The Effects of Human-Wildlife Conflict (HWC) on Mental Health: The Case of Shezongo Community of Kafue National Park (KNP), Zambia

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ABSTRACT

Background: Human-wildlife conflict (HWC) is a bi-directional relationship affecting man and wild animals. Both species suffer extreme consequences, including encroachment of man into wildlife habitats and the destruction of crops and livestock by wildlife foraging for food sources. HWC is particularly prominent in Game Management Areas (GMAs), situated as buffer zones around national parks. Subsequent conflict between man and wildlife leads to not only physical harm but also psychological distress, exacerbating the consequences for mental health.

Objectives: A mixed methods design was used to investigate the effects of HWC on mental health. The study aimed to determine the hidden nature of HWC within a population residing in a GMA region in Kafue National Park, Zambia.

Methods: Forty-two participants took part in this study, representing a diverse range of demographic characteristics. Of these, 40 participants completed quantitative measures investigating the effect of HWC on mental health. Additionally, eight participants participated in interviews on the nature of mental health in the context of HWC. Some interview participants also completed the quantitative measures, while others did not. Thematic analysis guided qualitative investigations, while Chi-Square Analyses and Fisher's Exact Test were used to investigate the association between HWC and mental health.

Results and Conclusions: The study found an association between HWC and heightened psychological distress in rural communities residing in GMA areas. Further research is required to improve the symbiotic relationship between man and wildlife, considering the consequences of HWC on human well-being and mental health.

Keywords

Human-wildlife Conflict, mental health, well-being, mixed methods, Environmental Psychology, Zambia.

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DEFINITIONS

Agrarian Communities: Communities that rely on producing and maintaining crops and farmlands to sustain themselves.

Agriculture: Farming practices that include cultivating crops and livestock for personal use and distribution to the market.

Environmental Psychology: A field of psychology that studies the intricacies of the relationship between humans and their natural or constructed environment.

Food Insecurity: The lack of adequate food and fear of future food shortages leads to altered food consumption behaviours. This condition is linked to health issues such as malnutrition, weakened immunity, and increased risk of chronic diseases.

Game Management Area: Buffer zones around national parks that aim to separate the national park from surrounding communities.

Human-Elephant Conflict: The negative interaction between humans and elephants has adverse consequences for both species.

Human-Wildlife Conflict: A bi-directional relationship between humans and wild animals that impedes the survival and well-being of both species.

Indigenous: Native to the land individuals reside in.

Livelihood: Social and material assets needed to maintain a living that ensures survival.

Mental Illness: A health condition that involves a change in one's mood, behaviour, and emotions, resulting in adverse consequences to life.

Mental Health: Includes social, emotional, and psychological well-being that enables individuals to reach their full potential.

National Park: A natural area with diverse flora and fauna. These areas are often protected by government agencies for the preservation of the habitat.

Open Area: An area other than a national park, game management area, bird sanctuary, or wildlife sanctuary where wild animals are found. These areas can be inhabited and farmed with the permission of a designated authority.

Psychosocial: The relationship between social factors and one's feelings, emotions, and behaviours.

Semi-subsistence Agriculture: Farming activities used for the farmer's direct consumption, with nominal outputs for the market.

Social and Emotional Well-being: A comprehensive understanding of health, incorporating mental health and other aspects of wellness such as connection to land or 'country', culture, spirituality, ancestry, family, and community.

Well-being: Flourishing across multiple domains of life (psychological, social, physical) inclusive of the absence of ill health and negative emotions.

Wildlife: Wild species of animals, flora, or bird species that survive off vegetation within a biome.

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To my dad, Steve Smith. Your unwavering dedication to the conservation of the Kafue National Park is truly inspirational.

CHAPTER 1

INTRODUCTION

1.1 Context and Rationale

Environmental Psychology (EP) is a critical sub-discipline within psychology that studies human-environment relations (Gifford, 2014). It is mainly concerned with how humans experience their natural and constructed environment, how their behaviour changes the environment, and vice-versa (Gifford, 2014). More comprehensively, EP examines the influence that the environment has on human emotions, thoughts, and feelings, in essence, their 'psyche' (Devlin, 2018). (Steg et al., 2013), further state that EP "examines the influence of the environment on human experiences, behaviour, and well-being" (p 2). EP, therefore, investigates the bi-directional relationship between humans and the natural environment (which includes wildlife) in which they are enmeshed (Gifford, 2009).

The bidirectionality of the cosmos, or the environment, with human interaction has profound implications for physical and mental health outcomes (Devlin, 2018). To this extent, (Moser, 2009) states that human well-being can only be achieved if the environment does not impede on the success of an individual's livelihood and, in turn, if an individual's success and livelihood do not defile their environment. Importantly, the study of Human-Wildlife Conflict (HWC) is securely positioned within the study of EP and recognizes that human physical and mental well-being can only be achieved if nature and human interaction are in harmony (Devlin, 2018).

1.2 Human-Wildlife Conflict (HWC)

HWC is defined as a two-way relationship between humans and wild animals that causes harm to both the needs of humans and wildlife (Barua et al., 2013). HWC is a major concern in many regions of the world (Gemeda & Meles, 2018) and often occurs when wild

animals, such as large herbivores (i.e., elephants) and predators (i.e., lions), wander into agricultural land, causing destruction to crop and yields (Nyirenda, 2012). Such destruction often leads to human retaliations communities and farmers respond to wildlife encroachment into farmlands. This encroachment causes financial and food insecurity, as farming is a primary means of livelihood for most rural communities in Sub-Saharan Africa and the global South (Braczkowski et al., 2020).

1.3 Game Management Areas (GMAs)

The development of Game Management Areas (GMAs) is closely intertwined with HWC mitigation efforts. These areas aim to address not only human encroachment into wildlife spaces for natural resources but also the intrusion of wildlife into civilian spaces in search of food. GMAs are 'buffer zones' situated on the boundaries of national parks. Due to their location, they act as 'buffers', providing protection to national parks and surrounding communities to mitigate HWC (Bandyopadhyay & Tembo, 2010). Notwithstanding this mitigation, there has been a rise in GMAs due to human encroachment into wildlife landscapes, resulting in competition between wildlife and humans over limited natural resources for survival (Chomba, 2012; Seoraj-Pillai & Pillay, 2017).

1.4 Human-Wildlife Conflict in Sub-Saharan Africa

Sub-Saharan Africa, with its developing countries and over 3000 Game Management Areas (GMAs), faces significant HWC challenges despite conservation efforts (Manfredo, 2015; Seoraj-Pillai & Pillay, 2017). The region's population, now around 1.21 billion, has expanded rapidly, leading to increased encroachment into wildlife habitats and a higher demand for natural resources (The World Bank, 2024; Seoraj-Pillai & Pillay, 2017). This has intensified competition for food, space, and water, causing habitat degradation and fragmentation (Bruinsma, 2017). Sub-Saharan Africa experiences financial strain and food

insecurity due to heavy reliance on agriculture, which drives habitat conversion and exacerbates HWC (Braczkowski et al., 2023; Gemeda & Meles, 2018). These factors underscore the need for continued efforts to address and mitigate HWC in the region.

1.5 Human-Wildlife Conflict, GMAs and Zambia

The increase in HWC within several GMAs in Zambia has been notable. Zambia boasts a substantial tourism sector owing to its abundant wildlife population (Morgan & Nyanga, 2023). However, the development of GMAs in the Eastern Province of Zambia, alongside the economic benefits of tourism, has contributed to this rise in HWC. These conflicts often stem from the competition between humans and animals for limited land space (Morgan & Nyanga, 2023). Zambia is a landlocked country in south-central Africa that shares borders with eight countries, namely, Angola, Namibia, Botswana, Zimbabwe, Mozambique, Malawi, Tanzania, and the Democratic Republic of Congo (Hobson et al., 2023). The estimated population of Zambia is approximately 20,767,302 (Worldometer, 2023).

Considering Zambia's increasing population, it is crucial to acknowledge that a third of its landmass is wildlife-protected, inclusive of national parks and GMAs (Hobson et al., 2023). Relevant to my thesis, the Kafue National Park is Zambia's oldest and largest national park, with a gross landmass of 22,400 square kilometres (African Parks, 2023). The Kafue National Park is spread over three local provinces of Zambia, namely Northwest, Central, and Southern Zambia (Hobson et al., 2023). The park is 'buffered' by nine GMAs (African Parks, 2023). My study is concentrated within the Shezongo Community, located on the south-eastern border of the Kafue National Park. Personal communications with game rangers and conservationists in the region indicate that the Shezongo Community spans two GMAs, namely the Nkala GMA and the Bilili GMA.

Similar to other regions within Sub-Saharan Africa, Zambia has seen an uncontrolled immigration of people into virgin woodlands in search of agricultural and charcoal opportunities that national parks and GMAs offer (Mayberry et al., 2017; Mekonen, 2020). Compounded with a drastic increase in the human population, there has been an encroachment of human settlement into wildlife landscapes, resulting in close human and animal contact, leading to crop and animal loss, which invariably damages the symbiosis between human and animal co-existence (Mekonen, 2020).

With reference to Zambia, (Chomba, 2012) found that during the period 2002- 2008, there were 347 human fatalities in Zambian GMAs (Central, Eastern, Southern, and Western). The animals responsible for these fatalities were crocodiles, elephants, hippos, lions, and buffaloes. One thesis is that GMAs are failing to effectively act as 'buffer zones' and that wild animals can freely roam into areas inhabited by humans and vice versa, causing inconsequential harm (Hobson et al., 2023). As such, the absence of clear physical boundaries between GMAs, national parks, and local human settlements results in profound conflict with no clear solution in sight (Hobson et al., 2023).

1.6 Statement of the Problem

Research shows a focus on wildlife conservation strategies in Sub-Saharan Africa, often overlooking the impacts on mental health and emotional well-being (Mayberry et al., 2017). Recent studies have begun to uncover the consequences of wildlife protection strategies on communities living near or within GMAs, including a rise in food insecurity and compromised mental health (Hjelm et al., 2017). Despite this research, there continues to be a limited amount of research exploring the impact of HWC on the mental, physical, and emotional well-being of low-income settlements (Barua et al., 2013; Mayberry et al., 2017; Mekonen, 2020).

1.7 Proposed Study and Response to Statement of the Problem

Given the consequences of HWC and a limited amount of mental health research in agricultural regions affected by HWC (Follmer & Jones, 2018), my mixed methods study investigated mental health outcomes in Zambia. To date, only a handful of studies (Chomba, 2012); (Nyirenda, 2012) (Nyirenda et al., 2013); (Nyirenda et al., 2018); (Subakanya et al., 2018) have investigated the association between HWC and mental health in Zambia. Significantly, the above-cited studies have employed mainly qualitative analysis to investigate HWC and mental health in Zambia. My study seeks to contribute to the literature by implementing a mixed-method approach to study this association. Moreover, my study introduced a holistic and people-centred theoretical framework approach based on the Social and Emotional Well-Being (SEWB) perspective (Gorman, 2010) and the Ecosystem Assessment and Human Well-Being Framework to investigate HWC and mental health.

1.8 Research Methods, Procedure, and Techniques

This study employed a parallel-database convergent mixed method design to respond to the research questions under investigation. Mixed methods design combines qualitative and quantitative methods to comprehensively explore the research problem, thus producing a rich analysis of a topic area (Cresswell & Plano Clark, 2018). Qualitative data was collected using interviews and analysed using NVivo 14 Software (QSR International, 2023). Quantitative data was collected using predominantly psychometrically validated questionnaires investigating mental health. The quantitative measures investigated the effect of HWC on Post-Traumatic Stress Disorder (PTSD), sleep, anxiety, psychosis, and depression. Quantitative data was analysed using Jamovi, an open statistical software (The Jamovi Project, 2022).

1.9 Thesis structure

The current chapter (*Chapter 1*) details the nature of HWC the rationale of the study and methods used to answer the research problem. *Chapter 2* reviews the relevant literature on HWC on human well-being. The literature focuses explicitly on HWC in Sub-Saharan Africa, with a particular consideration of Zambia. The chapter concludes by detailing the primary research questions for the study. *Chapter 3* describes the methods undertaken for the study. The chapter further details the relevant ethical considerations implemented in the study. The chapter concludes by detailing the theoretical frameworks that undergird the research study. *Chapter 4.1* provides an overview of the qualitative analysis of the study. *Chapter 4.2* details findings from the first theme following thematic analysis. *Chapter 4.3* details qualitative results from the second theme. *Chapter 5* details quantitative results on HWC and mental health. *Chapter 6* provides a summary and discussion of the results of the study.

CHAPTER 2

2. LITERATURE REVIEW

2.1 Environmental Psychology

Environmental psychology, sometimes referred to as Ecopsychology, is a key sub-discipline within psychology that investigates the interdependence of humans with nature and the implications that nature has on cognitive well-being and mental health (Thoma et al., 2021). Holistically, environmental psychology investigates the interrelated nature of all forms of life and how the physical environment influences human well-being (Scott et al., 2014). From a theoretical perspective, environmental psychology embeds the Earth as a living system and human beings, their psyche, products, and cultures as an integral part of the larger system (Thoma et al., 2021).

Of importance to my study, environmental psychology recognizes that the Earth and the needs of humans are interdependent and interconnected and that human health and well-being must include sustainable and mutually enhancing relations with the natural world (Scott et al., 2014). Regarding the interdependence of nature and human well-being, eco-immunologist Elizabeth Roberts (Roberts, 1993), Click or tap here to enter text.states that 'Every act of healing has one obligation: it must create a pattern of health around itself…Our health is created by helping other systems become healthy'. The subsequent sections explore the 'unhealthy' nature between HWC and subsequent human mental distress.

2.2 Theoretical Framework

In this study, the Social and Emotional Well-Being (SEWB) framework as well as the Ecosystems and Human Well-Being frameworks, were applied to guide both the design and analysis of the research. The SEWB framework provided an overarching perspective on mental health, ensuring that the study considered the holistic dimensions of well-being. The

Ecosystems and Human Well-Being Framework informed the analysis of how ecological factors and human-wildlife interactions specifically impact mental health. For the quantitative analysis, the frameworks helped identify relevant mental health outcomes and contextualise them within the broader socio-ecological environment of the Shezongo community. For the qualitative analysis, they guided the thematic analysis of participants' experiences, ensuring that the interconnectedness between mental health, community relations, and environmental factors was thoroughly explored. By integrating these theoretical frameworks, the study aims to provide a nuanced understanding of how HWC affects mental health and well-being, grounded in both cultural and ecological contexts.

2.2.1 Social and Emotional Well-Being (SEWB)

Germane to this research, human insecurity in the context of HWC is associated with diminished SEWB (Gorman, 2010). Recognized as a culturally appropriate construct, SEWB operates on a holistic approach to health that encompasses various dimensions of health and overall well-being (Le Grande et al., 2017). Within the SEWB framework, mental health and well-being are connected to one-ness with land, country, cultural identity, spirituality, ancestral ties, family bonds, and community relationships (Le Grande et al., 2017). This comprehensive view of well-being aligns with the fundamental values of indigenous African culture, where harmony with the 'Earth' and land contribute to defining personhood and well-being (Jauro, 2016; Le Grande et al., 2017).

2.2.2 The Ecosystems and Human Well-Being Framework

Intertwined to the SEWB, the Ecosystems and Human Well-Being Framework posits that the ecosystem (land, earth) is interconnected to human health and that disharmony between man and land (human-wildlife conflict) impairs human well-being (Millennium Ecosystem Assessment, 2005). The framework particularly emphasises the importance of personal safety

and protection from disasters emanating from the 'Earth' (Millennium Ecosystem Assessment, 2005) and how this impacts human well-being due to man's interconnectedness to Earth. Additionally, the framework underscores the role of good social relations in fostering community amidst ecological challenges (Millennium Ecosystem Assessment, 2005). In its plurality, the Ecosystems and Human Well-Being Framework recognizes the dynamic relationship between ecosystems and human well-being and advocates for interdisciplinary approaches to address the ecological (wildlife) needs of the Earth, with the need for humans to flourish within the ecological system (Millennium Ecosystem Assessment, 2005). In essence, the Ecosystems and Human Well-Being Framework serves as a valuable theoretical lens for examining the multifaceted relationship between ecosystems, the human- wildlife system, and mental health and well-being.

2.3 Human-Wildlife Conflict

This study positions HWC as a sub-theme of environmental psychology and investigates conflicts between humans and their existence with nature (wildlife). HWC has become a global issue as the human population has drastically increased over the centuries (Gemeda & Meles, 2018; Seoraj-Pillai & Pillay, 2017). The global population is increasing dramatically, and currently, it surpasses 8 billion (United States Census Bureau, 2023). Therefore, with the increasing global population, wildlife and human species compete for limited habitational space, leading to negative and unhealthy interactions between the two species (Gross et al., 2021). The competition for limited resources has been stated as one of the most pressing sustainable development challenges globally, as competing for living space has a considerable effect on human livelihood and the survival of wildlife species (Braczkowski et al., 2023). The impact of HWC is felt in both developed and developing countries. However, their effect in developing countries has been reported as profoundly prodigious (Seoraj-Pillai & Pillay, 2017).

