projects that are governed by local authorities. They should fund projects that promote social cohesion.

In addition, funding traditional knowledge transfer programs and supporting joint research projects between tertiary institutions and communities. Realistic commitment should be seen through budgetary allocations. IKS remains rhetoric without dedicated funding. National policies should benefit from the growing focus on ‘locally-led adaptation’ by major funds like the Green Climate Fund.

The integration of IKS into formal disaster preparedness requires genuine commitment. It is not a

simple technical task but a transformative process. It thrives on building equitable partners. Legal reform; operational co-production, educational transformation, and ethical funding provide a comprehensive framework for action. These policy recommendations will provide a fertile ground for the integration process. There is need to move from extraction to collaboration. The impetus is on building disaster management systems that effective, efficient, just, culturally resonant, and truly resilient. Indigenous knowledge systems when combined with the tools of the present, holds key to a safer future for all.

5.5 Areas for Further Research

The following areas are recommended for further research

- Effective methods for recording, preserving, and digitizing IKS
- IKS and climate change adaptation
- IKSpolicy integration mechanisms.
- IKS and intergenerational transfer.

REFERENCES

- Berkes, F., & Ross, H. (2013). Community resilience: Toward an integrated approach. *Society & Natural Resources*, 26(1), 5–20.
- Burgess, R. G. (2001). *In the field: An introduction to field research*. London: Routledge.
- Chanza, N. (2014). Indigenous knowledge systems and climate change adaptation in Zimbabwe. *Journal of Sustainable Development in Africa*, 16(7), 1–18.
- Chikoko, M. (2018). _Integrating Indigenous Knowledge Systems in Disaster Risk Reduction: A Zimbabwean Perspective. *Zimbabwe Journal of Disaster Studies*, 5(2), 45-59.
- Chilisa, B. (2020). *Indigenous research methodologies* (2nd ed.). Thousand Oaks, CA: Sage.
- Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook of qualitative research* (2nd ed.). Thousand Oaks, CA: Sage.
- Dube, T., & Masiya, T. (2024). Documenting indigenous knowledge systems for disaster risk reduction in rural Zimbabwe. *Journal of Disaster Risk Studies*, 16(1), 1–12.
- Dube, T., & Musi, A. (2022). Indigenous knowledge erosion and intergenerational transfer in rural Zimbabwe. *African Journal of Indigenous Knowledge Systems*, 4(1), 33–49.
- Folke, C., Carpenter, S. R., Walker, B., Scheffer, M., Chapin, T., & Rockström, J. (2010). Resilience thinking: Integrating resilience, adaptability and transformability. *Ecology and Society*, 15(4), 20.
- Gaillard, J. C., Clavé, E., Vibert, O., Azhari, D., Denain, J. C., Efendi, Y., Setiawan, R. (2008). Ethnic groups' response to the 2004 Indian Ocean tsunami in Aceh, Indonesia. *Natural Hazards*, 47(1), 17–38.
- Gopal, P., Singh, R., & Kumar, A. (2023). Indigenous knowledge systems and disaster risk reduction: Enhancing community resilience and preparedness. *International Journal of*

- Disaster Risk Reduction*, 85, 103510.
- Grey, M.S., Manyani, A., Masunungure, C. (2020). Integrating local languages to enhance risk reduction and adaptation strategies to drought and climate variability: The plight of smallholder farmers in Chirumhanzu district, Zimbabwe. *Journal of Disaster Risk Reduction*, Jamba
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105–117). Thousand Oaks, CA: Sage.
- Heijmans, A. (2009). The social life of community-based disaster risk reduction: Origins, politics and framing. In J. C. Gaillard & B. Wisner (Eds.), *Indigenous knowledge and disaster risk reduction* (pp. 21–35). Geneva: UNISDR.
- Hiwasaki, L., Luna, E., Syamsidik, & Shaw, R. (2014). Process for integrating local and indigenous knowledge with science for disaster risk reduction. *International Journal of Disaster Risk Reduction*, 10, 15–27.
- Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4, 1–23.
- INISDR. (2015). *Indigenous knowledge for disaster risk reduction*. Geneva: United Nations International Strategy for Disaster Reduction.
- Israel, B. A., Eng, E., Schulz, A. J., & Parker, E. A. (2012). *Methods for community-based participatory research for health* (2nd ed.). San Francisco, CA: Jossey-Bass.
- Kelman, I., Mercer, J. & Gaillard, J. C. (2020). Indigenous Knowledge and Disaster Risk Reduction, *Geographical Journal*, 179(1), 62-70
- Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Delhi: New Age International.

