



Barriers to Effective Climate Change Management in Zimbabwe's Rural Communities

116

Louis Nyahunda and Happy Mathew Tirivangasi

Contents

Introduction and Background	2406
Barriers to Effective Climate Change Management in Zimbabwe's Rural Communities	2408
Overview of Climate Change Management	2409
Climate Change Management Efforts at National Level in Zimbabwe	2411
Climate Change Management Strategies at Local Levels	2412
Determinants of the Ability to Adapt to Climate Change (Adaptive Capacity)	2416
Economic Resources	2417
Training and Awareness	2417
Social Capital	2418
Equity	2418
Availability of Technology	2419
Availability of Infrastructures	2419
Availability of Institutions	2419
Barriers Towards Effective Climate Change Management in Zimbabwe's Rural Communities	2420
Poverty	2420
Inadequate Information about Climate Change and Adaptation	2421
Lack of Adequate Institutions that Support Adaptation	2423
Gender Inequalities	2424
Inadequate Extension Services	2425
Outbreak of Health Emergencies	2426

This chapter was previously published non-open access with exclusive rights reserved by the Publisher. It has been changed retrospectively to open access under a CC BY 4.0 license and the copyright holder is "The Author(s)". For further details, please see the license information at the end of the chapter.

L. Nyahunda (✉)

Department of Social Work, University of Limpopo, Polokwane, South Africa

H. M. Tirivangasi

Department of Research Administration and Development, University of Limpopo, Polokwane, South Africa

e-mail: happy.tirivangasi@ul.ac.za

© The Author(s) 2021

W. Leal Filho et al. (eds.), *African Handbook of Climate Change Adaptation*,
https://doi.org/10.1007/978-3-030-45106-6_251

2405

Conclusion	2427
References	2428

Abstract

The daunting effects of climate change are more visible and acute among rural people in most developing countries. Smallholder farmers in rural communities are more encumbered by climate change impacts and they have been reeling with climate induced shocks for some time. Their vulnerability to climate change impacts is aggravated by high dependence on the climate volatile natural resource base, high poverty levels, lack of adaptive capacity, low educational levels, and lack of technoscience-based technologies among other key compounding factors. In the light of this, Zimbabwe is still crawling to implement and administer effective climate change management measures aimed at disaster risk reduction and management, vulnerability reduction, social resilience, and capacity building because of political and socioeconomic quagmires trapping the country. Consequently, rural people are the hardest hit by these developments. Climate change management connotes a human intervention to reduce the sources or enhance the sinks of greenhouse gases and adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities through mitigation and adaptation. Nevertheless, rural people are on record of engaging in a plethora of activities to manage climate change and its actual or potential risks. However, their efforts are marred by an avalanche of setbacks which serve as barriers to climate change management. Against this backdrop, this book chapter intends to delineate the factors serving as barriers to climate change management in Zimbabwe's rural communities.

Introduction and Background

Zimbabwe like many other developing countries is highly vulnerable to climate change impacts due to livelihoods that are climate sensitive. The country's vulnerability is also catalyzed by low adaptive capacities among its citizens (Zvamasiya et al. 2017). On that note, the multifarious impacts of climate change are visible and felt in different sectors which beacons the country's economy namely; agriculture, health, water resources, transport, energy, tourism, wildlife, and biodiversity (Dube and Nhamo 2019). The precarious impacts of climate change are taking a toll in rural communities where rainfed agriculture is a key livelihood factor. Furthermore, rural people are more vulnerable to climate change impacts because they lack adaptive capacity in the wake of climate change induced shocks (Nyahunda et al. 2019). In the light of this, Mubaya and Mafongoya (2017) opine that the manifestation of climate change impacts through erratic rainfall patterns and excessive temperatures is resulting in dwindling of crop yields placing rural people at a perilous position of food insecurity. As for Chanza (2014), due to climate change, rural communities have been saddled by successive droughts, desiccation of water sources, floods,

distribution of pathogens causing diseases and death of livestock, deterioration of the natural resource base including grazing lands for livestock, and widened poverty levels.

This chapter derives from empirical research on climate change adaptation among rural people in Chivi south and Umzingwane districts. It also benefited from a conceptual review of literature on climate change adaptation studies conducted in other rural parts of Zimbabwe. This was done to extract best adaptation practices and also to document the constraints faced by rural people in their adaptation efforts. In this regard, this is meant to inform policy measures that could be devised to circumvent adaptation constraints among rural people. For empirical purposes, the study was qualitative in nature guided by the multi-case study design. Data was collected through transect walks, focus group discussions and individual interviews with 40 participants that were purposively and conveniently selected in Chivi south and Umzingwane districts. In September 2019, the Government of Zimbabwe declared a national state of disaster over drought as crop yields dwindled owing to climate change. In response, the government appealed for international funding to cater for famine affecting more than 6.5 million people (Dube and Nhamo 2019). Matebeleland South and Masvingo provinces which were the focal point of this study were identified as the most vulnerable provinces to the vagary impacts of climate change (Phiri et al. 2014). These provinces are situated in the agro-ecological regions that are volatile to climate change. As such, agricultural production has been stymied by long dry spells, hot temperatures and erratic rainfall patterns owing to climate change (Jiri et al. 2017). Earlier studies conducted in Chivi south (Masvingo province) and Umzingwane (Matebeleland South province) districts revealed that climate change risks are rampant such as water stress, drought, increased incidences of pests and diseases, and death of livestock (Mudzonga 2012; Dube et al. 2016).