2.3.1 Human-Wildlife Conflict in Sub-Saharan Africa

Sub-Saharan Africa has a significant number of developing countries, as well as the world's largest wildlife reservoirs, with over 3000 GMAs (Seoraj-Pillai & Pillay, 2017). GMAs have been established to protect environmental, biological, and cultural diversity in different regions of the world (Seoraj-Pillai & Pillay, 2017). This thesis expands on the relationship between GMAs and HWC in subsequent sections. Notwithstanding, as noted by (Manfredo, 2015) although significant progress has been made since the 2003 World Parks Congress (Durban, South Africa), which focused on "Creating Coexistence Between Humans and Wildlife: Global Perspectives on Local Efforts to Address Human-Wildlife Conflict (HWC)", HWC continues to be a major challenge in Sub-Saharan Africa, and the world at large.

The human population has increased; therefore, the encroachment of human populations into wildlife spaces has subsequently increased (Manfredo, 2015; Seoraj-Pillai & Pillay, 2017). With broad reference to Sub-Saharan Africa, the escalating growth in the human population has increased the demand for natural resources and fossil fuels. The tension between humans and wild animals arises from their competition for food, space, and water (Seoraj-Pillai & Pillay, 2017; Wilson & Primack, 2019). The rapid growth of the human population in Sub-Saharan Africa, approximately 1.21 billion (The World Bank, 2024), has escalated the demand for natural resources and fossil fuels, consequently causing habitat degradation and fragmentation (Bruinsma, 2017). These shifts intensify the competition between wildlife and humans for land (Seoraj-Pillai & Pillay, 2017). Based on recent research by Seoraj-Pillai and Pillay (2017), it has been found that local communities and commercial farmers are most affected by HWC. Species such as lions, wild dogs, brown hyenas, cheetahs, leopards, elephants, and monkeys are commonly involved in these conflicts (Seoraj-Pillai & Pillay, 2017).

However, it is essential to consider a potential reporting bias in HWC literature, especially regarding incidents involving commercial farming industries versus those within local communities. Some suggest that the apparent difference in reported conflicts between these settings may stem from more frequent reporting by commercial farmers rather than an actual variation in the damage experienced by each group (Seoraj-Pillai & Pillay, 2017). In Sub-Saharan Africa, smallholder subsistence farms dominate the landscape, with farmers cultivating crops under varying soil and water conditions (Bruinsma, 2017). However, human activities have exerted pressure, resulting in the degradation of one-third of the continent's soils due to extensive crop production (Ritchie & Roser, 2013). This degradation has significantly hampered agricultural productivity in the region, impacting approximately 180 million people due to reduced crop yields resulting from soil damage (Bruinsma, 2017). Additionally, pastoralist[1] African communities encounter further challenges, residing in remote and underdeveloped areas prone to drought and disease (Bruinsma, 2017).

These factors contribute to high levels of vulnerability to food insecurity within these regions (Bruinsma, 2017). Pastoral areas make up about 40% of Africa's land mass but are less suitable for growing crops; hence, livestock husbandry remains the predominant farming practice in arid parts of Africa (Bruinsma, 2017). The above changes have led to significant competition between pastoralists and wildlife for limited resources such as water and grazing land (Bruinsma, 2017).

As a result of the fight over limited resources, Sub-Saharan African countries bear the most significant burdens of HWC, experiencing financial strain and food insecurity and significant impacts on mental well-being (Braczkowski et al., 2023). One of the plausible explanations for the financial and food insecurities mentioned above is the heavy reliance of

[1] Someone who raises and manages livestock, often leading a nomadic or semi-nomadic lifestyle to ensure the well-being of their livestock.

many people in Sub-Saharan Africa on agriculture for their livelihoods which has the potential to cause stress and anxiety (Gemeda & Meles, 2018). This dependence often leads to the conversion of former wild habitats into agricultural fields, among other factors (Gemeda & Meles, 2018).

This change frequently results in HWC, which has been shown to cause psychological distress, as demonstrated by research on its impact on human well-being. For instance, a qualitative study conducted by (Velempini, 2021) explored elephant management's effects on vegetation in Botswana's Okavango Delta. The study revealed that the rising human and elephant populations have led to competition for space in the Okavango Panhandle. This contestation for space led to the erosion of wildlife by human settlement and increased the likelihood of HWC, leading to crop damage, property destruction, livestock depredation, and, in some cases, human fatality (Velempini, 2021). As displayed, HWC can have a significant impact on people's livelihoods and safety. Therefore, it is imperative to conduct further investigation into this matter. However, as the (Velempini, 2021) study was a qualitative case research study, it holds some limitations, such as the purposeful sampling method used; therefore, the sample is non-random, leaving the study unable to represent a larger population (Ridder, 2017).

2.3.2 Zambia and HWC

At a microscale, due to a rise in population, there has been a limited availability of suitable grazing land in Zambia, inevitably leading to conflict between humans and wildlife in recent years (Nyhus, 2016). Zambia has expanded from a population of approximately 4 million at independence (1964) to the currently 20,158,000 in 2022 (The World Bank, 2023). This has resulted in various outcomes, including the establishment of transportation networks and economic development. As mentioned earlier, human population growth has led to agricultural expansion into areas once considered wilderness (Chomba, 2012). Due to the

demand for food sources, the global agricultural sector is constantly shifting, significantly affecting natural ecosystems (Nyhus, 2016). With reference to Zambia, it is estimated that by 2050, there will be an additional 200-300 million hectares of farmlands (Nyhus, 2016), meaning an increase in the settlement of agrarian communities into wildlife habitats (Sitienei et al., 2014). On the other hand, the transformation of wild areas into cultivated farmland has resulted in the deterioration of natural habitats occupied and relied upon by wild animals (Chomba, 2012).

This alteration of landscapes has heightened the incidence of HWC, as demonstrated by a Chomba (2012) seminal study investigating patterns of HWC in the Central, Eastern, Northern, and Western regions of Zambia. This influential study indicated that between 2002 and 2008, there were 347 human fatalities in the country due to HWC . The study found that the species of animals responsible for human fatalities included crocodiles, elephants, hippos, lions, and buffaloes (Chomba, 2012). Further to the above, the study reported that between 2004 and 2010, there were 305 incidents regarding livestock being injured or killed by wildlife, resulting in a total of 605 registered and documented incidences of human and livestock fatalities in the above regions (Chomba, 2012).

Critically, in Zambia, similar to other contexts in Sub-Saharan Africa, HWC is believed to threaten livelihood security, particularly due to economic losses caused by crop raiding by both carnivores and omnivores (Nyirenda, 2012; Richardson et al., 2012). To mitigate HWC linked with crop loss and livelihood insecurity, the Zambian government has introduced GMAs to minimize human and wildlife interaction with the intention of reducing HWC (Chomba, 2012).

2.4 Game Management Area (GMAs) and HWC

Game Management Areas (GMA) are defined as buffer zones around national parks that act as transitional areas between national parks and surrounding communities (Bandyopadhyay & Tembo, 2010). Within the Zambian context, GMAs are specifically designated areas of land set aside for wildlife conservation and sustainable use (Zambian Ministry of Tourism, 2015). To date, one-third of Zambian land is dedicated to GMAs (Zambian Ministry of Tourism, 2015). Under this regulation, the Zambia Wildlife Authority (ZAWA) and local communities who are custodians and stewards of the land, are responsible for enforcing regulations and ensuring the protection of wildlife from illegal hunting and poaching (Zambian Ministry of Tourism, 2015). Financially, GMAs are used for trophy hunting, which generates revenue for conservation and community development projects (Mkanda et al., 2014). Importantly, since GMAs have been established for wildlife to move between protected and unprotected areas, traditional stewardships have since been established in Zambia to facilitate the conservation of natural resources and protect surrounding human populations from wildlife encroachment into communities (Bandyopadhyay & Tembo, 2010; Mkanda et al., 2014).

Notwithstanding the establishment of GMAs, there is continued encroachment of wildlife into human habitats, and human encroachment into GMAs (Khumalo & Yung, 2015). Wildlife research, such as (Mkanda et al., 2014), suggests that the proximity of rural communities to GMAs leads to inevitable encounters between humans and wild animals as communities primarily rely on natural resources like water sources and grazing lands. National parks and GMAs have thus become contested sites, especially during times of drought and environmental degradation due to global warming (Velempini, 2021).

2.5 Consequences of GMAs in Zambia

The establishment of GMAs in Zambia, aimed at wildlife conservation, inadvertently disrupts local communities dependent on surrounding lands for sustenance (Kelly & Gupta, 2016). Particularly affecting communities relying on semi-subsistence agriculture, the delineation of land for GMA practices poses significant challenges to agricultural activities of nearby communal households potentially leading to stress and anxiety (Bandyopadhyay & Tembo, 2010; Morgan & Nyanga, 2023). Given that a considerable portion of Zambia's population resides near national parks and wildlife areas adjacent to GMAs (Morgan & Nyanga, 2023), households engaged in traditional subsistence farming face heightened vulnerability to wildlife species, including large herbivores like elephants and predators such as lions (Dickman & Hazzah, 2015). This proximity and the resulting HWC contribute significantly to the psychological distress experienced by these communities.

In rural Zambia, where a significant portion of the population resides within or near GMAs (Kassie et al., 2014) and relies on subsistence farming, households encounter substantial challenges to their livelihoods because they are particularly susceptible to HWC due to their proximity to GMAs (Nyirenda et al., 2018). As noted by bodies such as the World Parks Congress and by researchers (Dickman & Hazzah, 2015; Seoraj-Pillai & Pillay, 2017), these communities often lack the resources and capacity to prevent or cope with wildlife damage such as livestock depredation[2] and crop raiding, [3] leading to considerable financial damages for farmers.

[2] The consumption of livestock by free-roaming animals like lions.
[3] Wild animals, (especially elephants) who feed off or destroy cultivated lands and crops.

2.5.1 Economic and Health Consequences of HWC in GMAs

A seminal meta-analysis by Seoraj-Pillai and Pillay (2017) detailing the consequences of HWC in GMAs states that HWC has significant financial consequences, particularly for subsistence farmers and rural communities due to crop and property damage. Morgan and Nyanga (2023) confirmed this finding with their interview-based research that investigated the economic implication of HWC in the Lupande GMA in Zambia. Findings indicate that notwithstanding direct financial loss to farmers and their immediate families, wildlife damage to farmers' livelihood has also resulted in huge economic losses for the Government of Zambia due to settling retaliatory killings of problem animals that have strayed into civilian land (Morgan & Nyanga, 2023).

Nyirenda et al. (2018) explored the societal consequences of interactions between humans and elephants at the interface of wildlife, agriculture, and human interaction. The study conducted in Lupande GMA, situated in eastern Zambia, found that 100% of interviewed participants (n=281) experienced crop damage due to wildlife (elephants) at least two times in the five previous farming seasons (Nyirenda et al., 2018). The economic and social consequences of HWC for this population included loss of agricultural productivity and financial vulnerability (Nyirenda et al., 2018). In addition, compromised livelihood sustainability was reported, as well as diminished psychological well-being as a result of heightened stress and dissatisfaction among the subsistence farmers experiencing HWC (Nyirenda et al., 2018). The shortcomings of this study are that it was qualitative, thereby prone to subjectivity and bias. However, the sample size of 281 provides a solid foundation for generalisability, enhancing the reliability of the findings (Research Prospect, 2023). Moreover, there is a lack of quantifiability in qualitative research, therefore, this study does not draw precise conclusions on the societal consequences of human-elephant (wildlife) conflict (Queirós et al., 2017).

Findings from the above are mirrored by those reported by Richardson et al. (2012), who investigated the impact of wildlife conservation in GMA areas within Zambia. The research demonstrated that GMAs contribute significantly to increased crop loss likelihood, indicating that households in regions with greater wildlife populations are more susceptible to such losses. Specifically, the presence of African elephants in these GMAs negatively affects household income, directly impacting the revenue derived from agricultural activities (Richardson et al., 2012). Interestingly, a study by (Mkanda et al., 2014) examined factors that contribute to the success or failure of wildlife conservation efforts in the GMAs in Zambia.

The study found that good governance, institutional support, and community involvement are critical in preventing HWC and wildlife conservation efforts in GMAs (Mkanda et al., 2014). Specifically, the study found that weak local governance and lack of institutional support, which led to the degradation of wildlife populations and lack of symbiosis between man and wildlife, led to greater conflict in these regions (Mkanda et al., 2014). Lastly, the study also found that community involvement, through revenue-sharing schemes and the employment of residents in wildlife protection and management activities, was both important in the success of wildlife conservation efforts and in mitigating harm in GMAs (Mkanda et al., 2014).

As previously noted, the effect of HWC and GMAs is not unique to Zambia. (Mekonen, 2020), investigated HWC around GMAs in communities residing around the Bale Mountains National Park in Southeast Ethiopia. Similarly, findings were uncovered pertaining to the vulnerability of agricultural communities in rural settings due to wildlife species such as herbivores (e.g., elephants) and predators (e.g., lions) crossing GMAs and infringing onto civilian land, causing crop damage and loss of life (Mekonen, 2020). However, this research lacked a theoretical framework, which can be considered a shortcoming of this study, as the absence of a theoretical framework leads to a lack of coherence, structure, and direction in a

research study (Grant & Osanloo, 2014). Similar effects, as noted by (Mekonen, 2020), have been reported elsewhere, such as in (Holmern et al., 2007) and Kenya (Patterson et al., 2004). Key to all the above, the economic and food insecurity consequences experienced by communities living next to GMAs and subsequently experiencing HWC are further linked to mental well-being, the focus of the current thesis.

2.6 Effect of HWC on Livelihood and Food Insecurity

Environmental psychology literature further links HWC to livelihood insecurity. 'Livelihood' is defined as the "set of capabilities, assets, and activities required for means of living" (Masa et al., 2017). In this manner, livelihood insecurity is understood as the inability to access social and material assets needed to maintain living conditions that ensure communal survival (Mapiye et al., 2021). Livelihood insecurity in the GMAs is associated with the dependence on natural resources for sustenance, as well as the competition for these resources within these areas, which could lead to increased stress and anxiety among affected populations (Richardson et al., 2012). Wildlife conflicts, including crop raiding and livestock depredation, frequently impact the mental well-being of individuals living in GMAs, causing psychological distress due to economic losses and reduced food and income security (Nyirenda, 2012). Moreover, limited economic opportunities and infrastructure, combined with the risks of property damage and conflict-induced displacement, further contribute to heightened stress levels and mental health issues in GMAs (Richardson et al., 2012).

Kelly and Gupta (2016) investigated the effect of livelihood insecurity on human well-being in protected GMAs in Cameroon as well as Botswana's Chobe region. Qualitative methods in the form of participant observations, interviews, and archival analysis revealed that the increase in GMAs has significantly reduced agricultural capacities that previously maintained rural livelihoods around the Chobe National Park (Kelly & Gupta, 2016). This

reduction has resulted in material, economic, food, and cultural insecurity, which in turn increase mental health issues. Movement restrictions imposed by the national park to enhance wildlife security have compounded these mental health issues (Kelly & Gupta, 2016). Since communal dwellers are prohibited from expanding communal grazing lands, and because farmers are not allowed to defend their livestock against wild animals due to protection clauses around wildlife, compounded by clauses against hunting, fishing, and collecting natural resources around GMAs, researchers have argued that GMAs have led to livelihood insecurities for communities around national parks (Kelly & Gupta, 2016). However, it is crucial to recognize that the conservation of natural resources, including wildlife, ultimately benefits human security by preserving ecological balance and ensuring the long-term sustainability of ecosystems, as highlighted in environmental psychology (Roszak et al., 1995).

Emerging research further indicates that livelihood insecurity leads to food insecurity, which has profound mental health implications. Food insecurity is defined as the inability to meet dietary needs that enable one to live and maintain a healthy and active lifestyle (Tesfaye et al. 2016). Food insecurity has been found to be associated with psychological and social stress (Na et al., 2019). A systematic review by Trudell et al. (2021) found that food insecurity is widespread, and populations experiencing more food insecurity are at a higher risk of poor mental health, including depression and anxiety. Emerging research establishes a critical link between livelihood and food insecurity, which can be extended to its implications for the broader context of human security, as highlighted by the literature on HWC and GMAs, as well as in environmental psychology literature.

2.6.1 Effect of HWC on Human Security

Importantly for my research gains, the literature indicates that HWC around GMAs is further linked to one's state of mental health and emotional well-being is linked to human security. Human security is defined as the promotion and protection of physical, economic, and

social well-being, both for individuals and communities (Yeshey et al., 2022). Social well-being in this regard refers to meeting basic needs that allow for intact physical and mental health (Yeshey et al., 2022). Broadly, well-being in mental health, based on the above broad definition of social well-being, refers to the condition of overall wellness, where an individual feels they are in a state of equilibrium between themselves and their physical and social environments (Bhugra et al., 2013). By extension, mental health includes having the ability to develop and maintain meaningful connections, engage in productive and meaningful work, and attain a clear understanding of one's capabilities (Bhugra et al., 2013).

A key study, Bond and Mkutu, (2018) investigated the implications of HWC on well-being and mental stress in the Laikipia County of Kenya. Qualitative findings from the study indicated that the effects of HWC were associated with "hidden costs." These included loss of self-esteem, sleep disturbance, sickness, restlessness, chronic stress, nightmares, headaches, chronic anxiety, psychological trauma, fear, and illness. These hidden costs were either due to food scarcity or physical harm from wildlife, resulting in, for example, tibia fibula fractures, lumbar spine fractures, and or dislocated hips (Bond & Mkutu, 2018). Consequently, (Bond & Mkutu, 2018) have raised a call for further research investigating community mental well-being in the context of human insecurity experienced in GMA that experience HWC.

