THE STATE OF HUMAN-WILDLIFE CONFLICT IN ZIMBABWE: MOVING FROM CONFLICT TO COEXISTENCE

FINAL STUDY REPORT

USAID ZIMBABWE RESILIENCE ANCHORS ACTIVITY

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Acronyms

ANCHORS	Accelerating New Community-based Holistic Outcomes for Resource Sustainability
CAMPFIRE	Communal Areas Management Program for Indigenous Resources
COVID19	Coronavirus disease 2019
FGD	Focus Group Discussion
GNP	Gonarezhou National Park
GCT	Gonarezhou Conservation Trust
HWC	Human-Wildlife Conflict
KAZA	Kavango Zambezi
KII	Key Informant Interviews
MCT	Matusadona Conservation Trust
NGOs	Non-Governmental Organizations
ODK	Open Data Kit
PAC	Problem Animal Control
RA	Resilience ANCHORS
RDC	Rural District Council
SOPs	Standard Operating Procedures
TFCA	Transfrontier Conservation Area
USAID	United States Agency for International Development
WCA	Wildlife Conservation Action
ZimParks	Zimbabwe Parks and Wildlife Management Authority

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EXECUTIVE SUMMARY

Introduction

The successful conservation of wildlife and the well-being of communities living adjacent to protected areas largely depends on the extent to which the communities and wildlife themselves can coexist. Where coexistence fails, human-wildlife conflicts (HWC) arise. Almost every country in the world faces some form of HWC, and highly biodiverse, developing countries like Zimbabwe particularly struggle with this issue. HWC is one of the major challenges experienced by communities living adjacent to wildlife areas across the country. HWC often severely impacts the livelihoods, security and wellbeing of the people who live alongside wildlife and whom we ask for support for wider conservation goals. Developing solutions for HWC has therefore become an urgent conservation priority in countries endowed with high biodiversity. Against this background, United States Agency for International Development (USAID) under its Resilience through Accelerating New Community-based Holistic Outcomes for Resource Sustainability (Resilience ANCHORS) Activity, commissioned a study which was conducted by [REDACTED] to understand HWC in communities living around wildlife areas in Zimbabwe.

Purpose and scope

The purpose of this study was to provide the Resilience ANCHORS Activity with detailed information on the status, nature and dynamics of HWC, how it is experienced and how communities living in and adjacent to HWC hotspots across Zimbabwe are affected. Knowledge gained from this study will inform the design and implementation of a suite of strategies and interventions, including HWC mitigation to be implemented under the Resilience ANCHORS Activity. The goal will be to increase the capacity of these local communities to coexist and sustainably protect and manage wildlife and other natural resources. The study will also guide HWC management in the HWC hotspots through the provision of primary evidence and also feed into ongoing national legal and policy reforms that include review of the Parks and Wildlife Act and the review and possible drafting of a new Wildlife Policy for Zimbabwe.

Methodology

This study was conducted in eight HWC hotspots across Zimbabwe; Chipinge District, Chiredzi District, Hwange District, Kariba town, Kwekwe District, Mbire District, Nyaminyami District and Victoria Falls town. The local communities in these study sites live alongside and share their space with wildlife. A mixed methods approach was used to conduct this study, which involved the use of quantitative and qualitative data collection techniques. The data was collected in January 2022, June 2022, July 2022 and in August 2022. The quantitative data collection involved the use of structured household questionnaires, and a total of 1 548 households were interviewed across the study sites. The qualitative data collection techniques involved

discussions with 119 focus groups and 58 interviews with key informants across the eight study sites.

Key Findings

Attitudes towards wildlife: Results from household surveys showed that attitudes towards wildlife protection are generally positive. A significant number of the respondents in Chipinge (74%), Mbire (48%) and Nyaminyami (33%) felt that it is important to protect wildlife resources. However, a significant number of the respondents in Hwange (44%) and in Victoria Falls town (44%) felt that it was not important to protect wildlife.

Overview of HWC: The incidences of HWC varied across the study sites with some sites such as Mbire experiencing higher levels of conflict (83.6% crop raids and 56.4% livestock attacks) compared to others. Crop loss is one of the most salient and pervasive experiences of communities across the study sites in Chipinge (68.5%), Hwange (71.5%), Mbire (83.6%), Nyaminyami (54%) and Victoria Falls (45.7%). This is followed by livestock loss and then attacks on humans.

Wildlife species causing HWC: Elephants are responsible for most of the attacks on humans across the study sites, in Chipinge (49.1%), Hwange (75%), Mbire (42.4%), Nyaminyami (42.6%) and Victoria Falls (59.1%). Elephants are contributing the most to crop raiding across all study sites in Chipinge (87.0%), Hwange (96.3%), Mbire (97.3%), Nyaminyami (91.9%) and Victoria Falls (92.5%). The majority of the interviewed respondents in Chipinge (57.1%), Mbire (87.4%) and Nyaminyami (67.5%) lost their livestock to hyenas while the majority of the respondents in Hwange (74.2%) and Victoria Falls town (65.5%) lost their livestock to lions.

Drivers of HWC: One of the major drivers of HWC in the study sites is the proximity of these communities to wildlife areas. Some of the drivers of HWC include; increase in wildlife abundance, poaching, encroachment into wildlife corridors from settlement and fields, limited grazing areas, limited water sources for livestock, poorly constructed livestock shelters and lack of meaningful benefits from wildlife resources.

Main source of livelihoods: The sources of livelihoods varied across the study sites, nonetheless the main livelihood source for most households is crop farming; Chipinge (83.7%), Hwange (39.1%), Mbire (50%), Nyaminyami (42.2%) and Victoria Falls town (39.8%). Fishing is also a main source of livelihood for some of the respondents in Nyaminyami (37.7%), while livestock is a main source of livelihood for some of the respondents in Mbire (47.7%). Arts and crafts, casual labor and employment are significant sources of livelihoods for respondents in Hwange and Victoria Falls town. The majority of the respondents across the study sites have very limited livelihood alternatives outside of crop farming and livestock rearing.

Threats to livelihoods: Results from this study revealed that the major threat to respondents' livelihoods in Mbire is crop raids (76.6%) while in Chipinge its crop raids (44.7%) and droughts (41.1%). In Hwange the major threat to respondents' livelihoods is crop raids (38.3%) and livestock predation (30%). The major threats to respondents'

livelihoods in Nyaminyami and Victoria Falls town include crops raids, drought, livestock depredation, lack of employment and the poor economy.

Impact of HWC on food security: Results showed that HWC has a negative impact on household food security. More than 96% of respondents across all study sites indicated that crop raids resulted in food shortages for their households. Crop raiding results in destruction of maize and other crops which would result in poor crop yields. Poor yields result in decreased food security among the farmers and insufficient food for their families. Since these farmers rely on the selling of agricultural produce and livestock to raise incomes, the destruction of crops and livestock through HWC means that the income from crops and livestock would be minimal or non-existent and the farmers might incur debts or fail to pay off existing debts.

Suggested mitigation strategies against HWC: A significant number of respondents in Chipinge (53.6%), Hwange (32.8%), Mbire (41.5%) and Victoria Falls (56.7%) suggested electric fencing of wildlife areas as one of the best strategies to prevent attacks on humans by wildlife. A significant number of respondents in Chipinge (48.2%) and Nyaminyami (37.2%) suggested fencing of crop fields as one of the most effective ways of protecting crops against destruction by wild animals. The majority of the respondents across the study sites suggested fencing of livestock enclosures and putting livestock in kraals at night as some of the most effective ways of protecting livestock against predation by wild animals.

State authority interventions: A significant number of respondents in Chipinge and Mbire listed various authorities including Forestry Department, Gonarezhou Conservation Trust, local Chief or the headman, local Councilor, NGO's, the Rural District Council (RDC), Safari Operator and ZimParks as being the most active authorities involved in wildlife related issues. In Nyaminyami the RDC (73.2%) and ZimParks (51.5%) are the key authorities involved in wildlife related issues. ZimParks is also the most active authority according to a significant number of respondents in Hwange (43.7%) and Victoria Falls (49.2%).

Reporting of HWC incidences: Some of the respondents that experienced HWC did not report the incident to the authorities. The majority (more than 50%) of the respondents in each study site reported incidences of human attacks. However, less than 50% of crop raids in Chipinge (48.3%) and Hwange (45.4%) were reported, while less than 50% of livestock predation in Chipinge (48%), Nyaminyami (37.0%) and Victoria Falls town (46.6%) were reported (Fig 29).

Challenges and limitations

Conducting this study during the COVID-19 pandemic was a challenge because extra care had to be taken to ensure that the study team and all the participants were kept safe. Although the individuals selected for household interviews and focus group discussions were randomly selected and informed beforehand, there were still a few instances where the enumerators failed to find someone at the household and would end up interviewing the next closest household. In some cases, the number of focus group discussion participants was less than the targeted 10 and sometimes more than

10 as some of the invited participants failed to show up and sometimes the uninvited showed up. A few of the targeted Key Informants could not be interviewed during the study because they were not reachable. The results of this study are based on specific sites and may not be generalizable to other sites in the country, even though there may be some similarities.

Key Recommendations

A holistic solution which addresses both HWC and poverty is critical in protecting biodiversity and improving livelihoods in human dominated wildlife landscapes. HWC management needs to be recognized as a central theme to conservation and community development and should not be treated as a niche problem, but a central topic to mainstream into various disciplines, such as socio-economic development, spatial planning, land use planning, rural development, education and climate change adaptation. It is important to address the underlying causes of HWC and these may include human-human conflict as well as land use and resource conflicts. To move from conflict to coexistence the following will need to happen at both the local and national level:

1. Local level

i. Human-wildlife Conflict Mitigation Strategy **–** Each district facing HWC should formulate an *HWC Mitigation Strategy* for the district through consultations with the local community and the relevant stakeholders. This strategy would help guide a more coordinated effort in mitigating conflict. A suite of HWC mitigation approaches and the Standard Operating Procedures for HWC mitigation should be developed and agreed on by the communities and stakeholders.

ii. Local HWC Task Force – Each district should bring together a local task force composed of key stakeholders working around HWC management, natural resource management and community development. The formation and selection of the task force can be done during the process of developing a HWC Mitigation Strategy. The taskforce will be critical in improving the effectiveness of local communities in HWC management through the provision of guidance, resources, and capacity building.

iii. Integrated land-use planning **–** Participatory integrated land-use planning in each district facing HWC would be critical as a mechanism for these communities to sustainably manage and benefit from wildlife and other natural resources within their landscape. The land-use plan (LUP) would facilitate the separation and designation of wildlife areas, settlement areas, pastures and crop fields which would minimize interactions between humans and wildlife. The land-use plans should be part of the Local Environmental Action Plan (LEAP) which are local plans that local authorities develop for the management of the environment within areas under their jurisdiction as stated in section 95 of the Environmental Management Act (Chapter 20:27).

iv. Education and Awareness **–** Education and awareness of local communities can be key in promoting coexistence as well as increasing the understanding and acceptance of wildlife and strategies that can be used to minimize risk or damage from

wild animals. Education and awareness-raising often mitigate conflict due to improved knowledge by communities of the risks and drivers of HWC.

v. Sustainable livelihood options **–** There is a need to introduce alternative livelihood opportunities as this is important for decreasing the dependence of communities on wildlife resources. Alternative livelihood programs like bee keeping and fish farming would also assist communities to move away from household incomes reliant on HWC prone activities such as crop farming. There is also a need for the provision of resources that are critical to community lives and livelihoods including the provision of solar powered boreholes, whose water can be used for household use, livestock and also community gardens; this would help with HWC mitigation as well as to improve livelihoods and household economies.

vi. Community engagement and training – Engage communities to fully participate in wildlife management and HWC mitigation, and fair, accountable and transparent governance systems for natural resources. Also train and inform farmers on how to develop and implement non-lethal mitigation measures for conflict prevention and mitigation.

vii. Collaboration in HWC management **–** Effective HWC management and coexistence strategies would require strong collaboration among stakeholders as well as building teams at the local level to deal with and react to HWCs. There is also a need for a framework for HWC management at the district level as well as effective knowledge management and exchange and communication. Collaboration at the local level will be crucial for significantly and sustainably managing and reducing HWC at scale. Within these collaborations, exchange of best practice and the application of guidelines for HWC management should be fostered.

viii. Establish local level structures for managing HWC **–** The prevalence of late responses to distress calls by communities indicates a dire need for the establishment of a local level structure that can address the issues of HWC. Usually, the wildlife authorities cite a lack of financial resources and motor vehicles to execute such tasks. Considering these operational challenges, ZimParks, RDCs and other stakeholders need to train community representatives to better manage wildlife and safely drive wildlife away from homesteads and fields. If successfully implemented, this could help lower operational costs for HWC distress calls and reduce the retaliatory killing of wildlife.

ix. Strengthen market linkages **–** Farmers in the study sites depend on crop farming and livestock rearing for their livelihoods but they often face challenges with marketing their produce and getting the best value for their products. Similarly, despite the prevalence of poor-quality farming seasons in most of the study sites, irrigation schemes in these areas usually produce a good crop. The farmers involved in the schemes sell their produce to other local farmers usually at low prices because of lack of access to other viable markets. To increase income and profitability, it is imperative to focus on strategies that improve both the crop and livestock business and marketing for these farmers. Linking farmers with markets has the potential to transform their lives and help in addressing food security and resilience challenges particularly due to the effects of HWC.

x. Enhance water provisioning **–** Water for household use has been a major source of HWC for communities living adjacent to protected areas. Climate change has brought about increased water scarcity in protected areas and in the adjacent communities, droughts have exacerbated the situation with some streams drying up and grasslands failing to replenish. The available dams and reservoirs in most of these areas cannot hold much water to sustain the growing population of humans, livestock and wildlife. As such, there is a need for deliberate efforts by the government, NGOs and CSOs to sink solar-powered boreholes in the communities as well as wildlife areas to ease water shortages and reduce HWC.

xi. Implement Conflict Mitigation Measures **–** Conflict mitigation measures that seek to both reduce the challenges associated with living in close proximity to wildlife and improving community livelihoods will need to be implemented and these could include chili fences and beehive fences to deter crop raiding wild animals. Livestock predation could be reduced by strengthening traditional livestock kraals and providing mobile predator-proof livestock bomas.

2. National level

i. National Policy on HWC management **–** The appropriate legislative framework such as a National HWC Policy would be critical in ensuring that HWC is holistically managed. The roles and responsibilities for HWC management should be made clear in the Policy. The HWC Policy would also spell out issues of compensation/consolation among other issues including the enablers for this. The HWC Policy should also contain a list of dangerous wildlife (or conflict species) that would be compensated for and under which conditions.

ii. Compensation/Consolation Scheme **–** Some form of compensation or consolation to the victims of HWC for their losses that includes injury, loss of life, loss of crops and livestock could help promote coexistence and improve the attitudes of local communities towards wildlife. These schemes could be government funded, private funded or NGO funded and could include compensation in both cash and kind. There is need for more research on what type of schemes would work better in the Zimbabwean context while looking at best practice from other countries.

iii. Devolution of Natural Resource Management **–** Communities should have the right to manage and benefit from their natural resources. Legal entities such as community trusts should be capacitated to manage their natural resources. Existing international legal frameworks around rights and sustainable use of natural resources such as the UN Convention on Biological Diversity and Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization should be enforced at the National level.

iv. HWC management integrated into the TFCA framework **–** Zimbabwe has six Transfrontier Conservation Areas (TFCAs) and there is need to have issues of HWC management integrated and standardized within the TFCA framework across the participating countries for example within the Kavango- Zambezi (KAZA) TFCA. Botswana and Namibia have some HWC compensation programs yet in Zimbabwe

this is absent. There is a need for regional best practice benchmarking across the TFCAs.

v. HWC National Database **–** The reporting and recording of HWC incidences across the country need to be standardized. A national database on HWC can be enhanced to ensure that there are no gaps in HWC data collection and monitoring across the country which is key in helping us get a better understanding of the dynamics of HWC.

vi. Institutional capacity building **–** There is a need to harmonize the bottom-up with top-down governance approaches, through multilevel and co-management arrangements. The late response or lack of response by the wildlife management stakeholders may be interpreted by community members as an indication that their lives or property are less important than that of wildlife. This may precipitate increased cases of HWC and decimate wildlife populations as community members use retaliatory tactics such as trapping or poisoning. As such, there is a need for deliberate efforts by various stakeholders to combine efforts, establish or strengthen the capacity of community-level wildlife managers e.g. Resource monitors.

vii. Strengthen role of CAMPFIRE and Community Conservancies in HWC **–** CAMPFIRE is currently being used as an approach to try to internalize the costs and benefits of living with wildlife at the community level. However, very little gained through CAMPFIRE is being used to cover the costs of HWC, with most of the revenue generated going to community development work. Also, the level of damage from HWC differs considerably between individual households and more needs to be done to ensure that those households that suffer the most receive appropriate benefits to offset these losses.

viii. Strengthen social service delivery by government institutions **–** The government ministries need to do more to meet their mandate of providing rural communities with essential services like education, transport, energy, water etc. This will reduce the pressure on CAMPFIRE to invest in social services since this is currently reducing the impact of benefits to investment in other areas like HWC management.

ix. Improved food security – There is a need to improve the food security of communities living alongside wildlife through collaboration with key institutions and ministries using the government's 'Leave No One Behind' approach and working with key stakeholders. This would increase the resilience of these communities who are often the poorest in society and by being located in natural regions IV and V also face challenges with drought and low rainfall

x. National Livelihood Diversification Framework – A national livelihood diversification framework is needed to help rural families across the country, especially in HWC hotspots, build a diverse portfolio of activities and social support capacities that would improve their living standards. The framework should also take into consideration HWC issues and also include other issues such as climate change, global pandemics, local and global economic crisis and other emerging issues.

xi. Innovation and Technology for HWC management **–** Innovation and technology could be an important part of a suite of HWC management measures. There are currently some technical tools, such as early warning systems, that have largely been

developed to prevent HWC but do not address other elements of HWC management. Innovation must look beyond technology alone and include new ideas and approaches that foster human-wildlife coexistence.

xii. HWC National Task Force – A Task force composed of key stakeholders working around HWC management, natural resource management and community development should be set up. The Task force's mandate would be to look further into HWC issues, explore and recommend a broad range of ideas on enabling coexistence between people and wildlife. The taskforce could also carry out further research on existing HWC compensation schemes in Africa and beyond and then develop an implementation strategy with clear recommendations on the most suitable schemes for the government to adopt to enhance human-wildlife coexistence.

Conclusion

Wildlife is posing a direct threat to the safety and livelihoods of people living alongside wildlife across Zimbabwe. Findings from this study support earlier studies done in Zimbabwe which showed that HWC is being experienced across a number of communities although the dynamics and extent of the conflict varies from place to place. These communities lose their livestock to carnivores, their crops get damaged by elephants and other herbivores, their property including houses and granaries get damaged and sometimes people get injured or killed by wildlife. When such incidents become a recurring issue, retaliation against the species blamed often follows, leading to conflict about what should be done to remedy the situation. Although communities in Zimbabwe have coexisted with wildlife for millennia it appears that the conflict is now becoming more frequent and graver. Even though the communities living alongside wildlife are experiencing costs from doing so, their attitude towards wildlife conservation is still generally positive. It is therefore imperative that all the affected communities, stakeholders and interested parties across the country work together towards finding lasting solutions to HWC, so as to reduce the costs that these communities incur from living alongside wildlife. This study has recommended a set of solutions that can be implemented at the household level, local level and at the national level to reduce the impact of HWC on local communities and promote human-wildlife coexistence and biodiversity conservation. It is however important to acknowledge that it will not be possible to eradicate all conflict, but that conflict has to be managed in the most effective and efficient ways possible.

1. INTRODUCTION

Wildlife is one of Zimbabwe's most valuable natural resources. The country has a very high level of biodiversity and the wild mammal fauna of the country includes all the "Big Five" – African elephant, white and black rhinos, lion, buffalo and leopard – but also many species of antelopes, zebras and giraffes. In Zimbabwe, wildlife produces important economic activity through consumptive use and non-consumptive use. However, despite the high level of biodiversity and its economic significance, Zimbabwe faces multiple sustained wildlife management challenges. These include HWC which refers to struggles that arise when the presence or behavior of wildlife poses actual or perceived direct, recurring threats to human interest or needs often leading to disagreements between groups of people and negative impacts on people and/or wildlife[1]. HWC results from a variety of ecological and anthropogenic drivers that exert pressures on landscapes where humans and wildlife share space. Some of the ecological drivers of HWC include seasonal changes, natural calamities, and animals' life cycles, as well as the movement patterns of animals. Habitat loss, changes in land use, livestock management, expansion of agricultural practices, climate change, resource extraction, infrastructure development, and urbanization are some of the anthropogenic drivers of HWC.

Human population growth and increased demand for agricultural land especially in developing countries is having a significant impact on traditional wildlife habitat and ranges. The increased interactions between humans and wildlife is leading to wildlife attacks on humans, livestock predation and crop raiding and this is a cause of much conflict between farmers and wildlife throughout the world. The most common HWC incidents undermine human welfare, health and safety. HWC also results in human-induced wildlife mortality when communities undertake retaliatory killing or poisoning of livestock carcasses subsequent to carnivore attacks. According to a presentation by the Zimbabwe Parks and Wildlife Management Authority (ZimParks), there has been a substantial increase in HWC reports received over the past few years, with problem animal reports increasing by 293% over a 5-year period from 2016[2]. To put the impact of HWC into perspective, during the period January to March 2021, 22 people, 167 cattle and 79 goats were killed, while 26 people were injured. These statistics exclude the crop damage and other infrastructural damage which ZimParks has not been quantifying.

It is therefore important for the USAID Resilience Anchors Activity to understand the status, nature, and dynamics of HWC, how it is experienced and how it affects communities in HWC hotspots across the country to inform wildlife conservation initiatives and the design and implementation of effective interventions. These

[1] IUCN (2020). IUCN SSC Position Statement on the Management of Human-Wildlife Conflict. (IUCN Species Survival Commission (SSC) Human-Wildlife Conflict Task Force).

[2] The nature, extent, and impact of Human Wildlife Conflict on community livelihoods in Zimbabwe: A statistical assessment of past trends, 2021

communities facing HWC are targeted by the USAID Resilience Anchors Activity with the purpose of increasing their capacity to sustainably manage and protect community-based natural resources, which include wildlife, in anticipation of future shocks and stresses. Additionally, USAID Resilience Anchors also focuses on policy and legal frameworks which impact community based natural resource management. This proposed study comes at an opportune time when the Zimbabwe Wildlife Policy of 1992 and the Parks and Wildlife Act (Chapter 20:14) are being reviewed, and an HWC Policy is being developed. The expectation is that this study will feed into these policy and legal reform processes.

Resolving HWC is central to successful sustainable development and this requires the harmonization of both environmental and human development goals. The conservation of wildlife and the well-being of communities living alongside protected areas and wildlife habitats is largely dependent on the coexistence between these communities and wildlife. Coexistence is a dynamic state in which the interests and needs of both humans and wildlife are generally met, though this coexistence may still contain some level of impact to both and is characterized by a level of tolerance on the human side[3]. Developing solutions for HWC has therefore become an urgent conservation priority in human dominated wildlife landscapes. However, the complexity of HWC would warrant a coordinated suite of responses and effective management of HWC would require applying a variety of approaches in parallel to achieve the desired impact[4].

1.1 Purpose of the study

HWC is one of the major shocks or challenges experienced by communities living adjacent to wildlife areas across the country. The purpose of this study is to provide the USAID Resilience ANCHORS Activity with detailed information on the status, nature and dynamics of HWC and how it affects and is experienced by communities living around HWC hotspots across Zimbabwe. This is the first step in providing an opportunity for these vulnerable communities to cope with and mitigate the effects of HWC while conserving the natural resource base for sustainable livelihoods. Knowledge gained from this study will inform the design and implementation of a suite of strategies and interventions, including HWC mitigation to be implemented under the Resilience ANCHORS Activity. The goal will be to increase the capacity of these local communities to coexist and sustainably protect and manage wildlife and other natural resources. The study will also guide HWC management in the HWC hotspots through the provision of primary evidence and also feed into ongoing national legal and policy reforms that include review of the Parks and Wildlife Act and the review and possible drafting of a new Wildlife Policy for Zimbabwe.

[3] Edson Gross E, Jayasinghe N., Brooks A., Polet G., Wadhwa R. and Hilderink-Koopmans F. (2021) A Future for All: The Need for Human- Wildlife Coexistence. (WWF, Gland, Switzerland)

[4] Barlow, A., Greenwood, C., Ahmad, I. U. & Smith, J. L. D. Use of an Action-Selection Framework for Human-Carnivore Conflict in the Bangladesh Sundarbans. *Conservation Biology* **24**, 1338–1347 (2010).

1.2 Objectives of the study

The specific objectives of the study were as follows:

Objective1: To carry out a comprehensive survey on HWC trends and current status at selected study sites in primary HWC hotspot communities.
Objective 2: To identify the impacts of HWC on the livelihoods of communities in the selected study sites.
Objective 3: To assess current mitigation strategies used by the local communities to address HWC.
Objective 4: To inform the design and or remodeling of strategies to mitigate the impact of HWC on target communities.
Objective 5: To assess the current local level institutional arrangements for HWC management and assess their capacity needs, and responsiveness and recommend a plan of action for capacity support and training.