As mentioned above, Dube and Nhamo (2019) posit that among other precarious impacts of climate change is the successive episodes of drought seasons in Zimbabwe particularly in rural communities where an estimated number of seven million people were declared food insecure by September 2019. Despite the Zimbabwean government's acknowledgement of the impacts of climate change on its socio-economic sectors and vulnerable groups such as rural people, little has been done to cushion rural people and their livelihoods from the vagary impacts of climate change. As such, efforts to manage climate change and its impacts through broad-based adaptation and mitigation processes in rural communities are still far from being lived realities. In order to substantiate this exposition, this book chapter provides evidence of climate change impacts, response strategies and challenges faced by rural people in responding to climate change impacts in Umzingwane district in Matebeleland South Province and Chivi south district in Masvingo province of Zimbabwe. This shall be juxtaposed to the experiences of rural people in other parts of Zimbabwe where climate change is taking a toll. As elsewhere in rural Zimbabwe, smallholder farmers in Umzingwane and Chivi have been reeling with the impacts of climate change for some time complemented by a myriad of challenges to triumph over climate change impacts (Mashizha 2019; Mutandwa et al. 2019; Nyahunda and Tirivangasi 2019). The most daunting setbacks are the soaring

poverty levels, low adaptive capacity and unemployment levels in these rural communities and climate change impacts is exacerbating the situation (Nyahunda et al. 2019).

In the foregoing, a plethora of studies in the climate change discourse in Zimbabwe's rural communities, Chivi south and Umzingwane districts included, testifies that rural people are not passive victims to the vagary impacts of climate change but they are responding to it through a plethora of adaptation and mitigation strategies (Gukurume 2013; Dube and Phiri 2013; Ndebele-Murisa and Mubaya 2015; Bhatasara 2018; Nyahunda et al. 2019). These adaptation strategies are aimed at insulating their lives and livelihoods from climatic shocks. What should be highlighted is that, in the process of embarking on a cocktail of adaptation strategies, rural people are still confronted by a myriad of challenges serving as barriers to effective adaptation (Nyahunda and Tirivangasi 2019). In the ongoing, Chanza and Gundu-Jakarasi (2020) opine that Zimbabwe is showing an avalanche of gaps towards climate change adaptation and mitigation. This is because, evidence of climate change in Zimbabwe portrays a predominantly challenging situation. As a result, climate change adaptation efforts in rural communities remain on the onslaught because of lack of adaptive capacity among rural people. Also, the socioeconomic plagues bedeviling Zimbabwe connotes that efforts to enhance modest climate change management through effective adaptation and mitigation remain constrained. This is because there is no evidence of studies dedicated to unravel the efforts being made to address the barriers to climate change adaptation in the rural areas. From this background, this chapter is predetermined to delineate the barriers to climate change management in Zimbabwe's rural communities in a quest to influence the development and implementation of responsive climate change adaptation policy practices. Against this backdrop, the next sections provides a brief overview of barriers in the context of climate change. This is followed by the overview of climate change management where broad definitions of adaptation and mitigation are dissected. Subsequently, climate change management efforts made at national level in Zimbabwe are presented followed by the discussion about localized climate change management efforts. Furthermore, the chapter shall delve into the determinants of adaptive capacity before providing the barriers towards effective climate change management in Zimbabwe's rural communities. Lastly, the chapter shall capture measures to be undertaken to circumvent the identified barriers as Zimbabwe strives to foster adaptive capacity and resilience to climate change.

Barriers to Effective Climate Change Management in Zimbabwe's Rural Communities

An array of definitions about barriers have been propounded in the climate change discourse. In the light of this, Biesbroek et al. (2011) define barriers as impediments amidst the implementation of climate change adaptation strategies. Barriers could be factors or conditions that are largely insurmountable which render adaptation to climate change ineffective (Kruse et al. 2013). Yaro et al. (2015) view barriers as

reasons why adaptive capacity is not attainable or being translated into action in the climate change discourse. Also, barriers can be institutional facet, normative or cognitive factors that restrict individuals or groups from implementing appropriate or sustainable forms of adaptation measures (Muzari et al. 2016). In the ongoing, Eisenack et al. (2014) regard barriers as obstacles that make adaptation to climate change less effective or less efficient. Earlier, Biesbroek et al. (2011) opined that barriers are different from limits as highlighted in some climate change literature. This is because barriers are mutable, avoidable, overcome, or reduced whereas limits are seen to be unsurpassable. In support, Yaro et al. (2015) denote that barriers can be overcome by individual or concerted collective effort, changed way of thinking, reprioritization of resources, institutional support, and political will. From the view point of Chanza et al. (2019), barriers are human or natural factors that impede adaptive efforts. As for Bhatasara (2018), barriers in the context of climate change adaptation are constraints faced during the adaptation processes. Despite a plethora of definitions and characteristics of barriers submitted by different scholars, in this study, the researchers paid homage to the definitions of barriers that point to conditions or factors rendering adaptation less effective or factors behind low adaptive capacity of rural people. In light of the above, several studies on climate change adaptation reveal that rural people are saddled by an avalanche of challenges serving as barriers to effective climate change management (Chanza et al. 2019; Nyahunda and Tirivangasi 2019). The understanding of barriers is an important escapade to gain ambient grounds to propose ways of dealing with them. Based on this, the barriers reported in this study were found to be restricting the process of adaptation and decreasing the adaptive capacity of rural farmers.