In a similar study, Mayberry et al. (2017) investigated the effect of wildlife encounters [elephant] on human well-being in the rural Khumaga region of Botswana. Semi-structured interviews, coupled with participant observations, revealed that participants who encountered experiences with wildlife encroaching into cultivation land reported untreated acute stress, constant fear of death, physical insecurity, and anxiety associated with wildlife encounters (Mayberry et al., 2017).

2.6.2 Effect of HWC on Mental Health and Emotional Well-Being in HWC

It suffices to say, as stated by (Mayberry et al., 2017) that HWC is a "burgeoning mental health wellbeing concern" (p 285) that threatens 'psychological capital' (Yeshey et al., 2022). (Barua et al., 2013) conducted a seminal review titled "The hidden dimensions of human-wildlife conflict: Health impacts, opportunity and transaction costs." They found that low-income countries experience hidden effects of HWC, including sleep deprivation, post-traumatic stress disorder (PTSD), and depression. However, Mayberry et al. (2017) state that the physical and mental health costs of HWC in low socio-economic backgrounds are under-researched.

To this end, an ethnographic study by Jadhav and Barua (2012) on the impact of HWC (elephants) and mental health in India found that conflicts with specific elephants in GMAs caused disturbed sleep, tiredness, and repeated flashbacks of elephant attacks, and diagnosis of PTSD (Jadhav & Barua, 2012). The qualitative design research study by Mayberry et al.(2017) conducted in Botswana, bordering Zambia, found that most community members experienced negative emotions when encountering elephants (wildlife), and this was associated with worry, anger, and fear ("*We are used to them, but at the end they will kill someone',* p283), frustrations, and shock. Mayberry et al. (2017) conclude by emphasizing how stress is related to elephants and other wildlife and is an emerging mental health concern that warrants additional investigation.

Khumalo and Yung, (2015) found that villagers living near GMAs in Namibia's Kwandu Conservancy experienced heightened stress and sleep deprivation due to guarding crops at night, to scare away wild animals. A constant issue that participants echoed in the study is that they "*don't even have time to sleep at night. What you have to do is stay awake, and then you have to chase away those animals*" (p. 236) leading to sleep deprivation. Indeed, psychological stress and reactivity to stress have been found to manifest sleep problems

(Niemiec et al., 2022). Niemiec et al. (2022) further indicate that stress affects cortisol modulation, which undermines sleep quality. Continuous disturbances in sleep have been found to cause emotional and medical burdens on an individual and tend to diminish productivity, therefore having the ability to cause implications for one's physical and emotional well-being (Niemiec et al., 2022).

Blackie (2022) employed a mixed methods study to investigate the association between PTSD and HWC in rural Botswana. Qualitative findings revealed instances of sleep disturbances and the onset of PTSD among participants who directly experienced or were caregivers to families affected by HWC, particularly incidents involving elephants resulting in fatalities or injuries (Blackie, 2022). Previous research from the Botswana Department of Wildlife and National Parks further indicates that between 2009 and 2019, a total of 57 people were killed by wildlife in Botswana alone (Blackie, 2022).

Qualitative findings from the above study indicated that mental health trauma due to HWC was often untreated and was often worsened due to possible mental health stigma in rural settings (Blackie, 2022). Lastly, quantitative findings indicated that when asked to categorize well-being levels as either excellent, good, satisfactory, or poor, 71% of respondents indicated poor well-being in health due to incidents of encountering conflict with wildlife (Blackie, 2022).

2.7 Summary of Reviewed Literature

The reviewed literature indicates that HWC arises when humans and wildlife compete for limited natural resources. These contestations lead to economic and social consequences for people dwelling within proximity to wildlife regions, as well as a decline in wildlife populations (Blackie, 2022). HWC is particularly pronounced in GMAs, which act as buffer zones around national parks to safeguard both wildlife and nearby human communities

(Bandyopadhyay & Tembo, 2010). Residing within the proximity of GMAs is linked to livelihood insecurities due to livestock depredations and crop damage (Bandyopadhyay & Tembo, 2010; Bond & Mkutu, 2018). Livelihood insecurity is closely tied to food insecurity, which has been found to impact physical and mental well-being (Na et al., 2019). Of relevance to my research objectives, food insecurity and HWC have been associated with a negative impact on mental health (Cole & Tembo, 2011) Encounters with wildlife such as elephants and other wildlife animals have a detrimental effect on physical and mental well-being, as indicated by the 'hidden costs' of HWC, including fear, untreated anxiety, PTSD, and sleep deprivation, to name a few (Bond & Mkutu, 2018; Khumalo & Yung, 2015; Mayberry et al., 2017).

To further understand the impacts of HWC on mental health, the studies have been reviewed and summarised in the table below (Table 1). It summarises the various studies in this reviewed literature section, investigating HWC across different regions, focusing on the impacts on local communities and mental health. It includes details on study locations, sample sizes, methodologies, objectives, outcomes, and identified research gaps, providing insights into the complexities of HWC and highlighting areas for future research.

Table 1

Overview of Studies in Reviewed Literature on Human-Wildlife Conflict

Author(s) and Year	Study Location, Sample Size & Method	Objective	Outcomes	Identified Gap
Seoraj-Pillai & Pillay (2017)	Sub-Saharan Africa; Not specified; Meta-analysis	Investigate the effects of Human-Wildlife Conflict (HWC) in developing countries	HWC significantly impacts developing countries, affecting local communities and commercial farmers, particularly species like lions and elephants.	Reporting bias in HWC literature, need for more balanced reporting between commercial and local settings.
Velempini (2021)	Botswana (Okavango Delta); Not specified; Qualitative case study	Effects of elephant management on vegetation and HWC	Increasing human and elephant populations escalate competition for space, causing crop damage, property	Non-random sampling method, limiting generalizability.

			destruction, and human fatalities.	
Chomba (2012)	Zambia (Central, Eastern, Northern, and Western regions); Not specified; Seminal study	Patterns of HWC and their impact on human fatalities and livestock injury	From 2002 to 2008, there were 347 human fatalities due to HWC, involving crocodiles, elephants, hippos, lions, and buffalos. From 2004 to 2010, there were 305 incidents of livestock injury or killing.	Focus on fatality and injury data; more insights needed on economic and psychological impacts.
Nyirenda et al. (2018)	Zambia (Lupande GMA); 281; Qualitative	Human-elephant interaction impacts in wildlife-agriculture interface	All participants suffered crop damage from elephants, leading to reduced productivity, financial vulnerability, compromised livelihoods, and psychological stress.	Subjectivity and bias due to qualitative nature; lacks precise quantifiability.
Richardson et al. (2012)	Zambia; Not specified; Qualitative	Impact of wildlife conservation in GMA areas	GMAs increase crop loss likelihood; Elephants negatively affect household income from agriculture.	More research needed on governance and institutional support's role in mitigating HWC.
Mkanda et al. (2014)	Zambia: Not specified; Mixed methods	Factors contributing to wildlife conservation success/failure in GMAs	Effective governance, institutional support, and community involvement are vital for success; weak governance exacerbates conflict.	Additional insights on specific community involvement practices and their effectiveness are needed.
Mekonen (2020)	Ethiopia (Bale Mountains National Park); Not specified; Qualitative	HWC around GMAs and agricultural community vulnerability	Herbivores and predators crossing GMAs cause crop damage and loss of life.	Need for a theoretical framework to enhance study coherence and structure.
Kelly & Gupta (2016)	Cameroon & Botswana (Chobe Region); Not Specified; Qualitative	The effects of livelihood insecurity on human well-being.	In Botswana, the increase of GMAs has reduced agricultural capacities resulting in material, economic, food and cultural insecurities.	Subjectivity and bias due to qualitative nature; lacks precise quantifiability.
Bond & Mkutu (2018)	Kenya (Laikipia County); Not Specified; Qualitative	Implications of HWC on well-being and mental stress.	HWC effects include loss of self-esteem, sleep disturbances, sickness, restlessness, chronic stress, nightmares, headaches, chronic anxiety, psychological trauma, fear, and illness, often due to food scarcity or physical harm.	Subjectivity and bias due to qualitative nature; lacks precise quantifiability. Further research on community well-being in the context of human insecurity in GMAs that experience HWC.

Mayberry et al. (2017)	Botswana (Khumaga region); Not specified; Qualitative	Impact of wildlife encounters on human well-being	Participants reported untreated acute stress, constant fear, physical insecurity, and anxiety due to wildlife encounters.	More research needed on mental health impacts and interventions.
Jadhav & Barua (2012)	India: Not specified; Ethnographic study	Impact of HWC (elephants) on mental health	Conflicts with elephants caused disturbed sleep, tiredness, flashbacks, and PTSD diagnosis.	Need for interventions to address mental health impacts of HWC.
Khumalo & Yung (2015)	Namibia (Kwandu Conservancy); Not Specified; Qualitative		Villagers living near the GMA experienced heightened stress and sleep deprivation due to crop guarding at night, to scare animals away.	
Blackie (2022)	Botswana; Not specified; Mixed methods	Association between PTSD and HWC	Instances of PTSD and sleep disturbances among participants; untreated trauma and mental health stigma noted, as well as poor well-being due to conflict with animals.	This study was done in Botswana, and no study quite like it has been done in Zambia. z

2.8 Limitations of Reviewed Literature

The majority of the studies investigating the impact of HWC on physical and mental health tend to be case study-based and ethnographic. As such, these studies typically employ small sample sizes, with findings that are difficult to generalise to broader populations under similar contexts. Moreover, as insightful as ethnographic studies are, they inherently carry potential bias. The avoidance of this largely depends on the researcher's reflexivity and self-awareness surrounding recognising how their personal beliefs and customs could potentially skew research results and interpretations (Lopez-Dicastillo & Belintxon, 2014). In addition to the above, although the reviewed studies detail the effects of physical and mental harm associated with HWC, none of the studies employ comprehensive, validated measures to study mental health outcomes related to HWC.

2.9 Research Objective

This study introduced a mixed methods approach to investigate the diverse repercussions of HWC on the mental and physical well-being of the Shezongo Community residing in the impoverished vicinity adjacent to the south-eastern Boundary of the Kafue National Park, Zambia. According to (Chomba, 2012), it is common practice for wildlife to enter communities (i.e., the Shezongo Community) surrounding national parks (i.e., the Kafue National Park), causing significant concerns for the well-being and security of community members. To date, no research has been conducted in the Shezongo Community of Zambia to investigate the effects of HWC on mental and human well-being. Due to the community's proximity to GMAs, it is hypothesised that the community would experience hidden costs of HWC, yet research of this nature has never been undertaken in this low socioeconomic community in the Kafue National Park, Zambia. Building upon the comprehension of detrimental consequences such as crop damage, livestock depredation, loss of human life, and food insufficiency elucidated by (Na et al.,2019) and (Follmer & Jones, 2018), the research endeavours to uncover the nuanced impacts of HWC on the holistic well-being of the community.

By introducing a mixed-method design to investigate the association of HWC and mental well-being in the Shezongo Community of Zambia, this study aims to thoroughly examine the often-overlooked consequences of HWC. Drawing on the call for community-based studies (Kelly & Gupta, 2016) and emphasizing the need for profound exploration (Barua et al., 2013), this approach seeks to contribute to a comprehensive understanding of HWC's impact on well-being. Incorporating both quantitative and qualitative data sets, the study aims for triangulation, wherein findings from one set validate and enrich those from the other (Cresswell & Plano Clark, 2018). This mixed methods approach explores the intricate relationship between HWC and community well-being, uncovering valuable insights often overlooked in community development efforts, particularly in low-resource regions.

2.10 Research Questions

2.10.1 Main Research Question:

Is there an association between human-wildlife conflict and mental health in the Shezongo Community in Zambia?

2.10.2 Sub-Questions for Quantitative Analysis:

1. Is there an association between mental health outcomes (PTSD, psychosis, stress, anxiety, depression, sleep disturbances) and the ability or inability of farmers to protect themselves and their families from wild animals in the Shezongo Community, Zambia?

2. Is there an association between mental health outcomes (PTSD, psychosis, stress, anxiety, depression, sleep disturbances) and experiences of property damage caused by wild animals in the Shezongo Community, Zambia?

CHAPTER 3

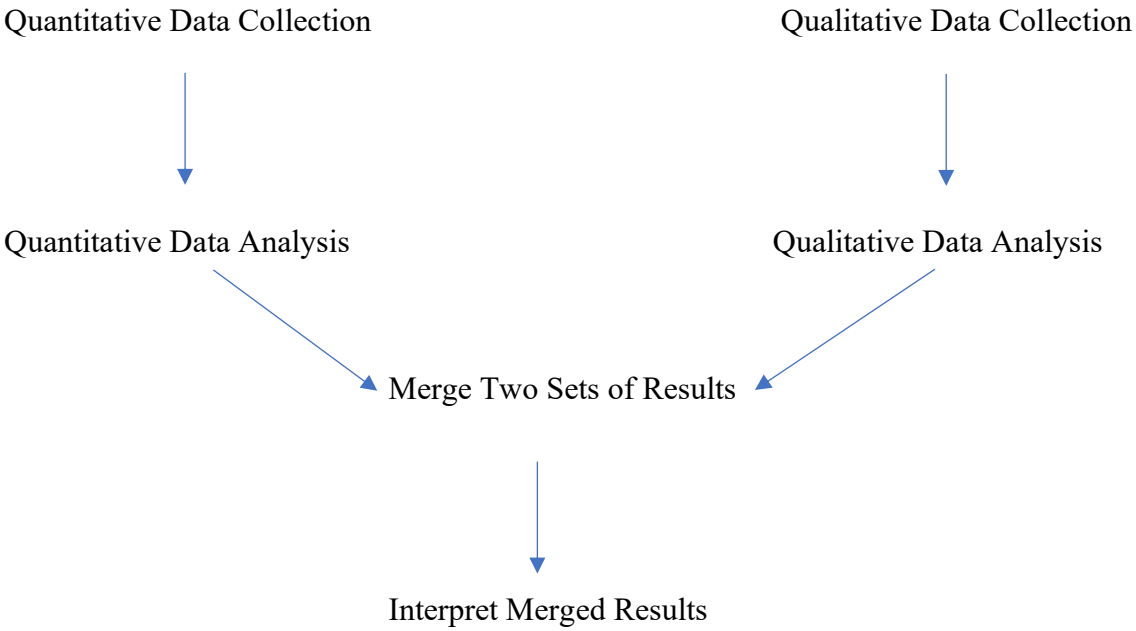
METHODOLOGY

3.1 Study Design and Setting

My study took the form of a mixed-method design. This type of design incorporates at least one quantitative research method, with at least one qualitative method, for data collection, data analysis, and the interpretation of results (Cresswell & Plano Clark, 2018). Multiple variants of mixed methods exist, and these include but not limited to, convergent mixed designs, explanatory mixed designs, and exploratory mixed designs (Cresswell & Plano Clark, 2018). My study took the form of a *parallel-databases convergent mixed methods* design. As explained by Cresswell and Plano Clark (2018) and illustrated in Figure 1, this design involves collecting and analysing two separate strands of data independently, with their integration occurring only during the interpretation phase. The researcher utilizes both types of data to explore different aspects of the same phenomenon and the independent results from each set are subsequently synthesised or compared in the discussion (Cresswell & Plano Clark, 2018).

Therefore, this study used the following procedure: **Phase One** involve collecting quantitative data, followed by **Phase Two**, which involved collecting qualitative data (Creswell & Plano Clark, 2018). The advantage of this design is that it captures distinct, yet complementary data on a topic of interest, enhancing the overall richness of a research problem (Cresswell & Plano Clark, 2018). Utilizing the strengths and weaknesses of quantitative and qualitative methodologies, this design enables the comparison of statistical outcomes with qualitative insights, contributing to a holistic analysis (Cresswell & Plano Clark, 2018).

Figure 1: Parallel-Bases Convergent Mixed Methods Study Design[4]



3.2 The Value of Mixed Method Design

Briefly, mixed methods design holds several strengths, as opposed to either, implementing qualitative or quantitative methods (Cresswell & Plano Clark 2018). By merging qualitative exploration of individual experiences with quantitative analysis, this approach enables methodological triangulation, validating research findings through cross-verification (Cresswell & Plano Clark, 2018). Additionally, it increases study validity by integrating qualitative data to contextualize quantitative results, while quantitative data provides statistical support for qualitative findings (Cresswell & Plano Clark, 2018). Moreover, mixed methods design affords greater flexibility, allowing researchers to tailor their approach to suit the study's requirements (Cresswell & Plano Clark, 2018). The convergent mixed design used in this study enabled the researcher to accomplish triangulation, which benefitted the study to arrive at a more comprehensive understanding of HWC and mental health (Cresswell & Plano Clark, 2018). Further, the convergent mixed methods design enabled the validation of research

[4](Cresswell & Plano Clark, 2018).

findings and assessed the consistency of participant responses at two different levels (qualitative and quantitative), in response to the research questions (Cresswell & Plano Clark, 2018).