2. METHODOLOGY

2.1 Study Area

This study was conducted in eight HWC hotspots across Zimbabwe; Chipinge District, Chiredzi District, Hwange District, Kariba town, Kwekwe District, Mbire District, Nyaminyami District and Victoria Falls town (Fig 1). Chipinge District is the southernmost district in Manicaland province. It is bounded on the north by Chimanimani District, on the west by Masvingo Province, and on the east by Mozambique. The Save River forms the western boundary of the district, and drains the western and southern portions of the district. Chiredzi district is in south-east Zimbabwe in Masvingo Province. A large part of the district is found in natural region V, although there are some parts that lie in natural region IV. Areas in natural region V are characterized by aridity and uncertain rainfall patterns. Chiredzi is one of the largest districts in the country with over 95% of its area taken up by Gonarezhou National Park (GNP) and other Protected Areas like Malilangwe Nature Reserve and Save Valley Conservancy.

Hwange District is located in Matabeleland North Province, in northwest Zimbabwe, bordering Botswana and Zambia. Its main town, Hwange, is located about 100 kilometers southeast of Victoria Falls, the nearest large city. The largest national park in Zimbabwe; Hwange National Park is found in Hwange district. Kariba town is a resort town in Zimbabwe's Mashonaland West province. It is situated adjacent to the Kariba Dam at the lake's north-west end, not far from the Zambian border. It is situated 280 kilometers (km) north-west of Harare, the nation's capital city. The town is close to Matusadona National Park and Charara Safari Area.

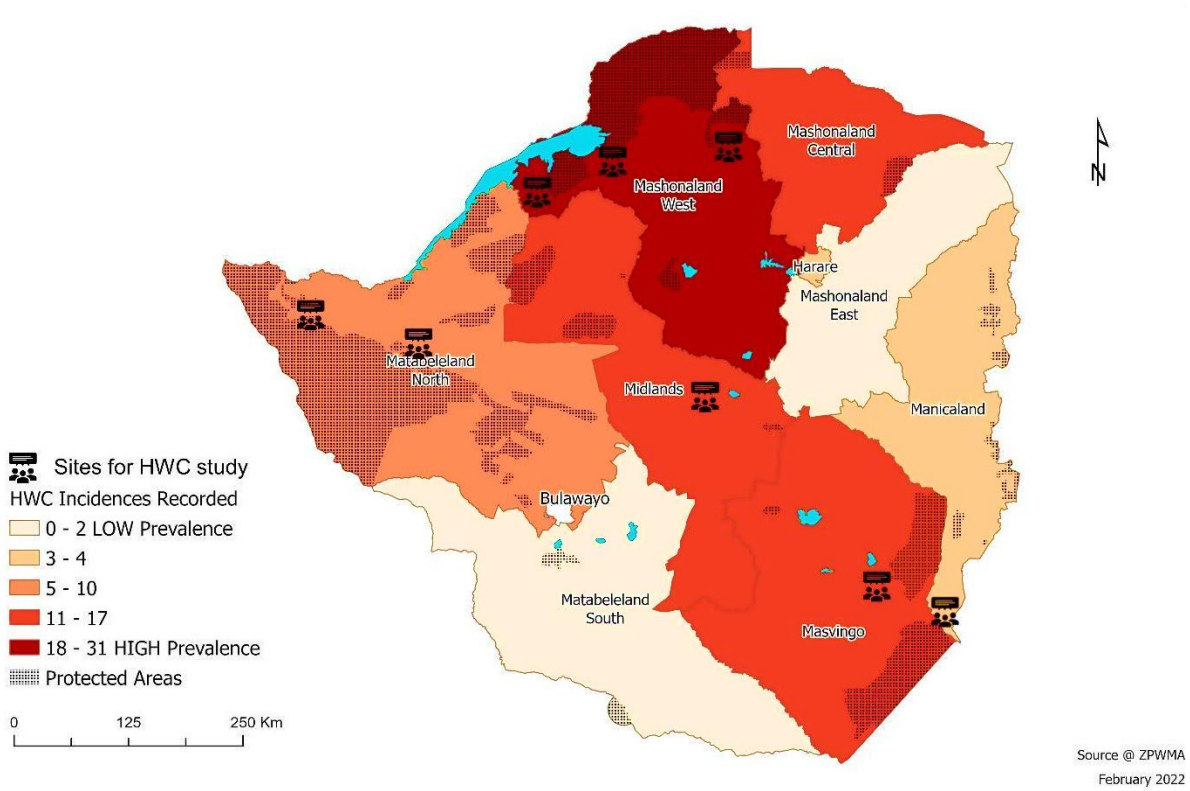

Figure 1. Location of the eight study sites across the human-wildlife conflict hotspots in Zimbabwe.

Kwekwe District is in the Midlands Province in central Zimbabwe, its main town Kwekwe is located approximately 220 km, southwest of Harare, the capital of Zimbabwe. The Midlands Black Rhino Conservancy and Sebakwe Recreational Park are found in Kwekwe district. Mbire district is located at the far end of the Mashonaland Central province, where it forms the northern border between Zimbabwe, Mozambique and Zambia. It lies in the Middle Zambezi Valley, which stretches from the Kariba dam to the Cahora Bassa dam and covers approximately 4,700 km^2. Mana Pools National Park, Hurungwe Safari Area, the Dande Safari Area and the Doma Safari Area are all found in this district.

Nyaminyami District is bordered to the west by Lake Kariba, to the south by Binga district, to the east by Gokwe north, and to the north and north-east by Hurungwe district. There is a large Protected Area (Matusadona Nationals Park) in the center of the District, and the areas closest to the park are prone to crop and livestock loss due to wildlife.

Victoria Falls, is a resort town and city in the province of Matabeleland North, Zimbabwe. It lies on the southern bank of the Zambezi River at the western end of the Victoria Falls themselves and is adjacent to Zambezi National Park. The local communities in these study sites live alongside and share their space with wildlife (Fig 1, Table 1).

Table 1. The sites sampled in the national study on human-wildlife conflict and the wildlife areas bordering these communities.

Province	Site	Wards	Wildlife Area
Manicaland	*Chipinge district*	*Ward 29 and Ward 30*	*Gonarezhou National Park*
Masvingo	*Chiredzi district*	*Ward 1 and Ward 23*	*Nyangambe Wildlife Area and Save Valley Conservancy*
Matebeleland North	*Hwange district*	*Wards 2,3,15,17*	*Hwange National Park*
Mashonaland West	*Kariba town*	*Wards 1,2,3,4,6,7, 8*	*Charara Safari Area*
Midlands	*Kwekwe district*	*Ward 1 and Ward 2*	*Midlands Black Rhino Conservancy*
Mashonaland Central	*Mbire district*	*Ward 2 and Ward 11*	*Dande and Doma Safari Areas*
Mashonaland West	*Nyaminyami district*	*Ward 2 and Ward 3*	*Matusadona National Park*
Matebeleland North	*Victoria Falls town*	*Ward 10 and Ward 11*	*Zambezi National Park*

2.2 Sampling

The six districts and two towns sampled in this study were purposely selected based on the HWC prevalence map (Fig 1) to gather data on local peoples' experiences with HWC, perceived trends in HWC, and attitudes towards problematic wild animals. The study team selected the wards that are most affected by HWC in each of the study sites and purposely selected two wards per study site (Table 2). The study team also purposely selected two wards in Chiredzi District and two wards in Chipinge Districts where the USAID Resilience ANCHORS Activity is being implemented.

In some instances where the wards were smaller, then two wards or more were selected for sampling (Table 2). Random sampling was used to select the villages from the purposely selected wards. The villages were then selected from a list of all the villages in the wards. The study team then used a systematic sampling approach to select households for interviewing from the village lists. The sampling unit in this study was the randomly selected household within the village. This study was conducted in these selected wards to gather data on local peoples' experiences with HWC, perceived trends in HWC, and attitudes towards problematic wild animals.

Table 2. The population and number of wards sampled across the study sites.

Site	Population[5]	Number of wards	CAMPFIRE wards	Sampled wards
Chipinge district	*298,841 (rural population)*	*30*	*2*	*2*
Chiredzi district	*275 759*	*32*	*9*	*2*
Hwange district	*62 670*	*20*	*18*	*4*
Kariba town	*26 451*	*9*	*0*	*7*
Kwekwe district	*119 863 (town)*	*33*	*0*	*2*
Mbire district	*198 966*	*17*	*8*	*2*
Nyaminyami district	*60 000*	*12*	*6*	*2*
Victoria Falls town	*35 199*	*11*	*0*	*2*

2.3 Data Collection

A mixed methods approach was used to conduct this study. This involved the use of quantitative and qualitative data collection techniques. The quantitative data collection involved the use of a structured household questionnaire. The qualitative data collection techniques involved focus group discussions and key informant interviews. The use of these methods allowed complementarity of methods and data triangulation. Enumerator training for the household surveys was done before data collection and the enumerators were trained on survey techniques, sampling protocols and interviewing techniques. All the data in this study was collected in January 2022 for one study site and between June 2022 and August 2022 for the other seven study sites.

i. Collection of quantitative data

Quantitative data was electronically captured from the selected respondents using Tablets with the Open Data Kit (ODK). The use of the ODK application minimized data entry errors, quickened data entry, cleaning and validation while in the field. The surveys were set up using XLS Form and Open Data Kit Collect which are both open-source tools for online and offline data collection. The XLS Form is the standard language used in developing ODK based surveys and allows the user to specify the questions, responses and the validation rules that are enforced when collecting data. Once the forms were completed, they were loaded onto an android based app to collect the data. To cater for network challenges, the survey used a combination of online - offline tools. After data collection, the household interviews data was downloaded from the Kobo Collect server in xls format.

[5] ZIMSTAT. Zimbabwe Population and Housing Census https://www.zimstat.co.zw. *Data is from 2012 Zimbabwe Census except Kwekwe and Victoria Falls which are 2022 Zimbabwe Census results.*

ii. Household Interviews

Household interviews were conducted in five out of the eight study sites. A systematic random sampling approach was used to select households for administering the questionnaires. A village register obtained from the village head in each of the selected villages was used as a sampling pool. A household was taken as the unit of analysis because it is where all decisions are primarily taken. The household heads were targeted as the respondents. In case of their absence, their spouse or another permanent resident adult (≥ 18 years) in the household took part in the interview. The interviews were done by a team of trained enumerators who had been involved in household interviews for the baseline survey in the study communities. Interview dates were communicated to each selected household one or two days in advance by a local guide hired by the study team in each ward. Before conducting the interviews, the general purpose of the study was explained to each interviewee and permission to conduct the interview was sought. Interviews took approximately 45–60 minutes to complete. Interviews were conducted upon the the condition that the individuals were willing to participate fully.

iii. Focus Group Discussions

A systematic random sampling approach was used to select households for Focus Group Discussions. From the selected wards, a few villages were then randomly selected, a village register obtained from the village head in each of the selected villages was used as a sampling pool. In the towns, the ward registers were used to randomly select 10 households for household interviews and 10 household representatives were selected for Focus Group Discussions in each of the sampled villages (Fig. 2). Participants for the FGDs did not participate in the HWC household survey interviews.

iv. Key Informant Interviews

A key informant is ‘an expert source of information’ who can, ‘as a result of their personal skills, or position within a society, provide more information and deeper insight into what is going on around them’ (Marshall, 1996). Key informants are people within the community who are knowledgeable, willing to participate, communicative, impartial and have a role in the community or understanding of the phenomenon that gives them information that the researcher is seeking. Key informants provide a perspective that the researcher (as outsider) could not otherwise obtain.

Key Informant Interviews (KIIs) were conducted with identified key stakeholders at district and ward level and they were carried out by the study team. The stakeholders for KIIs included the Councilors, traditional leaders, researchers, practitioners, experts in HWC, RDC personnel and ZimParks personnel.

Figure 2. A focus group discussion at Mola ward 3 in Nyaminyami district. Photo: K. Chuma

v. Interviews of HWC Victims

The study team conducted in-depth interviews with victims of wildlife attacks in the study sites to gather firsthand accounts of the impact of HWC on their lives and livelihoods. The use of in-depth interviews allowed the study team to uncover issues in the context of HWC, the root causes, perceptions and beliefs. Convenience sampling was used to select the participants based on how recent the loss is, accessibility of homestead and degree of loss. A structured guide was used to conduct the in-depth interviews. Each in-depth interview was electronically recorded with a high-frequency recorder and where possible video recorded.

Figure 3. The multiple injuries that an HWC victim in Kariba town sustained after a crocodile attack in January 2022. Photo: [REDACTED]

Table 3. The number of households, focus groups, key informants and HWC victims interviewed across the study sites.

Site	Households Interviewed	Focus Group Discussions	Key Informants	HWC Victims
Chipinge district	*330*	*17*	*7*	*-*
Chiredzi district	*-*	*22*	*5*	*-*
Hwange district	*244*	*14*	*10*	*1*
Kariba town	*-*	*13*	*8*	*2*
Kwekwe district	*-*	*24*	*6*	*-*
Mbire district	*354*	*17*	*10*	*2*
Nyaminyami district	*392*	*17*	*6*	*3*
Victoria Falls town	*228*	*12*	*6*	*1*

2.4 Data Analysis

Descriptive analysis was used to analyze the data based on the research questions. The findings were interpreted in light of existing research on HWC and the objectives of the study. The results were presented as percentages or means in tables and graphs. Qualitative data obtained from FGDs and KIIs was analyzed through Thematic

Content Analysis approach[6]. Findings from qualitative analyses were integrated with quantitative findings to provide a more comprehensive and context-specific picture as well as triangulating the findings.

2.5 Ethical and environmental safeguarding

This study involved soliciting sensitive information from target communities and key informants, therefore some of the ethical considerations that were adhered to during and after the study included: Free, Prior and Informed Consent (FPIC), doing no harm, confidentiality, and COVID-19 regulations. The permission to carry out the study was sought from the relevant authorities including the Provincial Development Coordinators, District Development Coordinators, RDCs, the local Councilors, Chiefs and village heads. Free, Prior and Informed Consent was sought from all study participants; participants of household interviews, focus group discussions, key informant interviews and HWC victims. The study ensured the confidentiality of personal level data by not sharing personal data of study participants with anyone outside of the study team. The data obtained was securely handled at all stages of the study. The COVID-19 protocols (sanitizing, social distance and wearing of masks) were adhered to during the household surveys, FGD, KII and interviews of HWC victims.

3. FINDINGS OF STUDY

This section presents the findings of the study based on the five objectives. The objectives of this study were addressed through the analysis of both quantitative and qualitative data from the household interviews, KIIs and FGDs.

3.1 Objective 1: HWC trends and current status in HWC hotspot communities.

3.1.1 Wildlife species in communities

The study found that the species mostly encountered by the respondents across the study sites (Fig 4) were elephants (more than 88% of the respondents), hyenas (more than 52%) and lions (more than 48%). Some of the respondents especially in Mbire and Nyaminyami mentioned that they also encountered baboons, buffalos and bushpig (Fig 4).

The household survey results are consistent with data obtained through FGDs and key informant interviews which established that elephants, lions, baboons and hyenas are the wildlife species most encountered in these communities. FGD participants in Mbire and Kariba town bemoaned the increase in the population of elephants within

[6] Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3, 77-101.

their communities and called for the responsible authorities to find solutions as elephants were endangering people's lives. Furthermore, people in these HWC hotspots are now getting indoors by 6pm to avoid encounters with these dangerous wildlife species.

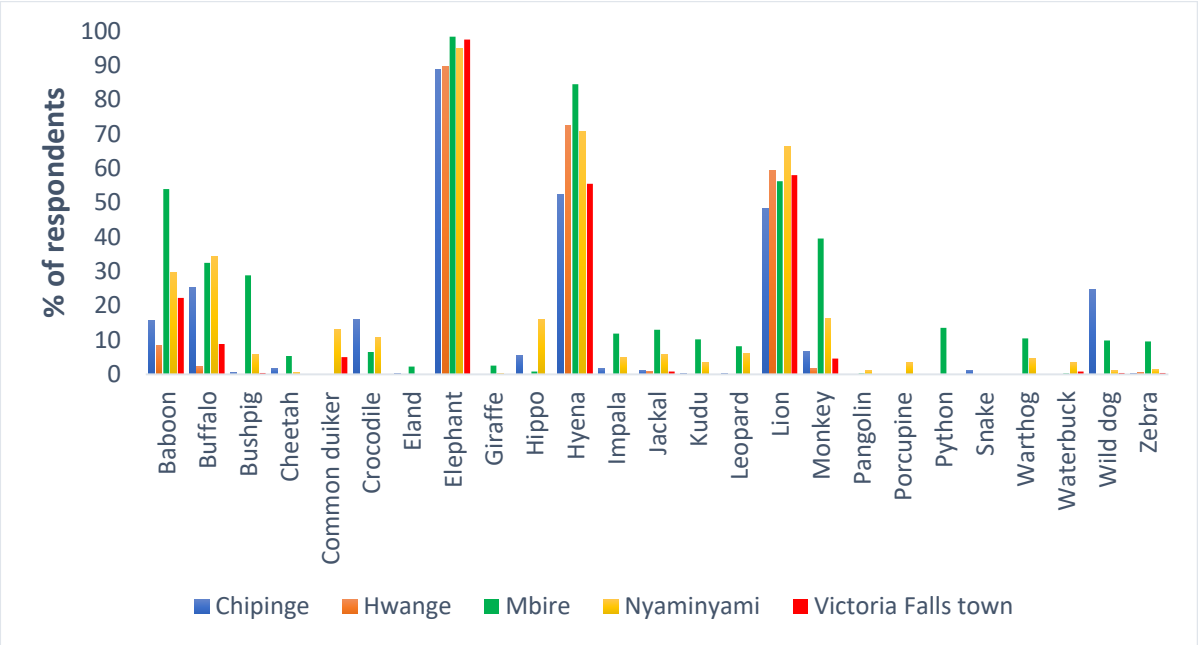

Figure 4. The wildlife species encountered by the respondents in their communities in Chipinge, Hwange, Mbire, Nyaminyami and Victoria Falls town.

In some of the study sites, it was established that the mobility and presence of elephants in the communities is seasonal and they are most frequently seen in the communities during the rainy season. FGD participants in Chipinge highlighted that when the water level in the Save River is low, wildlife crosses the river from Gonarezhou National Park into the communities and elephants, hyenas, lions and jackals are commonly seen during the dry season in this community. In Chiredzi ward 1 (Gudo area) FGD participants complained that hyenas are seen or heard almost every day in their communities. FGD participants from all study sites mentioned that wild animals encroach into their communities because the fence which used to border National Parks, wildlife areas and communities has been destroyed.

In Kwekwe (Zibagwe ward 1 and 2), FGD participants and key informants expressed concern regarding the increase in jackals and hyenas and complained that they attack their livestock throughout the year. Another FGD participant from Zibagwe ward 2 revealed that jackals were preying on goats during the day. Key informants from all study sites concurred that HWC has significantly affected communities in a negative way because wildlife species raid crops, attack livestock as well as injure or kill people in communities adjacent to wildlife areas.

In Victoria Falls town and Kariba town, FGD participants and key informants expressed concern over how elephants and baboons are destroying property in these resort

towns. They mentioned that these wildlife species destroy or vandalize houses, gardens, water taps, roofs, and windows. Not only that but, baboons also break into cars and empty rubbish bins, ultimately causing pollution. Given the current status quo, study participants in all study areas suggested that the responsible authorities should drive away the wild animals from the communities. Further to that, they suggested that a permanent solution will be to demarcate boundaries between communities and wildlife areas. Drawing from the findings of this study, the state of HWC in these areas is precarious and requires urgent intervention.

3.1.2 Attitudes towards wildlife

Attitudes of communities towards wildlife protection across the study sites are generally positive. A significant proportion of respondents in Chipinge (74.1%), Mbire (48.8%) and Nyaminyami (33.1%) felt that it is important to protect wildlife resources (Fig 5). However, a significant proportion of respondents in Hwange district (43.9%) (especially in wards close to Victoria Falls town) and in Victoria Falls town (44.0%) felt that it is not important to protect wildlife (Fig 5).

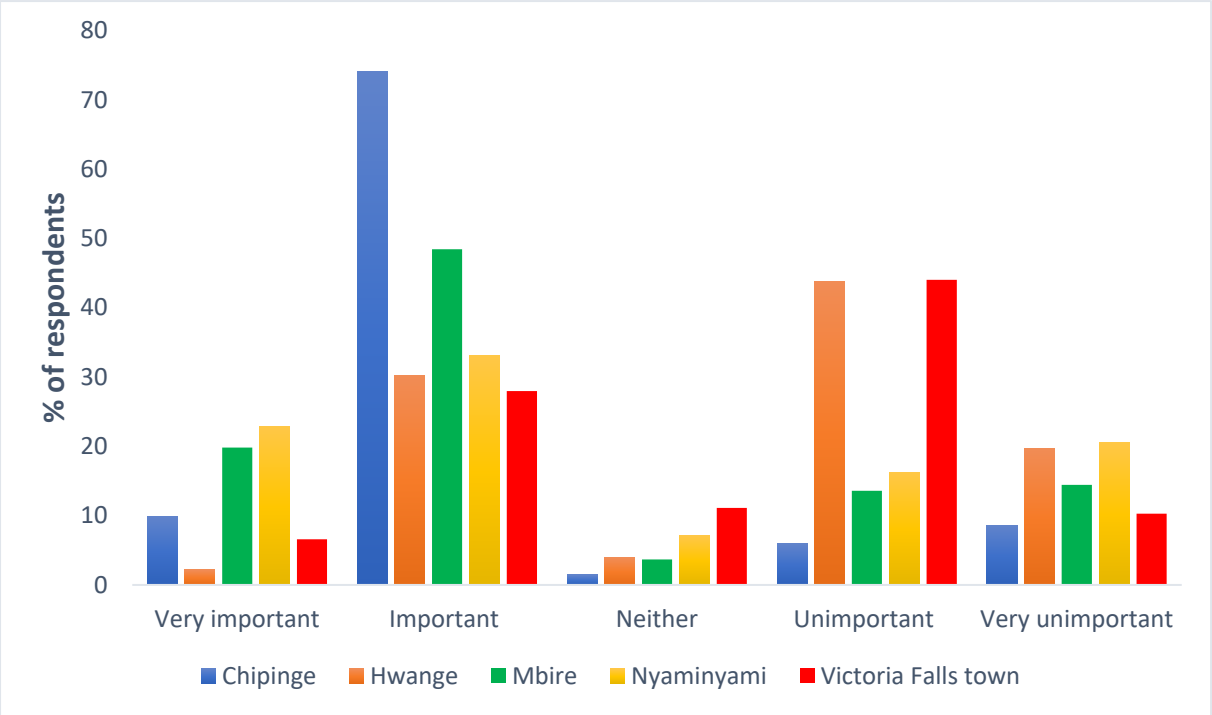

Figure 5. The respondents' views on the importance of wildlife protection.

There was a significant difference between the views of male and female respondents on the importance of wildlife protection. A significantly higher proportion of males (48.3%) than females (40.6%) felt that it is important to protect wildlife (Fig 6), while significantly more females (24.7%) than males (18.6%) felt that it is unimportant to protect wildlife (Fig 6).

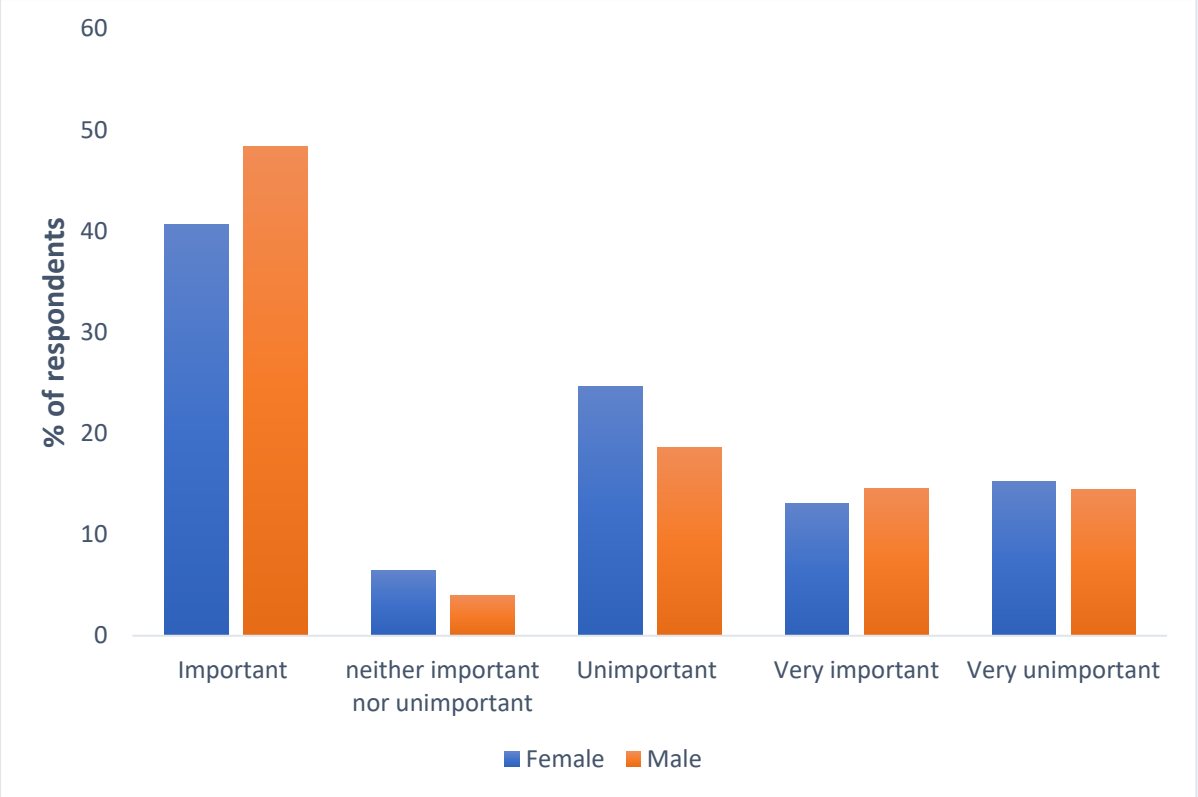

Figure 6. The views of female and male respondents across the study sites on the importance of wildlife protection.