- Kovach, M. (2021). *Indigenous methodologies: Characteristics, conversations, and contexts* (2nd ed.). Toronto, Canada: University of Toronto Press.
- Kugara, S., Chanza, N., & Dube, T. (2022). Assessing drought vulnerability and adaptive capacity in semi-arid Zimbabwe. *International Journal of Disaster Risk Reduction*, 77, 103074.
- Labaree, R. V. (2009). Research design. In *The SAGE encyclopedia of qualitative research methods*. Thousand Oaks, CA: Sage.
- Makondo, C. C., & Thomas, D. S. G. (2018). Climate change adaptation: Linking indigenous knowledge with western science for effective adaptation. *Environmental Science & Policy*, 88, 83–91.
- Marambanyika, T. Mutsiwegota, C. and Muringaniza, K.C.R. 2012. Importance of Community Participation in Sustainable Utilization of Wetlands: Case of Chebvute in Zvishavane District of Zimbabwe. *Journal of Environmental Science and Engineering B1* 832-844
- Mashoko, D. S. (2022). Reclaiming indigenous knowledge systems in African education: Challenges and prospects. *Journal of African Studies and Development*, 14(2), 45–56.
- Mavhura, E. (2017). Many rivers to cross: Factors influencing disaster risk reduction by traditional leaders in Zimbabwe. *Jambá: Journal of Disaster Risk Studies*, 9(1), 1–9.
- Mavhura, E., Manyena, S. B., Collins, A. E., & Manatsa, D. (2013). Indigenous knowledge, coping strategies and resilience to floods in Muzarabani, Zimbabwe. *International Journal of Disaster Risk Reduction*, 5, 38–48.
- McMillen, H., Ticktin, T., Friedlander, A., Jupiter, S. D., Thaman, R., Campbell, J., Veitayaki, J. (2014). Small islands, valuable insights: Systems of customary resource use and resilience to climate change in the Pacific. *Ecology and Society*, 19(4), 44.
- Mercer, J., Kelman, I., Lloyd, K., & Suchet-Pearson, S. (2010). Reflections on use of participatory research for disaster risk reduction. *Area*, 42(2), 152–162.

- Mikulecky, P.(2023). Dealing with risks associated with tsunamis using Indigenous Knowledge Approaches. *International Journal of Disaster Risk Reduction*, 86, 102545.
- Morardet, S., Masiyandima, M., Jogo, W. and Juizo, D. 2010. _Trade-offs between livelihoods and wetland ecosystem services: an integrated dynamic model of Ga-Mampa wetland, South Africa._ LANDMOD 2010 Montpellier-February 3-5, 2010.
- Muchenje, F., &Muringaniza, K. (2023). Integrating indigenous knowledge and scientific forecasting for climate risk management in Zimbabwe. *Climate and Development*, 15(6), 543–556.
- Mugambiwa, S. S. (2018). Climate change and rural livelihoods in Zimbabwe: Challenges and opportunities. *Jàmbá: Journal of Disaster Risk Studies*, 10(1), 1–9.
- Muguti, T., &Maposa, R. S. (2012). Indigenous weather forecasting: A phenomenological study engaging the Shona of Zimbabwe. *Journal of Pan African Studies*, 4(9), 102–112.
- Mushore, T. D. (2020). The role of indigenous knowledge systems in disaster risk reduction in Zimbabwe. *African Journal of Social Work*, 10(1), 45–56.
- Muthee, J. K., Mutua, J. M., &Kiema, J. B. K. (2019). Indigenous knowledge systems and disaster risk reduction in Africa. *Journal of Disaster Risk Studies*, 11(1), 1–8.
- Nakashima, D., McLean, K. G., Thulstrup, H. D., Castillo, A. R., &Rubis, J. (2012). Weathering uncertainty: Traditional knowledge for climate change assessment and adaptation. Paris: UNESCO.
- Nunn, P. D., Aalbersberg, W., Lata, S., &Gwilliam, M. (2017). Beyond the core: Community governance for climate-change adaptation in peripheral parts of Pacific Island Countries. *Regional Environmental Change*, 17(6), 1909–1921.
- Nyahunda, J. (2024). Integration of Indigenous Knowledge Systems into Climate Change Mitigation and Adaptation Endeavors: milestones and gaps in South Africa and Zimbabwe Vol 177,