3.3 Setting

This study focused on the Southeastern boundary of the Kafue National Park, Zambia, which is one of the largest national parks in the world (Mkanda et al., 2018). For this study, the unit of analysis was the Shezongo Community due to the researcher's proximity to the area and personal experience with HWC in the vicinity. This Shezongo Community is situated partially in the Nkala and Bilili GMAs. These GMAs are a sanctuary for bird and wildlife species (Zambian Ministry of Tourism, 2015). Shezongo is situated partially in an "open area" near the GMAs, where humans and wildlife inadvertently come into contact (Zambian Ministry of Tourism, 2015). From personal communication with researchers and academics in the Shezongo catchment, Shezongo is defined as a rural community akin to other communities situated around GMAs. Additional insights from these exchanges indicate that Shezongo has a land mass area of approximately 144,949 hectares, with a population estimated at roughly 46,889 inhabitants. Furthermore, drawing from personal resources and local knowledge, most inhabitants rely on subsistence farming, which continues to be threatened due to an increase in human population and wildlife. Human encroachment into wildlife spaces and wildlife intervention within grazing and farming lands have resulted in HWC in the area. People of the Shezongo community identify as being part of the Ila people group, where Ila is the predominant language (Personal communication with wildlife experts during fieldwork).

3.4 Study Recruitment

Due to the rural nature of the study setting, participants were recruited through liaison with the spokesperson of the village. The spokesperson acted both as the primary gatekeeper

to the community and by extension, the gatekeeper to Chief Shezongo (the Shezongo village chief). Upon ethical approval, a community translator gathered community members in the Shezongo community, to explain the purposes of the research and the benefits thereof. The community meeting further detailed study eligibility, and what study participation would entail. Interested participants were then provided with information letters (Appendix A), and later, consent forms (Appendix B) (*Detailed in Ethical Considerations*). All information letters and consent forms were explained in Ila and completed in English with the assistance of a translator. All signed forms were returned to the researcher before data collection commenced.

3.5 Participants

3.5.1 Quantitative Phase

In the first phase, non-probability snowball sampling was used to recruit 40 male and female participants aged between 18 and 65 years (Males, n = 26; Females, n = 14). All participants were subsistence farmers and semi-literate with a reasonable command of English. Sample size estimation for the study was based on the Central Limit Theorem (CLT), which suggests that the parameters of a population can be estimated using a randomly selected sample of adequate size (Kwak & Kim, 2017). According to the CLT, sample means are approximately normally distributed regardless of the population distribution shape, and the distribution of these means will have a mean (μ) and a variance (σ^2) that can be estimated (Kwak & Kim, 2017). Statisticians have established that a sample size of $n \geq 30$ is sufficient to assume a normal distribution within the sample and conduct inferential analysis (Chang et al., 2008). Thus, a sample size of 40 was considered adequate for this study to ensure the dependent measures would return a normal distribution.

To ensure the sample size for the analysis was appropriate, a power analysis was conducted. Power analysis considers the effect size, significance level, and power to determine

the minimum sample size required to detect an effect (Faul et al., 2009). Using an anticipated effect size of 0.5 (medium effect), a significance level (alpha) of 0.05, and a desired power of 0.80, the power analysis indicated that approximately 64 participants would be needed to achieve sufficient power for detecting meaningful associations between human-wildlife conflict and mental health outcomes. Due to practical constraints, including limited accessibility to the population and resource limitations, the study was conducted with a sample size of 41 participants. Although this is slightly below the ideal number suggested by the power analysis, it still meets the basic criterion set by the CLT for assuming a normal distribution within the sample. Therefore, despite the limitations, the sample size of 41 was deemed sufficient for exploratory analysis in this context.

3.5.2 Qualitative Phase

For the qualitative phase, convenience sampling was used to recruit eight research participants for the interviews. The eight participants were selected based on convenience, location, and English proficiency. The small sample size allowed for in-depth analysis of the phenomenon under discussion and allowed the researcher to elucidate some of the findings from the quantitative phase of the study (Vasileiou et al., 2018). To ensure diverse representation, both male and female farmers were recruited for this phase of the study. Table 2 below details the characteristics of study participants for the qualitative portion.

3.5.3 Inclusion and Exclusion Criteria for Quantitative and Qualitative Phase

The inclusion criteria of both phases of the research were that the participants were required to be (1) between the ages of 18-65 years of age; (2) productive members[5] of the Shezongo community; (3) participants who have experienced HWC (4) those with at the least,

[5] Those who contribute to the labour market and economic market (farming).

a minimal conversational skill in English; and lastly, participants (5) residing within the Shezongo community. Participants were *excluded* if they did not meet the above criteria.

Table 2

Qualitative Participant's Demographics

Pseuds[6]	Age	Sex	Marital Status	Education	Employ. Status	Land Owner	Farmer
P1	18-25	F	Single	P	E	No	Yes
P2	36-45	M	Married	P	E	Yes	Yes
P3	36-45	F	Married	P	SE	Yes	Yes
P4	26-35	M	Married	P	E	Yes	Yes
P5	26-35	F	Married	P	SE	Yes	Yes
P6	36-45	M	Married	P	E	Yes	Yes
P7	46+	M	Married	P	E	No	Yes
P8	36-45	M	Married	P	E	Yes	Yes

Note: P = Participant; F = Female; M = Male; E = Employed; SE = Self Employed; P = Primary

3.6 Materials

3.6.1 Quantitative Measures

A *Demographic Questionnaire* (Appendix C) was administered to ascertain participants' age, sex, marital status, education, employment status, land ownership, and farming activities.

3.6.1.2 Outcome Measures for Mental Health

Due to the paucity of mental health scales in HWC, clinically validated mental health screening scales derived from Mental Health America (https://mhanational.org/) were used to ascertain mental health well-being. As indicated by published research, these mental health screening tools are used globally due to their cultural and linguistic validity, and their reliability to address mental health measures in diverse cultural, race, ethnic, religious, language, and socio-economic contexts (Mental Health America, 2023).

[6] Pseudonyms

For the purposes of the study, five items out of each of the existing six questionnaires for mental health and well-being (*depression, anxiety, psychosis, PTSD, stress, and sleep disturbance*) were selected per the purposes of the study. The criteria for selecting these items included their relevance to HWC and their ability to capture the essential aspects of each mental health construct. These specific items were chosen to ensure that the questionnaire remained concise and focused while retaining its ability to measure the constructs effectively. All questions took the form of multiple-choice options and were categorized into four-point Likert scales, denoting 1= *Never*, 2=*Sometimes*, 3=*Often*, and 4=*Always*. This adaptation was necessary to contextualize the items within the unique experiences of the study participants. The subsequent sections briefly detail each of the mental health measures used to ascertain mental health and well-being.

Sleep. The MHA sleep questionnaire was screened to determine the tendency of study participants to experience sleep disturbances as a result of HWC. The MHA sleep questionnaire consists of 26 items based on recommendations from the Sleep Foundation. This measure was used to identify and quantify sleep-related disturbances (Mental Health America, 2023). By selecting the most relevant five items, we aimed to capture the key aspects of sleep disturbances while keeping the questionnaire manageable.

PTSD. The MHA PTSD questionnaire screened for the likelihood of experiencing PTSD amongst study participants experiencing HWC. The questionnaire is based on the PC-PTSD-5 (Primary Care PTSD Screen for DSM-5). The psychometric properties of the PC-PTSD-5 are well attested and include high internal validity ($\alpha = 0.94$), test-retest validity ($r = 0.82$), and strong convergent validity ($r= 0.74 - 0.85$) and discriminant validity ($rs = 0.31$ to 0.60) (Blevins et al., 2015). The selected items focused on symptoms most relevant to HWC experiences.

Depression. The MHA depression screening tool was used to help assess the risk factors of HWC associated with depression amongst participants of this study. The MHA depression screening tool screened for depression and depressive symptoms. The questionnaire is based on the PHQ-9 (Patient Health Questionnaire), which has been found to have high face and equivalence validity for South African and Sub-Saharan African contexts (Makhubela & Khumalo, 2022). The chosen items addressed the most critical depressive symptoms linked to HWC.

Stress. The MHA stress screening tool assisted in the assessment of risk factors of HWC associated with stress amongst the study participants. The MHA stress screening tool was based on a set of 16 items and screened for stress-related phenomena (Mental Health America, 2023). The selected items were the most indicative of stress in similar contexts.

Anxiety. The MHA anxiety questionnaire was used to assist in the assessment of risk factors of HWC associated with anxiety amongst the study participants. The MHA anxiety questionnaire screens for generalized anxiety disorder (GAD) symptoms. The questionnaire items are based on the GAD-7 (Generalized Anxiety Disorder 7-item scale), which has been found to have strong convergent and internal validity (Odero et al., 2023). The instrument has also been found to be reliable in Sub-Saharan contexts such as Kenya (Odero et al., 2023). The selected items focused on generalized anxiety symptoms relevant to HWC.

Psychosis. The MHA Psychosis Questionnaire was used to help assess risk factors of HWC associated with psychosis among the study participants. The questionnaire is based on the Prodromal Questionnaire — Brief Version (PQ-B) that screens risk syndromes related to psychosis. The psychometric properties of the PQ-B are well-attested and include internal validity and construct validity (Okewole et al., 2015). The chosen items were those most relevant to early signs of psychosis in the context of HWC.

The use of specific items from different questionnaires, instead of the full questionnaires, aimed to balance comprehensiveness and participant burden. This selection process was informed by their relevance to HWC. While reducing the number of items could potentially impact the breadth of each construct, the chosen items were the most critical for assessing the mental health impacts of HWC, ensuring that the reduced item set maintains sufficient validity for exploratory analysis. Using MHA screening tools instead of other well-known tools was based on their proven reliability and cultural validity across diverse populations, making them particularly suitable for the study context. Full versions of well-known screening tools might provide better validity and reliability. However, the adapted shorter versions were necessary to ensure feasibility and participant engagement.

3.6.2 Qualitative Measures

3.6.2.1 Interviews

Materials included an audio tape recorder and an interview guide (Appendix D). The interview guide was based on the (Millennial Ecosystem Assessment's Ecosystems and Human Well-Being Framework, 2005). Although participants spoke the dialect of Ila, interviews were conducted in English, which is the official language of Zambia (Mwanza, 2017). A lay translator was on hand for instances where language barriers arose.

3.6.2.2 Procedure

Since this research utilized the parallel-database convergent mixed methods approach, the researcher followed specific procedural requirements for mixed method, including guidelines on (a) conducting the study (implementation), (b) combining quantitative and qualitative approaches (integration), and (c) prioritization (Cresswell & Plano Clark, 2018), all of which are elaborated in the below section.

The **implementation** or execution of the study pertains to whether the collection and analysis of quantitative and qualitative data occur in sequence or simultaneously (Cresswell & Plano Clark, 2018). In a parallel-databases convergent design, the researcher simultaneously gathers qualitative and quantitative data while keeping them distinct. This approach ensures that qualitative data analysis remains independent of quantitative data collection and vice versa (Cresswell & Plano Clark, 2018). In this study, the researcher collected quantitative data shortly before gathering qualitative data due to logistical reasons. The quantitative data analysis took place before the qualitative data collection, meaning it did not influence the qualitative data collection process, as prescribed by the parallel-based convergent research design (Cresswell & Plano Clark, 2018).

The researcher collected quantitative data first: Participants were invited via word of mouth (village spokesperson) to participate in the study. Interested participants convened at a mutually agreed-upon communal venue within the community. Once participants understood that the study was voluntary and agreed to participate (Appendix B), they proceeded to complete the demographic questionnaire (Appendix C) and mental health questionnaires (Appendix F). The measures took approximately three hours to complete. Once all the questionnaires were complete, data collection for the qualitative phase began. Following the data collection for the quantitative and qualitative phases of the research, data from the questionnaires were transferred to Microsoft Excel for storage and data analysis. After that, data from the qualitative portion of the research was transferred to iCloud for storage. This phase was followed by the transcription and further analysis of interview data.

Participants in the qualitative phase were selected based on convenience sampling, ensuring that a diverse range of perspectives and experiences were represented. The researcher conducted qualitative data collection (semi-structured interviews) in a communal venue within the community, agreed upon by all parties involved (n=8). This strategy allowed participants

to share their experiences and perspectives on HWC and its effect on their well-being. The interviews were audio-recorded with the participant's consent (Appendix G). Additionally, the researcher took field notes and photographs while in the field to capture the contextual aspects of the participants' living environments and lifestyles. Following the interviews, the researcher transcribed and analysed the qualitative data using thematic analysis.

Integration is a crucial stage in mixed methods research, involving the blending of quantitative and qualitative methods. In this study, the researcher interconnected the quantitative and qualitative approaches in the *discussion* chapter, which is in alignment with the parallel-databases convergent variant of a mixed methods design (Cresswell & Plano Clark, 2018). Lastly, **prioritization** refers to which approach, quantitative or qualitative (or both), gets more weight or attention in the data collection and data analysis phase (Cresswell & Plano Clark, 2018). In this parallel design, equal weight was given to both quantitative and qualitative dimensions, ensuring a comprehensive exploration of HWC and its impact on mental health and personal well-being.

3.7 Data Analysis

3.7.1 Data Management

Quantitative data was analysed using (The Jamovi Project, 2022), an open statistical software (Jamovi, Version 2.3). For data analysis, outcome scores on each of the measures were converted to total scores. As per guidelines of the MHA questionnaires, ordinal variables (e.g., never, sometimes, often, always) were converted into categorical data (*1*, *2*, *3*, and *4*), used to derive total scores on each mental health measure.

To convert total scores to categorical scores, the following data manipulations were enacted. Firstly, the total scores were scores as follows: <=11 = *Low*; 12-14 = *Mild*; > = 15 = *Heightened*. To enable dichotomous scoring (Yes/ No), and subsequent analysis, scores

indicating *Mild* or *Heightened* levels for each mental state were indicated as '*Yes*' and denoted the presence of mental health challenges (anxiety, depression, stress, sleep deprivation). *Low* score levels were denoted by *'No'* and indicated the absence of mental challenges due to HWC. Subsequent statistical analyses were thus performed on these binary categories, and the alpha level of significance was set at alpha = 0.05. Qualitative analysis was conducted using NVivo 14, a Computer Assisted Qualitative Data Analysis Software (CAQDAS) (QSR International, 2023). Thematic analysis was employed to establish codes (Appendix H) for the identification of emergent themes from the interviews.

3.7.2 Quantitative Data Analysis

Descriptive analyses were conducted on demographic data to test for normality. Inferential analyses were carried out using categorical data using Chi-Square Analysis and Fisher's Exact Test. Statistical analysis was implemented to examine associations and relationships between HWC and mental health outcomes by category.

3.7.3 Qualitative Thematic Analysis

Thematic analysis was used to identify, analyse, and report on emerging themes found in the data (Braun & Clarke, 2006). Thematic analysis was derived using Braun and Clarke's (2006) six steps, which included (1) developing familiarity with the data; (2) generating initial codes to identify and label meaningful units of information; (3) followed by identifying patterns and relationships within the data; followed by (4) revising and refining identified themes. These steps were followed by (5) defining and naming themes; and lastly (6) writing up the report.

3.8 Ethical Considerations

Ethical approval for this study was granted by the Rhodes University Human Ethics Committee and the Faculty of Humanities (Ethical Approval Number: 2022-5513-7125; Appendix I). Key ethical considerations included participants providing written and verbal

consent to partake in the study (Appendix B). Participants were also informed of their right to withdraw from the study without any consequences. Participant anonymity and confidentiality were maintained using study codes and pseudonyms. Only the researcher and their supervisor have access to the participant's identity.

3.8.1 Potential Risks, Harm, and Benefits

HWC research is often plagued by emotional distress, such as recounting near-death encounters with wildlife. It is thus possible that interviews and questionnaires could have triggered traumatic responses. Since no psychologists are present in remote areas such as where the study was executed, a spiritual advisor was available to address any arising distress.

CHAPTER 4

QUALITATIVE RESULTS

4.1 Overview of Qualitative Data Analysis

The semi-structured interviews were guided by the Ecosystems and Human-Wellbeing Framework (Millennium Ecosystem Assessment, 2005), to gain insight into the influence of HWC on participant's mental health. For ease of reporting, findings from qualitative analysis are spread over three Chapters. *Chapter 4.1* (this Chapter) presents the demographic details of the sample and the key qualitative themes emerging from my codes. As indicated in Table 3 participants were aged between 18 and 45 years of age. Most participants reported being married and having a primary school education. Most participants (n=7) were landowners and participated in farming, predominantly maize and cattle farming.

Table 3

Demographic Characteristics and Farming Practices

Pseuds[7]	Age[8]	Gender	Marital	Education	Employment	Landowner	Farmer	Farming Type[9]
P 1	18-25	F	Single	P	E	No	Yes	Mazie
P 2	36-45	M	Married	P	E	Yes	Yes	Mazie, Cattle
P 3	36-45	F	Married	P	SE	Yes	Yes	Mazie, Cattle, Soya Beans, Ground Nuts
P 4	26-35	M	Married	P	E	Yes	Yes	Mazie, Cattle, Goats
P 5	26-35	F	Married	P	SE	Yes	Yes	Mazie
P 6	36-45	M	Married	P	E	Yes	Yes	Mazie, Cattle
P 7	46 +	M	Married	P	E	Yes	Yes	Mazie, Cattle, Goats
P 8	36-45	M	Married	P	E	Yes	Yes	Mazie, Cattle

Note: P = Participant; F = Female; M = Male; P = Primary; E = Employed; SE = Self Employed

[7] Pseuds: Pseudonyms.
[8] The age ranges of the participants: 18-25, 26-35, 36-45, and 46+.
[9] Types of crops and livestock farming of participants.

Following the thematic analysis of the data, as indicated in Table 3, two primary themes emerged from the interview analysis: (1) coexisting with wildlife leads to *livelihood insecurity*, which is includes financial and food issues and lack of physical safety. Secondly (2), coexisting with wildlife leads to adverse effects on *well-being*, specifically mental and physical well-being. In addition to Table 4, Table 5 indicates the key extracts and narratives used to derive the primary themes of the study.