The majority of respondents who benefit from CAMPFIRE programs in Mbire ward 11, Chipinge ward 29 and ward 30 and those who benefit from Nyangambe Wildlife Area in Chiredzi ward 23 reiterated that wildlife should be conserved. One of the FGD participants in Mahenye elaborated that the people of Mahenye want to conserve wildlife because they are seeing the benefits from the CAMPFIRE program. A key informant from Nyangambe noted that people in ward 23 generally have a positive attitude towards wildlife conservation because of the benefits they derive from the Conservancy, even though the benefits are still low. In Kariba town, Nyaminyami ward 2 and Victoria Falls town participants expressed negative attitudes towards wildlife protection. They argued that they are not benefiting from wildlife and also cited the lack of freedom of movement during the night, and the risk of being killed or injured by elephants, hippos and crocodiles.

A significant proportion of the respondents in Chipinge (79.5%), Mbire (49.3%) and Nyaminyami (43.8%) agreed that it is their responsibility to protect wildlife. (Fig 7). However, the majority of the respondents in Hwange district (especially wards close to Victoria Falls town) and in Victoria Falls town disagreed and some strongly disagreed, while others remained neutral about their responsibility towards wildlife protection. (Fig 7).

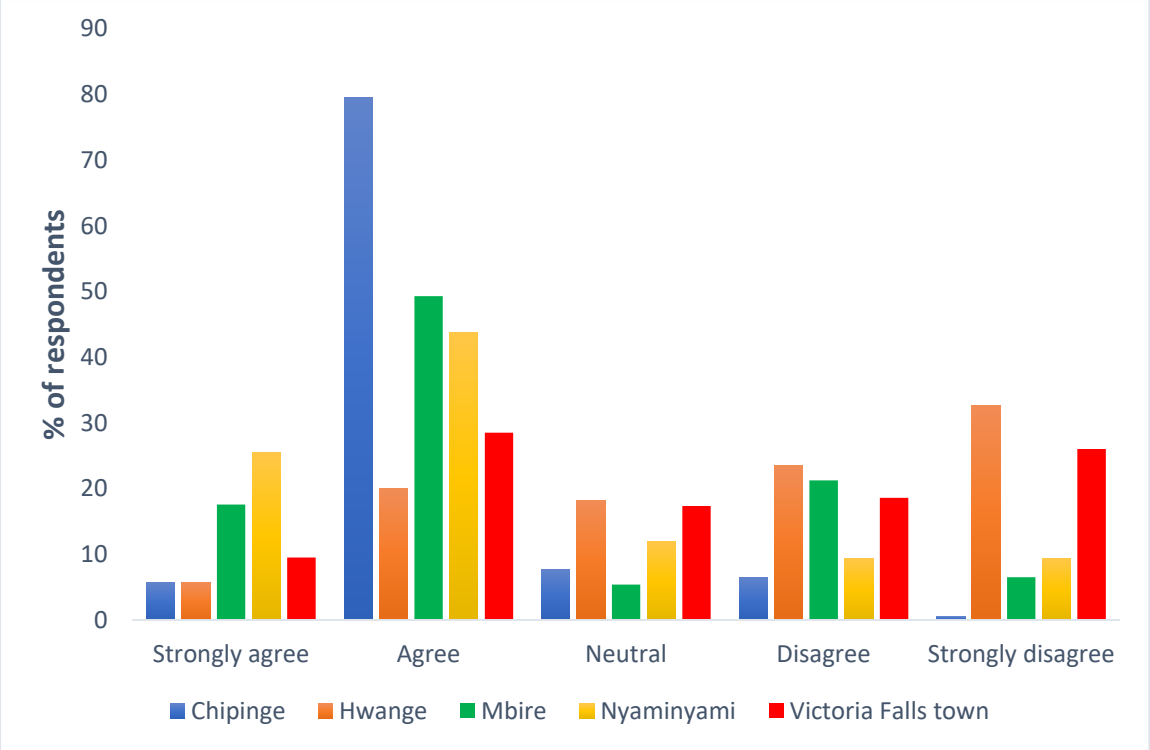

Figure 7. The respondents' views on their responsibility towards wildlife conservation.

There was a significant difference between the views of male and female respondents on their responsibility towards wildlife conservation. Significantly more males (50.3%) than females (43.8%) agreed that it is their responsibility to protect wildlife, while significantly more females (16.9%) than males (12.8%) disagreed that it is their responsibility to protect wildlife (Fig 8).

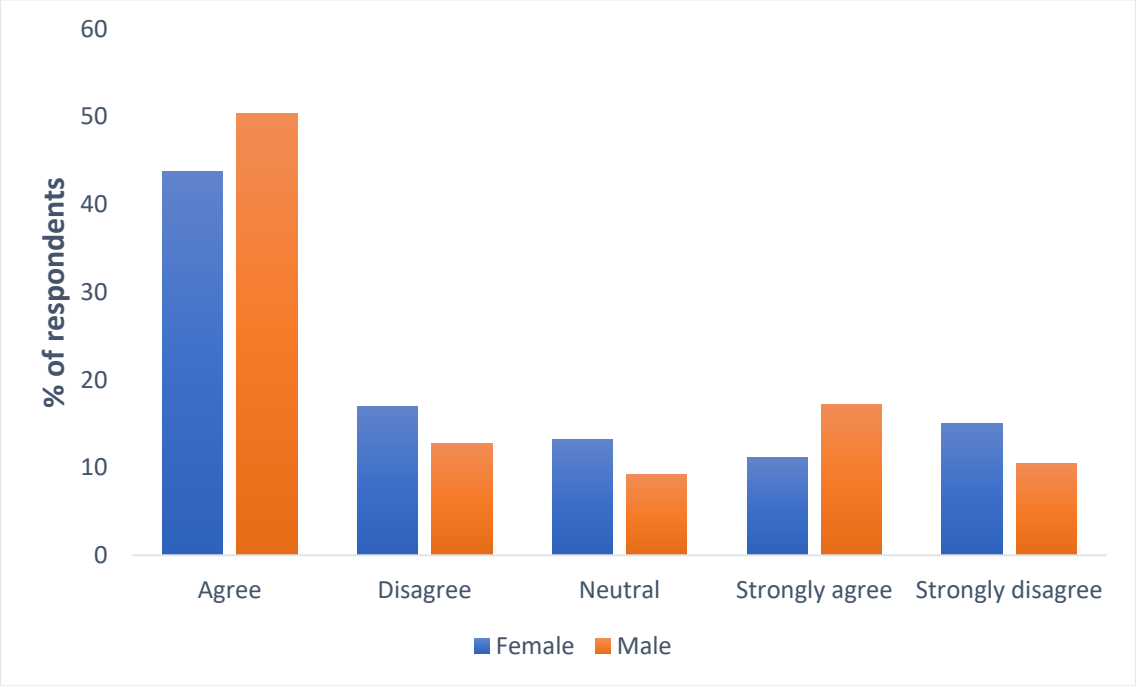

Figure 8. The views of female and male respondents across the study sites on their responsibility towards wildlife conservation.

The majority of the respondents in Chipinge (76.6%), Mbire (50.3%) and Nyaminyami (42.7%) agreed that they are willing to participate in wildlife conservation initiatives (Fig 9). However, the majority of the respondents in Hwange district (especially wards close to Victoria Falls town) and in Victoria Falls town disagreed (16.5% and 12.5% respectively) and some strongly disagreed (20.9% and 24.4% respectively), while others remained neutral (30.0% and 30.8% respectively) that they are willing to participate in wildlife conservation initiatives (Fig 9).

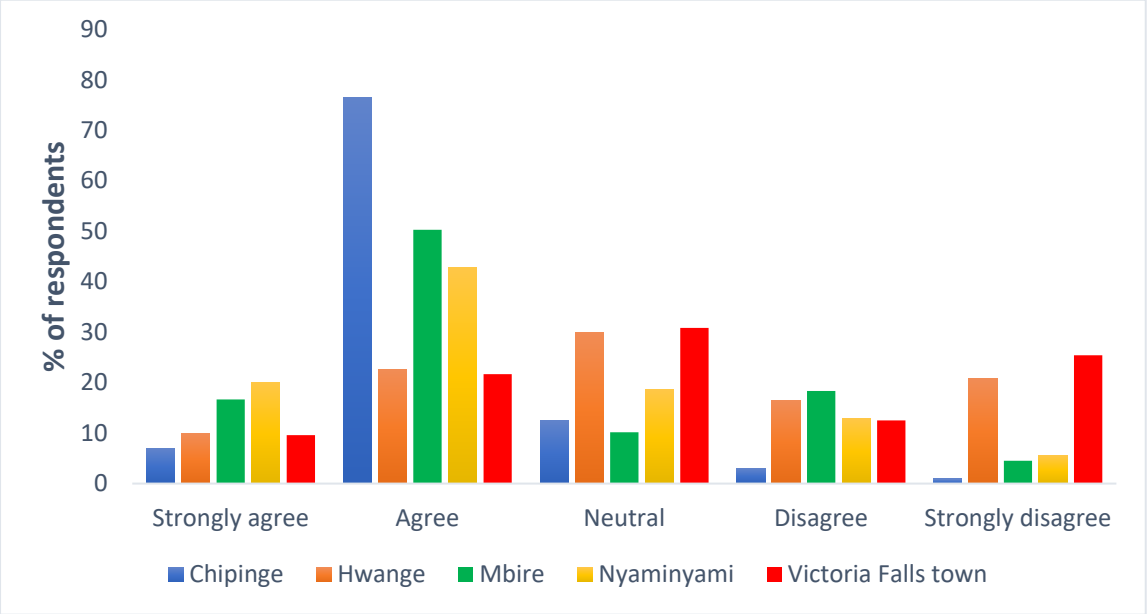

Figure 9. The respondents' willingness to participate in conservation initiatives.

There was a significant difference between the views of male and female respondents on their willingness to participate in conservation initiatives. Significantly more males (48.9%) than females (42.3%) agreed that they are willing to participate in conservation initiatives, while significantly more females (14.2%) than males (10.6%) disagreed that they are willing to participate in conservation initiatives (Fig 10).

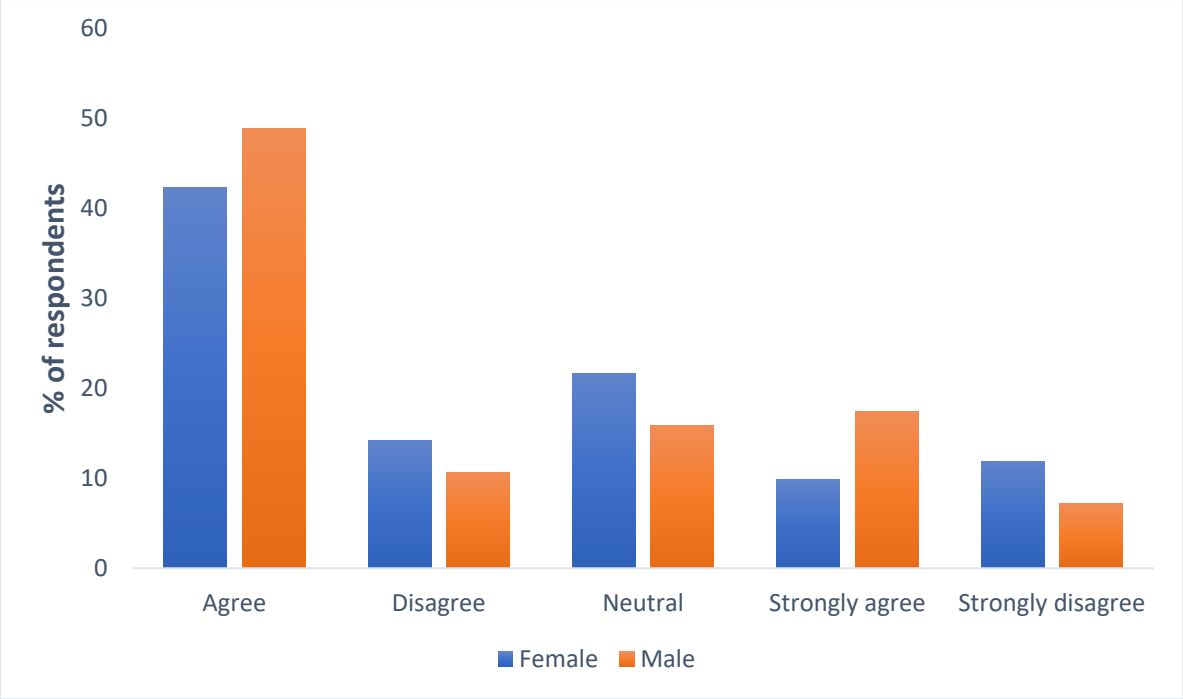

Figure 10. The views of female and male respondents across the study sites on their willingness to participate in conservation initiatives.

The negative attitudes towards wildlife conservation and the unwillingness to participate in conservation initiatives by the respondents in Hwange district (especially the wards close to Victoria Falls town) and Victoria Falls town could be due to the fact that they do not have a CAMPFIRE program and are not receiving any direct benefits from wildlife unlike districts such as Chipinge, Mbire and Nyaminyami where communities are benefitting from CAMPFIRE.

This study has shown that gender plays an important role in perceptions of wildlife conservation. Women participating in our study showed significantly more negative attitudes toward wildlife than men. This could be attributed to the fact that women are disproportionately affected by HWC compared to men as they are involved in activities like guarding crop fields and collecting firewood and water which puts them at risk of wildlife encounters and attacks.

The majority of the respondents across all study sites said that they dislike or strongly dislike lions (Fig 11). However, 23.7% of the respondents in Nyaminyami indicated that they like lions and 9.4% strongly like lions (Fig 11). The majority of the respondents across all study sites said that they dislike or strongly dislike elephants (Fig 12). However, 27.1% of the respondents in Nyaminyami indicated that they like elephants and 12.3% said they strongly like elephants in (Fig 12) and they mentioned benefits from tourism and trophy hunting as reasons for liking elephants.

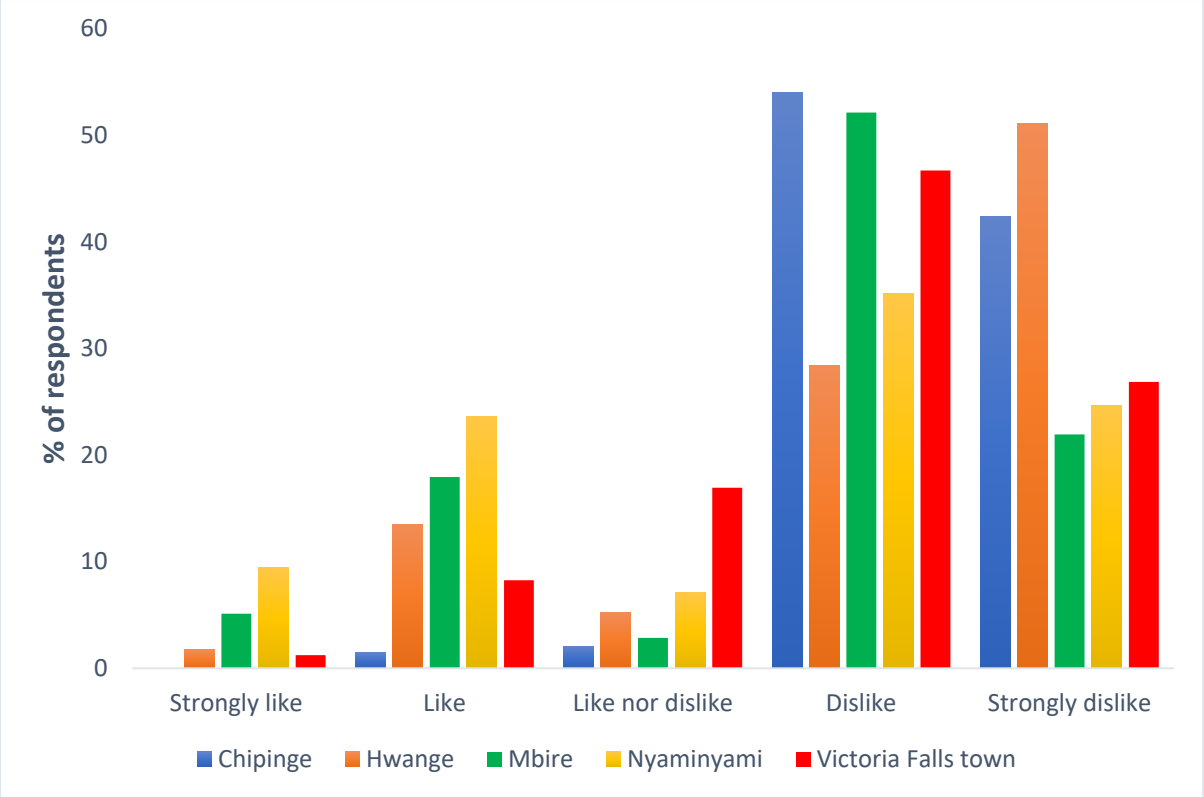

Figure 11. The respondents' attitudes towards lions.

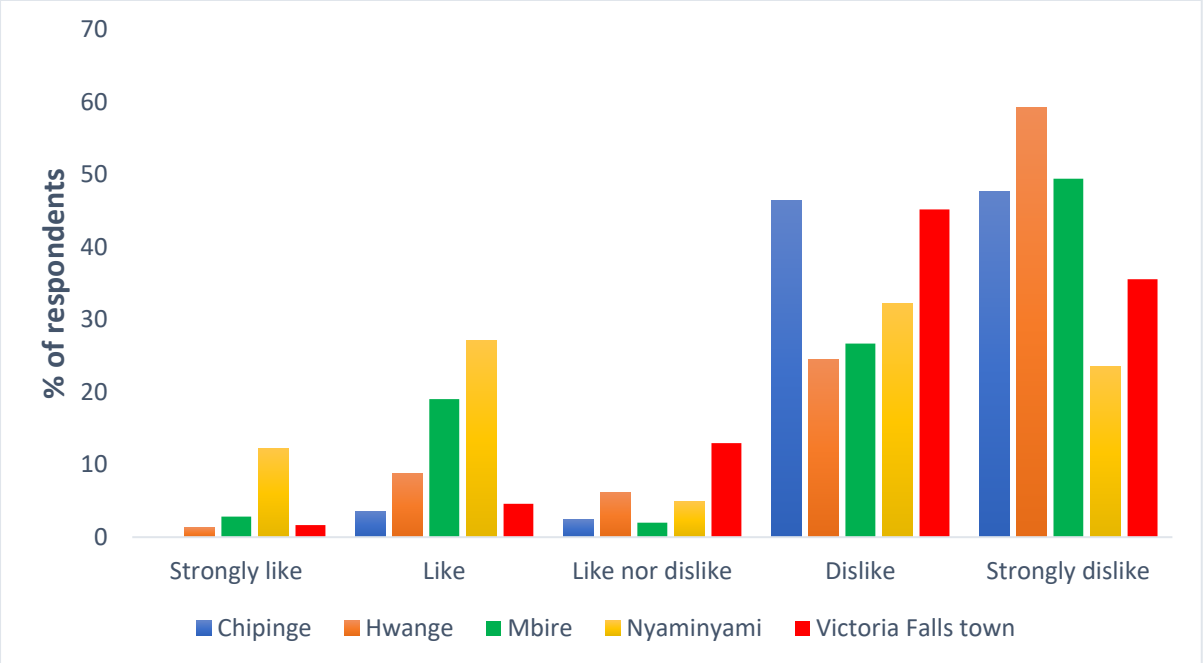

Figure 12. The respondents' attitudes towards elephants.

Although some of the communities that live alongside wildlife realize the importance of wildlife conservation and are willing to participate in conservation initiatives they however do not like dangerous wildlife species like lions and elephants. The reasons

given for the dislike included that elephants kill people and destroy crops and that lions are dangerous and they kill people and livestock.

The majority of the FGD participants from all study sites expressed negative attitudes towards dangerous wildlife species like lions, elephants and crocodiles. They reiterated that they are losing crops and livestock to wildlife and a participant from Maparadze in Chipinge added that that as subsistence farmers they exist one crop failure away from poverty. Their area has very limited livelihood opportunities and with crop failure and livestock attacks, some people are resorting to fish poaching activities in the Save River.

FGD participants expressed frustration that they receive no compensation from the responsible authorities like the RDCs and ZimParks and they suggested that ZimParks and the RDCs should take responsibility for conserving wildlife. In this regard, the majority of FGD participants from all study sites suggested that there should be culling of elephants, hyenas, jackals, baboons, hippopotamus and crocodiles. They reiterated that such a move would reduce HWC as well as safeguarding their livelihoods and protecting their lives.

3.1.3 Overview of human-wildlife conflict

The results of the study showed that respondents across the study sites are experiencing HWC on a regular basis. The incidences of HWC varied across the study sites with some sites like Mbire experiencing higher levels of conflict (83.6% crop raids and 56.4% livestock) compared to others (Fig 13). Crop loss was one of the frequent and problematic experiences felt by communities across the study sites in Chipinge (68.5%), Hwange (71.5%), Mbire (83.6%), Nyaminyami (54%) and Victoria Falls (45.7%). This is followed by livestock loss and then attacks on humans (Fig 13).

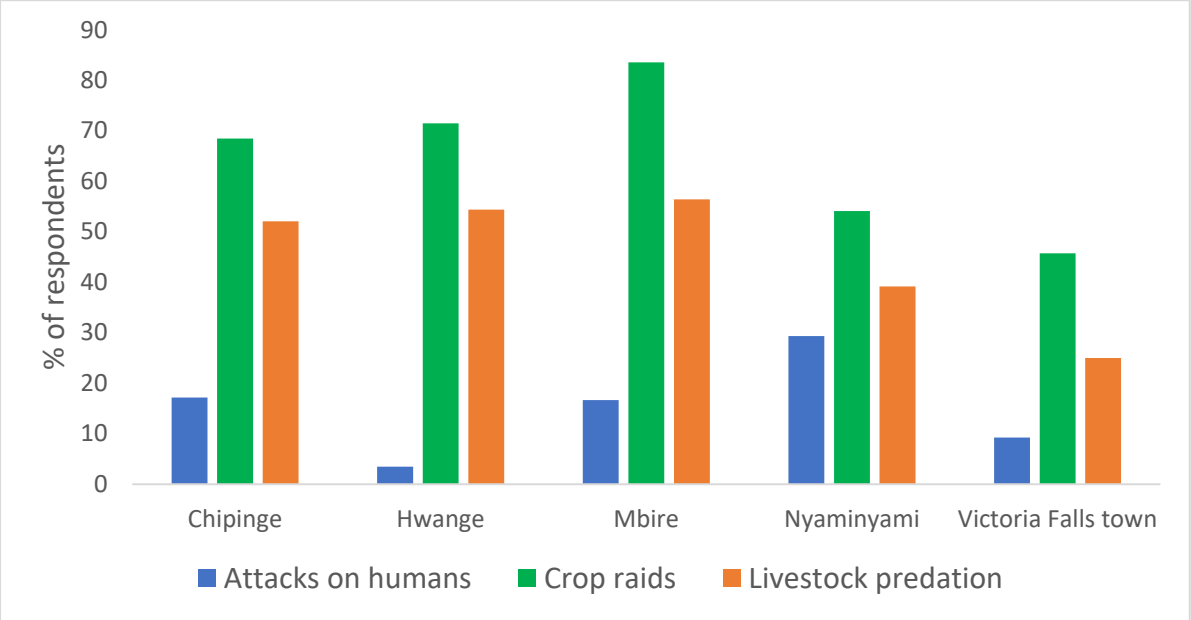

Figure 13. An overview of the human-wildlife conflict incidents across the study sites.

The FGD findings established that all communities living alongside wildlife experience various forms of HWC. However, it was noted that the level and intensity of the conflict varies from community to community. Overall, all the study sites are prone to HWC every year due to their proximity to wildlife areas, wildlife corridors and national parks. FGD participants from the study sites bemoaned the fact that they can hardly plant and harvest without experiencing crop raids. These results demonstrate that HWC is an increasing problem for the communities living alongside wildlife areas and their proximity to wildlife areas makes it difficult to avoid HWC.

3.1.4 Wildlife species causing HWC

Elephants are responsible for most of the attacks on humans across the study sites in Chipinge (49.1%), Hwange (75%), Mbire (42.4%), Nyaminyami (42.6%) and Victoria Falls (59.1%) (Fig 14). Buffalos, crocodiles and lions are also significantly contributing to the attacks on humans. In Nyaminyami, ward 2, the hippopotamuses (19.1%) are also responsible for attacks on humans, especially fishermen in the Gatshe Gatshe fishing camp (Fig 14).