Article No 162, Springer Nature.

- Nyamwanza, R. (2020). _Socio-Economic Determinants of Climate Change Adaptation in Rural Zimbabwe African Climate Change Journal, 12(3), 78-92.
- Overton, C. (2023). Mobilizing Destruction: Militant Decolonial Education to organize Vulnerable Populations and Reduce Risk to Disasters, Traue Commons, 2023.
- Paddy, P. (2023). Southern Ground Hornbills, Whole Earth Education
- Patton, M. Q. (2001). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Rungmanee, S., & Cruz, A. (2005). Indigenous knowledge and tsunami survival: Lessons from the Moken. *Asian Disaster Management Review*, 3(2), 15–27.
- Shizha, E., & Mthethwa, P. (2021). Indigenous knowledge systems and decolonisation of education and development in Africa. *Journal of African Studies and Development*, 13(3), 79–92.
- Sieben, E.J.J. , Ellery, W. N., Kotze, D.C., Rountree, M., 2011 . Hierarchical Spatial Organisation and prioritisation of wetlands: A conceptual model for wetland rehabilitation in South Africa. *Wetlands Ecology Management*, 19, 209-222.
- Smith, L. T. (2012). *Decolonising methodologies: Research and indigenous peoples* (2nd ed.). London: Zed Books.
- Teddlie, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. *Journal of Mixed Methods Research*, 1(1), 77–100.
- Tschakert, P., Tuana, N., Westskog, H., Koelle, B., & Afrika, A. (2016). T-learning in the context of climate change: Indigenous knowledge, scientific knowledge, and ethical space. *Ecology and Society*, 21(1), 39.
- Twigg, J. (2021). Characteristics of a Disaster Resilient Community: A Guidance Note. DFID.
- Uchena, O., Ogochukwu, N. Mupofu, V. (2025). A Collaborative Integrated Indigenous –Based

- Flood Risk Reduction. *Journal of Disaster Risk Reduction*, Jamba
- UNDRIP. (2007). *United Nations Declaration on the Rights of Indigenous Peoples*. New York: United Nations.
- UNESCO. (2017). *Indigenous knowledge systems and disaster risk reduction*. Paris: UNESCO.
- UNESCO. (n.d.). *Harnessing indigenous knowledge for disaster risk reduction*. Paris: UNESCO.
- UNISDR. (2015). *Sendai framework for disaster risk reduction 2015–2030*. Geneva: United Nations Office for Disaster Risk Reduction.
- United Nations Office for Disaster Risk Reduction (UNDRR) (2021). *Indigenous Knowledge for Disaster Risk Reduction: A Global Review*. Geneva: UNDRR.
- Woldegiogis, T. B. (2021). Decolonising education in Africa: The role of indigenous knowledge systems. *International Journal of African Renaissance Studies*, 16(1), 54–70.
- World Bank. (1998). *Indigenous knowledge for development: A framework for action*. Washington, DC: World Bank.

APPENDIX 1

RESEARCH LETTER

ZIMBABWE

CEMS DEPT

P Bag 1020
BINDURA

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



BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date:

TO WHOM IT MAY CONCERN

NAME: _____ REGISTRATION: _____

PROGRAMME: _____ PART: _____

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

The student has to undertake research and thereafter present a Research Project in partial fulfilment of the Master of Science Education in Geography programme. The research topic is:

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

Your co-operation and assistance is greatly appreciated.