Overview of Climate Change Management

In this section, climate change management refers to response mechanisms employed human systems to address climate change and its associated risks through adaptation and mitigation measures. In the light of this, the Intergovernmental Panel on Climate Change (IPCC 2014) defines climate change adaptation as response strategies employed by human or natural systems to reduce exposure to climate change risks and to minimize harm or exploit its beneficial opportunities. On the same note, adaptation entails changes and adjustments effected in response to perceived or actual negative stimuli's (climate change) which breeds opportunities for sustainable change and development (Chanza 2014). The United Nations Framework on Climate Change Convention (UNFCCC 2014) defines climate change mitigation as strategies employed by human systems to reduce greenhouse gasses and emissions that cause climate change. To shade more light, Muzari et al. (2016) posit that mitigation involves technological and behavioral adjustments which promote land conservation and preservation, managing deforestation and resorting to renewable energy sources aimed at enhancing greenhouse gas sinks.

From the above expositions, what should be highlighted is that mitigation and adaptation play complementary roles. This connotes that mitigation is poised to

stabilize the climatic system thereby minimizing pressure on adaptation (Chanza and Gundu-Jakarasi 2020). Earlier, Chanza (2014) argued that when mitigation fails, adaptation becomes a bone of contention. However, it is important to note that mitigation is more costly to implement for smallholder farmers because it requires technological advancements and modern infrastructural development which are still far from being a lived reality particularly in Zimbabwe. As such, several studies in Zimbabwe's rural communities have captured an avalanche of evidence that points to climate change adaptation in rural communities (Gukurume 2013; Ndebele-Murisa and Mubaya 2015; Nyahunda and Tirivangasi 2019). The implementation of adaptation strategies in the wake of climate change is an interplay of natural perception that the climate system has changed and there is need to adapt, influence of indigenous knowledge systems about the changes in the natural environment which informs possible management measures through the utilization of available resources and the presence policy practices that influence adaptation.

In the ongoing discussion, it is important to emphasize that a plethora of climate change impacts and a vicious vulnerability circle bedeviling most rural communities is making adaptation an inescapable discourse. Due to the fact that responding to the causes of climate change (mitigation) will take time, adaptation becomes a necessity to save people's lives and livelihoods. Most importantly, adaptation to climate change impacts is now a cardinal requirement to reduce its daunting risks and reap the benefits of adaptation (Nyahunda et al. 2019). Furthermore, there is a ubiquitous acknowledgement that without adaptation, climate change and its precarious impacts become detrimental on people's lives and livelihoods. Thus, if people fail to adapt to climate change impacts, they become vulnerable to social disruptions, ailments and deaths brought about by climate change. Based on this, Chanza (2014) provides a synopsis of types of adaptation in the climate change discourse as follows;

- (i) Anticipatory adaptation: This type of adaptation takes place before the eruption of climate change and its impacts are observed. In other cases, this type of adaptation is called proactive adaptation.
- (ii) Autonomous adaptation: This is also referred to as spontaneous adaptation common in most communities where climate change is at the epicenter of people's lives. As such, this type of adaptation is triggered by the observation of ecological changes in the natural or human systems which encumbers people's welfare.
- (iii) Planned adaptation: This type of adaptation is influenced by policy measures out of the acknowledgement that the climate system has changed or is about to change and strategic action is required to minimize its impacts.

To extrapolate from the above, earlier arguments denoting that adaptation and mitigation play complementary roles means proactive (anticipatory) adaptation may suppress the climate change phenomenon from occurring which is also the purpose of mitigation. Proactive adaptation is still a challenge in Zimbabwe's rural communities because it requires strategic planning, early forecasting determinations, suppression of anticipated hazards through technology. Importantly, successful climate

change management through adaptation is a product of adaptive capacity which refers to the ability of a social ecological system to organize itself and respond to climatic induced damages, learn from them and make use of the advantages present to moderate the risk (IPCC 2014). To this end, the ongoing discussion in this chapter shall navigate on efforts made by the Zimbabwean government to manage climate change impacts at national and local levels before delving into a brief discussion about the determinants of adaptive capacity.

Climate Change Management Efforts at National Level in Zimbabwe

The Zimbabwean government has not been complacent in responding to climate change despite presenting challenges in the country's economic trajectory. Accordingly, the country recognizes the critical contribution of climate change variability in stalling its developmental aspirations (Chanza and Gundu-Jakarasi 2020). In response, the country came up with a gamut of strategies and policy measures signaling a broad-based commitment to tackle climate change and its impacts. Based on this, the Zimbabwean government developed the Zimbabwe Climate Change Response Strategy in 2014. The strategy provides guidelines on coordination and mainstreaming of climate change factors into the country's developmental trajectory to be implemented at local, district, provincial, and national levels (Dodman and Mitlin 2015). The development of the National Climate Change Response Strategy was the first step which subsequently led to the development of the country's National Adaptation Plans (NAPS), National Adaptation Programme of Actions (NAPAs), and Nationally Appropriate Mitigation Actions (NAMAS) as mandated by the Kyoto Protocol and the UNFCCC (Dodman and Mitlin 2015). Zimbabwe's NAPs are aimed at mainstreaming climate risks into national developmental planning, programs, and policies.