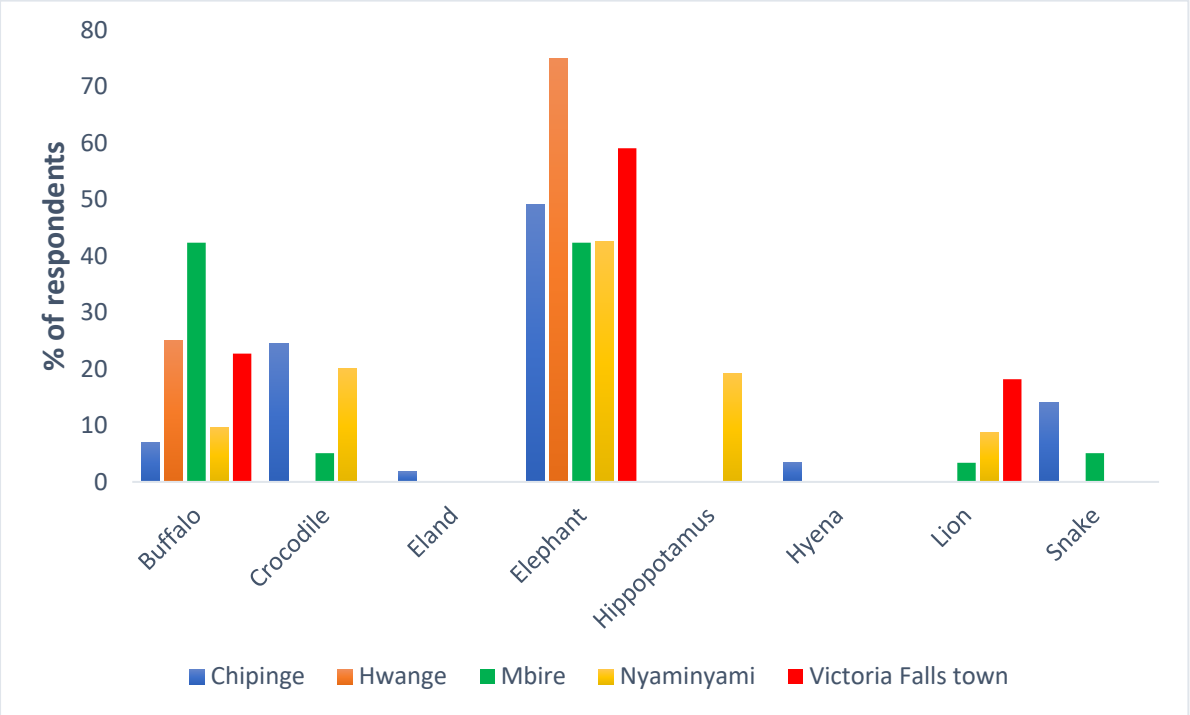

Figure 14. The wildlife species responsible for attacks on humans across the study sites.

Whilst FGD participants from Chiredzi and Kwekwe district mentioned that there are generally very isolated cases of human attacks by wildlife in these areas and they only experience a few injuries caused by hyenas every year. It was also established that every year crocodiles and hippopotamus injure and kill a number of people in Kariba town and Nyaminyami ward 2 (Gatshe Gatshe area) and also along the Angwa River in Mbire and Save River in Chipinge and Chiredzi.

FGD participants in Kariba town, Victoria Falls town and Mbire were particularly concerned by the rate at which people are losing their lives to elephant attacks within their communities. The participants stated that instead of declining, cases of human attacks by elephants are increasing each year. As such they called for urgent intervention from the responsible authorities and stakeholders to reduce loss of life and injuries in their communities. Oftentimes the breadwinners are the ones that get killed or injured leaving the families without a provider. Elephants are contributing the most to crop raiding across all study sites in Chipinge (87.0%), Hwange (96.3%), Mbire (97.3%), Nyaminyami (91.9%) and Victoria Falls (92.5%) (Fig 15).

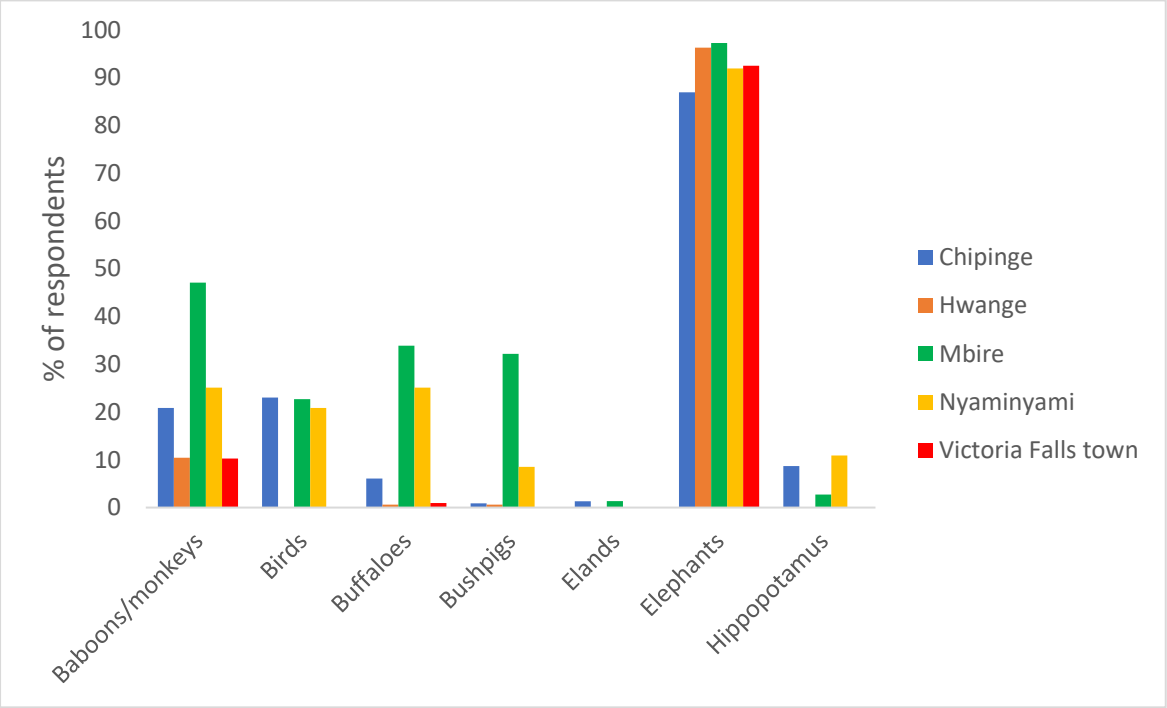

Figure 15. The wildlife species responsible for crop raiding across the study sites.

During FGDs and key informant interviews, participants noted that baboons, monkeys, bushpigs, buffalos and birds are responsible for destroying crops mainly in Nyaminyami ward 3, Mbire, Kwekwe Zibagwe ward 1 and 2, Hwange and Chiredzi. But most participants confirmed that elephants were the main wildlife species responsible for crop losses in the study sites. The participants mentioned that elephants tend to destroy crops during the rainy season which is just before the ripening stage. They went on to say that elephant raids cause households to become food insecure and it goes to show why food insecurity is common in communities across the country that live alongside wildlife.

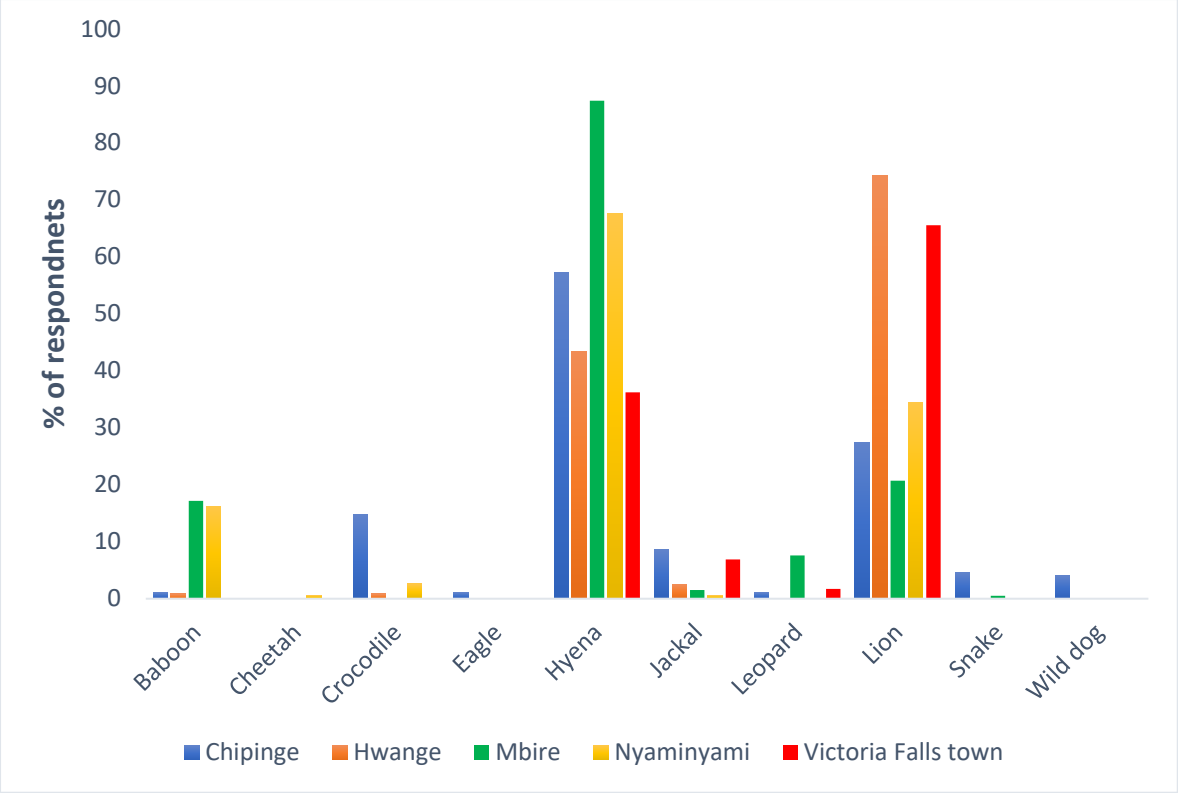

Figure 16. The wildlife species responsible for livestock predation across the study sites.

The majority of respondents in Chipinge (57.1%), Mbire (87.4%) and Nyaminyami (67.5%) lost their livestock to hyenas and in many study sites hyenas are a problem throughout the year. The majority of the respondents in Hwange (74.2%) and Victoria Falls town (65.5%) lost their livestock to lions (Fig 16). Lions and hyenas attack cattle, calves, goats, sheep and donkeys and can attack livestock inside or outside kraals and also in the pastures. Baboons in Mbire (17.2%) and Nyaminyami (16.2%) are also contributing to livestock predation especially of poultry and small livestock and crocodiles are also contributing to livestock predation in Chipinge (14.9%) (Fig 16) and in Chiredzi and Kwekwe (Zibagwe) jackals are also causing conflict within their communities.

3.1.5 Drivers of HWC

(i) Proximity to wildlife areas

One of the major drivers of HWC in the study sites is the proximity of these communities to national parks, conservancies and wildlife areas, for example Chipinge district ward 29 and 30 (Gonarezhou National Park), Hwange District (Hwange National Park) and Chiredzi District (Save Valley Conservancy) (Fig 1). Other study sites like Nyaminyami ward 2 and 3, Kariba town, Victoria Falls town, Kwekwe ward 1 and 2 and Mbire are all located in wildlife areas (Fig 1). Animals from these wildlife areas can easily cross into nearby communities and cause livestock predation and crop raiding and sometimes kill or injure people. During FGDs, participants from all the

study sites underscored the derelict state of fences bordering wildlife areas. Consequently, this makes it easier for wild animals to encroach into communities. Participants in Chipinge district mentioned that during seasons when water levels are low, wild animals easily cross the Save River and move from Gonarezhou National Parks into nearby communities. Therefore, the proximity of these communities to wildlife areas increases their susceptibility to HWC.

(ii) Increase in wildlife population in the study sites

A number of key informants and FGD participants highlighted that owing to increased anti-poaching activities and conservation efforts, the population of wild animals in wildlife areas, national parks and study sites had indeed increased. This trend has also been witnessed in other parts of Zimbabwe – some beyond the focus of this research study. One key informant from Nyangambe Wildlife Area in Chiredzi attributed the HWC to the increase in the population of humans and that humans end up competing with wildlife for limited resources. The majority of the FGD participants believe that the number of wild animals in national parks, wildlife areas and conservancies is increasing to an extent that there might not be enough food for elephants, baboons, lions, buffalos and hyenas in these areas. This then results in these species encroaching into communities in search of food, raiding crops and killing livestock and injuring or killing people. This study showed that wildlife poses a serious threat to human security in most communities that are based close to wildlife areas. FGDs participants in Kariba town were particularly concerned about the increase in the population of baboons as they are now encroaching into communities on a daily basis. They further noted that baboons have become more aggressive towards humans especially women and children.

(iii) Poaching

Poaching of plains game may also be a major driver of HWC in some study sites. Results from the survey carried out in Chipinge indicated that there were high frequencies of sightings of lions, elephants, hyenas and very limited sightings of plains game in the communities. This may suggest that there are now limited populations of plains game in GNP mainly as a result of poaching by the communities bordering GNP. The decimation of plains game may then drive the predators to look for food outside of the Protected Area which results in increasing HWC. During FGDs, some participants concurred that there was some level of poaching in the wildlife areas by community members. Some FGD participants in Mahenye, Chipinge explained that some of the poachers would first go into Mozambique to reach GNP. They would also transport the poached meat through the same route and barter trade it for a bag of mealie meal or other items. In Kariba, FGD participants and key informants mentioned that HWC there is caused by poachers from Zambia who chase, shoot and disturb wildlife which drives lions and elephants closer to communities. In Nyangambe ward 23, Chiredzi, key informants also mentioned that poaching in Nyangambe Wildlife Area and Save Valley Conservancy is also fuelling HWC in communities adjacent to these wildlife areas.

(iv) Expansion of human settlements and crop fields into wildlife areas

Expansion of crop fields into wildlife areas and the clearing of land for agricultural and residential uses was cited as one of the major factors fuelling HWC. The population of humans in these areas has been increasing over the last few decades leading to encroachment of humans into wildlife areas due to the increased demand for land and resources. Some of the FGD participants confessed that they have settled in wildlife areas. During the FGDs, some participants from rural areas expressed concern over how some village heads sometimes allocate crop fields in wildlife corridors to new families. Key informants from Kariba town and Victoria Falls town concurred that the taking up of land in wildlife corridors (Fig 17) for residential and industrial use is the main cause of HWC.

Other factors that come with human settlement also aggravates HWC. For instance, the study established that the cutting down of trees for firewood and resettlement in forests also contributes to conflict. Also, with deforestation and resettlement, wild animals need to come closer to communities to search for water, pastures and food which heightens HWC. One key informant from Kwekwe (Zibagwe, ward 1) expressed concern over how mining activities were triggering the encroachment of elephants into communities due to the clearing of land.

Figure 17. Elephants passing through a wildlife corridor in Kariba town in July 2022, as residents stand by and watch. Photo: [REDACTED]

(v) Limited grazing areas

In most of the study sites FGD participants and key informants highlighted that they have very limited grazing area due to the increase in human population which has

resulted in the expansion of human settlements and crop fields into what used to be grazing areas. Due to this encroachment into wildlife areas, their livestock is prone to predator attacks, particularly during the summer season when water and food is scarce. During FGDs, some participants in Chipinge indicated that their specific wards have inadequate pastures and they instead bring their livestock to graze in the forests which contain wildlife such as lions, jackals and hyenas. They further indicated that when they see predators like lion, jackal or hyena, they have to abandon their livestock to protect themselves. The lack of grazing areas may also be indicative of the absence of land use plans or the lack of enforcement of these plans in the communities.

(vi) Limited water sources for people, livestock and wildlife

This study found that there are limited water sources for people, livestock and wildlife in all the study sites. To support this point, one key informant from Mbire ward 2 observed that HWC also emanates from limited water sources as human beings and wildlife often share the same water sources. FGD participants in the Masoka area in Mbire revealed that they receive low rainfall which results in the rapid drying up of water sources. The participants also bemoaned the fact that they do not have boreholes in their areas and as a result, they share water from the Angwa River with wildlife and livestock. This trend seems to be prevalent in various communities as it was reiterated in several FGDs across the study sites. During an FGD in Hwange some participants from ward 17 disclosed that they do not have rivers and therefore one borehole is used for household use, for livestock and gardening, and this results in water rationing among households. FGD participants from Nabushome village ward 17, Hwange mentioned that there is lack of water for their livestock so they take the cattle to Gwayi River but the risk of crocodile attacks is very high there**.** In Chipinge and Chiredzi ward 1 some FGD participants noted that local streams and swampy areas were drying up leaving livestock vulnerable to water scarcity and forcing them to travel long distances to drink water in the Save River where they are at risk of crocodile attacks. The silting of rivers and dams is an emerging challenge noted by FGD participants in Zibagwe ward 1 and 2 as well as key informants in Zibagwe ward 1 in Kwekwe. The participants noted that siltation is reducing the available drinking water for humans and livestock and increasing water insecurity.

(vii) Poorly constructed livestock shelter

Poorly built kraals are a common sight among livestock-owning households in Chipinge, Chiredzi, Mbire, Kwekwe, Hwange and Nyaminyami. Some of these kraals are built with branches and others are built with poles that are poorly spaced (Fig 18). These poorly constructed structures mean that predators can easily scare the livestock out of the kraals and kill them. During FGDs, participants highlighted that most people did not know how to construct good kraals that can protect their livestock from predators. They further highlighted that they also have challenges in accessing fence and poles for kraal construction and because of those challenges, they end up erecting poor structures which would expose their livestock to predation by hyenas, lions, and jackals. Most FGD participants in communities that live alongside wildlife do not

reinforce their kraals or adopt elevated kraals for goats. This study found that communities that use elevated kraals for goats have a significantly reduced rate of predation of goats by hyenas. Some FGD participants in Nyaminyami ward 3, mentioned that livestock predation had reduced due to people adopting the use of predator-proof mobile bomas.

Figure 18. A poorly constructed and weak livestock kraal in Nyaminyami ward 3. Photo: [REDACTED]

(viii) Fluctuations in River flows

One of the drivers of HWC mentioned in study sites like Kwekwe, Hwange, Mbire, Chiredzi and Chipinge is the fluctuation of the river flow of Munyati, Gwayi, Angwa and Save rivers respectively. During FGDs, participants in Chipinge highlighted a connection between river flow and predator attacks, during the rainy season, when the river flow is at its peak, predator attacks are rare (Fig 19) but during the dry season when the river flow is low predator attacks increase. Predators such as hyenas and jackals are able to cross the rivers when they are low and attack livestock. During the dry season herders also move their livestock to greener pastures by the riverbed and this increases the likelihood of crocodile attacks.

Figure 19. The flooded Save River in Chipinge, during the rainy season. Photo [REDACTED]

(ix) Lack of meaningful benefits from CAMPFIRE

One of the drivers of HWC is the combination of a lack of meaningful benefits from wildlife for communities living alongside wildlife as well as costs incurred from HWC. The FGD participants in Kariba town, Victoria Falls town and Kwekwe bemoaned the fact that they do not have CAMPFIRE programs and do not benefit from wildlife resources. Concerns were raised as to why they do not benefit from wildlife in the way that other communities living adjacent to wildlife areas do. FGD participants in areas without CAMPFIRE programs expressed a negative attitude towards the conservation of wildlife. They insisted that responsible authorities should cull some wildlife species particularly elephants, baboons, hyenas and crocodiles. One key informant from Kwekwe (Zibagwe ward 1) suggested that the responsible authorities should plough back the proceeds from wildlife into the affected communities to improve tolerance.

During FGDs, some participants pointed out that Mahenye ward 30 in Chipinge was one of the first areas in Zimbabwe to establish a functional CAMPFIRE program that resulted in tangible benefits to the community. However, there was a huge drop in community benefits following the exit of USAID support in 2003. One key informant pointed out that when community members consider the cost of living with wildlife (crop raids, livestock predation, injury or death to humans) versus the lack of meaningful benefits to the community, some end up using retaliatory strategies such as poisoning, trapping, poaching and destroying wildlife habitats. As such, the lack of

meaningful benefits from CAMPFIRE and Conservancy projects can escalate HWC. Some of the FGD participants in these study sites noted with concern that wounded animals (from trophy hunting) in the CAMPFIRE areas, especially elephants, are prone to attacking and killing people.

3.2 Objective 2: The impacts of human-wildlife conflict on livelihoods.

Participants across all study sites expressed concern regarding access to social services in their respective communities. It is evidently clear from the findings of this study that access to education and health facilities is also greatly impacted by the presence of wildlife species like elephants, lions and buffalos around human settlements.

3.2.1 Access to Social Services

Results of this study showed that the majority of respondents across the study sites live more than 3 km away from the nearest health facility with a significant number living more than 5 km away from the nearest health facility (Fig 20).

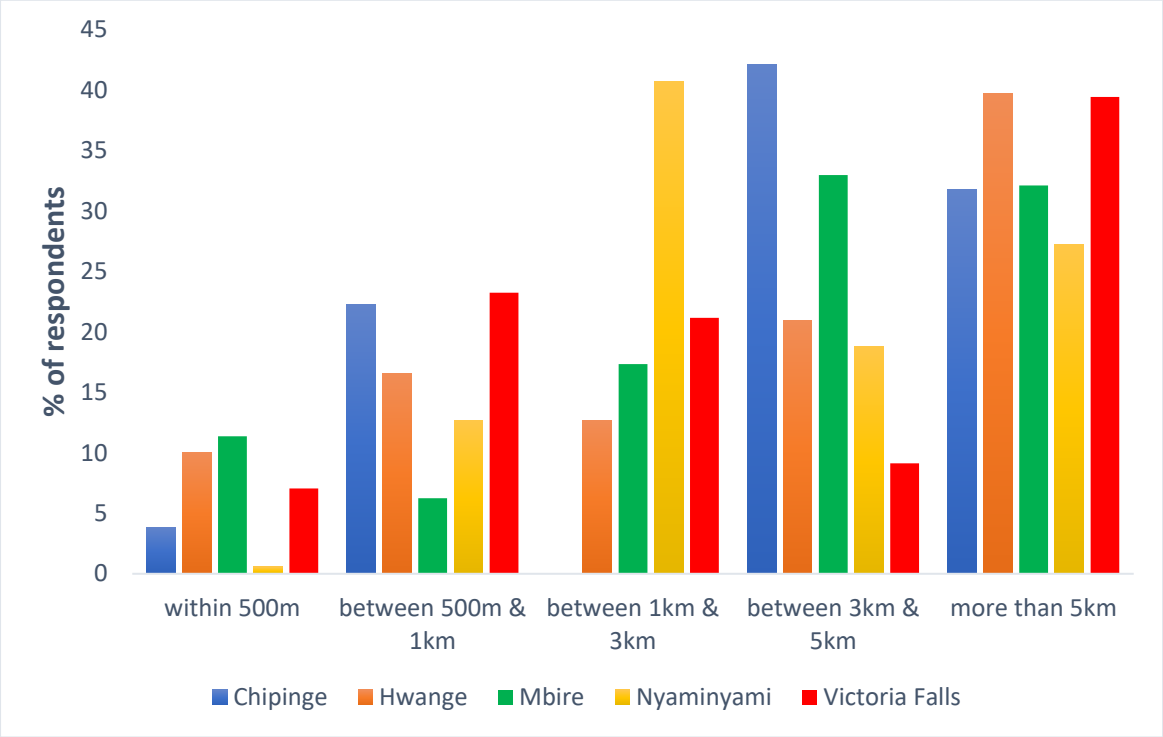

Figure 20. Distance of the interviewed households to the nearest health facility across the study sites.

FGD participants across the study sites stated that access to health facilities is a major challenge and this is consistent with data obtained in key informant interviews. In a key informant interview, a headman from Kwekwe (Zibagwe, ward 2) explained that people from ward 2 walk 14 kms to access the nearest clinic at Sebakwe. The situation is made worse by the fact that there is only one vehicle to transport people in the area and it leaves in the early hours of the morning. The location and availability of health

facilities in these study sites affects the right to health (access, availability – distance) and often a sick and frail person has no other option than to walk long distances to get treatment. This is particularly a challenge for pregnant women, the elderly and the young as they must walk long distances to access health facilities. Through these long and challenging journeys people also have an increased risk of encountering wildlife. In Nyaminyami ward 3, participants of an FGD highlighted that they risk encountering elephants on the walk to access their nearest clinic in Mola.

The majority of the interviewed households in Hwange, Nyaminyami and Victoria are within 3km of the nearest primary school while the majority of the households in Chipinge and Mbire are more than 3 km away from the nearest primary school (Fig 21).

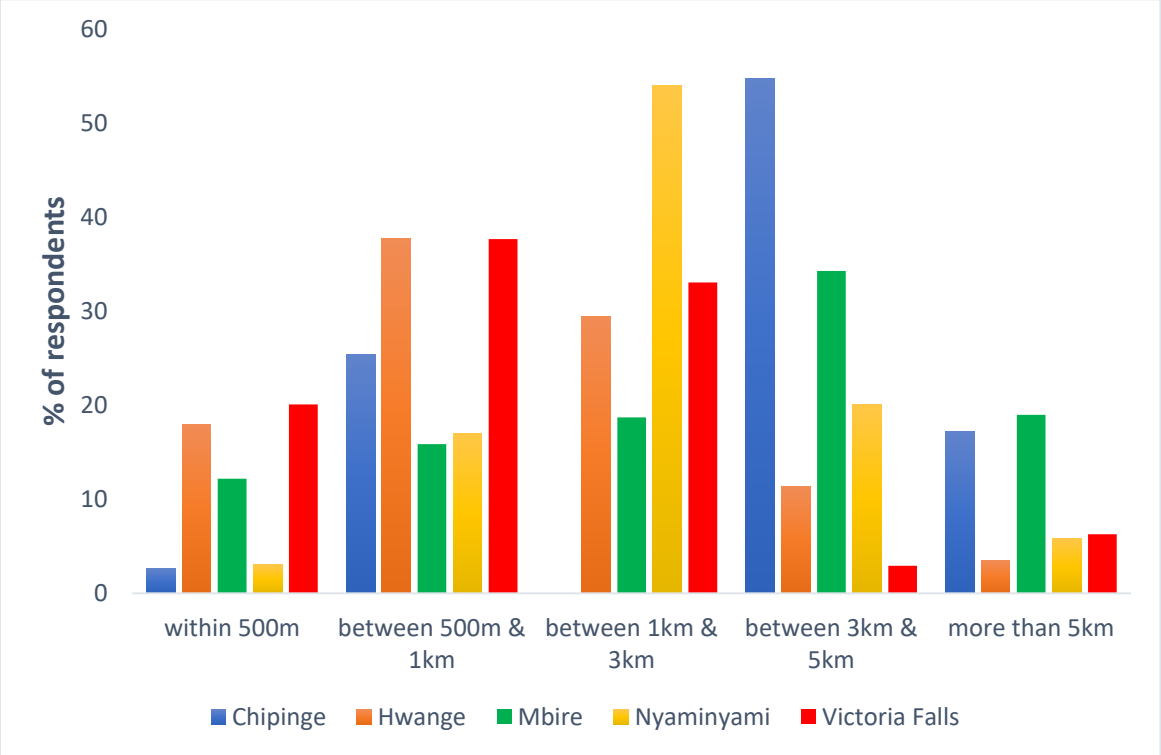

Figure 21. Distance of the interviewed households to the nearest primary school across the study sites.