Thank you

Y MUDAVANHU (PhD)
CHAIRPERSON - CEMS

APPENDIX 2

PERMISSION LETTER

BIKITA RURAL DISTRICT COUNCIL

Cell: 0772 130 516, 0782 737 417, 0772 403 637
Email: bikitarde@gmail.com
Website: www.bikitarde.co.zw



ALL COMMUNICATIONS TO BE
ADDRESSED TO THE
CHIEF EXECUTIVE OFFICER

P. BAG 594
Nyika

19 December 2025

The Principal
Bindura University of Science Education
Faculty of Science Education
P.Bag 1020
BINDURA

**RE: PERMISSION LETTER TO CONDUCT RESEARCH FOR CHIONA MORGEN
REGISTRATION NUMBER B1336758**

Reference is made to the above subject matter.

The letter serves to inform you that Chiona Morgen, currently pursuing Master of Science in Geography with Bindura University of Science Education, has been authorized to conduct his research entitled "Integrating Indigenous Knowledge Systems in Disaster Preparedness". A case study of Ward 15 Bikita District, Masvingo Province." The local authority will be glad to assist him.

Yours faithfully

Eng. A.T. Mtuke
Chief Executive Officer
Bikita Rural District Council



APPENDIX 3

QUESTIONNAIRE: Integrating Indigenous Knowledge in Disaster Preparedness.

Part A: Respondent Information (Demographics)

A0

Village/Ward.....

A00 Household ID/ Enumerator Code:.....

A1. Role in the Community (tick all that apply)

- ☐ Elder/ knowledge custodian
- ☐ Head of household
- ☐ Local government official
- ☐ Traditional leader (chief/headman)
- ☐ Herbalist/Healer/Spiritual leader
- ☐ Local government/ CPU Representative
- ☐ Youth Representative(18-35)
- ☐ Teacher/ Health worker/ NGO worker

Other (Please Specify).....

A2. Age (in years)

- ☐ 18-30 years
- ☐ 31-45 years
- ☐ 46-60 years
- ☐ 61 years and above

A3. Sex/ Gender (tick one)

☐ Male

☐ Female

☐ Prefer not to say

Other.....

A4. Highest level of education completed:

☐ No formal education

☐ Primary

☐ Secondary

☐ Tertiary/ College

Other:.....

A5: Main Livelihood (tick one)

☐ Smallholder farmer

☐ Livestock/herder

☐ Fishing

☐ Formal employment

☐ Informal trade

☐ Unemployed

Other.....

A6. Years resident in this village.....

A7. Household size (number of people normally living here).....

Part B: Awareness and Perception of Indigenous Knowledge

B1. In your opinion, does this community possess indigenous knowledge used to predict natural events (e.g., floods, droughts, storms, earthquakes)?

- ☐ Yes
- ☐ No
- ☐ I do not know

If B1=Yes go to B2 and B3 asked; if No go to B4

B2. Which types of indicators are used in your community to predict events? (Tick all that apply; then probe and write answers

- ☐ Animal behaviour (e.g., bird calls, insects) –examples:

.....

- ☐ Plant signs (e.g., flowering, fruiting)- examples

.....

- ☐ Atmospheric signs (e.g., cloud/ wind patterns)- examples

.....

- ☐ Celestial signs (moon, stars) –examples

.....

- ☐ Dreams/visions- examples

Other (specify)

.....