Table 4

Main Themes with Sub-Themes that Emerged During Data Analysis

Research Sub-Questions	Main Themes	Sub-themes
1) How do the emotional and psychological implications of HWC affect community members overall quality of life and sense of security?	Livelihood Insecurity	a) Financial Insecurity b) Food Insecurity c) Safety Insecurity
2) How do members of the Shezongo community perceive and experience the impact of Human-Wildlife Conflict on their daily livelihood activities and overall well-being?	Well-being	a) Physical Well-being b) Emotional Well-being

Table 5

Extracted Verbatim from the Data Analysis Leading to the Emergence of Key Themes

Livelihood Insecurity	Well-being
If our maize get eaten, and goat and other things then we can't get money	When they (elephants) eat our crops ahh we feel sad.
Like here we get money from maize, and sometimes elephants eat maize, so money is difficult.	We are sad.
[It's] difficult to make money and difficult to find food.	We are scared… Because elephants can kill [us].
It's making hard to make my money…because my goats, when I sell them, one goat, I have got money, if hyena come and eat my goat, so it's a problem to find money.	When you are coming from somewhere then you cross the elephant, it can kill you. That's why we worry.
Elephants disturb our fields and eat our crops.	Elephants…they finish everything… so for that we find that we get stressed.

No food, no money, we are suffering here too much.	We feel sad, very sad.
They (wild animals) make [it difficult], cos our maize is our money.	When they (elephants) come, we fear.
I have a problem because the animal will come and eat our crops. There is no feed what I can feed our child.	because blood pressure is high… headache, illness… because of that problem.
Yes, some time ago they came and [tried to] kill me.	I can't, not even breathe, not even breathe, I even… get admitted.
I am worried about food and what I can give our small child.	if I remember, or someone reminded me about the goats, I can't even sleep sometimes… [I feel] stressed.
They (wild animals) disturb our life.	sleeping problems, and headache problem.
Like here we get money from maize, and sometimes elephants eat maize, so money is difficult.	you can't even sleep… you will be thinking, my props they are eaten now how am I going to survive?
When you are coming from somewhere then you cross the elephant, it can kill you. That's why we worry.	When something bad have happened, you have headache
If you plant a field for maize, you have a plan for it, meaning to feed your family from that field; now if the animal comes and eat everything, then you get stuck.	when that happen, I had headache…I have nightmares, I don't sleep, I'm always thinking, my health will not be good.
At night, if you cannot see it (wild animals), once you get into it, it kills you.	At that time, I can't sleep
We fear even go there to the river, we can meet them when they go to drink water, that's where us also we go to fetch water, so we fear even going to fetch water.	They (elephants) are dangerous… because when you try to go there, they can come to you... [and they] can even they can even harm you.
	You can't sleep… Thinking too much, [and] sometimes when sleeping elephants can come [and raid our crops].
	Like elephants, you are eating, you have like a farm, then you are eating, then elephants come into the farm, eating the maize, you can't sleep well, you can't eat well.
	You cannot sleep. You have; you make plans.

Note: See appendix L for further explanations of verbatim data.

Based on interview extracts indicated in Table 5, the rest of this chapter explores these findings based on the Ecosystems and Human Well-Being theoretical framework.

4.2 'We are Scared': Livelihood Insecurity in Human-Wildlife Conflict

HWC is associated with fear, insecurity, vulnerability, and loss. According to Nyirenda (2012) and Richardson et al. (2012), HWC is particularly associated with livelihood insecurity due to loss of property, sequent crop damage, and physical encounters with wild animals. As noted by Participant 7 who states, '*If you plant a field for maize, you have a plan for it*'. Encounters with wildlife have major ramifications that significantly affect livelihoods in multiple ways (Nyirenda, 2012; Richardson et al., 2012). As further indicated by the Ecosystem and Human Well-Being Framework, HWC is intricately linked to financial, food, and physical insecurity which subsequently affects livelihoods.

4.2.1 Financial Insecurity

> "Elephants eat maize, so money is difficult" (Participant 1).
>
> "...it's making hard to make my money… because my goats, when I sell them, one goat, I have got money, if hyena come and eat my goat, so it's a problem to find money." (Participant 4).

According to Subakanya et al. (2018), most rural households in Zambia meet their basic needs for food, water, fuel, clothing, shelter, and financial security from natural resources within their surrounding environments. Significantly, crops, particularly maize, and raising domestic animals, such as goats, provide financial security to inhabitants around GMAs (Subakanya et al., 2018). When participants in this study were asked about the impact that wild animals have on their lives, most participants indicated that crop raiding by wildlife leads to financial insecurity. As indicated by Participant 1, who states, "*Elephants eat maize, so money is difficult*" one of the direct effects of HWC is crop deprivation. Since multiple households in rural Zambian depend primarily on subsistence farming for sustenance, crop damage leads to many families living below the poverty line (Richardson et al., 2012).

Economic consequences of crop degradation were found to be particularly pronounced amongst farmers who grow maize for financial purposes. As echoed by Participant 5, who states, “They (wild animals) make [it difficult], cos our maize is our money.”. Similarly, Participant 7 stated, “No food, no money, we are suffering here too much”. As noted by (Kassie et al., 2014), a significant portion of Sub-Saharan Africa depends on raising livestock and growing maize for financial security. More precisely, approximately 80% of small rural households in Zambia depend on maize production to meet their feeding and financial needs (Kassie et al., 2014). In addition to the financial needs provided by maize production, maize is the principal staple food in Zambia and accounts for more than half of the national calorie intake (Manda et al., 2018; Mwalupaso et al., 2019; Nyirenda et al., 2018).

In summary, crop damage, particularly maize degradation, and the predation of livestock are associated with financial insecurity. Consequently, HWC in the form of crop degradation significantly impacts inhabitants' livelihoods, making it difficult for them to achieve financial stability.

4.2.2 Food Insecurity

> “Elephant[s] they, they eat maize and water and water being dirty.” (Participant 1)
>
> “I have a problem because the animal will come and eat our crops.… I am worried about food.” (Participant 3)
>
> “When the elephants come and eat it so we get stuck.” (Participant 5)
>
> “[It’s] difficult to make money and difficult to find food.” (Participant 7).

Linked to the financial consequences, food insecurity is a defining concern in HWC. As indicated by Braczkowski et al. (2023), crop raiding by wild animals, especially elephants, incapacitates rural communities and places an undue burden on food security. As indicated by

Participant 7, who states, “They [wild animals] eat everything…especially elephants,” and echoed by Participant 3, who states, “I am worried about food,” immediate coexistence with wildlife leads to both food insecurity and economic hardship. Nkansah-Dwamena (2023) reports heightened vigilance due to rural inhabitants constantly perceiving wildlife threats to livestock and crops due to wildlife threats on food security. In their study investigating ‘lessons learned from community engagement and participation in fostering coexistence and minimizing HWC’ in Ghana, 80% of participants interviewed expressed concerns about the notable consequence of food insecurity (Nkansah-Dwamena, 2023).

In a similar study, Cole and Tembo (2011) found that coexistence with wildlife is associated with food insecurity in greater Zambia. Findings from their quasi-mixed methods study found that heightened food insecurity was associated with ill-physical health in the form of greater occurrences of headaches and constant fatigue due to the inability to confront HWC in rural communities (Cole & Tembo, 2011). Summarily, food insecurity appears to be a significant consequence of HWC, leading to compromised well-being and economic hardship (Nkansah-Dwamena, 2023).

4.2.3 Safety and Physical Insecurity

> “Lion[s] they normally attack animals like cattle and pigs.” (Participant 7)
>
> “We fear even go there to the river, we can meet them when they go to drink water, that's where us also we go to fetch water, so we fear even going to fetch water.” (Participant 5)

A sub-theme emerging from the analysis of livelihood insecurity is the lack of physical security. Mayberry et al. (2017) report that physical insecurity is a major consequence of HWC. As reported by Yeshey et al. (2022), sharing natural resources, such as river spaces with free-roaming wild animals in and around GMAs invariably leads to direct interaction between humans and wildlife. As highlighted by Participant 7, humans lack the physical ability to drive

away wildlife such as elephants from farmland. The participant notes, "*Elephants are more dangerous because they come for your crops*", a sentiment echoed by Participant 5, who observes, "*We can't harm those animals them, they are big, so we fear… we can only stand and watch them… We can't do anything*." (Participant 5).

While Zambian law does afford protection to wild animals, including through conservation initiatives and legal safeguards, the practical implications of these protections for communities residing near GMAs can be complex. Despite legal provisions, local communities around GMAs may face challenges in effectively safeguarding themselves against wildlife threats. Participant 6 highlights the dependence on Zambia Wildlife Authority (ZAWA) personnel for assistance, indicating reliance on external support for protection against wildlife, in saying that "*Unless to talk with ZAWA[10] people… To help us… Most time, when we can send the information to ZAWA people; they send, they give us a scout [11]… To protect us and control the animals, elephant."*. However, Participant 5's account underscores a sense of vulnerability suggesting that communities may perceive their options for self-defence as limited to rudimentary measures like making noise or using drums, in saying that *"Us in the village only making noise…beating some drums*". These narratives shed light on the multifaceted nature of HWC, where legal protections exist but may not always translate into practical solutions, leaving communities feeling exposed to potential harm.

4.2.4 Conclusion

The Ecosystems and Human Well-Being Framework (Millennium Ecosystem Assessment, 2005) anchors human well-being as a symbiotic relationship between man and the environment. This framework further emphasises that 'basic materials for a good life', include adequate livelihoods, especially in security, both financial and physical security. Based on this

[10] Zambian Wildlife Authority
[11] A scout in this context is a wildlife ranger of the Zambian Wildlife Authority

approach, it surmises to state that HWC endangers human livelihood and causes compromised safety and food security. The damage inflicted by wild animals on crops and livestock loss not only results in consequences on livelihoods but leads to significant emotional distress, such as fear, anger, anxiety, and worry (Mayberry et al., 2017). The following chapter (Chapter 4.2) further explores the consequences of HWC on psychological and physical well-being.

4. 3 "I can't even sleep": Sleep Deprivation, Fear and Anxiety in Human-Wildlife Conflict

4.3.1 Mental Health and Well-Being and HWC

> "The elephant, it can kill you. That's why we worry…. We are scared." (Participant 1).
>
> "When they (elephants) eat our crops ahh we feel sad." (Participant 5).
>
> "We will not sleep at night…to protect [maize]". (Participant 6).

Compromised mental health, due to physical harm and food insecurity, is a major cause of mental distress in HWC (crop damage and livestock depredation). Although poorly researched (Mayberry et al.,2017), implicit effects of HWC on mental health include sleep deprivation, anxiety, stress, depression, and heightened worry (Hjelm et al., 2017; Khumalo & Yung, 2015; Yeshey et al., 2022). Primarily due to the constant need to guard crops and livestock against wildlife at night, participants in the study regularly reported sleep depravity and heightened stress levels.

As noted by Participant 4, who states, *'If I remember, or someone reminded me about the goats [depredation], I can't even sleep sometimes… [it makes me feel] stressed'*. Worry of animal and crop safety is a key theme linked to sleep deprivation, which, in turn, leads to anxiety and worry. Participant 7 states, '*You cannot sleep. You have, you make plans"*.

Participants in the study needed to make alternative arrangements to protect crops at night, which included guarding crops and making big fires to scare animals away.

Another key finding elucidated from the interviews was the fear participants experienced of being killed by wild animals. This fear was associated with heightened anxiety and insecurity. As noted by Participant 1, who stated, 'The elephant, it can kill you. That's why we worry…. We are scared'. The fear of being killed by wildlife is a finding echoed by Jadhav and Barua (2012), who further found that previous encounters with wildlife often resulted in farmers and communities experiencing post-traumatic stress disorder and untreated stress symptoms that affect community health, especially among those who have experienced near-death experiences due to encounters with wildlife.

From a mental health perspective, as reiterated by Participant 3 who states, '[if] there is no feed (food) what I can feed our child… I am worried … what I can give our small child', and Participant 4, who states, "To feed the family, it is very difficult", suffices that, crop degradation and livestock loss, lead to significant emotional distress, due to primary caregivers' reduced ability to feed themselves and their families, due to loss in income as a result of HWC (Sekhar, 1998). As reaffirmed by Participant 4, who states, 'Last rainy season, three goat was eaten by hyena… it is very difficult to have, to make money because like in our village we get money from animals and farming like maize… If our maize get[s] eaten, and goat[s] and other things then we can't get money unless we go to our family'. In summary, in terms of mental health, crop damage, particularly maize degradation and the predation of livestock, is associated with financial insecurity and the hidden effects of mental distress. Consequently, HWC, in the form of crop degradation, is associated with fear, untreated anxiety, PTSD, and sleep deprivation (Bond & Mkutu, 2018; Khumalo & Yung, 2015; Mayberry et al., 2017). The consequences of psychological distress underscore the profound challenges that HWC poses to inhabitants in achieving a state of social and emotional well-being, as inhabitants appear

alienated from peaceful coexistence with nature, subsequently affecting individuals from achieving their full potential to contribute positively to their communities, and obtaining self-actualisation and emotional well-being (Gorman, 2010).

The effect of sleep deprivation associated with HWC is not unique to this study. Bond and Mkutu (2018) investigated HWC in Zambia and found that sleep disturbances, restlessness, fatigue, and decreased productivity were associated with wildlife encroaching on civilian spaces at night. Similarly, Khumalo and Yung's (2015) study described that they [participants] '*Don't even have time to sleep at night. What you have to do is stay awake, and then you have to chase away those animals*' (p. 236).

4.3.2 Sleep and Mental Health

Closely associated with sleep deprivation are physiological disorders concurrent with sleep deprivation. Kahneman and Krueger (2006) have indicated a bidirectional relationship between poor sleep quality and physiological well-being. Primarily, sleep depravity is associated with a rise in cortisol levels, which, in turn, leads to heightened reactivity to stress and compromised physical well-being (Niemiec et al., 2022).

Participants in the study reported that lack of sleep led to the loss of appetite, frequent migraines, and heart palpitations. As noted by Participant 5, '*When that (crop depredation) happen, I had [a] headache…I have nightmares, I don't sleep, I'm always thinking, my health will not be good*'. This sentiment was echoed by Participant 7, who stated that wildlife roaming civilian land and destroying crops at night led to states where [they] '*Can't, even breathe, I even, I even get admitted [to the hospital]*'. The physiological effects of sleep deprivation and anxiety due to HWC have been elaborated by (Jadhav &Barua,2012), who state that individual well-being is impacted by frequent experiences of disrupted sleep, which leads to sleep loss and eventual fatigue, which affects financial productivity.

4.3.3 Conclusion

Previous studies, for example, Jadhav and Barua (2012), have highlighted the adverse effects of HWC on mental health and sleep. Significantly, sleep disturbances are associated with hidden psychological consequences, including sleep deprivation, anxiety, PTSD, and depression. From a physiological perspective, compromised sleep is associated with a rise in cortisol levels, which affects mental health outcomes in HWC. From the Millennial Ecosystem and Human Well-Being Framework (2005), which emphasises the interplay between environmental stressors (i.e., HWC) and overall well-being, there appears to be a significant connection between environmental stressors, physical health, and sleep patterns. To further explore the effect of HWC on mental health, the subsequent chapter will discuss the quantitative data from questionnaire responses on sleep, PTSD, anxiety, and stress. This chapter focuses on the qualitative results and highlights the profound psychological and emotional impacts of HWC, including fear, untreated anxiety, PTSD, and sleep deprivation. It is clear that HWC not only affects physical security but also deeply impacts mental well-being, making it challenging for inhabitants to achieve a state of social and emotional well-being.

CHAPTER 5

QUANTITATIVE RESULTS

5.1 Quantitative Analysis

The quantitative analyses build upon the key findings derived from qualitative interviews. This chapter presents the results of these analyses, focusing on the relationship between human-wildlife conflict (HWC) and mental health outcomes such as depression, anxiety, psychosis, PTSD, stress, and sleep disturbance. The key variables indicating HWC were (a) farmers' ability or inability to protect themselves and their loved ones against wild animals and (b) reported experiences of wild animal damage to property. These variables capture the immediate physical risks posed by wildlife encounters and elucidate the inherent mental health challenges in cohabiting with wildlife.

The farmers' ability or inability to protect themselves and their loved ones against wild animals is a critical variable because it reflects their direct exposure to physical danger, which can significantly impact their mental well-being. For example, farmers who are unable to safeguard their families are more likely to experience heightened anxiety and stress, contributing to adverse mental health outcomes. Reported experiences of wild animal damage to property serve as another essential indicator of HWC. This variable highlights the economic and psychological toll on farmers when their crops or livestock are harmed. Such experiences can lead to chronic stress, depression, and other mental health issues as farmers face the dual burden of economic loss and the constant threat of wildlife damage.

5.2 Descriptive Analysis

5.2.1 Demographic Data

Non-probability snowball sampling was used to recruit 40 participants for the quantitative phase of the study. Males constituted 65% of the sample, with females comprising 35%. Most participants were between 26 and 45 years old and were farmers (92.5%) who experienced some form of HWC (Appendix K). As indicated in Table 6, 90.0% of participants reported experiencing some level of depression, with 85% reporting experiences of stress, and 72.5% of participants reported anxiety induced symptoms, resulting from HWC.