FGDs participants in Mbire, Masoka (ward 11) and Angwa (ward 2) areas bemoaned the distance between their households and educational facilities. They underscored that primary and secondary schools are located far away from their households. As such, school children walk for 6 to 10 kms to and from schools through wildlife populated forests and paths. In Chipinge, participants in wards 29 and 30 highlighted that although some of the schools are near, children have to pass through forests they are likely to encounter elephants. These elephants endanger their lives and then affects mobility and safety, especially of young school-going children.

To reduce the risks of being attacked by elephants and buffalos – students in Nyaminyami and Mbire walk to school school after sunrise. The majority of the FGD participants in Mbire and Chipinge highlighted that as a precautionary measure they have resorted to escorting their young children to school. In some severe cases, children only attend school out of the farming season because wild animals, particularly elephants, roam the communities during the farming seasons thus endangering the lives of community members and their young children. In Hwange ward 2, 16, 17 participants noted that ECD pupils sometimes fail to attend school due to the presence of elephants within their communities.

In Mbire during the rainy season children often have to stop their schooling, this is because on their way to school they need to cross the Angwa River which is always flooded and populated with crocodiles. These reflections show that access to educational and health services is a major issue for most communities living alongside wildlife in Zimbabwe.

3.2.2 Main source of livelihoods

The sources of livelihoods varied across the study sites. The main livelihood source for most households across the study sites is crop farming; Chipinge (83.7%), Hwange (39.1%), Mbire (50%), Nyaminyami (42.2%) and Victoria Falls town (39.8%) (Fig 22). Fishing is also a main source of livelihood for some of the respondents in Nyaminyami (37.7%), while livestock is a main source of livelihood for some of the respondents in Mbire (47.7%). The majority of the respondents across the study sites have very limited livelihood alternatives outside of crop farming and livestock rearing (Fig 22) although arts and crafts and casual labor are significant sources of livelihoods for respondents in Hwange (5.2% and 20.0% respectively) and Victoria Falls town (10.0% and 19.9% respectively).

The FGD participants across the study sites revealed that many families in Nyaminyami, Chiredzi, Mbire, Chipinge, Kwekwe and Hwange rely on crop farming for their livelihoods. Most of the study areas are in natural region IV and V which receive very low rainfall and require drought tolerant seed varieties and therefore households mainly grow maize, sorghum and other small grains for subsistence.

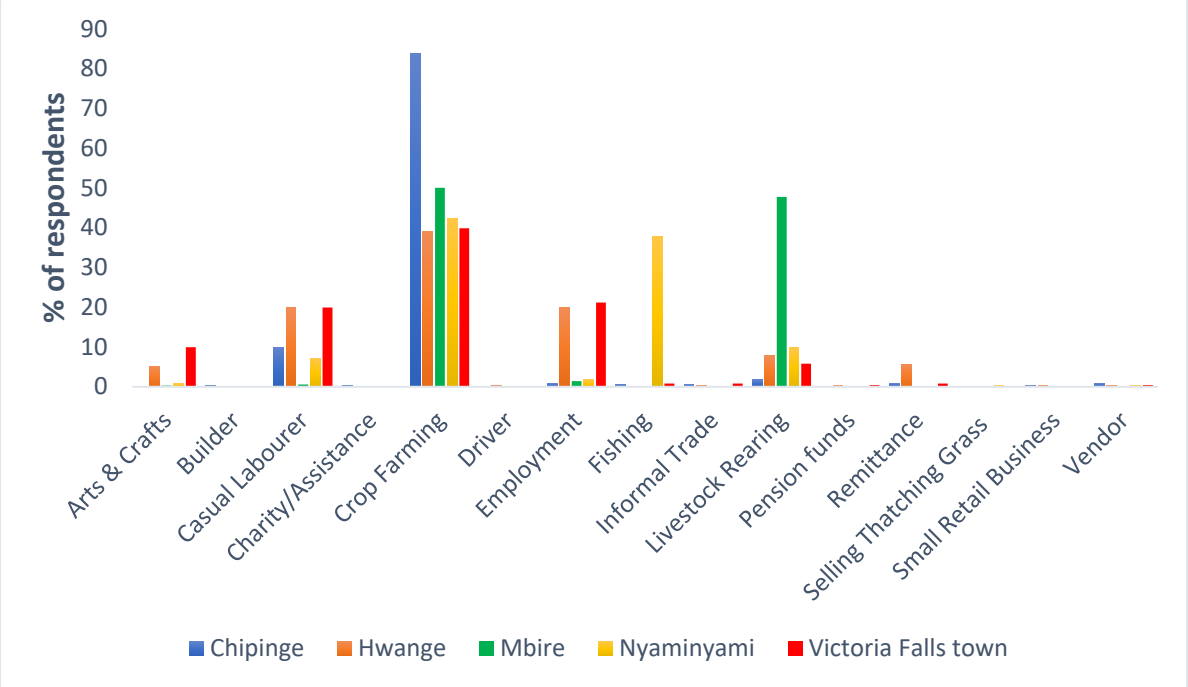

Figure 22. The main sources of livelihood for interviewed households across the study sites.

Key informants from all study sites reiterated that they rely on rain-fed subsistence agriculture because the water sources for irrigation have dried up. This has also been compounded by siltation in the few available dams. The FGDs demonstrated that some of the communities in these study sites engage in other sources of livelihoods like gardening, however, climate change effects have been cited as a major challenge. The study established that there are serious water challenges in much of the study sites. In Mbire they hardly have any boreholes or rivers which makes it impossible for them to engage in irrigation activities. In Kariba town and the Gatshe-Gatshe area of Nyaminyami, FGD participants highlighted that they survive mostly on fishing.

3.2.3 Main source of household income

The sources of income varied across the study sites. The major source of a household's income in Chipinge (54.6%) and Mbire (79.9%) is sale of agricultural produce (Fig. 23). The main source of income for households in Hwange (34.1%) is casual labor on farms belonging to other villagers while in Victoria Falls town the main source of income is casual labor in the town (31.9%) and in surrounding areas (31.9%) (Fig. 23). The main source of income for households in Nyaminyami (45.6%) is the sale of fish (Fig. 23).

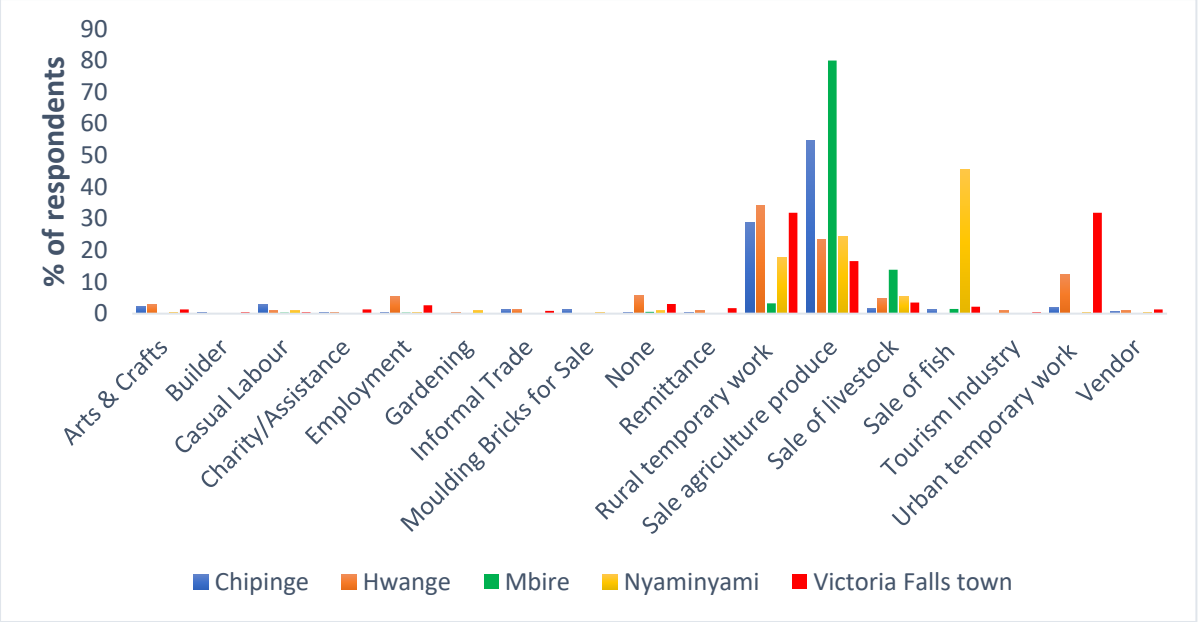

Figure 23. The main sources of household income for interviewed households across the study sites.

The household survey results are consistent with the FGDs and the key informant interviews carried out in communities living alongside wildlife in Zimbabwe. During FGDs, participants highlighted that their major source of income is the sale of agricultural produce as well as livestock. Other than these two major sources of income, some of the FGD participants mentioned that they survive on casual labor, piece jobs, illegal artisanal mining, brick molding, cutting grass for sale and buying and selling (informal trading). Some FGD participants from Mahenye in Chipinge revealed that they earn some minimal income from making and selling reed mats. In Gatshe Gatshe area (Nyaminyami, ward 2) and Kariba town, FGD participants highlighted that they earn household income mainly from selling fish and *kapenta* and also buying and selling (informal trade).

Overall, these results indicate that crop raiding by wildlife, livestock predation and the effects of climate change greatly impact a households' sources of income. This also contributes to their vulnerability and the precariousness of their existence. Participants queried why the responsible authorities are not coming up with sustainable solutions to deal with HWC as it negatively affects their livelihoods and food security.

3.2.4 Threats to livelihoods

Results from this study showed that the major threat to respondents' livelihoods in Mbire (76.6%) is crop raids while in Chipinge its crop raids (44.7%) and droughts (41.1%). In Hwange the major threat to respondents' livelihoods is crop raids (38.3%) and livestock predation (30%). The major threats to respondents' livelihoods in Nyaminyami and Victoria Falls town include crops raids, drought, livestock depredation, lack of employment and poor economy (Fig 24).

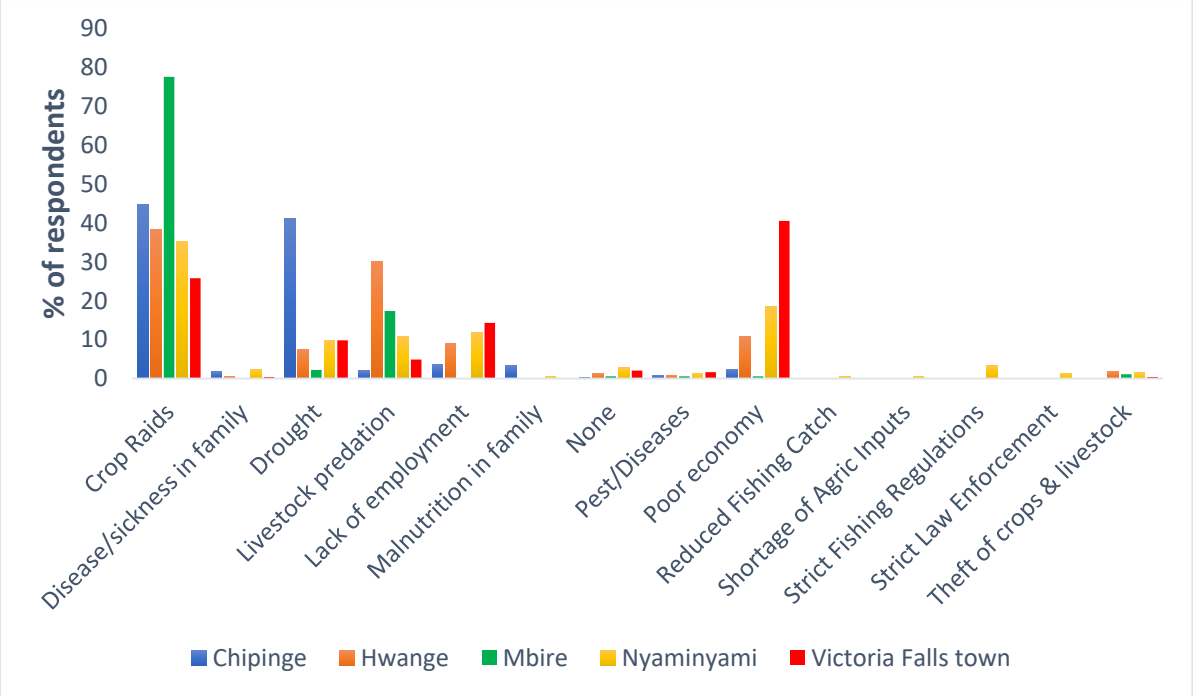

Figure 24. The threats to livelihoods of interviewed households across the study sites.

These results were confirmed by key informants and FGD participants. During the FGDs in Nyaminyami ward 3, Chiredzi, Mbire, Hwange, Kwekwe and Chipinge participants highlighted that crop raids, droughts and predation on livestock are major threats to their livelihoods. This is because communities in all districts except for Nyaminyami ward 2, Kariba town and Victoria Falls town identify farming as their major source of household income. FGD participants across all study sites disclosed crop raiding as a major threat to their livelihoods. Crop raiding, mainly by elephants, buffalos, bushpigs and baboons, results in lower yields and increases food insecurity in all study sites. The FGD participants also noted that when the crops are reaching ripening stage, a variety of wildlife species encroach into fields and raid the crops. Other animals like kudus were also cited as a problem in Kwekwe ward 1 and 2.

FGD participants in Gatshe Gatshe (Nyaminyami ward 2) and Kariba town mentioned that crocodiles and hippopotamus in Lake Kariba pose a threat to people's livelihoods. In these two study sites several fishermen have lost their lives as a result of crocodile and hippopotamus attacks. In Kariba town, many FGD participants complained that their movement within their communities is limited due to the presence of wildlife. Their livelihoods are affected because residents are forced to be indoors by 6pm or risk being attacked by elephants.

Another cause of concern that was reiterated across the study areas was the impact of climate change. One informant from Mbire reported that climate change has impacted negatively on their households' sources of income due to the limited water sources which results in competition between humans, their livestock, and wildlife. The rains are erratic and sometimes not sufficient to support growth of crops. Taken

together, all these threats affect livelihoods and food security at the household level. FGD participants and key informants in all wards in Chiredzi, Chipinge, Nyaminyami, Hwange and Mbire revealed that their areas are very dry (semi-arid). One key informant from Hwange ward 17 highlighted that communities living adjacent to wildlife are located in natural region IV and V, which are drought prone areas which is a major impediment to agrarian driven livelihood activities. As such, FGD participants from Nyaminyami ward 3 highlighted that growing traditional crops is no longer viable due to the changing weather patterns. In response and in seeking to enhance their chances of getting better yields, communities are now growing drought tolerant crops such as millet and sorghum.

The study findings show that livestock predation is prevalent in Hwange, Chipinge, Chiredzi, Mbire, Kwekwe and Nyaminyami. The location of these communities adjacent to wildlife areas makes them very susceptible to livestock predation by wild animals. One of the FGD participants in Hwange mentioned that wild animals like hyenas come from the game park and kill their goats and cattle. Wards located adjacent to wildlife areas like Mbire and Nyaminyami also lose livestock to predation by hyenas, jackals, lions and crocodiles. One FGD participant in Kwekwe (Zibagwe ward 2) highlighted that jackals even attack their goats during broad daylight. The findings confirm that droughts, livestock predation and crop raids are major obstacles to the respondents' livelihoods. If the communities' crops escape drought, then the crops are still at risk of raids from elephants, bushpigs, baboons and buffalos. It is a challenging and precarious position for communities to be in.

3.2.5 Impact of HWC on food security

Results from this study show that HWC has a negative impact on household food security. More than 96% of respondents across all study sites indicated that crop raids resulted in food shortages for their households. Crop raiding by elephants and other wildlife species damages maize and other crops and results in poor crop yields. Poor yields mean that there is decreased food security among the farmers and insufficient food for their families (Fig 25). Since most farmers in the study sites rely on the selling of agricultural produce to raise incomes (see Fig 23 above), the destruction of crops through HWC suggests that the income from crops would also be drastically reduced and they might incur debts or fail to pay off existing debts (Fig 25).

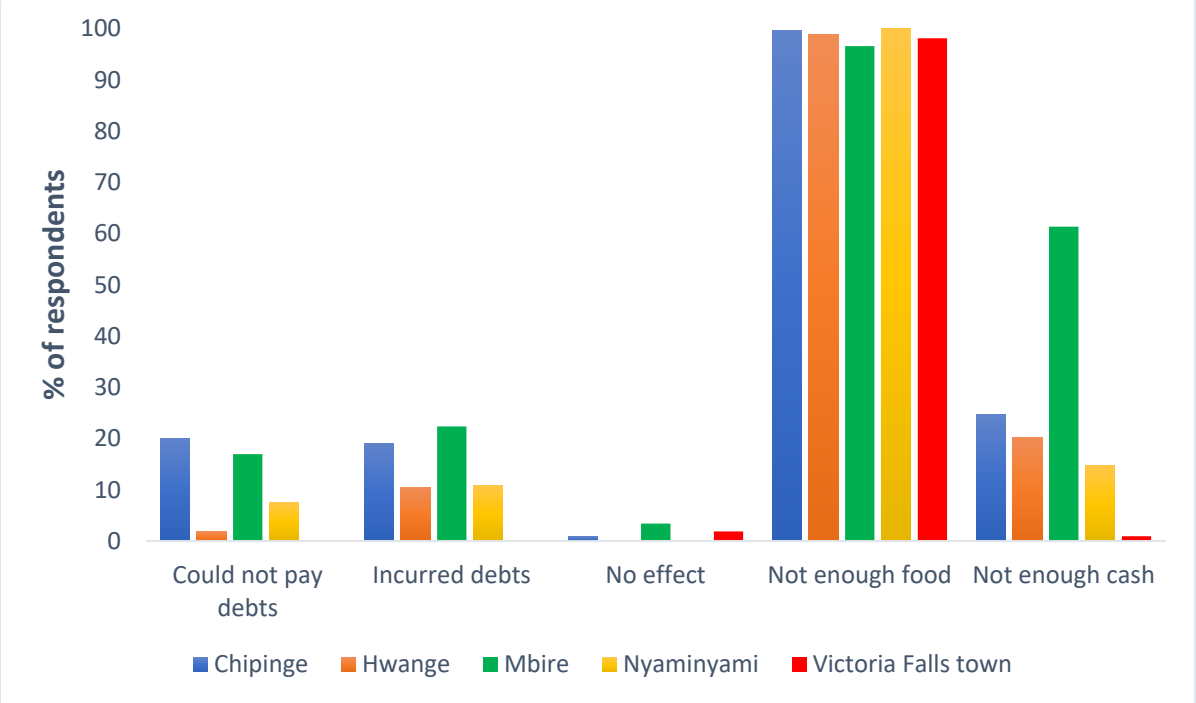

Figure 25. Effect of crop raids on livelihoods of interviewed households across the study sites.

This study revealed that the food security situation in the communities living alongside wildlife in Zimbabwe is extremely precarious, which leaves many households food insecure and hunger stricken. During FGDs, participants highlighted that once their crops are raided by wildlife, they become food insecure because most of the time the animals destroy everything. Some FGDs participants in the Masoka area, Mbire mentioned that often elephants destroy all their crops in the fields as well as in the granaries. Any shock to crop yields through crop raiding worsens the plight of the households and some participants stressed that they have reduced their food portions with some resorting to eating only one meal a day.

Other households in the study sites rear poultry, cattle, goats and other domestic animals. These livestock provide a source of livelihood and income for the households in many of these study sites. However, respondents indicated that although they do livestock production, they also suffer losses due to HWC. FGD participants in Hwange, Mbire, Nyaminyami, Chiredzi, Chipinge and Kwekwe also highlighted the gravity of HWC on their livestock production. One of the FGD participants in Nyaminyami ward 3 mentioned that most households lose goats and cattle to predation by hyenas and lions. Another FGD participant in Chiredzi ward 1 described when lions attack a kraal sometimes they kill livestock but only eat one. Communities in Mbire, Hwange, Chiredzi, Chipinge and Kwekwe also complained about crocodiles that attack their livestock along the major rivers namely, Angwa, Gwayi, Save and Munyati respectively. Most households living along these major rivers are losing livestock to these predators and this leads to food insecurity. One of the study's main findings is that food security in the study sites is adversely affected by HWC.

3.3 Objective 3: Mitigation strategies used by the communities to address HWC.

3.3.1 Current mitigation against crop damage

FGDs established that communities living alongside wildlife are using a number of mitigating strategies to reduce crop raids by elephants, bushpigs, buffalos, kudus, monkeys and baboons. The main mitigation strategies that are being implemented include but are not limited to fencing, use of scare crows, planting chilli around fields (chilli produces a scent which repels elephants, as such, they are deterred from encroaching into crop fields), use of reflectors, use of lights, use of dogs to chase baboons, making noise, beating tins/drums, and guarding the fields (day and night). In Mbire ward 11 and ward 2, Nyaminyami ward 3 and Chipinge, FGD participants highlighted that they sometimes use chilli bombs, chilli strings and burning elephant dung with chilli to scare away elephants. The use of chilli was also confirmed by key informants in these areas.

The respondents in Mbire are using various methods like guarding crop fields, making noise, putting up fires, throwing stones, using chilli peppers and using flashlights to protect their fields against crop raiding wildlife (Fig 26). While some of the respondents in Chipinge are not taking any action to protect their fields (34.4%), others are fencing (34.4%) and guarding their crop fields (26.3%) (Fig 26). A significant number of the respondents in Hwange (53.4%), Nyaminyami (42.8%) and Victoria Falls town (43.6%) are not taking any action to protect their fields against wild animals (Fig 26).

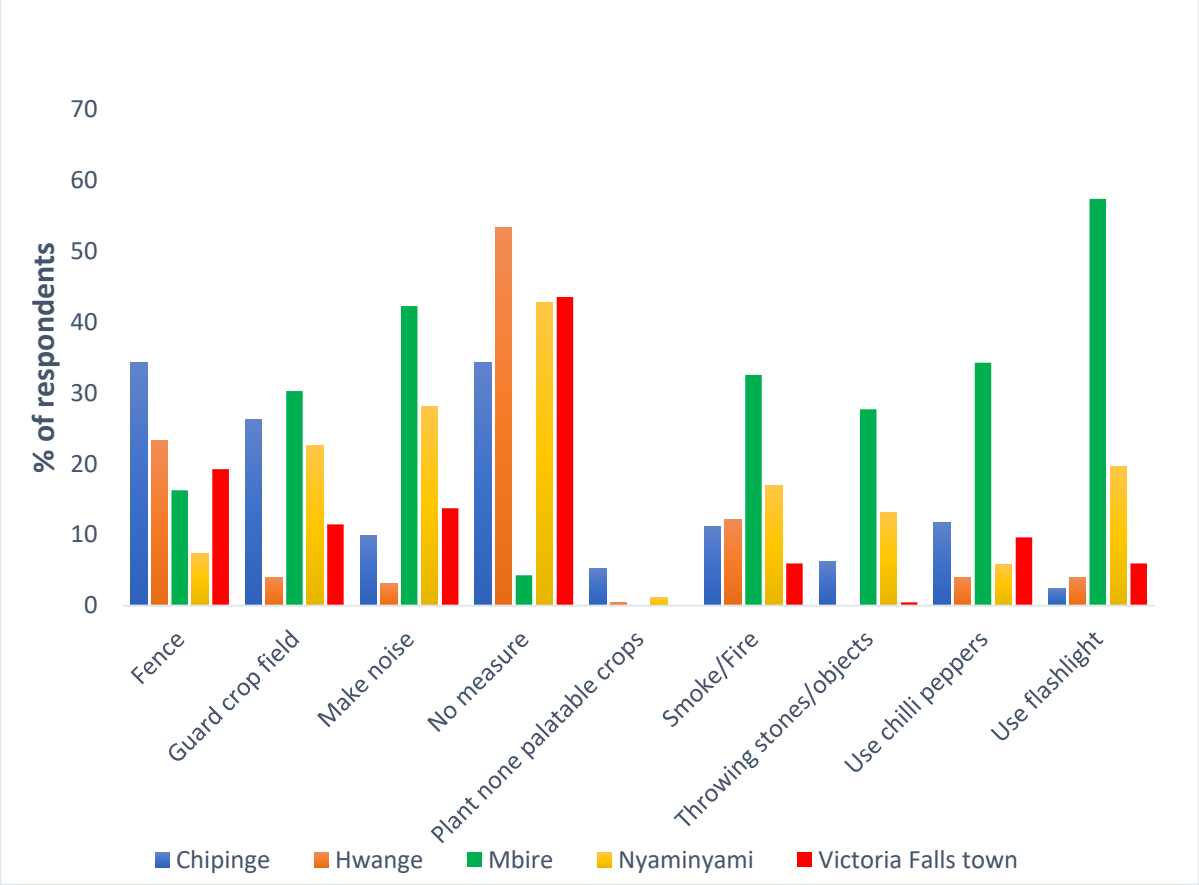

Figure 26. The current mitigation measures used by households across the study sites to reduce crop raids by elephants and other wildlife.