B3. How reliable are these indicators in your experience? (Tick one)

- ☐ Very unreliable

- ☐ Somewhat unreliable
- ☐ Neither
- ☐ Somewhat reliable
- ☐ Very reliable

B3a. How often do indicators predict an event correctly? (Approximate)

- ☐ Almost always (greater than 80% of times)
- ☐ Often (50-80%)
- ☐ Sometimes (20-50%)
- ☐ Rarely (less than 20%)
- ☐ I do not know

B4. Who are the primary holders of this knowledge? (tick all that apply)

- ☐ Farmers/ Fishers
- ☐ Healers/ Herbalists
- ☐ Spiritual leaders/ Spirit mediums
- ☐ Specific families
- ☐ Everyone in the community
- ☐ Other: (specify)
- ☐ I do not know

Part C: Indigenous Practices in Disaster Preparedness and Response

C1. Which traditional practices do your household/ community use to prepare for an expected disaster? (Tick all that apply; then give examples)

- o Storing specific seeds/ grains (e.g., millet, sorghum)-example
.....
- o Building or reinforcing houses (e.g., raised floors, thatching)-examples
.....
- o Community grain banks (ZunderaMambo)-
example.....
- o Planting calendars tied to indicators-
example.....
- o Rituals/ceremonies to ask for rain or protection-example
.....
- o Relocating to higher ground before rains-example
.....
- o Other (specify)
.....
.....

C1a How often is these preparedness practices used?

- o Every season
- o Most years
- o Occasionally
- o Rarely
- o Never

C2. Which practices are used during a disaster for safety (response) (Tick all that apply)

- o Evacuation to specified safe sites
(name).....
- o Use of drums/runners/local signs to warn people-
describe.....
- o Sharing food/ mutual labour groups-
example.....
- o Traditional medicines/ healing- example
.....
- o Other
(specify).....
.....

C3. Which practices are used after a disaster to recover (recovery)(tick all)

- o Community feasts/ceremonies
.....
- o Communal rebuilding (Mushandirapamwe/Ilima/ Sebetsa
.....
- o Use of medicinal plants
.....
.....
- o Restocking through Kuronzera
.....
- o Other
(specify).....
.....

C4. Which plants, animals, or natural signs do people watch as early warning signs (tick all known and then give a local name)

☐ Specific birds (specify)

.....
.....

☐ Plant phenology (specify)

.....
.....

☐ Moon/ star signs (specify)

.....
.....

☐ Insect behaviour (specify)

.....
.....

☐ Wind/cloud patterns

(specify).....
.....

☐ Dreams/visions-describe briefly

.....

☐ Other (specify)

Part D: Current Integration and Collaboration

D1. Are any of these community indigenous practices currently included in the official community disaster plan?

- ☐ Many included
- ☐ A few included
- ☐ None included
- ☐ I do not know

D1a If many or a few give examples (which practice/who included):.....

D2. How would you describe current relationship between the knowledge holders and government disaster management agencies?

- ☐ Strong collaboration and mutual respect
- ☐ Occasional consultation
- ☐ Little or no communication
- ☐ Tension and mistrust

D2a. Have you (or someone in your household) ever attended a meeting where elders and government discussed disaster plans?

- ☐ Yes-when?
- ☐ No

D3. In your experience, what are the main barriers to integrating indigenous knowledge into formal disaster management? (tick all that apply)

- ☐ Lack of respect by officials
- ☐ Language/ communication gaps
- ☐ Knowledge is not documented/formalized
- ☐ Fear that the knowledge may be misused/appropriated

- ☐ Conflict between scientific and indigenous knowledge
- ☐ The knowledge is being lost within the community itself
- ☐ No funding/resources
- ☐ Other.....
.....

D4. How much would you trust a disaster warning that combined elders' indicators with meteorological forecasts?

- ☐ No trust at all
- ☐ Low trust
- ☐ Neutral
- ☐ Some trust
- ☐ Complete trust

Part E: Opportunities and Way Forward

E1. The biggest strength of using indigenous knowledge in disaster preparedness is

- ☐ Accuracy
- ☐ Accessibility
- ☐ Culturally fit
- ☐ Cost effectiveness
- ☐ Context specific
- ☐ Other (specify)
.....
.....

E2. How can the government and NGOs better support the preservation and application of this knowledge? (Tick all that apply)

- ☐ Funding for community-led projects
- ☐ Training of youths and custodians
- ☐ Inclusion in school curriculum
- ☐ Joint monitoring and validation projects
- ☐ Legal recognition and protection
- ☐ Other.....
.....