5.2.3 Mental Health Outcomes

Table 6

Reported Mental Health Outcomes After Wildlife Encounters

Mental Illness	***Counts for Yes***	***Counts for No***	***% Total Yes***	***% Total No***
Anxiety	29	11	72.5%	27.5%
Depression	36	4	90.0%	10.0%
Psychosis	27	13	67.5%	32.5%
PTSD	23	17	57.5%	42.5%
Sleep	23	17	57.5%	42.5%
Stress	34	6	85.0%	15.0%

Note: 'Yes Counts' and 'No Counts' denote the number of individuals with and without each condition, respectively; '% Total Yes' and '% Total No' signify the proportion of individuals with and without the condition relative to the total; PTSD =Post-Traumatic Stress Disorder; Sleep refers to Sleep Disturbance.

5.3 Inferential Analysis

5.3.1 Answering Primary Research Question

The primary research question for the quantitative phase was:

'Is there an association between HWC and reported Mental Health outcomes amongst subsistence farmers residing in Shezongo community in Zambia?

This broad research question was subdivided into two sub-questions, namely:

5.3.1.1 Sub-Question 1

Is there an *association* between *mental health outcomes* (PTSD / Anxiety / Depression / Sleep Disturbance / Psychosis) and *farmers' ability or inability to protect themselves and their loved ones from wild animals?*

5.3.1.2 Sub-Question 2

Is there an *association* between *mental health outcomes* (PTSD / Anxiety / Depression / Sleep *Disturbance / Psychosis) and farmers' experiences of wild animal damage to property?*

5.3.2 Answering Sub-Question 1

Is there an *association* between *mental health outcomes* (PTSD / Anxiety / Depression / Sleep Disturbance / Psychosis) and *farmers' ability or inability to protect themselves and their loved ones from wild animals?*

5.3.2.1 Statistical Analysis

A Fisher's Exact Test of Independence was performed to explore the relationship between PTSD and the ability or inability to protect oneself and loved ones from wild animals. Results indicated a statistically significant association ($p = 0.030$, Phi = 0.377) between PTSD and farmers' ability or inability to protect themselves and loved ones from wild animals. The

odds ratio (5.93, CI[12]: 1.27 - 27.7) indicated that individuals with PTSD are almost six times more likely to report an inability to protect themselves and their loved ones from wild animals compared to those without PTSD. However, it should be noted that Table 7 indicates the distribution of PTSD and the ability to protect oneself and loved ones from wild animals, with 87.0% of participants reporting PTSD also indicating an ability to protect themselves and their loved ones, which might require further nuanced discussion.

Table 7

Contingency Table: Reported PTSD and the Ability or Inability to Protect Oneself and Loved Ones from Wild Animals

		Ability to Protect Oneself and Loved Ones from Wild Animals		
Reported Post-Traumatic Stress Disorder		Yes	No	Total
Yes	Observed	20	9	29
	Expected	16.68	12.32	29.0
	% Within Column	87.0%	52.9%	72.5%
No	Observed	3	8	11
	Expected	6.33	4.67	11.0
	% Within Column	13.0%	47.1%	27.5%
Total	Observed	23	17	40
	Expected	23.00	17.00	40.0
	% Within Column	100.0%	100.0%	100.0%

Note. Observed values represent the actual reported occurrences, while expected values assume no association between reported PTSD and the ability to protect oneself and loved ones from wild animals.

A chi-square test of association indicated a significant association between reported *psychosis* and farmers' ability to protect themselves and loved ones against wild animals, X^2 (1, N = 40) = 3.79, p = 0.05, *Phi* =0.30. As indicated in Table 8, 90.9% of participants who

[12]95% Confidence Intervals.

responded to an *inability to protect themselves and loved ones against HWC* responded experiencing some level of psychosis (Yes). This suggests that individuals with psychosis are significantly more likely to report an inability to protect themselves and their loved ones from wild animals.

Table 8

Contingency Table: Reported Psychosis and Ability to Protect Oneself and Loved Ones from Wild Animals

		Ability to Protect Oneself and Loved ones from Wild Animals		
Reported Psychosis		Yes	No	Total
Yes	Observed	17	10	27
	Expected	19.57	7.42	27.0
	% Within Column	58.6%	90.9%	67.5%
No	Observed	12	1	13
	Expected	9.43	3.58	13.0
	% Within Column	41.4%	9.1%	32.5%
Total	Observed	29	11	40
	Expected	29.0	11.0	40.0
	% Within Column	100.0%	100.0%	100.0%

Note: Observed= actual counts of individuals within categories; % Within Column= Percentages within columns represents proportion of individuals in each category relative to the column total.

With reference to reported stress as seen in Table 9, a Chi-square test of association indicated a significant association between reported *stress* and *farmers' ability to protect themselves and loved ones against wild animals*, X^2 (1, N = 40) = 3.67, p = 0.05, *Phi* =0.30. This association represented a medium relationship (0.303).

Table 9

Contingency Table: Reported Stress and the Ability or Inability to Protect Oneself and Loved Ones from Wild Animals

	Ability to Protect Oneself and Loved ones from Wild Animals		
Reported Stress	Yes	No	Total
Yes	14	9	23
No	15	2	17
Total	29	11	40

Note: The counts represent the number of individuals reporting 'Yes' or 'No' to stress in relation to their ability to protect themselves from wild animals.

Further, a chi-square test of association indicated a significant association between reported *sleep disturbances* and farmers' *ability to protect themselves and loved ones against wild animals*, X^2 (1, N = 40) = 3.67, p = 0.05, *Phi* =0.30. *Cramer's V* (0.303) indicated that this association represented a medium relationship. As further indicated in Table 10, 81.8% of those who reported the inability to protect themselves and their loved ones from wild animals (No) reported 'yes' to experiencing sleep disturbances.

Table 10

Contingency Table: Relationship Between reported Sleep Disturbance and the Ability or Inability to Protect Oneself and Loved Ones from Wild Animals

		Ability to Protect Oneself and Loved Ones from Wild Animals		
Reported Sleep Disturbance		Yes	No	Total
Yes	Observed	14	9	23
	Expected	16.7	6.33	23.0
	% within column	48.3%	81.8%	57.5%
No	Observed	15	2	17
	Expected	12.3	4.67	17.0
	% within column	51.7%	18.2%	42.5%
Total	Observed	29	11	40
	Expected	19.0	11.0	40.0
	% within column	100.0%	100.0%	100.0%

Note: Total Sleep= Total Sleep Disturbance Level; Observed= actual counts of individuals within categories; % Within Column= Percentages within columns represent the proportion of individuals in each category relative to the column total.

5.3.3 Answering Sub-Question 1.2

'Is there an association between mental health outcomes (Stress / Anxiety / Depression / Sleep Disturbance / Psychosis) based on experiences of wild animal damage to property?'

The Chi-Square of Association Test was used to assess the association between *anxiety* and *extent of wildlife damage to property*. The relationship between anxiety and the extent of wildlife damage to property was significant X^2 (3 = 40) = 11.8, $p = 0.008$. Cramer's V = 0.543, further signifying the association between anxiety and the extent of wildlife damage. As indicated in Table 11, 51.7% of participants who had their crops damaged also reported '*yes'* to reported anxiety, and 31% of participants experiencing crop damage and livestock depredation reported '*yes'* to reported anxiety.

Table 11

Contingency Table of reported Anxiety and the Extent of Wildlife Damage to Property

		Extent of Wild Animals Damage				
Reported Anxiety		CD	CD & LD	CD & DL	Other	Total
Yes	Observed	15	9	0	5	29
	Expected	13.05	7.35	2.17	6.53	29.00
	% Within Column	51.7%	31.0%	00.0%	17.2%	100.0%
No	Observed	3	1	3	4	11
	Expected	4.950	2.750	0.85	2.475	11.00
	% Within Column	27.3%	9.1%	27.3%	36.4%	100.0%
Total	Observed	18	10	3	9	40
	Expected	18.00	10.00	3.0	9.00	40.00
	% Within Column	45.0%	25.0%	7.5%	22.5%	100.0%

Note. CD= Crop Damage; LD= Livestock Depredation; DL= Diseased Livestock; Observed values represent the actual reported occurrences, while expected values assume no association between anxiety levels and the extent of wildlife damage.

A Fisher's Exact Test of independence was performed, as the data did not meet the assumptions for the Chi-squared of association. The Fisher's Exact Test was used to assess the association between *reported stress* and the *extent of wildlife damage to property*. There was a significant association between the extent of wildlife damage and stress, $p = 0.047$. *Cramer's* $V = 0.464$ was further calculated, indicating a moderate to strong association. Table 12 further indicates that 85.0% of participants experiencing wild animal damage to their property reported '*yes*' to experiencing stress. This suggests that individuals who have encountered significant wildlife damage to their property are more likely to report higher levels of stress.

Table 12

Contingency Table of Reported Stress and Extent of Wild Animal Damage to Property

		Extent of Wild Animal Damage				
Reported Stress		CD	CD & LD	CD & DL	Other	Total
Yes	Observed	16	10	3	5	34
	Expected	15.30	8.50	2.55	7.65	34.00
	% Within Column	88.9%	100.0%	100.0%	55.6%	85.0%
No	Observed	2	0	0	4	6
	Expected	2.700	1.500	0.450	1.350	6.00
	% Within Column	11.1%	0.0%	0.0%	44.4%	15.0%
Total	Observed	18	10	3	9	40
	Expected	18.00	10.00	3.00	9.00	40.00
	% Within Column	100.0%	100.0%	100.0%	100.0%	100.0%

Note. CD= Crop Damage; LD= Livestock Depredation; DL= Diseased Livestock; Observed values represent the actual reported occurrences, while expected values assume no association between reported stress and the extent of wild animal damage; % Within Column= Percentages within columns represents proportion of individuals in each category relative to the column total; Other= Other forms of wildlife damage not specified directly.

CHAPTER 6

DISCUSSION

6.1 Introduction

Humankind and nature have coexisted since recorded history. However, due to human migration and development, such symbiotic ecosystems have come under threat (Nyhus, 2016). Significantly, competing interests over resources such as land, water, and food, have led to conflict between man and wildlife. The consequences of this conflict, at least from a human perspective, have led to adverse mental health outcomes for populations living in GMA areas (Meyer & Börner, 2022). Given the rising conflict between man and wildlife, the aim of this study was to investigate the effect of HWC on mental health and human well-being. As such, this study expands on that of (Barua et al., 2013), who investigated the hidden dimensions of mental health in HWC using the (Millennial Ecosystem Assessment and Human Well-Being Framework, 2005). A slight departure from (Barua et al., 2013) is that my study implemented a parallel, convergent, mixed methods design to investigate the effect of HWC on mental health and human well-being.

6.2 Summary of Qualitative Findings and Links to Existing Literature

The primary findings from my thematic analysis reveal compromised well-being due to HWC. Primary compromises on well-being include sleep disturbances, feelings of sadness, worry, and anxiety as a result of HWC, experienced in the form of crop damage, livestock depredation, and encounters with wildlife. The presence of hidden mental illness within the sample of my study is consistent with previous findings investigating the impact of HWC on mental well-being in Botswana, Zambia, India, and other contexts rife with HWC. Mayberry et al. (2017) found that individuals residing in rural Botswana, who experienced elephant raids on crops, experienced acute emotional stress, intense fear, and worry due to coexisting with

elephants. Similarly, (Jadhav & Barua, 2012) found that communities in India that experienced elephants raid on crops experienced disturbed sleep, tiredness, repeated flashbacks of elephant attacks, and even diagnoses of PTSD.

In the current study, a connection is observed between the consequences of wildlife incidents such as crop destruction, which raises concerns among participants about the availability of food for themselves and their families. Sadness, stress, and worry were evident themes within the study, and these particularly arose as a result of experiences of food insecurity within the sample of study. From the (Millennial Ecosystem Assessment and Human Well-Being Framework, 2005), experiences of food insecurity significantly diminish the quality of life and psychological well-being for individuals experiencing food insecurity. To this end, (Mammen et al., 2009) state that food sufficiency influences one's mental outlook and hugely affects a person's quality of life and life satisfaction. Studies have found that food insecurity and malnutrition often result in individuals' feelings of low life satisfaction and depressive mental symptoms (Mammen et al., 2009).

Linked to the above, (Tesfaye et al.,2016) note that food insecurity is linked to heightened experiences of mood disorders, such as anxiety and depression, especially in low-income countries, due to prolonged experiences of food insecurity, compared to developed contexts. Similarly, (Sulemana & James, 2019) found a relationship between food insecurity and psychological well-being. Findings from the World Values Surveys (Wave 6) indicated that a significant majority (61.7%) of the Sub-Saharan African population surveyed experienced food insecurity within the preceding year of the study (Sulemana & James, 2019). Significantly, the increased frequency of food insecurity was linked to diminished levels of subjective well-being and quality of life (Sulemana & James, 2019).

6.3 Summary of Quantitative Results and Links to Existing Literature

Quantitative analysis indicated an association between mental health outcomes and HWC. More specifically, a significant relationship was identified between experiences of HWC and symptoms of anxiety, psychosis, PTSD, and sleep disturbances. Participants specifically indicated a connection between compromised mental health outcomes, the *extent of wildlife damage to property* and *the inability to protect oneself and loved ones from wildlife.* Significant associations between HWC and mental health outcomes were primarily noted for *stress, anxiety, sleep disturbance, and PTSD.*

Quantitatively, there is a lack of direct investigations into the association between HWC and mental illness. However, existing literature provides insights into this relationship. Bond and Mkutu (2018) indicate the psychological toll of HWC, including stress, sleep disturbances, chronic anxiety and psychological trauma within communities in Kenya. Similarly, (Blackie, 2022), found an association between PTSD and HWC in rural Botswana. Quasi-mixed methods findings revealed the effects of HWC on sleep disturbances and the onset of PTSD among participants who directly experienced fatalities or injuries from elephant attacks within the population. Notwithstanding the above quasi-mixed methods study, there continues to be a dearth of quantitative and mixed methods studies investigating the association between HWC and mental illness.

Nonetheless, the convergence of qualitative and quantitative findings from the current study indicates a robust understanding of the complex relationship between HWC and mental well-being. Qualitative analysis highlighted themes such as sleep disturbances, feelings of sadness, worry, and anxiety stemming from encounters with wildlife, particularly due to crop damage and livestock depredation. These themes converged with quantitative data, which demonstrated a significant association between HWC and mental health outcomes, notably stress, anxiety, sleep disturbance, and PTSD. Specifically, participants linked compromised

mental health to the extent of wildlife damage, mirroring the qualitative findings regarding crop damage and livestock depredation. Quantitatively, participants reported the inability to protect themselves and their loved ones from wild animals, compromising their mental health. This converges with qualitative findings in that participants reported sadness and fear surrounding the physical safety of themselves and their families. This convergence underscores the multifaceted impact of HWC on individuals' psychological well-being, emphasising the need for comprehensive interventions to address both the ecological and human dimensions of wildlife management.

6.4 Integration of Qualitative and Quantitative Results

In this section, I will integrate the qualitative and quantitative results to provide a comprehensive understanding of the impact of HWC on mental health and well-being. This integration will highlight how the two sets of data complement and contrast with each other. The qualitative findings revealed that participants experienced significant emotional distress due to HWC, including feelings of fear, sadness, anxiety, and stress. These emotional responses were primarily triggered by crop damage, livestock depredation, and encounters with wildlife, leading to compromised well-being. The quantitative results corroborated these findings, showing high prevalence rates of depression (90%), anxiety (72.5%), stress (85%), and sleep disturbances (57.5%) among participants experiencing HWC.

A key theme from the qualitative analysis was livelihood insecurity, encompassing financial, food, and physical insecurity. Participants expressed concerns about the economic impact of crop and livestock losses, which was linked to increased stress and anxiety. The quantitative data supported this, showing a significant association between HWC and mental health outcomes such as anxiety, stress, and psychosis. For instance, statistical analyses indicated significant associations between reported stress and farmers' ability to protect

themselves and their property from wildlife, as well as between anxiety and the extent of wildlife damage to property.

The qualitative data provided rich, narrative insights into the lived experiences of the participants, highlighting the profound psychological and emotional impacts of HWC. These narratives included detailed accounts of fear and anxiety related to potential wildlife encounters and the resulting loss of crops and livestock. On the other hand, the quantitative data offered a broader overview of the prevalence and statistical significance of these mental health issues, providing empirical evidence to support the qualitative findings. Notwithstanding, there were disparities between the qualitative and quantitative findings. For example, while the qualitative data underscored profound fears and anxieties akin to PTSD symptoms following wildlife encounters, the quantitative analysis did not indicate a significant correlation between HWC and PTSD. This discrepancy suggests that the qualitative approach may have captured more nuanced emotional complexities that were not fully reflected in the quantitative data.

6.5 Recommendations for Future Research

To improve the integration of qualitative and quantitative data in future studies, I recommend:

1. Adopt IPA for Qualitative Analysis: Use Interpretative Phenomenological Analysis (IPA) to explore the lived experiences of individuals affected by HWC, providing deeper insights into psychological and emotional impacts, complementing quantitative data (Alase, 2017).
2. Develop and Validate Context-Specific Instruments: Create and validate questionnaires tailored to HWC's unique context, ensuring quantitative tools fully capture specific experiences and mental health challenges (HWC).
3. Enhance Cross-Methodological Integration: Employ strategies like joint displays or meta-inferences to better integrate qualitative and quantitative findings, offering a more cohesive understanding (Svoboda, 2023; Johnson et al., 2017).