In some study sites, like Kariba, Hwange and Victoria Falls, FGD participants noted that they do not have a localized method to get rid of elephants because they are scary and can break any type of fence. However, FGD participants from Nyaminyami ward 2 (Gatshe Gatshe area) applauded the efforts by responsible authorities and stakeholders in the erection of an energized fence. They highlighted that since the installation of the solar powered fence, crop raids by wild animals have generally decreased. Some of the strategies being used by these communities indeed come with some associated risks (human insecurity). Participants in some study areas mentioned that sounding drums to scare elephants is still risky because elephants can keep advancing even when they hear the sound of drums, consequently endangering their lives. Some FGD participants in Chipinge felt hopeless in the face of wildlife encroachment into communities. They strongly felt that it was better to be safe than to try and protect their fields and end up dead or injured.

3.3.2 Current mitigation against livestock predation

Kraaling livestock is the main mitigation measure against livestock attacks by wild animals that respondents in Chipinge (68.1%), Hwange (70.1%), Mbire (79.8%) and Nyaminyami (84.7%) use (Fig 27). Herding of livestock is mainly being used in Mbire (62.7%). A significant number of respondents in Chipinge (28.6%) and Mbire (24.3%) also fence off their livestock enclosures to prevent livestock predation (Fig 27).

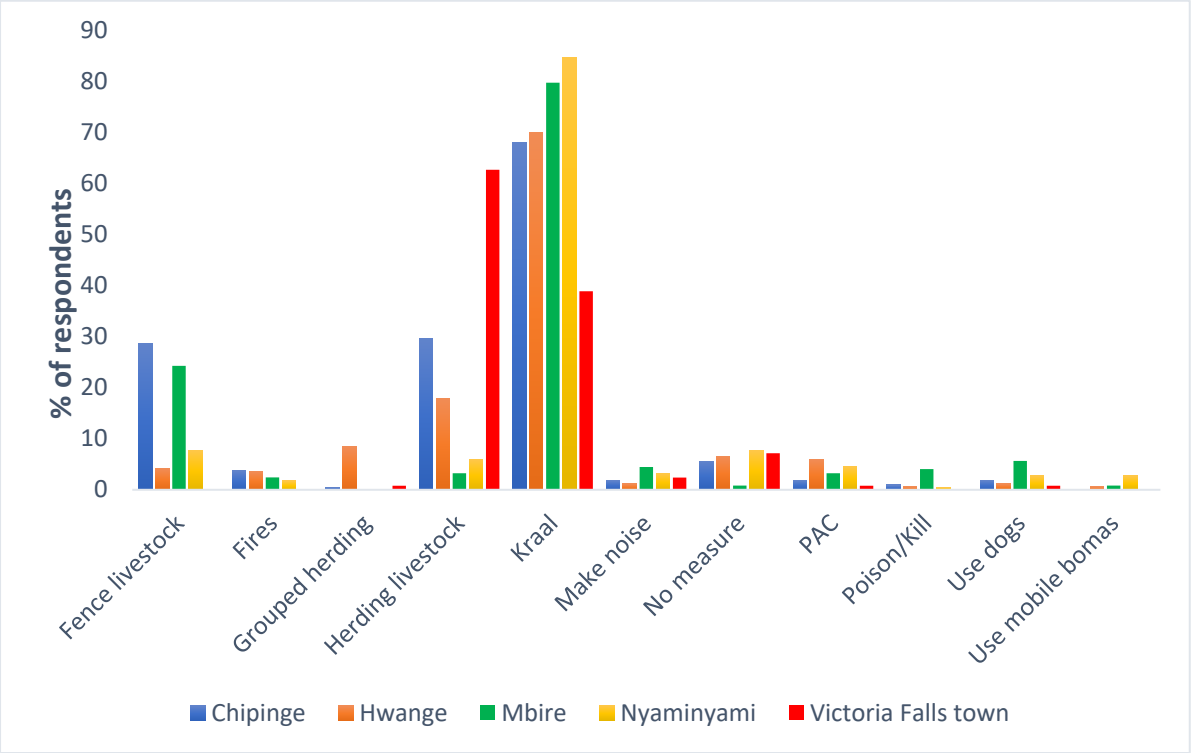

Figure 27. The current mitigation measures used by households across the study sites to reduce livestock predation by lions and hyenas.

The FGDs showed that communities in all study sites use several mitigation measures to avoid livestock predation by carnivores such as hyenas, lions and jackals. Kraaling livestock is one of the main strategies being used by communities across all study sites to prevent livestock attacks. Other mitigation strategies used by communities is the reinforcement of kraals by putting strong poles and thorns around them, as well as the use of mobile bomas (donated by Wildlife Conservation Action) in Nyaminyami ward 3, the herding of livestock and making fires near kraals during the night.

Some participants in Nyaminyami were critical about several of the mitigation measures being implemented in their communities. They stressed that the measures sometimes help, but do not really solve the problem of HWC. FGD participants in Chipinge pointed out that one of the mitigation measures, herding their livestock, also leaves them at risk of attacks by predators,

3.4 Objective 4: Design and remodeling of strategies to mitigate the impact of HWC on communities.

3.4.1 Suggested mitigation strategies against attacks on humans by wildlife

The majority of the participants in all the study districts cited the unrestrained movement of wild animals within communities as endangering people's lives.

Communities living alongside wildlife expressed the desire for the creation of a boundary between communities and wildlife areas, National Parks and for some form of security infrastructure for them to better coexist with wildlife. They suggested that responsible authorities could install electrified/ or solar powered fences between settled areas and wildlife habitat as a practical and durable solution to reduce attacks on humans and livestock buy animals and as a way of mitigating HWC.

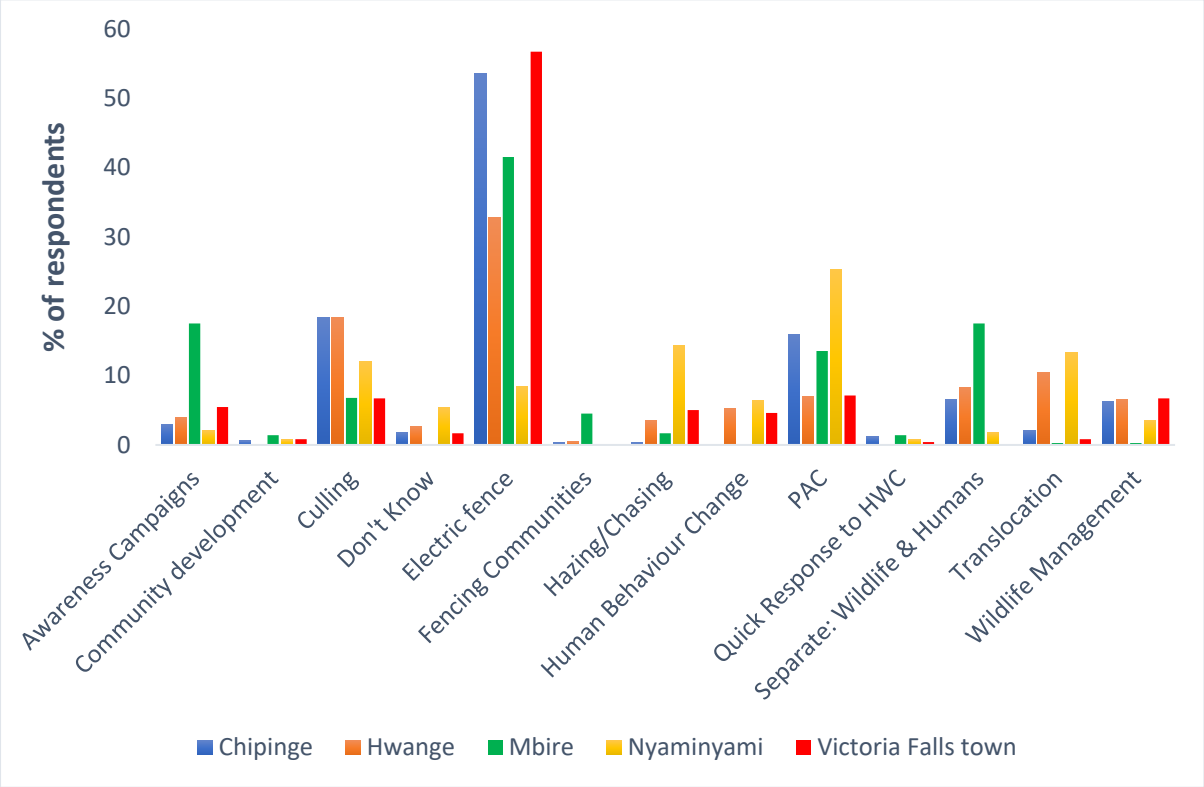

Figure 28. The most effective ways of reducing attacks on humans by wild animals as suggested by the respondents across the study sites.

A significant number of respondents in Chipinge (53.6%), Hwange (32.8%), Mbire (41.5%) and Victoria Falls (56.7%) suggested electric fencing of wildlife areas as one of the best strategies of preventing attacks on humans by wildlife (Fig 28).

However, FGD participants from Nyaminyami ward 3, openly rejected the idea of fencing off the Mola area. They reiterated that erecting a fence will affect their sources of livelihoods since they do casual labour and fishing outside the Mola area. In this regard, they proposed that ZimParks and Nyaminyami Rural District Council must collaborate in wildlife management, increase patrols and PAC to reduce human attacks by wildlife species.

One key informant from CAMPFIRE in Chipinge presented an opposing view to the fencing off of an area and stressed that once a park is fenced, it means that the CAMPFIRE program will curtail or curb opportunities for trophy hunting. This is due to

the fact that the animals that come to the CAMPFIRE area are those that leave the National Parks, if a National Park were to be fenced, it would limit this wildlife movement. The respondent further disclosed that culling also removes high-quality trophies, and this would negatively affect the revenue for CAMPFIRE thus impacting community development.

Several FGD participants raised concern over the population surge of dangerous wildlife species such as elephants, hyenas, crocodiles and buffalos and felt that while fencing could be effective, culling would also help in reducing the number of such animals. The majority of participants suggested that the responsible authorities should relocate some of the wildlife species like elephants, crocodiles and hyenas from the community to National Parks and Conservancies. Relocation of wildlife was cited as a necessary measure to decongest wildlife habitats and reduce the occurrence of attacks on humans.

Participants from all study sites were also critical of the operations of authorities such as the Zimbabwe Parks and Wildlife Management Authority. A sentiment shared by many respondents is that ZimParks tends to respect the rights and lives of animals more than the rights and lives of human beings. This relates to the lack of commitment to saving human lives against the perceived and expressed commitment to saving wildlife. The FGDs, bemoaned the fact that ZimParks react slowly to reports on HWC and attacks on human beings but react swiftly to poaching especially when wild animals are caught by snares or a villager is found in possession of poached game. However, in Mbire ward 11, FGDs participants applauded the response by Mbire Rural District Council game scouts who often do problem animal control (PAC) and respond to community report. There were some suggestions that ZimParks should establish sub offices with game scouts in communities so that they can swiftly and timeously respond to HWC.

The majority of participants suggested that authorities like ZimParks and RDCs in all wildlife hotspots should educate communities on HWC, wildlife laws and policies as well as animal behavior. They concurred that such awareness campaigns and education are crucial in reducing conflict, injuries and loss of life.

Respondents in Nyaminyami also suggested culling, hazing/chasing, Problem Animal Control (PAC) and translocation as preferable strategies for reducing attacks of humans by wild animals (Fig 28).

3.4.2 Suggested mitigation strategies against crop damage

A significant number of respondents in Chipinge (48.2%) and Nyaminyami (37.2%) suggested fencing of crop fields as one of the most effective ways preventing crop damage (Fig 29), while a significant number of respondents in Hwange (53.7%) and Victoria Falls (37.4%) felt that there was no strategy available that would be effective in protecting crop fields (Fig 29). While those in Mbire suggested using flashlights

(33.3%) as one of the most effective ways of protecting crops (Fig 29) against destruction by wild animals.

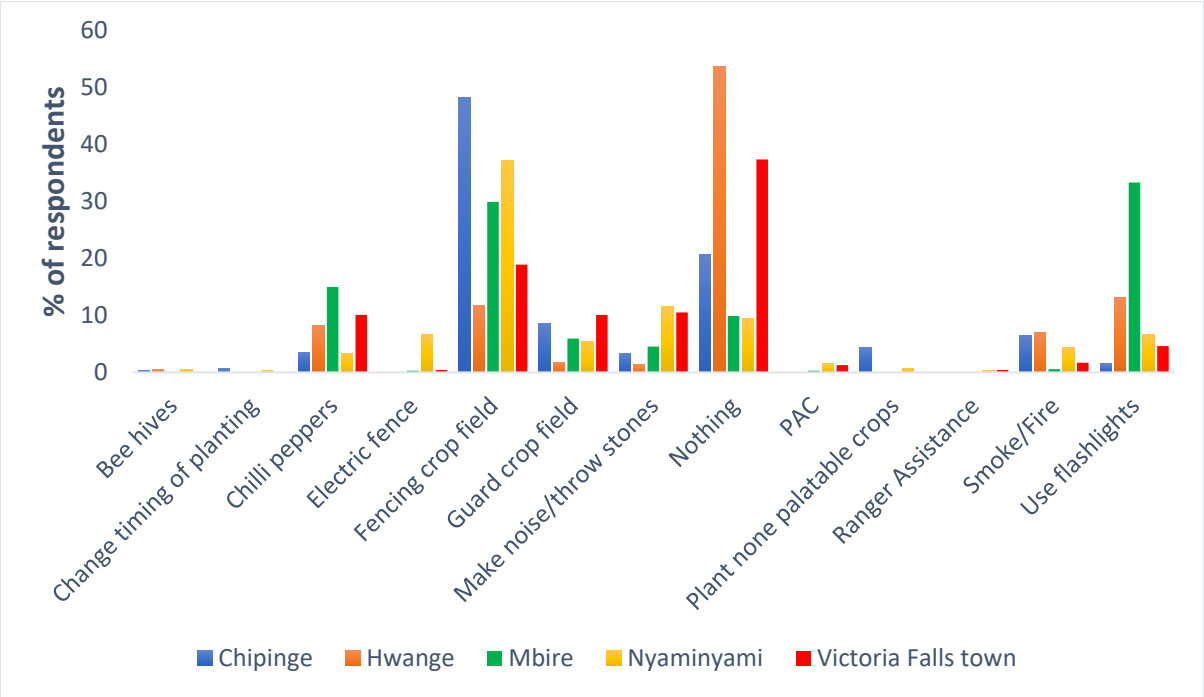

Figure 29. The most effective ways of reducing crop raids by wild animals as suggested by the respondents across the study sites.

This study showed that some of these approaches will be too expensive for some households given their limited income opportunities and size of fields. An FGD participant from Mahenye in Chipinge felt that protecting their fields from raids by wildlife was not affordable because it would require a lot of resources communities living adjacent to wildlife areas are trying different approaches to protect their crops from raids by wild animals. Although approaches such as wire fencing are deemed effective, since they own large fields. There is therefore a need to try different cost-effective measures like planting chilli and beehive fences on the periphery of fields to repel elephants.

The FGDs revealed that some communities in Mbire and Nyaminyami have adopted the use of chilli to avoid crop raids by elephants. In Mbire some FGD participants applauded the assistance they received from African Wildlife Foundation who have taught communities how to grow chilli pepper and also donated the seeds for chilli farming. This strategy is reported to have yielded positive results since households could at least harvest an additional crop. Some suggested that ZimParks, RDCs and CAMPFIRE associations should do combined efforts in PAC to drive away the elephants.

3.4.3 Mitigation strategies against livestock predation

Results from this study show that the majority of the respondents across the study sites suggested fencing of livestock enclosures and putting livestock in kraals as some of the most effective ways of protecting livestock against predation by wild animals (Fig 30). Some of the respondents especially in Hwange (29.3%) and Victoria Falls (33.2%) had no idea of what the most effective ways of protecting livestock against predation would be (Fig 30). Some respondents in Hwange (13.5%) and Nyaminyami (24.0%) that have witnessed the effectiveness of mobile bomas suggested mobile bomas as one of the most effective ways of protecting livestock against predation.

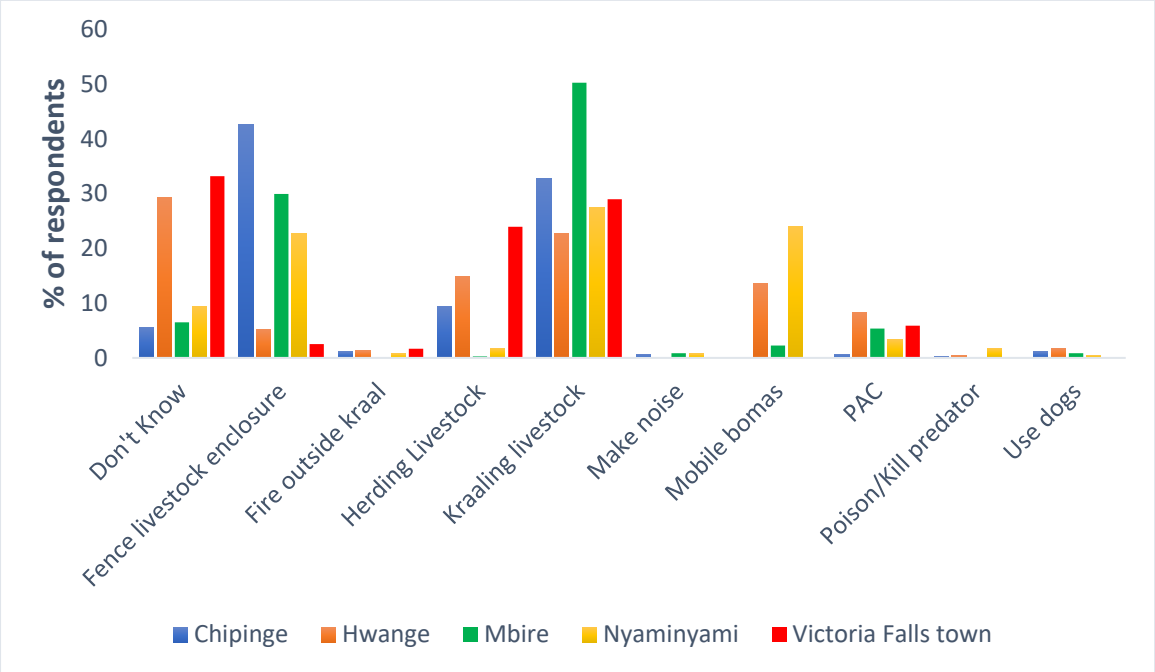

Figure 30. The most effective ways of reducing livestock predation by wild animals as suggested by the respondents across the study sites.

FGD participants in the study sites suggested that reinforcing kraals with strong poles or fences is an effective strategy for reducing livestock predation by wild animals such as lions and hyenas One of the FGD participants from Maparadze ward in Chipinge mentioned that the biggest challenge was that most kraals are poorly constructed and predators such as lions and hyenas can easily break into these kraals. In some cases, predators would easily scare out livestock from the kraal and prey on them whilst outside. In Nyaminyami ward 3 and Hwange, some FGD participants and key informants suggested that communities should adopt the use of mobile bomas to avoid livestock predation. Some FGD participants in Nyaminyami ward 3, Mola highlighted that those who have been offered bomas by Wildlife Conservation Action have significantly reduced livestock predation during the night. In a number of the study sites, participants also underscored the need for more water sources to avoid interaction between wildlife and livestock as a way of reducing chances of livestock predation. They suggested that responsible authorities and donors should drill boreholes as well as revitalize silted dams to reduce crocodile attacks in major rivers.

3.5 Objective 5: Current local level institutional arrangements for HWC management.

3.5.1. Authorities active in wildlife related issues

A significant number of respondents in Chipinge and Mbire listed various authorities including Forestry department (3.3% and 37.0% respectively), Gonarezhou Conservation Trust (42.6% and 0% respectively), local Chief or the headman (38.2% and 36.4% respectively), local Councilor (36.1% and 43.2% respectively), NGO's ()% and 31.6% respectively), the RDC (16.3% and 59.3% respectively), Safari Operator (0% and 37.3% respectively) and ZimParks (41.7% and 74.3% respectively) as being the most active authorities involved in wildlife related issues (Fig 31). In Nyaminyami the Rural District Council (73.2%) and ZimParks (51.5%) are the key authorities involved in wildlife related issues (Fig 31). ZimParks is the most active authority for a significant number of respondents in Hwange (43.7%) and Victoria Falls (49.2%) (Fig 31).

FGD participants across all study sites mentioned that they report cases of HWC and other wildlife related issues to Chiefs, Councilors, headmen, game scouts, CAMPFIRE offices, RDC's and ZimParks within their areas. A minority of the FGD participants across study sites also stated that they engage the police and other non-state actors such as Conservancies and Safari Operators. Participants from all study sites expressed mixed feelings on the manner in which responsible authorities react to HWC issues as well as wildlife management more broadly.

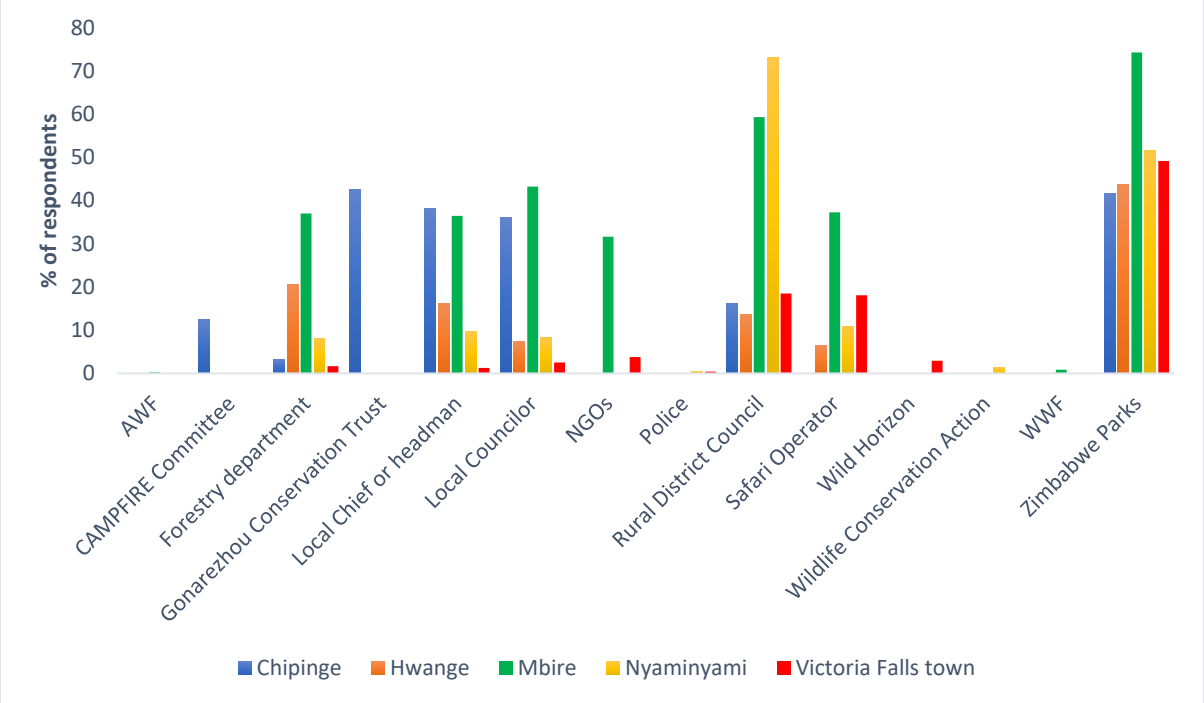

Figure 31. The authorities that are most active in wildlife related issues across the study sites.

3.5.2 Reporting of HWC incidences

The majority of the respondents in each study site; Chipinge (55.2%), Hwange (100%), Mbire (93.1%), Nyaminyami (86.1%) and Victoria Falls (81.8%) reported incidences of human attacks. However, only less than 50% of crop raids in Chipinge (48.3%) and Hwange (45.4%) were reported, while less than 50% of livestock predation in Chipinge (48%), Nyaminyami (37.0%) and Victoria Falls town (46.6%) were reported (Fig 32).

This study established that there is under reporting of incidences of HWC. The majority of the FDG participants expressed negative perceptions regarding the efficiency of authorities in their jurisdictions. The FGD participants across all study sites mentioned that they do not report the incidents because the responsible authorities rarely act when such reports are made they only attend to HWC reports when a human being is killed. As such the participants indicated that they are now reluctant to report when conflict incidents occur. One FGD participant in Kwekwe (Zibagwe ward 1) mentioned that it was a waste of time to report crop raids by baboons and monkeys and he outlined how communities have learnt to co-exist with the wildlife species.

FGD participants in Kwekwe, Zibagwe stated that one of the reasons they do not report HWC incidences is due to the fact that they do not receive any compensation from the authorities after crop raiding and livestock predation by wildlife. Participants also highlighted that they are reluctant to report because they felt wildlife authorities value wildlife more than human beings.