E3. What is the best way to document this knowledge for future generations? (tick ALL that are acceptable to you)

- ☐ Video and audio recordings with elders
- ☐ Community workshops and mapping exercises
- ☐ School curriculum integration
- ☐ Written records in local language
- ☐ It should not be documented but kept within oral tradition (Explain why?)
- ☐ Other.....
.....

E4. Are you willing to participate in future dialogues or workshops to help bridge indigenous knowledge and scientific disaster management?

- ☐ Yes
- ☐ No
- ☐ Maybe

E4a. If yes- indicate preferred roles (TICK)

- ☐ Storyteller/Knowledge custodian
- ☐ Community facilitator
- ☐ Enumerator/ Recorder
- ☐ Other (specify)

Part F: Additional Comments

Is there anything else you would like to share about indigenous knowledge, disasters, or how to protect our community better?

- ☐ Yes- anonymized quote
- ☐ No

Thank you for your valuable time and for sharing your wisdom. Your contribution is greatly appreciated.

APPENDIX 4

INTERVIEW GUIDE: Integrating indigenous Knowledge in Disaster Preparedness

Interview ID.....

Date.....

Location (village/ward)

Respondent pseudonym and role (e.g. “Elder FGD1 male”)

Age (approx.):

Gender: M/F/Other.....

Consent given? Yes/No (thumbprint/signature)

Audio recorded? Yes/No (only with explicit permission)

Notes taker:

Duration..... minutes

Introduction

Good morning. My name is Chiona Morgen from Bindura University. Thank you for agreeing to talk. This study is about local knowledge used to anticipate and respond to natural events. Your participation is voluntary. You may refuse to answer any question or stop at any time. I would like to audio record this interview to capture your words exactly and I will only do this if you agree. Some knowledge may be sacred or private; you can tell me not to record or to keep those parts out of

any public reports. Do I have your permission to continue? If yes, sign/ thumbprint and record permission and record permission for recording if granted.

Interviewer Instructions (before and during)

Use neutral language and let respondents speak without interruption.

Ask closed follow-ups when time permits (dates and numbers)

Probe for concrete stories e.g., “Can you tell me the last time this happened, when was it, what happened, what did people do?”

When sacred/ restricted material is mentioned, repeat the FPIC offer: “do you want this part to be recorded or included in the reports?”

The interview length to be kept to 45-60 minutes or shorter for institutional actors.

After the interview write a paragraph reflexive note on observations, power dynamics and translation issues.

Target a specific interviewee e.g.,

A. Knowledge-custodian/ Elder (approx 50-60 minutes)

Purpose: Document indicators, methods of transmission, perceived reliability, rituals, and attitudes to documentation/ integration.

Background and role (5mins)

1. “Please tell me about your role in this community?” (**Probes:** “How did you learn this role? For how long have you practiced/ held this role? Do others rely on you for decisions about weather, planting or ceremonies?”)

Description of indicators and examples (10-15 min)

2.” Can you describe the signs/ indicators people watch here to know if a bad season or flood is coming?” (**Probes:** Which animals/plants/sky signs? Local names? Could you give a recent example When did this happen (month/year), and what happened next?” Probe for frequency. “How often has this indicator been correct in your memory?” (Ask for count or percentage estimate).

Decision-making and actions triggered ((8-10 minutes)

3. “When those signs appear, what do people do in this community?” (**Probes:** “Who decides (elders, families, headman)? “Are there specific preparations (seed saving, rituals, relocation)? Any collective actions (ZunderaMambo, communal work)? Has this decision reduced any harm before? Can you describe one example?

Transmission and change (8-10mins)

4. “How is this knowledge passed on?? Do younger people learn these signs?” (**Probes:** “Are there differences between what men, women and youth know? Has the way you pass knowledge changed in recent decades?” Ask for causal reasons: “Why is it changing (migration, schooling, and climate)?”

Validation and conflict with scientific forecasts (6-8 mins)

5. “Has the community compared these signs with weather forecasts or scientific information?” (**Probes:** “If so, what happened-did they agree or disagree? What did your community do when they disagreed?” Probe for mixed warnings. “Would you trust a combined warning (elder signs and Met Service) - why or why not?”