4. Expand Sample Size and Diversity: Include larger and more diverse samples to enhance generalizability, providing a comprehensive understanding of HWC's impact across different populations and settings (Allmark, 2004).

Reflecting on the current analysis, the mixed methods approach provided a comprehensive understanding of HWC's impact on mental health but had limitations in integrating qualitative and quantitative data. Thematic analysis offered in-depth insights into participants' lived experiences but may not have fully captured the interpretative depth and subjective meanings.

Addressing these recommendations can improve data integration, providing a more holistic understanding of the complex relationship between HWC and mental health.

6.6 Methodological Considerations Affecting Interpretations

Mixed methods research designs are strenuous to execute due to the expertise required to execute such a design (Creswell & Plano Clark, 2018). Limitations in the researcher's proficiency in the design might compromise the interpretation of data in several ways. Significantly, the researchers' proficiency in qualitative methodologies may have overshadowed their understanding of quantitative approaches to data analysis, potentially leading to a bias towards qualitative data interpretation over quantitative analysis. Additionally, a lack of experience in combining the approaches into a single study might have limited the researchers' ability to effectively integrate data from both qualitative and quantitative components to arrive at an in-depth and comprehensive analysis of the data. In hindsight, instead of thematic analysis, employing interpretative phenomenological analysis (IPA) interpretations might have offered a different perspective by enabling the exploration of participant lived experiences of human-wildlife conflict and its effect on mental health (Alase, 2017).

Notwithstanding the above, mixed methods allowed for a thorough exploration of the association between HWC and mental health, as this approach enabled a high degree of validity and trustworthiness. In this research, the researcher presents the findings in a low-inference descriptive manner to ensure the reader understands what is being reported and does not misinterpret the findings presented in the research report, adding to the validity of the research. In addition, the questionnaires were specifically geared to measure the extent of mental illness that participants experience after an HWC incident. Therefore, it is believed that the questionnaires measured what they set out to measure. Moreover, the MHA screening tools were adapted to fit the cultural and language level of the research participants, as well as benefit validity.

Furthermore, the report emphasises thick description, providing detailed insights into the research context and data collection process, further enhancing the study's transparency and genuineness. Additionally, through the use of thick descriptions, this study can serve as a model for other researchers with similar study parameters (Shenton, 2004). The research techniques were meticulously documented, increasing the likelihood that the findings would align if the study were replicated by a different researcher using a similar sample population.

6.7 Limitations of Study

Sample Method and Size: Due to limited time and resources, the study only included a small sample size for the quantitative (n=40) and qualitative (n=8) phases of the study. As such, the transferability of findings from the study is limited. Due to the sample size, the study has limitations on the cross-sectional impact of its findings on the community. Based on the above, it is recommended that future studies could benefit from a larger and more diverse sample to ensure broader applicability of the results.

Instrumentation: In the absence of predetermined questionnaires, specifically relating HWC to mental health, the researcher contextualised mental health screening questionnaires from the MHA to study the phenomenon of mental health in HWC. Although expedient, the adaptation and contextualisation of the MHA had inherent shortcomings for the study. For example, the possibility of not fully capturing the unique experiences of HWC-affected individuals, issues of validity and reliability, and a potential lack of depth in understanding the psychological impact of wildlife conflict. Notwithstanding the above, the MHA has high psychometric validity and reliability in capturing mental health in diverse cultural and linguistic contexts (Mental Health America, 2023). Given the above limitation, it is recommended that future research investigating the association between HWC, and mental health develop and validate questionnaires tailored for this study context.

Language and Cultural Barriers: The researcher is not a native speaker of Ila; as such, there was a language barrier during the interview process. Inadvertently, the language barrier potentially impacted the quality of communication between the interviewer and interviewees despite the assistance of a translator. Similarly, for the quantitative questionnaire, the research simplified aspects of the MHA questionnaire to cater to education and language limitations. It is not immediately clear how this compromise may have affected the accuracy of responses from participants. It is recommended that future researchers prioritize professional translation services to mitigate potential communication barriers and ensure data integrity, especially in rural contexts, such as where my study was executed.

6.8 Policy Recommendations

To address the complexities of HWC, policy interventions should adopt a holistic approach. This includes supporting livelihood diversification to reduce dependency on single-income sources like agriculture, especially for communities relying on traditional practices

(Bryceson, 1999). Based on my study findings, it is recommended that cross-sectoral collaboration among agriculture, wildlife conservation, public health, and social welfare sectors be considered crucial for developing holistic approaches to mitigate HWC on quality of life and mental health (International Union for Conservation of Nature, 2023). In addition to the above, incorporating indigenous knowledge practices, such as communal practices, may help mitigate the effect of HWC on mental health. These communal practices would possibly enhance resilience around the experiences of mental health (Anakwenze, 2022).

6.9 Significance of the Study

To the researcher's knowledge, this is the first study to employ a mixed methods approach to exhaustively investigate the effect of HWC on mental health and well-being in Zambia. The study highlights that, although under-researched, HWC has an influence on the indigenous community's well-being. Significantly, although nature conservation practices are integral for the preservation of land and animal species; the hidden costs of HWC, especially in low-resourced communities are significantly important for conservation sustainability. Furthermore, this research is expected to raise awareness around the topic as well as broaden the knowledge base as a means for NGOs to implement programs in the most affected areas and as a way to prevent and treat issues related to HWC.

6.10 Reflexivity

Reflexivity plays a crucial role in research involving introspective self-reflection by researchers (Gewirtz & Cribb, 2006). In this study, the researcher openly acknowledges their positionality and personal experiences that may influence the interpretation of results. Personally, as Loryn Smith, I conducted research on HWC and mental health due to experiencing PTSD after a wildlife encounter (see Appendix L). This traumatic event impacted

my well-being, potentially influencing my approach to data collection and interpretation, although not definitively.

Furthermore, my positionality, privilege, and access to resources might have enabled me to heal from this encounter, highlighting disparities compared to the Shezongo community enduring ongoing HWC experiences. While unlikely, my awareness of privilege could have influenced data interpretation by prompting consideration of its impact on community members' experiences and responses. This reflexivity encourages critical examination of power dynamics. Ultimately, I hope this research sparks collaboration with NGOs and governing bodies to comprehensively address HWC's impact on mental well-being. Given my limited resources, such collaborative efforts may better support the long-term well-being and safety of the community.

6.11 Summary and Conclusion

The integration of mixed methods findings provides a unique and diverse perspective on HWC and well-being. Qualitative findings provide a nuanced understanding of the lived experiences and well-being challenges of individuals residing near wildlife-rich areas. These qualitative insights, coupled with the quantitative results quantifying concerns, provide robust evidence of the profound impact of human-wildlife interactions on human well-being within this ecosystem. Qualitatively, findings indicate that participants experience feelings of fear regarding potential harm from wild animals, alongside feelings of sadness, worry, and stress, which is indicative of compromised mental health. Correspondingly, quantitative analysis highlights a high prevalence of reported depression (90%) and reported anxiety (85%) among those experiencing HWC, with a significant correlation observed between reported psychosis and reported depression scores. This quantitative evidence reinforces the qualitative findings concerning compromised mental health, particularly reported depression, due to proximity to wild animals, exacerbating reported psychosis.

Furthermore, fear of encountering wild animals restricts an individual's daily movement, resulting in insecure access to resources. Additionally, the qualitative findings revealed that participants frequently experienced encounters with wild animals, which heightened their vulnerability to insufficient water, food, and income, which led to mental health concerns such as sadness (i.e., reported depression) and worry related to their safety and livelihood security. This aligns with the quantitative findings in that the questionnaires revealed that participants who had experienced HWC reported depression as a common mental health concern. However, disparities in findings emerge concerning the association between PTSD symptoms and dangerous wildlife encounters. While quantitative data fail to indicate a significant correlation, qualitative analysis underscores profound fears and anxieties among participants following such incidents reminiscent of symptoms associated with PTSD. These emotional complexities suggest a nuanced perspective not fully captured by quantitative tests, highlighting the necessity for an integrated approach to comprehensively understand the multifaceted impacts of human-wildlife interactions on human well-being.

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APPENDICES

Appendix A

The study involves answering questionnaires that will be administered by myself, the researcher and a translator, at an agreed time that is convenient to you, and at an agreed upon place that will be conducive to answering questionnaires. You will be asked to answer questions regarding HWC and mental health, which is the phenomenon under study. Answering the questionnaires should not take longer than approximately 30 minutes. Pseudonyms will be used in the research report to protect your personal information.

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

Participation in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason, and there will be no penalty or negative consequence for withdrawing your participation.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

The potential benefit of participating is the improved understanding of community experience and the effects that HWC has on one's mental health.

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

There are no foreseeable or expected negative consequences for participating in the research. If, however, the interview or questionnaires causes you any discomfort, you are encouraged to contact the spiritual advisor or church pastor in your community for emotional support.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

All information which is collected about you during the course of this research study will be kept strictly confidential. Your answers may be reviewed by people responsible for making sure that the research is done properly, including the supervisor, however, your answers will be given a code number or a pseudonym, and you will be referred to in this way in the data and research report. Access to the questionnaire material will be restricted to myself and my supervisor and will be processed and analysed only by me. For the duration of the study, the completedquestionnaires, and your signed consent form will be stored safely in a locked cupboard/filing cabinet in a secure/locked office. The transcript of interviews in which all identifying information

has been removed will be retained in a locked cupboard/filing cabinet in a secure/locked office for a further five years after the researcher's degree has been conferred.

You have the right to insist that your name will not be recorded anywhere and that no one, apart from the researcher, will know about your involvement in this research. The data collected willbe used for the purposes of writing a research report, as part of my Masters by Thesis (Psychology) degree.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

Hard copies of your answers will be stored by the researcher for a minimum period of five years in a locked cupboard/filing cabinet for future research or academic purposes; electronic information will be stored on a password protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. Hard copies will be shredded and/or electronic copies will be permanently deleted from the hard drive of the computer through the use of a relevant software programme.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

You will not be remunerated for your participation in the study and there will be no direct benefits to participating in this study. There are no incentives linked to your participation in this study.

Thank you for taking time to read this information sheet and for participating in this study.

Loryn Janine Sm

Appendix B

PARTICIPANT INFORMED CONSENT DECLARATION

(To be signed by research participant/s)

Project Title: The effects of Human-Wildlife Conflict (HWC) on mental health: Shezongo Community, South-Eastern Boundary of Kafue National Park (KNP), Zambia

Loryn Janine Smith from the Department of Psychology, Rhodes University has requested my permission to participate in the above-mentioned research project.

The nature and the purpose of the research project and of this informed consent declaration have been explained to me in a language that I understand.

I am aware that:

1. The purpose of the research project is to ***introduce a mixed methods approach to the investigation of HWC, in the specific context of the south-eastern boundary of the KNP, Zambia. It is intended for knowledge to be produced on how the experience of HWC affects the mental health of the individuals residing in the Shezongo community. This study will introduce a social science / psychological approach to the study, as a means to understand the lives of thepeople residing in this particular community.***

2. Rhodes University has given ethical clearance to this research project ***(Ethics Approval Number)*** and I have seen/may request to see the clearance certificate by contacting the Ethics Coordinator (ethics-committee@ru.ac.za)

3. By participating in this research project I will be contributing towards ***generating knowledge on the experience of HWC. This knowledge has the hopes of being used in future research aimed at the development of sustainable and effective solutions to the problem in the future.***

4. I will participate in the project by completing ***a demographic questionnaire and a survey questionnaire/interview.***

5. My participation is entirely voluntary and should I at any stage wish to withdraw from participating further, I may do so without any negative consequences.

6. I will not be compensated for participating in the research, but my out-of-pocket expenses will be reimbursed.

7. The following risks are associated with my participation: The interviews and questionnaires administered to research participants have the potential to trigger

individuals if they have experienced, witnessed or heard of HWC happening to someone close to them. This may cause the participants distress in some form.

8. The Researcher intends to publish the research results in the form of ***a complete thesis as per the requirements of the Rhodes University Masters by Thesis degree with the potential of further publishing in the future***. However, confidentiality and anonymity of records will be maintained and my name and identity will not be revealed to anyone who has not been involved in the conducting of the research, ***unless I indicate to the contrary/recognize that as a public figure my identity will inevitably be/become known, in which case I agree to accept the loss of anonymity.***

9. In terms of the Protection of Personal Information Act (No. 4 of 2013) it remains my right to request the Researcher to provide me with a detailed explanation of exactly how confidentiality and anonymity of the data I provide will be achieved. I may also request to know exactly how my personal information will be stored securely, for how long it will be stored.

10. If any data collected from me for this research project is to be used by the Researcher for any further study, I am to be informed in writing and my written consent requested again. I need not give consent for the new research if it is incompatible with the initial purpose of the present study (POPIA, s15(3)). Equally, I can simply reject the request. In such cases, a formal request needs to be made to me by the researcher via the Ethics Coordinator (ethics-committee@ru.ac.za).

11. In terms of the POPI Act, I possess the right to receive feedback about this research. This will take the form of a verbal liaison between the researcher and gatekeeper unless ***I elect not to receive this feedback.***

12. Any further questions that I might have regarding the nature of the research and/or my participation in it will be answered by ***Loryn Janine Smith (g16s2235@campus.ru.ac.za).***

13. By signing this informed consent declaration, I am not waiving any legal claims, rights, or remedies. A copy of this informed consent declaration will be given to me, and the original will be kept on record by the Researcher.

14. I ***agree/disagree*** (delete inapplicable) to the Researcher's request to take photographs, or videoing me as part of this research project, recognizing that agreement here is likely to raise the risk of compromising my anonymity and that steps will be taken to ensure this will not happen it my consent is given.

15. I ***agree/disagree*** (delete inapplicable) to the Researcher's use of voice recording of my comments and opinions during interviews, the purpose of which is to ensure the accurate recording of my views/responses. Furthermore, I have the right to request a

copy of the interview transcriptions to confirm that my opinions are accurately recorded

I, ……., have read the above information / confirm that the above information has been explained to me in a language thatI understand and I am aware of this document's contents. I have asked all questions that I wished to ask, and these have been answered to my satisfaction. I fully understand what is expected of me during the research.

I have not been pressurised in any way and I voluntarily agree to participate in the above-mentioned project.

……	……	……
Participants signature	**Witness**	**Date**

Appendix C

Demographic Questionnaire

Full Name: _____

Address: _____

Age:	☐18-25 ☐26-35	☐36-45 ☐46 & above	**Sex:**	☐Male	☐Female
Marital:	☐Single ☐Married	☐Divorced ☐Widowed	**Education:**	☐Primary ☐University	☐Secondary ☐None
Employment:	☐Employed ☐Unemployed	☐Self-employed	**Land owner**:	☐Yes	☐No
Do you farm:	☐Yes	☐No	**What type of farming do you do?**		

Appendix D

Interview Guide

1) Do you and your family have problems with wild animals?

2) What kind of problems do you have with wild animals?

3) What animals are the biggest problem for you?

4) What do people in the village do to stop the wild animals?
    a) Do these things help?

5) Do you believe that wild animals endanger your life?
    a) How do they endanger your life?

6) After a bad experience with wild animals, do you change the way you act towards them?
    a) How does your behavior change?

7) How do you think wild animals affect your life?
    a) Access to food and water
    b) Ability to move around freely
    c) Ability to feel safe in your home
    d) Ability to make money
    e) Ability to see your family and neighbors

8) Do you feel **scared and nervous** walking around the village once you have had problems with wild animals?
    a) Do you get **frightened or scared** easily after you have had a bad experience with wild animals?

9) Do you **worry** a lot after having problems with wild animals?
    a) What do you worry about?

10) Do you feel **sad** after having problems with wild animals?
    a) Why do you feel sad?

11) How do you **sleep** after having problems with wild animals?
    a) Get little sleep, sleep too much, sweat a lot, think too much, feel sad and stress at bedtime
    b) Do you ever have nightmares about wild animals?
        i) What happens in your nightmares?

12) Do you **eat** normally after having problems with wild animals?

13) Do you find yourself not going to places where you might see wild animals or places that might remind you of bad things happening with wild animals?

14) If something bad happens with wild animals, such as an animal attacks your cows, or damages your crops, or attacks you or your family, do you feel **guilty** about what happened and can't stop blaming yourself?

15) When something bad happens with wild animals, do you still take care of yourself?

16) Do you often get headaches?
    a) Why do you think you are getting heachaches?

17) Do you think stress is affecting your health?
    a) How is your health?

    b) Why do you think this is happening?
    c) Do you drink a lot of alcohol or smoke a lot to deal with **stress**?

Appendix E

Photographic Field Work Indicating HWC.

The above picture was taken in the Shezongo community. This is a fence made from dead trees and branches to protect crops from wild animals.

This is an image of Shezongo community members homes seen in the tree line.