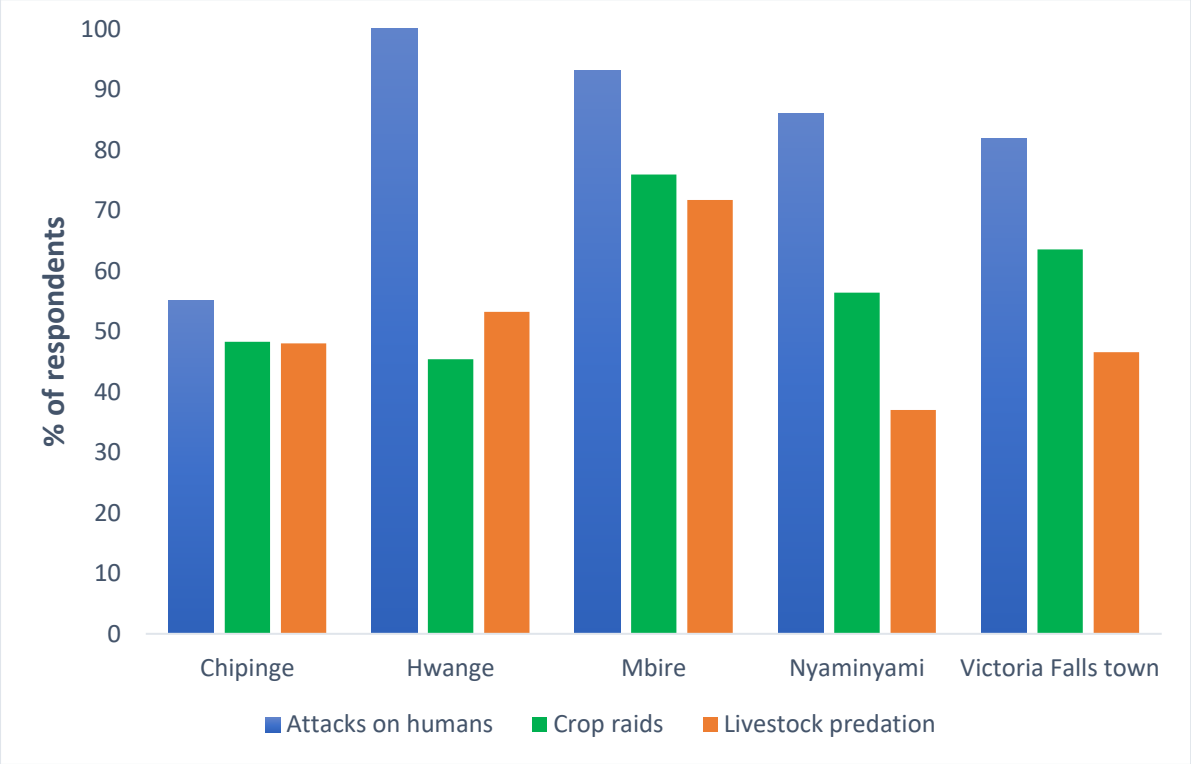

Figure 32. The percentage of respondents that reported incidences of conflict to authorities.

3.5.3 Authorities to whom HWC incidences are reported

The majority of the respondents in Chipinge (50%) and Victoria Falls town (55.6%) reported incidences of wildlife attacks on humans to ZimParks authorities (Fig 33). However, the majority of the respondents in Mbire (85.2%) and in Nyaminyami (67.7%) reported incidences of wildlife attacks on humans to the Mbire Rural District Council and the Nyaminyami Rural District Council respectively, while a significant number of respondents in Hwange reported to both ZimParks (37.5%) and the Police (37.5%) (Fig 33).

FGD participants from some of the study sites mentioned that they report incidences of HWC to village heads, Councilors, Police, RDC's and ZimParks. However, some respondents from Chipinge and Mbire mentioned that they also report to CAMPFIRE. FGD participants from Kariba mentioned that they mainly report to ZimParks. In Hwange and Victoria Falls town, FGD participants and key informants stated that communities just report to their local leaders such as the Councilor and village head. In Hwange some youths stated that they normally report to the village head and to the CAMPFIRE office. One FGD participant from Chipinge revealed how he now only informs the Councilor or Chief when an HWC incident occurs and no longer reports to the RDC or GNP because these stakeholders do not offer any assistance.

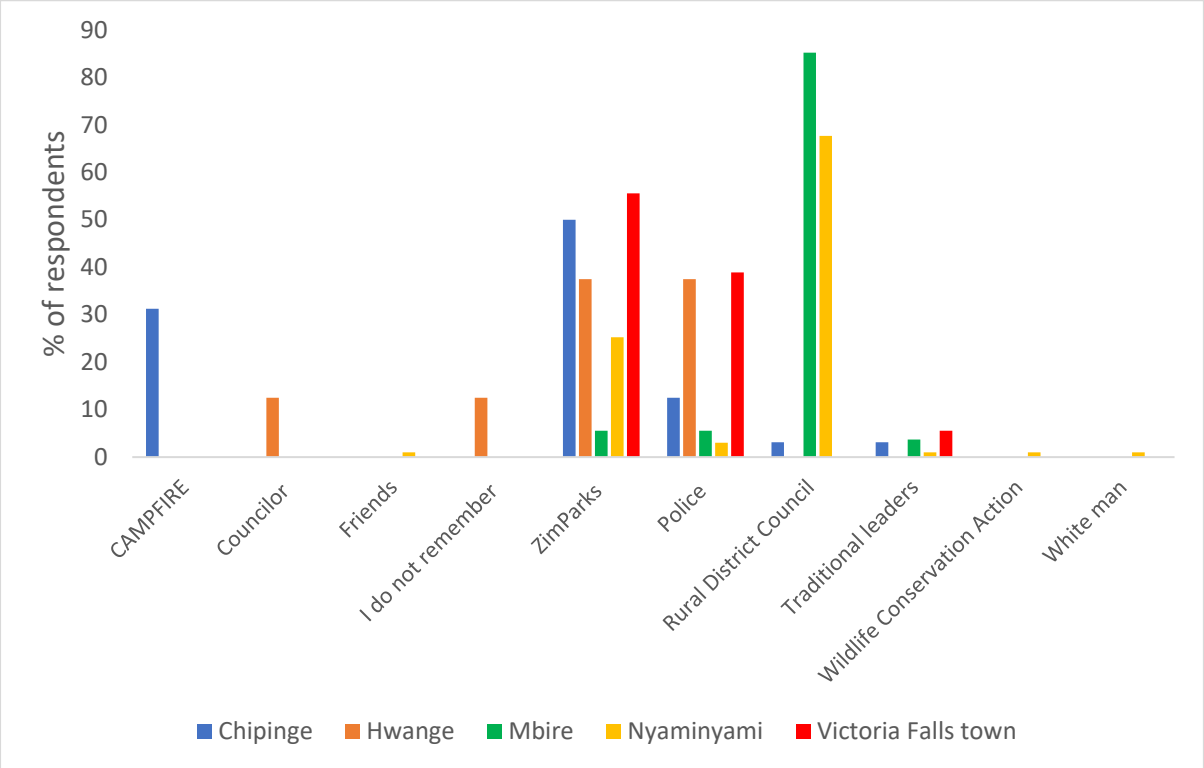

Figure 33. The authorities that respondents reported incidences of conflict to.

The majority of study participants reiterated that the responsible authorities do not offer any assistance during bereavement or offer compensation when a person is injured or loses livestock to predators. Some FGD participants also mentioned that the responsible authorities like the RDC and ZimParks sometimes attend to reports of

HWC after a day or two and sometimes even weeks. In Mbire, FGD participants generally commended the role being played by CAMPFIRE and Mbire RDC game scouts. They stressed that these authorities are generally responsive and receptive to communities when they report crop raids by elephants. They mentioned that these authorities normally conduct PAC programs and scare elephants with guns during the rainy season.

The sentiments shared by study participants suggest that institutions that are mandated to handle wildlife issues are facing capacity challenges and resource constraints in terms of responding to PAC calls and helping communities to mitigate HWC. Respondents from across the study sites mentioned that responsible authorities often say that they do not have vehicles or fuel to attend to HWC incidents. As such they suggested that state and non-state actors should collaborate to find a sustainable and lasting solution to end conflict between humans and wildlife. Further to that, the majority of participants suggested that the government and ZimParks should enact a compensation law in the Parks and Wildlife Act.

These study findings contribute in several ways in proffering actionable, tangible and sustainable solutions in a bid to address HWC. In particular, the findings also offer suggestions of what could be done to capacitate different actors in wildlife management that better enable communities to transition from conflict to coexistence. These findings will help us to better understand the complexity around wildlife management and how state, non-state actors like Wildlife Conservation Action (WCA), African Wildlife Foundation (AWF), Wildlife Conservation Research Unit (WildCRU) and others can collaborate with communities to reduce HWC in Zimbabwe.

3.5.4. Institutional arrangements

(i) The Rural District Council (RDC)

The RDC is the institution that has Appropriate Authority in the management of wildlife resources at a district level. The major role of the RDCs is to oversee the wildlife management activities within the communities. Key informants from RDCs across the study sites stated that they help communities in HWC awareness and education programs. One key informant from Mbire mentioned that they have game scouts who act as frontline responders to HWC reports. The RDCs help in PAC and scare away wild animals from communities. He further highlighted that they have been promoting smart agriculture so that communities do not encroach into wildlife corridors as they can maintain and boost yields and increase profits on their existing pieces of land. However, key informants from some of the RDCs including Councilors mentioned that they lack resource such as vehicles, fuel, food rations, guns and ammunition for the rangers. They complained that some rangers end up engaging in poaching activities themselves if they are not well resourced. The RDC key informants reiterated that a lack of resources limits their efforts in mitigating HWC as well as PAC programs.

This study found that the RDCs normally collaborate with other stakeholders like Forestry Commission and Agritex to address HWC. It was also established that the RDCs coordinate the CAMPFIRE programs on behalf of the community. The RDCs are also responsible for applying for hunting quotas from ZimParks and ensure that it is utilized appropriately. When the quota is awarded, ghe RDCs enter into hunting agreements with Safari Operators on behalf of the local communities and monitor its utilization. Revenue generated from hunting by the Safari Operators is shared between the Safari Operators, RDCs, CAMPFIRE Associations, and the participating communities. The RDC distributes the money based on the needs in the participating wards. Part of the revenue is used to support development from the source wards and the remainder is used to support development efforts in other wards within the district.

(ii) Zimbabwe Parks and Wildlife Management Authority (ZimParks)

ZimParks is an agency of the Government of Zimbabwe which is responsible for the management of National Parks, Safari Areas and Wildlife Management areas in Zimbabwe. The institution derives its mandate from the Parks and Wildlife Act. ZimParks collaborates with RDCs in PAC programs and HWC management in all communities living alongside wildlife in Zimbabwe. Its day-to-day duties include but are not limited to conservation of wildlife species, deployment of anti-poaching patrols and Problem Animal Control (PAC). One key informant from Kwekwe mentioned that ZimParks has game scouts who attend to HWC in different wards in their areas of jurisdiction. However, ZimParks is under-resourced and understaffed which greatly affects their operations in all the study sites. One key informant from ZimParks lamented that they have inadequate resources as an organization and that they sometimes fail to attend to the HWC reports due to resource constraints, particularly a lack of vehicles or fuel. To strengthen their capacity, some FGD participants suggested that ZimParks should give RDCs some powers and authority to make decisions over wildlife. They bemoaned the fact that RDCs cannot shoot problem animals without approval from ZimParks.

(iii) The CAMPFIRE Committee

At a community level, there is a 7-member CAMPFIRE committee. This committee manages the wildlife on behalf of the community and has the responsibility of undertaking initiatives to raise awareness about the importance of wildlife conservation, alert the RDCs when there are problem animals and administer CAMPFIRE disbursements from the RDC. The committee also works with the community in selecting recipients of the hunting quota disbursements from the RDC, based on the priorities set in the ward development plan. The CAMPFIRE committee targets community level developments and not individual-level investments. For instance, one of the key informants from CAMPFIRE in Maparadze, Chipinge, mentioned that in their ward in 2021 the CAMPFIRE committee disbursed about ZWL40 000 each to 5 schools in the ward. This money was used to support the schools to purchase exercise books for the students.

(iv) ZimParks Partners

All Protected Areas in Zimbabwe fall under the auspices of ZimParks. As such, the Gonarezhou National Park and Matusadona National Park are part of ZimParks' portfolio. However, in March 2017 ZimParks and the Frankfurt Zoological Society (FZS) formed the Gonarezhou Conservation Trust (GCT), which is an innovative new model for Protected Area management. In 2019 ZimParks also entered into an agreement with African Parks for the management of Matusadona National Park and formed Matusadona Conservation Trust (MCT). Both GCT and MCT are directly responsible for management of their respective parks for the next few years. GCT is working with only two wards in Chipinge district, and the rest are in Chiredzi district while all the wards that MCT works with fall under Nyaminyami district. However, the management of HWC in the communities surrounding both Gonarezhou and Matusadona is sometimes not straightforward and opaque according to the standard operating procedures for both National Parks. This is because animals that leave the Park automatically become CAMPFIRE animals and become the responsibility of the respective RDCs, however the RDCs often lack the resources and capacity to deal with HWC. GCT is assisting the two wards in Chipinge district by training Resource monitors. These monitors work with a local level liaison person. When the communities see animals that would have strayed from the park, they are supposed to alert the monitors. The monitors will then report to the GCT Community Liaison Officer who is stationed within the community – this is the same for MCT in Nyaminyami. In terms of PAC, both GCT and MCT act upon the invitation of Chipinge RDC and Nyaminyami RDC respectively and they often assist in dealing with the problem animals. There are no arrangements for compensation of victims of HWC by either of the Trusts.

(v) Nyangambe Wildlife Conservancy

This Conservancy is a Save Valley Conservancy buffer which is located in Chiredzi North, ward 23. There is a healthy wildlife population and the Conservancy is one of the thriving community-led wildlife conservation projects in Zimbabwe. The wildlife conservation project is jointly owned by 181 families from Nyangambe Resettlement Area in Chiredzi. One key informant from the Conservancy mentioned that they educate communities on animal behavior and how to coexist with wild animals. He also stated that they encourage farmers to reinforce kraals. The proceeds from the Conservancy generated from trophy hunting is used to develop various community projects for example improvement of school infrastructure and agriculture. Taken together, such efforts are important in reducing poaching and HWC.

4.0 RECOMMENDATIONS

A holistic solution which addresses both HWC and poverty is critical in protecting biodiversity and improving livelihoods in a human dominated wildlife landscape. The effective mitigation of HWC across the country will require integrated coordination between village, ward and district institutional levels. Such coordination can reduce the costs of HWC by increasing the efficiency of planning and implementation of

development projects and ensuring that HWC prevention and mitigation measures are integrated as part of a coordinated and systematic program.

HWC threatens the survival of various terrestrial and marine species. As such integrated and holistic HWC management approaches (Fig 34) will allow species to survive in areas where they otherwise would have declined or become extinct. Local communities bear the costs of living with wildlife and these negative impacts shape people's risk perceptions, while cultural and social norms also influence people's tolerance of wildlife. Therefore, managing and minimizing HWC offer multiple benefits for communities, including saving lives, preventing crop loss, livestock predation and reducing damage and destruction of property. The perception of the community towards wildlife conservation can also improve if there are support systems to reduce the risk of living with wildlife and strong HWC policies that empower communities to coexist with wildlife. This would ultimately lead to higher tolerance of wildlife and reduced likelihood of species extinction.

Figure 34. The importance of coexistence for both people and biodiversity. (Adapted from Gross et al. 2021)[7]

HWC can also pit people against each other when diverse societal needs and responses are inadequately addressed. Holistic HWC management approaches would include bringing stakeholders together and building consensus among stakeholders around HWC management actions. This would ensure that HWC interventions are implemented through a consensus decision and through a

[7] Gross E, Jayasinghe N., Brooks A., Polet G., Wadhwa R. and Hilderink-Koopmans F. (2021) A Future for All: The Need for Human-Wildlife Coexistence. (WWF, Gland, Switzerland).

transparent and collective process. HWC can have an impact on businesses and farmers producing agricultural goods and other commodities, leading to localized food insecurity and decreased productivity and competitiveness for producers. HWCs can negatively affect the sustainable development of communities and as such livelihood development projects that are built upon human-wildlife coexistence can increase the income of farmers and communities and increase their resilience to wildlife-caused damage and losses. Well-designed HWC management schemes have the potential to increase revenues from forestry, agriculture, aquaculture, and free-ranging livestock production. Investing in HWC management programs can help to ensure the survival of wild species, maintain ecosystem functions, and enhance the safety of communities that share their space with wildlife. These are important elements that can contribute to a thriving wildlife economy and highlights the symbiotic relationships between people and wildlife.

Living with wildlife has associated costs, which are unevenly distributed and disproportionately fall to those who live near that wildlife and are often the poorest in society. HWC is as relevant for sustainable development as it is for wildlife conservation, since HWC creates adverse ecological, social, and economic impacts. It is critical to recognize HWC management as a central theme to conservation and community development and it should not be treated as a niche problem, but rather a central topic to mainstream into various disciplines, such as socio-economic development, spatial planning, land use planning, local development, education and climate change (Fig 35). It is also important to address the underlying drivers of HWC and these may include human-human conflict, land use and resource conflicts.

Figure 35. Successful HWC management requires the use of holistic approaches that take multiple elements of HWC management into consideration.

There is a need to take an integrated approach to the management of HWC, this means that all six elements of conflict management must be accounted for in any site or area-based program, and none should be implemented in isolation (Fig 36). Understanding the conflict through research, as has been the goal of this study, is a critical first step towards HWC management. Apart from the methods used in this study, research can also include hotspot mapping, understanding the spatial and temporal characteristics of the conflict, understanding the social characteristics and community attitudes and also monitoring the severity and impact of HWC.

Figure 36. Six elements important in human-wildlife conflict management. (Adapted from Leslie et al 2019)[8]

It will also be important to stop or prevent HWC before it occurs. There are various prevention measures that can be implemented and these include community education, livestock and crop management, law enforcement, barriers and deterrents, safe working environments, habitat management, land use planning, early warning systems and removal or translocation of problem animals. There is also a need for a swift response to HWC incidents and measures should be put in place to alleviate a specific or ongoing HWC incident (Fig 36). Response teams can be put in place at a local level and capacitated to respond swiftly to HWC. There will be need for clear reporting mechanisms, Standard Operating systems and sometimes there might be a need for removal or translocation of problem animals as a response to HWC.

[8] Leslie, S., Brooks, A., Jayasinghe, N., & Koopmans, F. (2019) Human Wildlife Conflict mitigation: Lessons learned from global compensation and insurance schemes. ANNEX REPORT. HWC SAFE Series. WWF Tigers Alive.

Mitigation measures should also be put in place to reduce the impacts of HWC after an incident occurs. Mitigation can be in the form of compensation programs/insurance schemes, alternative livelihoods, livelihood diversification and benefit sharing. Monitoring and measuring the performance and effectiveness of HWC management interventions as well as information sharing and adaptive management is important for effective HWC management. Protocols, principles, provisions and measures undertaken by authorities and stipulated in legislation and governmental plans are critical for HWC management (Fig 36). This would include International laws as well as national and local HWC strategies and management plans.

The views and needs of the local communities should be considered when developing HWC management strategies. It is important to note that the HWC management strategies that are to be developed by the Resilience ANCHORS Activity or any other stakeholder will be most effective when developed alongside and accepted by local communities[9]. To move from conflict to coexistence the following will need to happen at both the national level and the local level:

1. Local level

i. Human-wildlife Conflict Mitigation Strategy

The districts facing HWC should formulate an HWC Mitigation Strategy through consultations with the local community and stakeholders. The workshop should bring together all stakeholders in the wildlife sector and the local communities to co-design an HWC Mitigation Strategy for the district. This workshop should be attended by the local leadership, local community, government departments, private sector and NGOs and the goal of this workshop will be to design concrete interventions to reduce HWC in that specific district. There are already some pre-existing tensions and disagreements among some stakeholders in each of the study sites and this workshop will also be important in ironing out the past and current conflicts and starting on a clean slate together. It will be important for the stakeholders to discuss what the problems are, explore the root causes and discuss which HWC mitigation strategies are already working in their communities and some new ones that could be implemented or improved. A suite of HWC mitigation strategies and the Standard Operating Procedures (SOPs) for HWC mitigation should be developed and agreed on by the communities and stakeholders. When kick-starting the process of formulating such a mitigation strategy it will be important to consider successful long-term HWC management plans such as:

- Solid support from all levels of government (information and training)
- Clear policies and legal frameworks

[9] Dheer, A., Davidian, E., Jacobs, M. H., Ndorosa, J., Straka, T. M., & Höner, O. P. (2021). Emotions and Cultural Importance Predict the Acceptance of Large Carnivore Management Strategies by Maasai Pastoralists. Frontiers in Conservation Science, 0, 23. doi: 10.3389/FCOSC.2021.691975

- An observation-action loop (when you collect the information at the ground, the information should enable decision making at all levels)
- Integration of wildlife, as an asset, in land use planning (promote wildlife land use options).

ii. Local HWC Task force

Each district can bring together a local HWC Task force team composed of key stakeholders working around HWC management, natural resource management and community development. The formation and selection of the task force can be done during the process of developing a Human-Wildlife Conflict Mitigation Strategy. The taskforce will be critical in improving the effectiveness of local communities in HWC management through providing interdisciplinary guidance, resources, and capacity building. This collaborative effort would also ensure the cross pollination of ideas and some transparency and accountability in HWC management at the district level.

iii. Integrated land-use planning

Management of HWC requires appropriate, evidence-based land use planning that takes the needs of both people and wildlife into consideration[10]. The growing human population across Zimbabwe is resulting in increased demand for agricultural land and increased interactions between humans and wildlife in the human-dominated wildlife landscapes. Participatory land-use planning in each district facing HWC would be critical as a mechanism for these communities to sustainably manage and benefit from wildlife and other natural resources within their landscape. The land-use plan would facilitate the separation and designation of wildlife areas, settlement areas, pastures and crop fields which would minimize interactions and conflict between humans and wildlife. The land-use plans should be part of the Local Environmental Action Plan (LEAP) which are local plans that local authorities develop for the management of the environment within areas under their jurisdiction as stated in section 95 of the Environmental Management Act (Chapter 20:27).

iv. Education and Awareness

Education and awareness of local communities is key in promoting coexistence as well as increasing the understanding and acceptance of wildlife and sharing the methods that can be used to minimize risk or damage from wild animals. Education and awareness about wildlife by the community can sometimes mitigate conflict due to improved knowledge of the risks and drivers of conflict[11]. NGOs and other stakeholders including various government departments such as EMA, Forestry Commission and ZimParks should facilitate the carrying out of education and awareness programs across HWC hotspots in the country. There is a general need for education and awareness about the use of natural resources, veld fires, HWCs,

[10] Songhurst A., McCulloch G., Coulson T. (2015). Finding pathways to human–elephant coexistence: a risky business. Oryx 50(4):713-20.

[11] Treves, A., & Karanth, K.U. (2003). Human-Carnivore Conflict and Perspectives on Carnivore Management Worldwide. Conservation Biology, 17.

poaching, CAMPFIRE and the importance of wildlife resources. The study observed that there is very low knowledge of laws governing natural resources by communities and there is a need for community education and awareness around HWC and the legal and policy frameworks around wildlife management in Zimbabwe. Furthermore, to improve the conservation of the environment and natural resources, deliberate efforts should be made to raise awareness among the communities and local level institutions on natural resources governance. Education and awareness around problematic animal species also need to be enhanced to improve attitudes towards and to minimize the negative impacts of HWCs across the country. At Lake Kariba, posters should display clear warning messages regarding the dangers of entering the lake and they should be written in the local languages (ChiShona and CiTonga) to ensure that they are understood by local populations[12]. For these communities that frequently encounter dangerous animals, education and awareness about the behavior of species like elephants and how to avoid attacks can be the difference between someone surviving an elephant encounter and dying.

v. Sustainable livelihood options

The attitudes towards wildlife conservation across the study sites was generally positive and improving the livelihoods of these communities and reducing poaching incidences will further improve attitudes towards wildlife and will also be key to dealing with HWC. There is a need to introduce alternative livelihood opportunities in HWC hotspot areas, as this is important for decreasing the dependence of communities on wildlife resources. People tend to be more tolerant of conflict with wildlife when they have many avenues of income rather than relying only on crops and livestock. People that are injured or killed by crocodiles are usually those that will be fishing in the rivers such as the Save River and the Angwa River. Some of these people usually spend days fishing and sleeping in the bush and this puts them at risk of attacks by crocodiles, hippos and other animals. Most people that fish do so to feed their family while others sell to other villagers to earn an income. Projects like fish farming can be implemented in these areas and such a project can positively contribute to the reduction in HWC and improve community livelihoods. For many countries across the world including Zimbabwe, the current biodiversity loss and poverty are linked, and that poverty and conservation must be recognized and addressed as interlocking challenges[13]. There is a need for the provision of resources that are critical to the improvement of community livelihoods such as the provision of solar powered boreholes, whose water can be used for household and livestock use and also community gardens; this would help with HWC mitigation as well as improving livelihoods and household incomes. A livelihood diversification framework that is

[12] Matanzima, J., Marowa, I., & Nhiwatiwa, T. (2022). Negative human–crocodile interactions in Kariba, Zimbabwe: Data to support potential mitigation strategies. Oryx, 1-5. doi:10.1017/S003060532200014X

[13] Adams, W.M., R. Aveling, D. Brockington, et al. 2004. Biodiversity conservation and the eradication of poverty. Science 306: 1146-1149.

applicable to the Zimbabwean landscape will be key in ensuring that communities are able to diversify their livelihoods and income.

vi. Community engagement and training

The community needs to be engaged so they can fully participate in wildlife management and HWC mitigation. Fair, accountable and transparent governance systems for natural resources must also be put in place. The majority of the study participants indicated during the FGDs that they are willing to be trained, to learn and to use new HWC mitigation strategies so they can protect their crops and livestock. The study team observed that there is a small number of farmers who are aware of strategies that help them to scare away animals from their fields at critical growth stages but most of the farmers/households plant their crops without taking any preventative or mitigatory measures to protect their crops. As such, there is a need for deliberate efforts by NGOs including the Resilience ANCHORS Activity and other stakeholders to scale up these strategies that prove to be effective to other community members/households who are on the HWC frontier. This may help to reduce the conflict and improve household food security.

vii. Collaboration in HWC management

Effective HWC management and coexistence strategies would require strong collaborations among stakeholders working in HWC management and conservation in general. There is also a need for HWC management protocol at the district level as well as effective knowledge management and exchange and communication among the stakeholders. Collaboration at the local level will be crucial for significantly and sustainably managing and reducing HWC. Within these collaborations, exchanges of best practices and the application of guidelines for HWC management should be fostered.

viii. Establish local level structures for managing HWC

The prevalence of late responses to stress calls by communities indicates a dire need for the establishment of a local level structure that can address the issues of HWC. Usually, the wildlife authorities cite a lack of financial resources and motor vehicles to execute such tasks. Considering these operational challenges, ZimParks and RDCs and other stakeholders need to train community representatives on managing wildlife and teach them to safely drive wildlife away from homesteads and fields. If successfully implemented, this can help lower operational costs for HWC stress calls and reduce the retaliatory killing of wildlife. A good example is the Lion or Community Guardian model currently being successfully implemented by some organizations in Zimbabwe like WildCRU and Wildlife Conservation Action – having been adopted from the Lion Guardian model in Kenya[14].