Sensitive knowledge and documentation preferences (5-7 min)

6. “Are some of these signs or stories sacred or sensitive? Are the things you prefer not to write down or share publicly?” (**Probes:** “If asked to document them what conditions would you allow that? Who should control the recordings or repository? What should be done so your community benefits from any use of this knowledge?”)

Integration and Recommendations (5-8 mins)

7.” How could formal disaster services (district CPU, AREX, NGOs) work with your knowledge in ways that are respectful and useful?”(**Probes:** Who should lead? Any training or pilot projects you would accept?”)

Closing (2-3 min)

8. “Is there anything I haven’t asked that you think is important?” Would you accept a follow up for clarification or an invitation to a validation meeting?” Thank you so much for sparing your time to attend to this interview session.

B. Community Leader/ Chief/ Headman (approx. 45-55 minutes)

Purpose: Institutional view of governance, rules about knowledge, integration with local planning.

1. Role & governance (5min)

’What is your role as a traditional leader in preparing your community for disasters?’ (Probe what traditional practices helped the community respond to past disasters)?

2. Community-level indicators & roles (10mins)

“Can you describe any indigenous warning signs or methods your community use to predict disasters (Probe: Are there any customary laws about sharing knowledge about these warning signs).

3. Decision-making & Enforcement (8-10 mins)

“How is disaster risk management traditionally organized in your community? (Probe: Who enforces the early actions to warning signs? Are there any fines or ritual obligations?)

4. Relations with formal agencies (10-12mins)

“How often do you engage with government or disaster management agencies on disaster preparedness? (Probe: Are traditional leaders formally involved in planning or decision making with these agencies? What kind of information is shared between you and formal institutions during disaster situations? Can you give examples where traditional and scientific systems worked together effectively?)

5. Documentation & IP (8-10 min)

“Has your community’s indigenous knowledge on disaster preparedness ever been recorded or documented?”(Probe: Who is responsible for preserving and passing down this knowledge? How do you feel about outsiders (researchers, NGOs, government) using or publishing your community’s knowledge? Have there been instances where your community’s knowledge was used without permission or acknowledgement? What protections do you think should be in place to safeguard this knowledge?”

6. Recommendations

“How can traditional leaders be more involved in official disaster planning and response?” (Probe: What should government and NGOs do to encourage and support indigenous knowledge in disaster preparedness? What kind of training or resources would help your community strengthen its

traditional disaster response practices? Do you recommend documenting traditional knowledge formally? If so, how would that process be done to respect ownership?)

C. Institutional Stakeholder (District CPU, AREX, Meteorological Officer (approx 30-40mins)

Purpose: institutional Capacity, prior collaboration, feasibility of integration, technical validation

1 Role and mandate (5mins)

“What is your role and mandate as an agency with reference to Disaster Risk Reduction and Community engagement?

2”Does your agency have prior projects, collaborations or consultations with communities on DRR and Community engagement?” (Probe: Can you give specific examples and outcomes (dates and reports)?” Are these initiatives documented?

3. What are the barriers to integration of IKS and formal DRR? (Probe: Are there policies in place that call for this integration? Is your agency capacitated to build trust with IKS holders? Are your budget lines able to support integration efforts? Do you have enough staff to conduct collaborative efforts?”

4. Do you assess or validate the relevance and reliability of indigenous knowledge in disaster preparedness (Probe: Are there frameworks or criteria your institution uses to evaluate traditional practices? Does your organization engage in co-production disaster preparedness strategies with local communities?”

5. Recommendations

‘How can government and institutions better recognize and support the role of IKS in DRR. (Probe: what training or capacity-building initiatives do you suggest to help both communities and

professionals work together on disaster preparedness? What approaches do you recommend for co-producing disaster risk knowledge between scientists and indigenous communities? What would you need to run a joint pilot?

Thank you sincerely for your time and sharing your invaluable wisdom, this knowledge is a gift.

How would you like the findings from these conversations to be shared back to your community?