Furthermore, the strategy identified key sectors that are vulnerable to climate change such as energy, water, health, agriculture and food security, land usage, forestry, livestock production, industry and commerce and transport. Responsively, the strategy explicitly provides key actions to be undertaken to enhance either adaptation or mitigation in the identified sectors (Makaudze 2016). To add on, in 2016, Zimbabwe developed and promulgated its Climate Change Policy to be supported by the National Climate Change Response Strategy. In the light of this, Zimbabwe's climate change policy draws lessons from the international instruments and protocols which Zimbabwe is a signatory such as the UNFCCC, the Kyoto Protocol, and the Paris Agreement. These instruments provide emphasis on the importance of strategic measures to curtail climate change impacts through crafting, implementing, and regularly publish and update regional and national measures fostered to mitigate climate change effects complemented by facilitation of sustainable climate change adaptation (Zhakata et al. 2017). In the ongoing cluster of arguments, Murombo (2019) denotes that Zimbabwe's climate change policy provides a framework for addressing climate change-related impacts through the

development of national adaptation and mitigation efforts. Among other key principles encapsulated in the climate change policy include: the government's commitment to encourage the use of efficient irrigation technologies, promotion of climate tolerant crop varieties and provision of livestock insurance, creation of climate conscious societies that would scale up collective participation in climate change interventions including adaptation and mitigation and upscaling the provision of climate extension services to the farming rural communities especially those depending on climate sensitive resources.

Through the harmonization of the dictates of Zimbabwe's Climate Change Response Strategies and the National Climate Change Policy, the Zimbabwean government created Local Area Adaptations Plans (LAPs), District Adaptation Plans (DAPs) and Provincial Adaptation Plans (PAPs). These provide a database of weather conditions and events in every area, past and present climatic trends and their risks, the area's vulnerability, projections of future climatic scenarios and resources in the areas that can be used for effective planning that builds resilient communities to climate change impacts (Zhakata et al. 2017). Notwithstanding the daunting fact that Zimbabwe's gamut of climate policies and aspirations are devoid of implementation owing to lack of strategic coordination and financing plans, the country is committed to undertake a comprehensive analysis to understand the barriers to climate change adaptation in its policy frameworks. Once again, this stance is not yielding any positive outcomes because rural communities have been saddled by barriers in their efforts to adapt to climate change (Chanza et al. 2019).

Climate Change Management Strategies at Local Levels

This section provides a catalogue of adaptation strategies employed by rural people in Chivi and Umzingwane districts and other rural communities in the wake of climate change and its related shocks in Zimbabwe. As articulated earlier that efforts to manage climate change through mitigation are not feasible in rural communities that are trapped by the doldrums of poverty, underdevelopment and deficiency of infrastructures that warrant mitigation, this study captured adaptation strategies at play among rural people because adaptation despite its insurmountable barriers is feasible even in poor marginalized communities. Despite being located in different provinces, Umzingwane and Chivi districts are susceptible to a myriad of climatic stressors which have compounded majority of households into abject poverty. The soils in these districts are prone to soil erosion making crop production unattainable. To worsen the situation, in Masvingo and Matebeleland South provinces where these districts are located, erratic rainfalls are predominant which are around 500–600 mm (Mudzonga 2016).

In Chivi south and Umzingwane districts, communal farming is a major source of livelihood but the vicissitudes of climate change are rendering rainfed agriculture a futile exercise (Chanza et al. 2019; Muzari et al. 2016; Phiri et al. 2014). Nevertheless, this study established that rural farmers are not passive victims to the vagary impacts of climate change but they are responding to it through a cocktail of

adaptation strategies either individually or collectively. Having said that, adaptation to climate change in Chivi and Umzingwane districts is in two-fold that is; independently through the realisation by the community members that they need to adjust their practices in response to the changes and to a limited extent through the influence of the government and nongovernmental organization measures.

In the foregoing, this study captured the adaptation strategies employed by smallholder farmers in both districts in comparison with other studies conducted in other rural communities of Zimbabwe in the wake of climate change induced shocks. This process was important to identify the gaps towards effective adaptation for rural people. In that regard, this study found that crop diversification was a common adaptation strategy to climate change impacts in Umzingwane and Chivi south districts. What emerged is that, smallholder farmers have come up with contingent responses through amalgamation of farming strategies and diversification of crop varieties. In the light of this, most smallholder farmers have resorted to drought tolerant crops that could withstand the long dry spells caused by climate change. The growing of small grain crops such as pearl, finger millet, sorghum and rapoko is on the rise in these two districts. Similar findings were reported by Chanza et al. (2019) in Silobela district that farmers diversified their cropping strategies in response to climate change impacts. To add on, intercropping and crop rotation are common farming practices complemented by changing of planting dates, zero tillage and mulching practices. Diversification of cropping systems is also complemented by the increase in the domestication of drought tolerant livestock such as goats, sheep, guinea fowls and indigenous chicken. A study conducted in Bikita district by Nyahunda and Tirivangasi (2019) revealed that some farmers are growing legumes such as cow peas and beans because they mature early. With the assistance from NGOs such as World Vision Zimbabwe and Action Faim, 45 boreholes and 11 shallow wells were drilled in Chivi south district to support gardening activities and address water stresses. On the same note, in Umzingwane district, the Matebeleland Enhanced Livelihoods Agriculture and Nutrition Adaptation (MELANA) program drilled four solar-powered boreholes to support gardening activities. In Zvimba district, Mashizha (2019) found that even without knowledge of climate change people have adapted at least one strategy and crop diversification was the common one. In Chimanimani district, Mutandwa et al. (2019) established that farmers have diversified their farming methods through varying crop planting dates. Conservation farming was also reported complemented by the use of contour ridges and mulching activities.