[14] Hazzah L, Dolrenry S, Naughton-Treves L, Edwards CT, Mwebi O, Kearney F, Frank L. Efficacy of two lion conservation programs in Maasailand, Kenya. Conserv Biol. 2014 Jun;28(3):851-60. doi: 10.1111/cobi.12244

ix. Strengthen and facilitate market linkages

Farmers in the study sites depend on crop farming and livestock rearing for their livelihoods but they often face challenges with marketing their produce and getting the best value for their products. Similarly, despite the prevalence of poor-quality seasons in most of the study sites, irrigation schemes, where available, usually produce a good crop. However, the farmers involved in the schemes usually sell their produce to other local farmers at low prices because of a lack of access to other viable markets. To increase income and profitability, it is imperative to focus on strategies that improve both the crop and livestock business and the marketing for these farmers. Linking farmers with markets has the potential to transform their lives and help in addressing food security and resilience challenges particularly to offset the effects of HWC. Unlocking the value of livestock including taping into new markets and customers could help farmers realize full benefits from various livestock value-chain enterprises in addition they would improve their livestock management practices such as kraaling and herding because of the improved benefits, in so doing reducing incidences of HWC.

x. Enhance water provisioning

Water for drinking has been a major source of HWC for communities living adjacent to protected areas. With the advent of climate change, there is increased water scarcity in protected areas and in the adjacent communities. This is because most of these areas are situated in dry regions with very erratic rainfall. Droughts have also exacerbated the situation with some streams drying up and grasslands failing to replenish. The available dams and reservoirs in most of these areas cannot hold much water to sustain the growing population of humans, livestock and wildlife. Wildlife has been reported to migrate from sanctuaries to communities seeking water for drinking. The migration of wildlife into the communities is making it difficult for communities to compete with wildlife since they are the losers. As such, there is a need for deliberate efforts by the government, NGOs and CSOs to sink solar-powered boreholes in the communities as well as wildlife areas to ease water shortages and reduce HWC.

xi. Implement Conflict Mitigation Measures

Conflict mitigation measures will need to be implemented for the various wildlife species.

a. Elephants (and other herbivores)

Although conflict with elephants is experienced throughout the year, the peak time coincides with the maturing of crops at the end of the rainy season when mature food crops are most palatable. On the other hand, the conflict between local communities and large carnivores usually increases during the dry season. The seasonality in HWC means that different conflict mitigation efforts could be intensified during the peak

periods of the conflict. Elephant conflict prevention and mitigation strategies can include:[15]

Farm Boundary Protection methods such as:
✔Noise deterrents ✔Organic smelly elephant repellent ✔Trenches ✔Chilli deterrents ✔Metal strip fence ✔Bio-fences as barriers ✔Food storage & protection ✔Beehive fences ✔Stone walls & gabions ✔Electric fencing

As well as **Early warning systems** such as:
✔Night guarding with light and fire deterrents ✔Trip alarms ✔Cellphone & LED lights-based warning systems ✔Infrared or motion-triggered sensors ✔Watchtowers / observation towers ✔Drones & aerial interventions ✔Geofences using GPS tracking collars.

b. <u>Lions and hyenas (and other predators)</u>

The quality of the kraals across the study sites was very poor and insecure. Poor quality kraals expose the livestock and leaves them susceptible to attack by wildlife. As such, there is a need for stakeholders to train the communities on how to construct proper livestock housing structures that can reduce livestock susceptibility to attacks by predators, especially at night. Chain link fences can be used to build stronger livestock enclosures[16] and mobile predator proof cattle bomas can also be used to protect livestock from attacks by large predators (Fig 37). These mobile bomas not only protect livestock but also result in increased soil fertility and improved yields from the manure that gets deposited by cattle in the boma.

[15] King, L., Raja, N., Kumar, M. and Heath, N., (2022) Save the Elephants' HEC Toolbox, English Edition 1, P.O. Box 54667, Nairobi 00200, Kenya

[16] Lichtenfeld, L.L., Trout, C. & Kisimir, E.L. Evidence-based conservation: predator-proof bomas protect livestock and lions. *Biodivers Conserv* **24**, 483–491 (2015). https://doi.org/10.1007/s10531-014-0828-x

Figure 37. An example of a mobile predator proof cattle boma used by farmers to protect livestock against predation by wild animals.

Some of the mitigation measures against crop raiding animals and against livestock predation are cost effective and can be easily implemented by the community members (Table 4). However, some of the mitigation measures are more expensive and would require resources and support from stakeholders working on HWC issues.

Table 4. The cost effectiveness of the various conflict mitigation measures against crop raiding and livestock predation by wildlife.

Most cost effective	**Least Cost effective**
Elephants and other herbivores	
Noise deterrents	Electric fencing
Organic smelly elephant repellent	Stone walls & gabions
Trenches	Beehive fences
Night guarding with light and fire deterrents	Cellphone & LED lights-based warning systems
Visual deterrents (scarecrows etc.)	Geofences using GPS tracking collars
Metal strip fence	Infrared or motion-triggered sensors
Bio-fences as barriers	Drones & aerial interventions
Food storage & protection	

Chilli deterrents	
Trip alarms	
Watchtowers / observation towers	
Lions, hyenas and other predators	
Strong livestock kraals	Mobile bomas
Herding livestock	Chain link fences
Fires outside kraals	Living wall kraals
Watch dogs and herding dogs	Warning shots from a firearm
Noise deterrents	Flashlights (e.g. lion lights)
Visual deterrents (fire, scarecrows)	Livestock guarding dogs
Safe behaviours	

At the local level, implementing conflict mitigation strategies, community engagement and training, education and awareness and formulating a human-wildlife conflict mitigation strategy are “low hanging fruits”. These measures could be easily implemented and result in a high impact on HWC management and reducing conflicts between people and wildlife (Fig 38). For example, a simple act of ensuring that livestock are put in strong kraals at night can drastically reduce incidences of livestock predation.

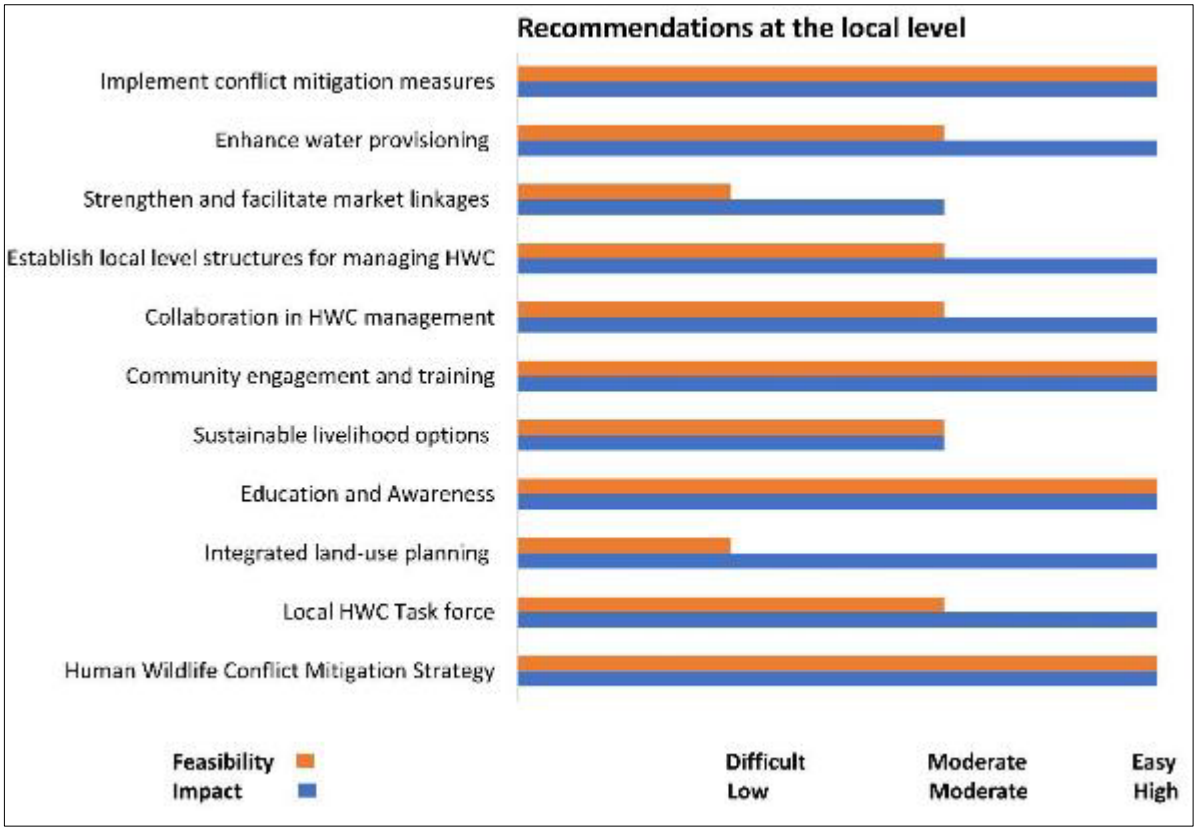

Figure 38. The feasibility and impact of the recommended local level HWC management measures.

2. National level

i. National Policy on HWC management

The appropriate legislative framework such as an HWC Policy would be critical in ensuring that HWC is holistically managed. The objectives of the HWC Policy can include development of standardized monitoring systems for HWC management. The HWC Policy can also establish best practice mitigation measures for HWC management and would also be critical in spelling out issues of compensation/consolation regarding damages caused by wildlife and how this can be implemented. The HWC Policy can also contain a list of the dangerous wildlife (or conflict species) that would be compensated for and under which conditions. Lessons on the implementation and effectiveness of such a Policy can be learnt from other countries such as Namibia who launched a National Policy on HWC management in 2009, which was then revised in 2018[17].

ii. Compensation/Consolation Scheme

Livestock predation and crop raiding remain the biggest source of contention for communities living alongside wildlife. Given the gravity of this problem, the government will need to explore compensation or consolation to the victims of HWC for their losses that include injury, loss of life, loss of crops and livestock as this can help promote coexistence and improve the attitudes of local communities towards wildlife. Compensation for HWC is currently being practiced in different countries: Botswana and Namibia (government compensation and insurance schemes), China (Government Insurance Scheme), India and Pakistan (Private and NGOs funded insurance schemes), United States of America (State Government compensation scheme). Currently, the Kenya Government operates a National HWC Compensation Scheme under the current WCMA, 2013. RDCs and communities must also explore the possibility of establishing a local level compensation framework. It should be noted that the creation of such a fund may mean that proceeds that go to communities from CAMPFIRE may fall. There is also the risk of moral hazards where people may not implement any strategies to scare away wildlife hoping to be compensated. Important lessons can be drawn from the Botswana and Namibia models of HWC compensation. A blended version could be explored for Zimbabwe.

iii. Devolution of Natural Resource Management

Communities should have the right to manage and benefit from their natural resources. Legal entities such as community trusts should be capacitated to manage their natural resources. Existing international legal frameworks around rights and sustainable use of natural resources such as the UN Convention on Biological Diversity[18] and the

[17] https://www.npc.gov.na/wp-content/uploads/2022/06/National-Policy-On-Human-Wildlife-Conflict-Management-2009.pdf

[18] https://www.cbd.int/doc/publications/cbd-sustain-en.pdf

Nagoya Protocol[19] on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization should be enforced at the National level. These instruments have proven to be useful in recognizing that indigenous peoples and local communities can enjoy Access and Benefit Sharing (ABS) in regards to their resource rights.

iv. HWC management integrated into the TFCA framework

Zimbabwe has six Transfrontier Conservation Areas (TFCAs) and there is a need to have issues of HWC management integrated and standardized within the TFCA framework across the participating countries. Within KAZA, Botswana and Namibia have some compensation programs that do not exist in Zimbabwe. There is a need for regional best practice benchmarking across the TFCAs.

v. HWC National Database

The reporting and recording of HWC incidences across the country need to be standardized to help get a better understanding of the dynamics of HWC and so that results can be compared from area to area and over time. A National database on HWC should be established to ensure that there are no gaps in HWC data collection across the country and that adequate data is available in a usable form for key decision-makers. This would also help the government and other stakeholders to improve their understanding of the nature and scale of HWC. It will also be critical to develop methodologies that can accurately measure the impact of damage caused by HWC e.g. damage to crops or livestock losses so a realistic picture can be obtained.

vi. Institutional capacity building

There is a need to harmonize the bottom-up with top-down governance approaches, through multilevel and co-management arrangement[20]. When an incident of HWC is reported to ZimParks rangers or rangers from RDCs – in most cases they arrive long after the stray animals have left the community after destroying crops and or killing livestock. Although their protocol provides that they should respond within 48 hours, sometimes they exceed this time citing. The late response or the lack of response by the PAC stakeholders may be interpreted by community members as an indication that their lives or property are less important than that of wildlife. This may precipitate increased cases of HWC and decimate wildlife populations as community members use retaliatory tactics such as trapping and poisoning among others. As such, there is a need for deliberate efforts by stakeholders including the RA Activity to combine

[19] https://www.cbd.int/abs/doc/protocol/nagoya-protocol-en.pdf

[20] Durant, S. M., Marino, A., Linnell, J. D. C., Oriol-Cotterill, A., Dloniak, S., Dolrenry, S., … Yirga, G. (2022). Fostering Coexistence Between People and Large Carnivores in Africa: Using a Theory of Change to Identify Pathways to Impact and Their Underlying Assumptions. Frontiers in Conservation Science, 0, 127. doi: 10.3389/FCOSC.2021.698631

efforts, establish or strengthen the capacity of community-level monitors or Community Guardians in PAC. This may be an effective approach as the monitors live within the communities and can therefore provide a prompt response. The monitors would also be responsible for monitoring the effectiveness of different HWC mitigation measures (e.g. chilli fences) and share the findings with all stakeholders.

vii. Strengthen the role of CAMPFIRE and Conservancies in HWC

CAMPFIRE is currently being used as an approach to try to internalize the costs and benefits of living with wildlife at the community level. However, only a small portion of the revenue generated through CAMPFIRE is being used to cover the costs of HWC, with most of the revenue generated going to community development work. Also, the level of damage from HWC differs considerably between individual households and more needs to be done to ensure that the households that suffer the most receive appropriate benefits to offset these losses. The HWC victims should also be prioritized for aid and other benefits.

viii. Strengthen the role of social service delivery by government institutions

The government ministries need to do more to meet their mandates of providing rural communities with essential services like education, transport, energy, water etc. This will reduce the pressure on CAMPFIRE to invest in social services since this is currently reducing the impact of benefits to investment in other areas like HWC management.

ix. Improved food security

There is a need to improve the food security of communities living alongside wildlife through collaboration with key institutions and ministries using the government's "leave no one behind" approach and working with key stakeholders. This would increase the resilience of these communities who are often the poorest in society and also face challenges with droughts and low rainfall being located in natural regions IV and V.

x. National Livelihood Diversification Framework

A national livelihood diversification framework is needed to help rural families in HWC hotspots build a diverse portfolio of livelihood activities and social support capacities that would improve their living standards. The framework should also take into consideration HWC issues and also include other issues such as climate change, the impact of global pandemics, local and global economic crisis and other emerging issues.

xi. Innovation and Technology for HWC management

Innovation and Technology can be an important part of a suite of HWC management measures. There are a few technical solutions aimed at conflict prevention that have been tried and tested such as early warning systems which use Global Positioning Systems (GPS) collars, that have largely been developed to prevent HWC but don't

address other elements of HWC management. There is therefore a need for continued experimentation and tests with new methodologies and tools. Innovation must also look beyond technology alone and include new ideas and approaches in behaviour psychology that enable behaviour change and foster human-wildlife coexistence.

xii. HWC National Task Force

A task force composed of key stakeholders and individuals should be formed. The task force's mandate would be to look further into HWC issues, explore and recommend a broad range of ideas on enabling coexistence between people and wildlife. The task force should also carry out further research on existing HWC compensation schemes in Africa (e.g. Namibia, Botswana and Kenya) and beyond and then develop an implementation strategy with clear recommendations on the most suitable schemes for the government to adopt to enhance human-wildlife coexistence.

The majority of the HWC management measures that are recommended at the national level by this study, would be somewhat difficult to implement but then again, all the measures have a moderate to high impact on HWC management (Fig 39). Establishing an HWC National Database could be easily implemented and would greatly impact the collection of HWC data and monitoring of HWC incidences across the country which would help the understanding of the dynamics and distribution of HWC (Fig 39).

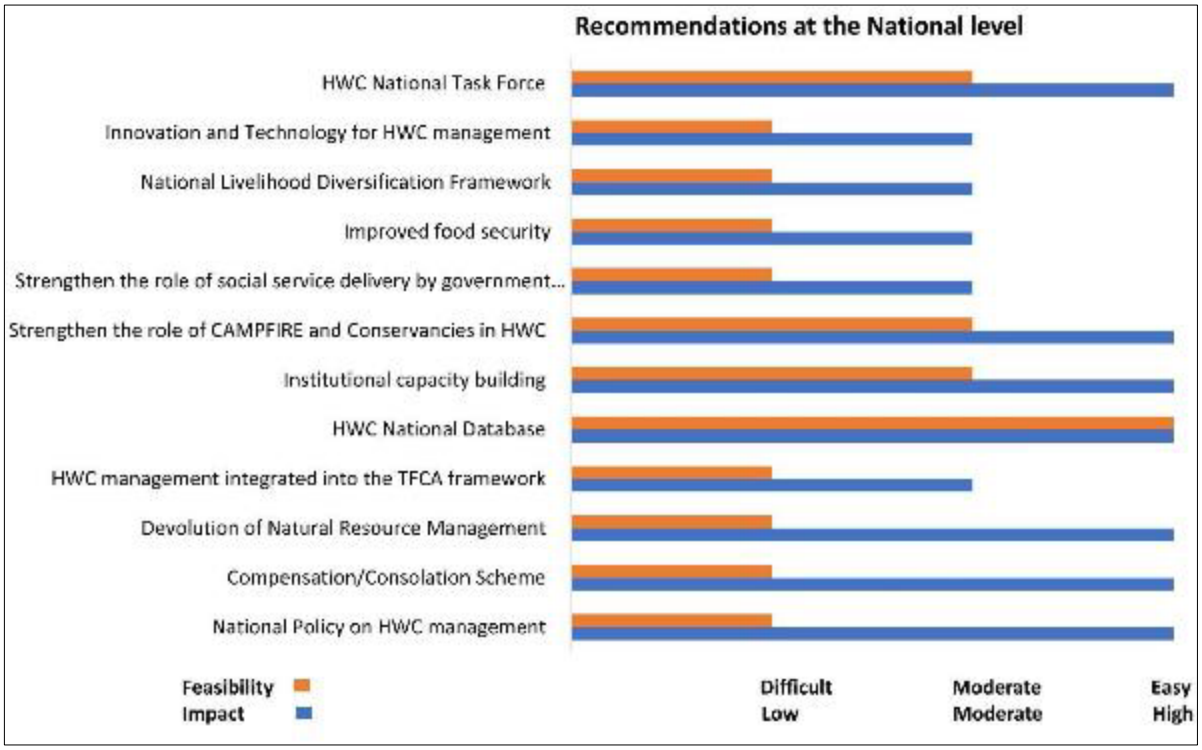

Figure 39. The feasibility and impact of the recommended national level HWC management measures.

5.0 CONCLUSION

Human-wildlife conflict is still a major problem that has not been effectively resolved in Zimbabwe. Wildlife is posing a direct and enormous threat to the safety and livelihoods of communities living alongside wildlife across the country. Addressing HWC in these areas requires striking a balance between conservation priorities and the needs of these vulnerable people. Results from this study supports earlier studies conducted across Zimbabwe by various researchers. Their findings showed that HWC is being experienced across several communities although the dynamics and extent of the conflict varies from place to place. However, elephants, hyenas and lions are the top three conflict species in many areas across the country[21,22,23]. Consequently, the implementation of mitigation measures across the country targeting these three species will greatly reduce HWC.

Communities that live alongside wildlife lose their livestock to predators, their crops to elephants, baboons and and other herbivores, their property including houses and granaries gets damaged and sometimes people get injured or killed by wildlife. When such incidents become a recurring issue, retaliation against the species blamed often follows, leading to conflict about what should be done to remedy the situation. For example, a previous study in Kariba found that the residents drive elephants away from residential areas using stones and burning fire logs and that they also kill or injure buffaloes using snares[24]. The communities across the study sites believe the current response to HWC by the responsible authority is unsatisfactory, and this could potentially escalate the conflict even further and most likely undermine the success of the CAMPFIRE programs and weaken the effectiveness of biodiversity conservation programs in these areas. This study as well as other previous studies[23] found that the general perception of the communities is that authorities seem to be more concerned about protecting wildlife at the people's expense and do not seem to show any concern over loss of human life and destruction of livelihoods and property. Urgent solutions for HWC management are therefore needed so that both people and wildlife are protected.

Although communities in Zimbabwe have coexisted with wildlife for millennia, it appears that the conflict is now becoming more frequent and graver. The rise in conflict has mainly been due to the increasing demand for land, such that at present some of the wildlife corridors are being encroached by crop fields, settlements and urban

[21] Musiwa, AR, Mhlanga, W. Human–wildlife conflict in Mhokwe Ward, Mbire District, North-East Zimbabwe. Afr J Ecol. 2020; 58: 786– 795. https://doi.org/10.1111/aje.12774

[22] Gandiwa, E, Gandiwa, P., Muboko, N., 2012. Living with Wildlife and Associated Conflicts in A Contested Area Within the Northern Gonarezhou National Park, Zimbabwe. Journal of Sustainable Development in Africa 14 (6), 252-260.

[23] Matseketsa G., Muboko N., Gandiwa E., Kombora D. M., Chibememe G. (2019). An assessment of human-wildlife conflicts in local communities bordering the western part of save valley conservancy, Zimbabwe. Global Ecology and Conservation. 20 doi: 10.1016/j.gecco.2019.e00737.e00737

[24] Lindah Mhlanga. (2001). Conflict between wildlife and people in Kariba town, Zimbabwe. Zambezia , xxviii (i)

development. While the communities living alongside wildlife are experiencing costs from doing so, their attitudes towards wildlife conservation are still generally positive. It is therefore imperative that all the affected communities, stakeholders and interested parties across the country work together towards finding lasting solutions for HWC, so as to reduce the costs that these communities incur from living with wildlife.

This study has recommended a set of solutions that can be implemented at the household level, local level and at the national level to reduce the impact of HWC on local communities and promote human-wildlife coexistence and biodiversity conservation. Gandiwa and his co-authors[25] conducted a study on HWC around communities living adjacent to Gonarezhou National Park and also recommended that decisions and actions regarding the control of problem animals should be devolved to the community level in order to help reduce human-wildlife conflicts. It will be critical to build the capacity of these communities and the stakeholders to develop HWC management and mitigation plans and to implement appropriate mitigation measures. The relevant authorities and stakeholders should immediately explore the “low hanging fruits” such as the use of conflict mitigation strategies, community engagement and training, education and awareness, and formulating a human-wildlife conflict mitigation strategy. The establishment of an HWC National Database could be easily implemented and would greatly improve the management of HWC across the country. A recent study on communities living in Save Valley Conservancy also found that conservation education and awareness can reduce hostility of the community towards wildlife and that educated communities are more receptive to such education programs[26].

Any HWC management measures put in place both at the local and at the national level should nevertheless recognize and respect the rights and development needs of local communities, while at the same time recognizing the need to promote biodiversity conservation. It is however important to acknowledge that it will not be possible to eradicate all conflict, but that conflict must be managed in the most effective and efficient ways possible.

[25] Gandiwa, E., I. M. A. Heitkönig, A. M. Lokhorst, H. H. T. Prins, and C. Leeuwis. 2013. CAMPFIRE and human-wildlife conflicts in local communities bordering northern Gonarezhou National Park, Zimbabwe. Ecology and Society 18(4): 7. http://dx.doi.org/10.5751/ES-05817-180407

[26] Peter Makumbe, Stenly Mapurazi, Sostina Jaravani, Isaac Matsilele, "Human-Wildlife Conflict in Save Valley Conservancy: Residents’ Attitude Toward Wildlife Conservation", Scientifica, vol. 2022, Article ID 2107711, 11 pages, 2022. https://doi.org/10.1155/2022/2107711

6.0 ANNEXES

[REDACTED]