APPENDIX 5

FOCUS GROUP DISCUSSION GUIDE: Integrating Indigenous Knowledge Systems in Disaster Preparedness (Ward 15)

A. Objectives

B. Target Groups and Composition

1. Elders/ Knowledge Custodians (age 55+)-men and women separate if gendered roles are strong
2. Women/ primary caregivers
- 3 Youths (18-35).
4. Community Disaster Committees/ CPU members (mixed)
5. Vulnerable households (e.g., households led by elderly women, persons with disabilities).

Size: 6 -8 participants in the discussion (a maximum of 10 or fewer if the participants are highly vocal).

Inclusion Criteria: Residents > 6 months, aged > 18, willing to consent. For Government official's role and experience will be considered.

RECRUITMENT SCRIPT

“Good morning/afternoon. My name is Chiona Morgen. I am a researcher from BUSE working with the community to learn about local knowledge used to prepare for and respond to droughts and floods. I invite you to a group discussion to share your knowledge and opinions.

C. Consent &FPIC

Thank you for accepting to take part in the Focus Group Discussion (FGD). The discussion aims to learn how people in this community use local knowledge to prepare for natural events. Your participation is voluntary. You may decline any question or stop at any time. I would like to audio –record the session to ensure accurate notes, only if you permit me to do so. If you or the community do not want certain information recorded or shared, tell me and it will be excluded from any public report. Do I have your permission to proceed and to record? (YES/NO)

Warm Up (5-8 mins)

1. Please introduce yourself (first name/code only) and tells us how long you have lived here and one thing you grow/do for a living. (Probe: “Who else in your household is involved in preparing for seasons?”)

INDICATORS (10-12 MINS)

2. What natural signs or changes do people in this community watch to know if a bad season/drought/flood is coming?

Checklist probe: animal behaviour, bird patterns, insect swarms, plant flowering/fruitleing, wind/cloud patterns, moon/stars signals, dreams/visions/prophecies, other

Probe: “Can someone give a recent example- when was it (month/year), what happened, what did people do after seeing that sign?

ACTIONS TRIGGERED (8-10 MINS)

3. When these signs are seen, what actions are taken by households and by the community? What do individuals and the community do?

Probe checklist: seed saving, early planting, shifting planting dates, communal grain stores (Zunde), rituals, relocation to higher ground, telling neighbours.

Probe: Who usually decides on this action? (elder council, headman, household head, women's group?)”

RELIABILITY & VALIDATION (8-10 MINS)

4. In your experience, how reliable are these signs? How frequently do they occur?

Probe: “How many times in the last 10 years did the sign correctly predict the event?” Can you give a rough count or percent? “Has the community ever compared these signs to meteorological forecasts? What happened?” Can you give specific dates and instances?

TRANSMISSION AND CHANGE (6-8 MINS)

5. How do people learn these signs and what is changing in the way knowledge is passed on?

Probes: apprenticeship, storytelling at night, rituals, school programs, seasonal work, causes of change-migration, schooling, commercialization, climate change

Question: Are youths learning these things? If not, why?

INTEGRATION PREFERENCES & BARRIERS 8-10 MINS

6. Do you think this knowledge should be used alongside official weather forecasts? Why or why not? What would make you trust a combined warning?

Probes: transparency, joint validation, involvement of elders, local demonstration projects, compensation/benefit sharing

What are the main barriers to integrating indigenous knowledge with formal disaster systems?

Prompt- respect, documentation, language, IP/theft, institutional distrust, legal issues

Probe: “Which of these is most important? Why?”

PRIORITISATION EXERCISE (8-10 MINS)

May three participants write the top three actions (indicators) you think should be prioritised for integration/ preservation

CLOSING 4-7 MINS

8. Is there anything else the group think is important for us to know about local knowledge and disaster preparedness?

9. Would you like to be invited to a community meeting to review findings?

Thank you participants profoundly for your time, shared knowledge, wisdom and generosity and making this discussion a success.

APPENDIX 6

Disaster Risk Reduction Sustainability Pillars Framework Matrix (DRRSPF)