Appendix F

Mental Health Questionnaire

Full Name: _____

Address: _____

Age (Q1): ☐18-25 ☐36-45 ☐26-35 ☐46 & above	**Sex:** ☐Male ☐Female
Marital (Q2): ☐Single ☐Divorced ☐Married ☐Widowed	**Education:** ☐Primary ☐Secondary ☐University ☐None
Employment: ☐Employed ☐Self-employed ☐Unemployed	**Land owner**: ☐Yes ☐No
Do you farm: ☐Yes ☐No	**What type of farming do you do?**

1) **Do you and your family have problems with wild animals?**
   ☐Never
   ☐Sometimes
   ☐Always

2) **What kind of problems do you have with wild animals?**
   ☐Crop damage from wild animals
   ☐Death in family from wild animals
   ☐Wildlife attacks on you and your family
   ☐Death of livestock (cows, goats, etc) from wild animals
   ☐Diseased livestock (cows, goats, etc) from wild animals
   ☐Other _____

3) **List the top 3 wild animals that are the biggest problem for you**
   #1 _____
   #2 _____
   #3 _____

4) **Are wild animals a big or small problem for you?**
   ☐Not a problem
   ☐Small problem
   ☐Moderate problem
   ☐Big problem

5) **What do people in the village do to stop the wild animals?**
   ☐Build fences
   ☐Plant chillies
   ☐Make loud noises
   ☐Night guarding
   ☐Shoot/poison animals
   ☐Other _____

6) **The things you do to stop the damage the wildlife does in your village - does it help?**
   ☐Yes
   ☐Sort of
   ☐No

7) **Do you believe that wild animals are dangerous?**
   - ☐ Yes
   - ☐ No

8) **Do you have what you need to prepare for wild animals to come into your village?**
   - ☐Yes
   - ☐No

9) **Can you protect yourself from wild animals?**
   - ☐Yes
   - ☐Sort of
   - ☐No

10) **If you have a bad experience with wild animals, do you change the way you act towards them?**
   - ☐Yes
   - ☐Sort of
   - ☐No

After having problems with wildlife, do you:

11) **Feel nervous**
   - ☐Never
   - ☐Sometimes
   - ☐Most of the time
   - ☐All the time

12) **Can't stop worrying**
   - ☐Never
   - ☐Sometimes
   - ☐Most of the time
   - ☐All the time

13) **Can't relax**
   - ☐Never
   - ☐Sometimes
   - ☐Most of the time
   - ☐All the time

14) **Get angry easily**
   - ☐Never
   - ☐Sometimes
   - ☐Most of the time
   - ☐All the time

15) **Feel scared that something bad will happen**
   - ☐Never
   - ☐Sometimes
   - ☐Most of the time
   - ☐All the time

After having problems with wildlife, do you:

16) **Have little interest in doing things**
   - ☐Never

- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

17) Feel sad
- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

18) Can't sleep or sleep too much
- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

19) Feel tired
- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

20) Don't want to eat or eat too much
- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

21) Can't concentrate
- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

22) Thoughts that you would be better off dead
- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

After encountering wildlife problems do you:

23) Have nightmares
- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

24) Avoid places that might remind you of what happened
- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

25) Always watching around you and easily scared?
- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

26) Feel nothing towards people around you and your surroundings
- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

27) Feel guilty about what happened and can't stop blaming yourself
- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

28) Do familiar surroundings sometimes seem strange, confusing, threatening or unreal to you?
- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

29) Have you heard unusual sounds like banging, clapping or ringing in your ears?
- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

30) Have you felt that you are not in control of your own ideas or thoughts?
- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

31) Do you feel that other people are watching you or talking about you?
- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

32) Do you worry at times that something may be wrong with your mind?
- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

33) Have you seen things that other people can't see or don't seem to see?
- ☐Never
- ☐Sometimes

- ⌑Most of the time
- ⌑All the time

34) Do people sometimes find it hard to understand what you are saying?

- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

After encountering wildlife problems do you:

35) Do you have trouble sleeping?

- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

36) Do you feel scared or sad?

- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

37) Are you taking care of yourself?

- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

38) Do you have a supportive community around you?

- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

39) How often do you drink alcohol?

- ⌑I do not drink alcohol
- ⌑1-2 times per week
- ⌑3-5 times per week
- ⌑More than 5 times per week

40) Do you often get headaches?

- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

41) Are you easily irritated?

- ⌑Never
- ⌑Sometimes
- ⌑Most of the time
- ⌑All the time

42) Do you think stress is affecting your health?

- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

After encountering wildlife problems:

43) I get little sleep at night

- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

44) I have trouble getting to sleep

- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

45) I wake up often during the night

- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

46) At bedtime I feel stressed

- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

47) At bedtime I feel sad

- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

48) I sweat a lot when I sleep

- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

49) I can't sleep because I think too much

- ☐Never
- ☐Sometimes
- ☐Most of the time
- ☐All the time

Appendix G

Rhodes University — Department of Psychology

USE OF TAPE RECORDINGS FOR RESEARCH PURPOSES PERMISSION AND RELEASE FORM

Name of participant			
Participant's contacts details	Email address: Phone number:		
Name of researcher	Loryn Janine Smith		
Level of research	Honours	Masters ✔	PhD
Brief title of project	**The effects of Human-Wildlife Conflict (HWC) on mental health: The case of Shezongo Community, of Kafue National Park (KNP), Zambia**		
Name of supervisor	Sizwe Zondo		

DECLARATION

(Please initial/tick blocks next to the relevant statements)

1.	The nature of the research and the nature of my participation have been explained to me.	verbally	
		in writing	
2.	I agree to be interviewed and to allow recordings to be made of the interview.	audiotape	
		videotape	
3.	I agree to_____and to allow recordings to be made.	audiotape	
		videotape	
4.	The tape recordings may be transcribed	without conditions	
		only by the researcher	
		by one or more nominated third parties	
5.	I have been informed by the researcher that the tape recordings will be erased once the study is complete and the report has been written.		
	OR I give permission for the tape recordings to be retained after the study and for them to utilised for the following purposes and under the following conditions		

Signature of participant:_____

Date: _____

Witnessed by researcher:_____

Date: _____

Appendix H

The effects of HWC on MH

Codes

Name	Description	Files	References
Livlihood Insecurity	The inability to meet basic needs	6	52
Financial	Not having money to meet basically needs	6	16
Food	Not having access to food to meet basic needs	6	16
Safety	Inability to protect oneself from harm/danger	5	11
Wellbeing	Presence of physical and emotional health	6	85
Mental		6	73
Anxiety	Feelings of nervousness, fear, worry and angry over experiences and ones environment	5	14
Depression	Feelings of sadness, lack of concentration, appetite changes, tiredness	5	6
PTSD	Behaviours/symptoms such as nightmares, avoiding places, fear and guilt as a result of previous experiences	4	14
Sleep Disturbance	Inability to sleep due to intrusive thoughts and stress	4	8
Stress	Response to ones environment in the forms of: trouble sleeping, fear, headaches, health problems	5	31
Physical		5	12
Appetite Problems	Eat too much or too little	2	2
Sick	Irregularities in physical wellbeing - eg: headaches/high blood pressure	3	4
Sleep Problems	Bad quality of sleep or no sleep	4	6

Appendix I

RHODES UNIVERSITY
Where leaders learn

Rhodes University Human Ethics Committee
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e: s.manqele@ru.ac.za
NHREC Registration number: RC-241114-045

https://www.ru.ac.za/researchgateway/ethics/

14 October 2022

Ms Loryn Smith

Email: loryn96@gmail.com

Review Reference: 2022-5513-7125

Dear Ms Loryn Smith

Re: The effects of Human-Wildlife Conflict (HWC) on mental health: The case of Shezongo Community of Kafue National Park (KNP), Zambia

Researcher: Ms Loryn Smith

Supervisor(s): Mr Sizwe Zondo, ,

This letter confirms that the above research proposal has been reviewed by the Rhodes University Human Research Ethics Committee (RU-HREC) and **PROVISIONALLY APPROVED PENDING PERMISSION/GATEKEEPER LETTER(S)**.

Gatekeeper permission is required from: Mr Steady Simanzu, Shezongo Village.

Once the Gatekeeper permission letter/s has been received please forward it to the Ethics Coordinator, in order to finalize your ethics approval.

Sincerely,

Janet Hayward

Dr Janet Hayward

Chair: Rhodes University Human Research Ethics Committee, RU-HREC

cc: Ethics Coordinator

Appendix J

Livelihood Insecurity	**Well-being**
If our maize get eaten, and goat and other things then we can't get money[13]	When they (elephants) eat our crops ahh we feel sad.
Like here we get money from maize, and sometimes elephants eat maize, so money is difficult.	We are sad.[14]
[It's] difficult to make money and difficult to find food. [15]	We are scared… Because elephants can kill [us].
It's making hard to make my money…because my goats, when I sell them, one goat, I have got money, if hyena come and eat my goat, so it's a problem to find money.[16]	When you are coming from somewhere then you cross the elephant, it can kill you. That's why we worry.
Elephants disturb our fields and eat our crops.[17]	Elephants…they finish everything… so for that we find that we get stressed.
No food, no money, we are suffering here too much.[18]	We feel sad, very sad.[19]
They (wild animals) make [it difficult], cos our maize is our money.	When they (elephants) come, we fear.[20]

[13] Elephants damaging and consuming crops can lead to financial insecurity for the community, as their livelihood depends on agricultural yields, especially maize and livestock like goats.
[14] Participants expressed feelings of sadness when HWC incidences occur. In this instance, they are talking about when elephants depleted their crops, and the consequences this leaves behind.
[15] This comment was made when talking about the experience of co-existing with wildlife.
[16] Hyenas are a significant threat to livestock, especially goats, which are an essential source of income. Their predation exacerbates the financial challenges faced by the community.
[17] The fear of elephants is not only due to crop destruction but also because of the real danger they pose to human lives, which contributes to a constant state of anxiety among community members.
[18] This participant expressed their battles because of having to live near wild animals.
[19] Participants expressed feelings of deep sadness when asked about crop-raiding by elephants, and the consequences that the participants must face because of this.
[20] It has been expressed that fear of wild animals, especially elephants, affects daily life and activities, including farming, fetching water, and even sleeping, causing substantial stress and anxiety.

I have a problem because the animal will come and eat our crops. There is no feed what I can feed our child.[21]	because blood pressure is high… headache, illness… because of that problem.[22]
Yes, some time ago they came and [tried to] kill me.[23]	I can't, not even breathe, not even breathe, I even… get admitted.[24]
I am worried about food and what I can give our small child.	if I remember, or someone reminded me about the goats, I can't even sleep sometimes… [I feel] stressed.
They (wild animals) disturb our life.[25]	sleeping problems, and headache problem.[26]
Like here we get money from maize, and sometimes elephants eat maize, so money is difficult.	you can't even sleep… you will be thinking, my props they are eaten now how am I going to survive?[27]
When you are coming from somewhere then you cross the elephant, it can kill you. That's why we worry.	When something bad [28] have happened, you have headache
If you plant a field for maize, you have a plan for it, meaning to feed your family from that field; now if the animal comes and eat everything, then you get stuck[29].	when that happen, [30] I had headache…I have nightmares[31], I don't sleep, I'm always thinking, my health will not be good.

[21] The constant worry about food availability for children demonstrates the depth of the challenges faced by parents in providing for their families.
[22] It is felt by community members that the stress and anxiety caused by wildlife threats can lead to physical health issues, including elevated blood pressure, headaches, and general illness among community members.
[23] This incident highlights the potential danger posed by wild animals and the risk they pose to human lives in the affected community.
[24] This comment was made when talking about the stressed wild animals cause to sustaining livelihoods, because of crop depredation.
[25] The ongoing disturbances caused by wild animals can lead to chronic stress among community members, impacting their overall well-being and mental health.
[26] Sleep disturbances and headaches are common symptoms of the ongoing stress and fear experienced by community members due to wildlife encounters.
[27] This was a rhetorical question asked by the participant, which implied that it is very difficult to survive when their crops are eaten by wild animals.
[28] The participant is referring to HWC incidences such as crop depletion or livestock depredation.
[29] Participants feel a sense of helplessness when their crops are depleted, as this is used as a livelihood strategy.
[30] The participant is talking about incidences with wildlife that have a negative impact on their livelihoods.
[31] Nightmares may occur as a psychological response to the fear and anxiety associated with wildlife encounters, impacting the mental well-being of individuals.

At night, if you cannot see it (wild animals), once you get into it, it kills you.[32]	At that time, [33]I can't sleep
We fear even go there to the river, we can meet them when they go to drink water, that's where us also we go to fetch water, so we fear even going to fetch water.[34]	They (elephants) are dangerous… because when you try to go there[35] they can come to you... [and they] can even they can even harm you.
	You can't sleep… Thinking too much, [and] sometimes when sleeping elephants can come [and raid our crops].
	Like elephants, you are eating, you have like a farm, then you are eating, then elephants come into the farm, eating the maize, you can't sleep well, you can't eat well.
	You cannot sleep. You have; you make plans.[36]

[32] The danger posed by wild animals, particularly at night when visibility is low, adds to the anxiety and fear experienced by community members.
[33] The participant is referring to when something negative has just happened with wildlife such as crop or livestock depredation, or an attack on close kin.
[34] The river serves as a vital water source for the community, but it is also a location where encounters with wild animals, such as elephants, can occur, leading to safety concerns for community members.
[35] The participant was implying that when trying to go anywhere, you have the possibility to face an elephant, which threatens their physical safety.
[36] The participant is expressing how HWC causes inability to sleep, as when their livelihood strategies are disrupted as participants need to strategize and plan amid these difficult times so that they can continue to provide for themselves and their families.

Appendix K

Quantitative Participant Demographics

Pseuds[37]	Age	Sex	Marital Status	Education	Employ. Status	Land Ownership	Farmer	HWC
P1	18-25	F	Single	P	E	No	Yes	Yes
P2	36-45	M	Married	P	E	Yes	Yes	Yes
P4	26-35	M	Married	P	E	Yes	Yes	Yes
P6	36-45	M	Married	P	E	Yes	Yes	Yes
P7	46 +	M	Married	P	E	No	Yes	Yes
P8	36-45	M	Married	P	E	Yes	Yes	Yes
P9	36-45	M	Married	P	E	Yes	Yes	Yes
P10	36-45	M	Married	P	E	Yes	Yes	Yes
P11	46 +	F	Married	P	E	Yes	Yes	Yes
P12	26-35	M	Married	S	E	Yes	Yes	Yes
P13	36-45	M	Married	P	E	Yes	Yes	Yes
P14	26-35	M	Married	S	E	Yes	Yes	Yes
P15	26-35	M	Married	P	SE	Yes	Yes	Yes
P16	26-35	M	Married	P	SE	Yes	Yes	Yes
P17	36-45	M	Married	P	SE	Yes	Yes	Yes
P18	26-35	M	Married	P	SE	Yes	Yes	Yes
P19	46 +	M	Married	N	SE	No	No	Yes
P20	18-25	M	Single	S	U	No	No	Yes
P21	46 +	M	Married	P	E	Yes	Yes	Yes
P22	18-25	M	Single	P	SE	Yes	Yes	Yes
P23	26-35	F	Married	N	SE	Yes	Yes	Yes

[37] Pseudonyms

P24	36-45	F	Married	N	SE	Yes	Yes	Yes
P25	36-45	F	Married	P	SE	Yes	Yes	Yes
P26	26-35	M	Single	N	SE	Yes	Yes	Yes
P27	26-35	F	Married	P	U	No	No	Yes
P28	18-25	F	Married	P	SE	Yes	Yes	Yes
P29	36-45	M	Married	P	E	Yes	Yes	Yes
P30	36-45	M	Married	P	E	Yes	Yes	Yes
P31	46 +	M	Married	S	SE	Yes	Yes	Yes
P32	36-45	M	Married	P	SE	Yes	Yes	Yes
P33	46 +	F	Married	P	SE	Yes	Yes	Yes
P34	46 +	F	Married	P	SE	Yes	Yes	Yes
P35	26-35	M	Married	P	SE	Yes	Yes	Yes
P36	36-45	M	Married	N	E	Yes	Yes	Yes
P37	46 +	F	Married	N	SE	Yes	Yes	Yes
P38	26-35	M	Married	S	E	Yes	Yes	Yes
P39	36-45	F	Divorced	S	SE	Yes	Yes	Yes
P40	18-25	F	Married	S	SE	Yes	Yes	Yes
P41	18-25	F	Married	N	U	No	Yes	Yes
P42	36-45	F	Married	P	SE	Yes	Yes	Yes

Note. F = Female; M = Male; P = Primary; N = None; S = Secondary; U = Unemployed; E = Employed; SE = Self Employed

Appendix L

Researcher's Personal Experiences of Human-Wildlife Conflict

As mentioned, the researcher has lived in the vicinity of the research setting for several years. Therefore, can provide a unique perspective on the issues of human-wildlife conflict, as they have lived through it, and witnessed it on several accounts. This portion of this thesis aims to provide a more personal context of the issues of human-wildlife conflict in the Kafue National Park in general. The images below will show the extent to which humans and wildlife occupy similar space, and how this often leads to detrimental effects for the wellbeing of humans and wildlife if this issue is not managed appropriately.

The above picture is of the aftermath of the researcher's personal experience of human-wildlife conflict, whereby an elephant attacked their tent in the middle of the night while sleeping in it.

The picture above shows the researcher's father and a herd of elephants wandering nearby. This picture was taken right in front of where the researcher and their family reside. This was a peaceful encounter with a herd of elephants.

The picture above is of the researcher with the head of a hippo. This picture was taken right in front of where the researcher and their family reside. The wildlife scouts who protect the park killed this hippo after it has attacked, and killed a local fisherman who was on a 'mokoro' (traditional wooden boat – picture below) fishing in the river.

The picture above is of an area where the staff who work with the researcher's family had their space attacked by a wild elephant. For safety reasons, they moved under the thatched shelter, however, the elephant proceed to still attack them inside this sheltered area.

The picture above is of the wildlife scouts on their patrol boat in front of where the researcher and their family reside. The scouts were looking for a body of a local fisherman who had reportedly been killed by a crocodile.