Results from a study conducted in Gwanda district by Ndlovu et al. (2020) reveal that pit planting is a key adaptation strategy and this is complemented by mulching activities to retain soil moisture. Conservation farming was also identified in Mutoko district by Bhatasara (2018). Also, in Mutoko, micro irrigation systems through the syphoning of water manually from the rivers was on the rise when water sources are not dry. In Chundu and Nyamakate resettlement areas, Kupika et al. (2019) established that rural farmers are cultivating in the wetlands and digging of wells along river beds to supplement agricultural activities. Rearing of small livestock such as goats, sheep and indigenous chicken was also reported in Zvimba, Hwedza,

Bikita, and Kariba districts (Mubaya and Mafongoya 2017; Zvamasiya et al. 2017; Nyahunda and Tirivangasi 2019).

The uncertainty of agriculture production has ignited most rural farmers to diversify their livelihood activities. In the light of this, livelihood diversification is a process by which rural households embark on diversification of a portfolio of activities and social support capabilities for survival and in order to improve their standard of living (Gukurume 2013). Majority of smallholder farmers are embarking on ex-post adaptation mechanisms from main activities such as agriculture which has been decorated by dwindling harvests and droughts emanating from climate change occurring in the communities. These activities are meant to improve their income streams and guarantee food security threatened by climate change. To that end, livelihood diversification activities that were captured include; petty trading of fruits, vegetables and firewood, menial jobs such as brick molding and thatching of houses (among men), gold panning (common in Umzingwane district), cross border trading, beer brewing and artisanal fishing. Kamwi et al. (2018) affirm to this exercise by denoting that diversification of livelihoods warrants resilience in the face of adverse trends or sudden shocks such as climate change. In Silobela district, Chanza et al. (2019) found gold mining, bee keeping, selling of mopane worms and brick molding as common livelihood strategies. Brick molding and selling of firewood were also identified by Nyahunda and Tirivangasi (2019) as common livelihood strategies among rural people in Bikita district. Arguably, these activities have a backlash on the environment which people should protect from land degradation and deforestation. In the Middle Zambezi Biosphere Reserve, Kupika et al. (2019) established that rural people are taking menial jobs in nearby commercial farms. To add on, in Zvimba district, Mashizha (2019) identified casual labor and artisanal mining among the livelihood diversification strategies. Soropa et al. (2019) established that in Tsholotsho and Chiredzi districts, the selling of mopane worms is very common as a supplementary economic activity to compensate the losses incurred from failed harvests.

Furthermore, migration emerged to be another adaptation strategy to climate change in Zimbabwe's rural areas commonly among men. The pervasive patriarchal dominance and social ascribed roles and care giving responsibilities of women limit them from migrating when climate change related disasters strike. This study found that most male figures in Chivi south and Umzingwane districts had either migrated to nearby cities or neighboring countries such as Botswana and South Africa in search for greener pastures. These migrants are remitting their incomes to support their families back home through securing of food, paying of school fees and medical bills and buying of essential farming inputs. Migration has been identified as a common adaptation strategy to the vagary impacts of climate change across Zimbabwe (Chanza et al. 2019; Soropa et al. 2015; Mugambiwa and Rukema 2019; Mubaya and Mafongoya 2017).

The reliance on Indigenous Knowledge Systems (IKS) emerged to be another cardinal adaptation strategy among rural people in Chivi south and Umzingwane districts. Chanza (2014) defines indigenous knowledge as a body of knowledge accumulative based on practice, belief and coordinated adaptive techniques passed

through generations on cultural transmission basis denoting how human beings create a relationship with the environment. Through the use of IKS, rural people in Chivi south and Umzingwane districts have developed meticulous systems of gathering, predicting, interpreting and making decisions related to weather. In the same wavelength, they are using this knowledge to devise modest agricultural practices, observation and forecasting of potential impacts of climate change thereby planning proactive adaptation measures, protection of crops, livestock and other assets against climate change induced disasters. On the same note, this is commonly done through a meticulous observation of animal behaviors and sounds, wind direction, astronomy correlation between movements of stars and haze circles around the moon to predict good and bad harvests. In Murehwa, Tsholotsho, and Chiredzi districts, Soropa et al. (2015) opine that rural farmers are using IKS to predict the quality of the season before the onset of the rains. In light of this, IKS indicators are observed early before the season commences. Similar findings about the usage of IKS as a determinant for climate change adaptation were reported by several scholars in studies conducted across Zimbabwe (Mubaya and Mafongoya 2017; Gukurume 2013; Nyahunda and Tirivangasi 2019; Chanza et al. 2019; Mashizha 2019).

What should be noted is that the use of trees and availability of certain wild fruits as a determinant of good and bad seasons was reported in Chivi and Umzingwane districts as in most parts of Zimbabwe. In the same line of argument, the trees, birds and wild fruits used to make seasonal forecasting differ from district to district. In Chivi and Umzingwane districts, IKS is relevant through reading the abundance of wild fruits and flowering of certain plants as a guarantee of the quantity of rain expected. In Zvimba, Bikita, Gwanda, Mutoko, and Murehwa districts, plenty of wild fruits guarantees a good season and a few wild fruits signals drought (Bhatasara 2018; Soropa et al. 2019; Mashizha 2019; Nyahunda and Tirivangasi 2019; Ndlovu et al. 2020). In Chiredzi, early flowering of trees and many mopane worms signals good harvests. Also, in Tsholotsho, heavy sound of animals such as lions in October guarantees a good season (Soropa et al. 2019).

At local levels, this study further found that people are harnessing social capital as an adaptation strategy to climate change. Gukurume (2013) defines social capital as a social web of networks created through interaction which strengthens trust and social norms. In light of this, norms, trustworthiness, and networks that tie people together through kinships, friendship and neighborhood defines social capital (Aldrich and Meyer 2015). Through harnessing of social capital, rural people in Chivi south and Umzingwane districts are making collective efforts to withstand the climate change aberrations by sharing scarce resources such as water and food. It further emerged that there are community savings clubs initiated to improve the income streams and generate funds to buy agricultural inputs, small livestock which are drought tolerant, construction of quality houses that can withstand floods and drilling of wells. In the same vein, rural people are embracing social capital through collective field (Nhimbe) work where they converge to work on certain tasks mainly planting, cultivation, and harvesting. Rural people are on record of utilizing social capital to share skills and problem-solving knowledge in

the wake of disasters. Further, Aldrich and Meyer (2015) argue that social capital fosters community engagement, cooperation and participation which are essential in addressing community challenges such as climate change. In corroboration, Musavengane and Simatele (2016) posit that social capital can be a vehicle through which the accumulation of different forms of capital can be achieved and contribute to environmental management.

Chanza et al. (2019) found social capital as a determinant for climate change adaptation in Silobela district through community lending and saving clubs called *mikando*. This was also identified by Nyahunda and Tirivangasi (2019) among rural people in Mazungunye communal lands and the activity is called *Fushai*. In the Nyaminyami area of Kariba rural district, Mubaya and Mafongoya (2017) found the harnessing of social capital in the wake of climate change aberrations manifesting through the Zunde raMambo project. Zunde is a Shona word that may mean a large gathering of people taking part in a common activity or may refer to plenty of grain stored for future use by people in a community (Chanza 2014). This is a traditional grain reserve where the harvest becomes useful in times of hunger. This practice is designated by the Chief (Mambo) (Nyahunda and Tirivangasi 2020). In the Muzarabani area, Chanza (2014) found the Zunde raMambo as the system that serves as a local social safety net for the poor and vulnerable members of the community from food insecurity caused by climate change. In Gutu district, Ndebele and Murisa- Mubaya (2015) found the Zunde raMambo as an important practice against climate change risks and the weakening of national social security schemes attributed to resource constraints and erratic food relief supply chains.

In continuation, in Chivi district as reported in Hwedza and Mutoko districts by Zvamasiya et al. (2017) and Bhatasara (2018), the predominance of social groups is also the hallmark for climate change adaptation. Similar findings were made in Chimanimani district by Mutandwa et al. (2019) that community members were creating social networks and mutual relationships for the purpose of sharing climate responsive strategies and sharing of information as well as best practices. In summing up this section, it is important to note that the presence of adaptation strategies documented in this study doesn't mean that rural people are effectively adapting to the impacts posed by climate change rather they are confronted by a myriad of conundrums serving as barriers to effective adaptation. The capture of adaptation strategies at play in these rural communities was essential to signpost the gaps in the process of adaptation. Having said that, the following section shall delve into determinants of adaptive capacity.

Determinants of the Ability to Adapt to Climate Change (Adaptive Capacity)

This section shall navigate on indicators of adaptive capacity. This is important to create a barometer that can be used to assess whether rural people are effectively adapting to climate change or not. The presence of the determinants of adaptive capacity connotes that there is effective adaptation while the absence of all or some

of its determinants imply that there are barriers to effective adaptation to climate change. Accordingly, this study juxtaposed the circumstances in Chivi and Umzingwane districts against the indicators of adaptive capacity as contemplated in a plethora of climate change adaptation literature. In the light of this, Yaro et al. (2015) denote that adaptive capacity is determined by an array of factors which are neither mutually exclusive nor independent but as a result of a combination of these factors. Based on this, the determinants of adaptive capacity were examined following the previous assessments of adaptive capacity made at local levels by Hinkel (2011), Abdul-Razak and Kruse (2017), and Yaro et al. (2015). As such, the following are the determinants of adaptive capacity in the climate change discourse.

Economic Resources

Farmers with a diverse source of income stand a better chance to adapt to the impacts of climate change than those without. Economic resources can be through a confluence of remittances and access to credit facilities that give the smallholder farmers the ability to be responsive in the wake of climate change and its related impacts. It is important to note that, economic resources can be gained through diversification of livelihood activities hinged on access to opportunities. Thus, farmers with economic security can be easily insulated from the precarious impacts of climate change. This is because they can afford to buy climate sensitive farming inputs including hybrid seeds, pesticides and stock feed for livestock. Economic security is the hallmark for food security even under circumstances where agricultural returns are low owing to climate change. On the same note, farmers with economic security have the ability to insure their crops and other assets in the wake of climate change induced disasters such as floods, hurricanes and veld fires.

Training and Awareness

Training as an indicator for successful adaptation implies that farmers with vast farming experience and access to extension services that enhances training, knowledge and skills about climate change stand a higher chance of adapting to climate change impacts than those that lack farming experience and training. Experienced farmers have etiquette indigenous adaptation practices and they have the ability to identify and react to climatic fluctuations. In the ongoing, there is a positive correlation between literacy levels and ability to adapt to climate change. This speaks to farmers with high literacy levels having the ability to adapt than those with lower or without literacy levels. What should be underscored is that knowledge that warrants successful in the climate change terrain is a product of education either formal or informal. Hinkel (2011) posit that education, training and public awareness on climate change is essential for influencing the society to jointly participate in climate change management that is adaptation. In this regard, the

availability of knowledge influences decision making peculiar for adaptation. To add on, climate knowledge includes evidence-based beliefs and practices about the causes and effects of climate change. In support, Bowen et al. (2012) aver that availability of information allows every population to deduce that something has taken a paradigm shift hence there is need to adapt. This helps to foster an intrinsic assessment on the severity of the disturbance and devise amicable solutions respectively. Lastly, exposure to knowledge enables rural people to evaluate possible actions to be undertaken and pay attention to those that are useful in tandem with their circumstances.

Social Capital

Social capital is one of the many resources available to individuals in every community despite presenting circumstances. This is a web of social networks created through interaction with other members of the community which serves as a hallmark of adaptation when people share resources, information and collective norms to build resilience against climate change. Adaptation to climate change rests on a social component as individuals interact with other network members to share resources, gain information, build new institutions and create collective norms, in order to provide resilience to climate change. As such, social capital serves as a public good in supporting whole communities through extreme events such as climate change (Dussaillant and Guzmán 2014). In the history of climate change strategies, social capital serves as an important vehicle used to acquire agricultural resources, shared problem-solving techniques, information dissemination, knowledge generation, sharing of experiences and solutions for disaster management. This connotes that people with social capital ties can easily adapt to climate change perturbations. Notably, social capital begets social protection.

Equity

Communities with contingent equity practices have ambient environments for successful adaptation to the climate change impacts by all members. In as much as this is an unlikely situation in most rural communities in Africa, adaptation is also a product of equity where there is fairness and equality in sharing of climate change burdens and benefits, equal distribution to resources and opportunities including climate change information, early warning awareness regarding disasters across gender constructs. Issues of equity as an indicator for adaptive capacity means men and women are equally involved in the planning and implementation of climate change interventions at all levels. This also speaks to the inclusion of other vulnerable groups in societies that is the elderly and people with disabilities.

Availability of Technology

The availability of technologies that enhances the farmers' knowledge about climate change crop varieties, soil moisture and fertility retention techniques is a panacea for climate change adaptation in communities where they are present unlike in those without. Relevant technologies in the climate change discourse are techno-science mechanisms aimed at assisting people in adjusting to changes for instance irrigation systems, drought resistant crops, use of remote sensing, local weather forecasting and early warning information systems.

Availability of Infrastructures

For successful adaptation to take place, there is need for infrastructural and technological support systems (IPCC 2014). The availability of the same infrastructures plays a pivotal role in providing early climatic warning information and weather forecasting. Basically, they form part of relevant networks that are important aspects in curbing climate change impacts and foster the ability to respond to natural disasters associated with climate change which manifest through droughts, floods and hurricanes. Important infrastructures that can facilitate successful adaptation to climate change include; irrigation facilities, water catchments, boreholes, schools, quality roads, health care facilities and transport. Despite all these fundamentals (infrastructures) missing or being inadequate in rural communities, in cases where they are available, they foster successful adaptation in the wake of climate change.

Availability of Institutions

The availability of institutions that support or enhance adaptation is the hallmark for adaptive capacity. Institutions play a cardinal role in the assessment of adaptive capacity and resilience building. These institutions include; public and private institutions that is the government and other stakeholders be it Nongovernmental Organizations or Community-Based Organizations. Institutional support that enhances adaptation to climate change can be through parallel practices between those institutions or through integration of their services. In the light of this, integrated institutional arrangements from local to national levels may provide essential support to the farmers to plan and implement contingent adaptation activities. In the same wavelength, strong institutions provide subsidies for agricultural inputs to rural farmers and disaster relief assistance in the wake of climatic induced perturbations. Hinkel (2011) strengthens the above by asserting that countries with modern social, private and public institutions have a high adaptive capacity level than those with no or low functional social institutions.

Barriers Towards Effective Climate Change Management in Zimbabwe's Rural Communities

Poverty

The conundrums of poverty are an albatross around the neck for majority of Zimbabweans in rural areas. Mhlanga and Ndlovu (2020) denotes that 73.3% of the Zimbabwean population are trapped under the manacles of poverty, majority of them in rural areas. As such, rural farmers in Chivi south and Umzingwane districts lack adequate resources to leap back from the climate change induced shocks. Smallholder farming in these communities is under siege because of the high dependence on natural erratic rainfalls. Resultantly, the endemic agricultural stagnation is leading to protracted food crisis and accelerated poverty levels. What it means is that, rural people in these districts are running short of adequate economic resources which anchors the ability to adapt to climate change impacts. Basically, poverty is a product of low literacy levels and high unemployment levels particularly in Umzingwane district where majority of the farmers haven't gone beyond primary education while others haven't obtained any formal education at all. Similar findings were made in Silobela district by Chanza et al. (2019) and in Gwanda district by Ndlovu et al. (2020) that the predominance of gold panning activities is leading to high school drop outs amongst the youth. As such, most people are school drop outs or haven't received any formal education.

In Zimbabwe, social protection systems are weak and rural farmers do not have financial reserves either credit or loan facilities due to the economic quagmires characterized by skyrocketing inflation projected to be at 750% by May 2020 (Dzobo et al. 2020). Consequently, peasant farmers in Chivi south and Umzingwane districts as in other rural communities of Zimbabwe are sinking deeper into poverty meaning they are facing a proliferation of obstacles to adapt to climate change. Earlier, Chanza et al. (2019) denoted that different educational levels and income have an impact on adaptation practices.

This study found that efforts by rural farmers in these districts to withstand the vagary impacts of climate change are impeded by the doldrums of poverty which they are entrenched into. In Chivi south district, most villages haven't benefited from the smart agricultural practices such as irrigations systems orchestrated by some NGOs in other parts of the district. As such, farmers in Danamombe and Mandamabwe communities lamented that agriculture is now a futile exercise without technoscience based farming mechanism. Similar findings were reported in Mulungwane and Mzinyathini communities in Umzingwane district that farmers cannot afford the relevant technologies essential for adaptation owing to high poverty levels. In the same vein, most farmers in both districts are stymied by financial setbacks to be able to purchase climate resistant crop varieties and other agricultural inputs. Majority of Zimbabwean are embroiled in confusion of the legitimacy of the local currency called the Real Time Gross Settlement (RTGs) against the United States Dollar which is used to peg prices of all commodities in Zimbabwe including agricultural inputs. The most poignant stance is that income

streams of most Zimbabweans and proceeds from the trading activities of rural people are in the valueless RTGs currency and the purchasing of farming inputs and other assets essential for adaptation remain a big mountain to climb thereby making adaptation to climate change a nightmare.

The most daunting fact is that the absence of social protection systems and safety nets from the government of Zimbabwe is making rural farmers to dispose their little assets in order to withstand the pressure of drought and other household emergencies. In Bikita district, Nyahunda and Tirivangasi (2019) found that rural people were selling their livestock at economically low prices to curb the conundrums of food insecurity. This makes the vicious circle of poverty infinite thereby inhibiting their efforts towards effective management to climate change. In the light of this, most rural people in Chivi south and Umzingwane districts are on record of selling of their livestock and other household assets at economically low prices to compensate losses from the agricultural activities. The economic tailspin bedeviling the country means there are also low remittances from local migrant workers to support their families. These dynamics validate the assertions made by the IPCC (2014) that most Southern African communities are trapped in a vicious circle of poverty which consequently make them vulnerable to climate change exacerbated by low adaptive capacity. Furthermore, poverty hampers rural people in Chivi south and Umzingwane districts from executing opportunities for climate change adaptation and they remain highly vulnerable to climate change and its impacts.

To extrapolate from the previous section which explored the determinants of adaptive capacity where economic security is one of them, it is important to note that most rural farmers fail to meet the standard measure of economic resources essential for climate change adaptation. Thus, poverty is a barrier towards effective climate change management in Zimbabwe's rural communities. Chanza et al. (2019) denotes that in Silobela district, rural people's dependence on climatic sensitive livelihoods is exacerbating their poverty levels. The manifestations of climate change through recurrent episodes of drought, perennial dry spells, thunderstorm and desiccation of water sources has a direct impact on rural people's livelihoods. Nyahunda and Tirivangasi (2019) allude that in Bikita district, rural people lack resources to procure climate viable resources such as hybrid seeds. In Makonde communal lands, Nyahunda et al. (2019) established that poverty is serving as a backlash towards rural people's adaptation efforts. In Mutoko district, Bhatasara (2018) found that rural farmers have limited agricultural capital due to the doldrums of poverty that they are entrenched in.

Inadequate Information about Climate Change and Adaptation

In Chivi south and Umzingwane districts like in other rural communities in Zimbabwe and beyond, climate change information is still scant and in cases where it is available, climate information/knowledge is marred by mixed perceptions about its causes and consequences. This is attributed to inadequate information about the climate change discourse that is its causes, impacts to effective adaptation

and mitigation strategies. Notwithstanding the visibility of NGOs and other government departments charged with disseminating climate change information to rural farmers, the efforts remain parochial because most rural farmers are still grappling to understand the concept climate change and its dynamics. As such, lack of adequate information about climate change and adaptation makes most rural farmers in Chivi south and Umzingwane districts unaware of what they are dealing with (climate change) and how. In as much as a significant number of participants acknowledged to have heard about climate change, they appeared to lack critical information about the roles they have to play to address their plights through active participation in climate change adaptation processes.

What should be underscored is that the way climate change information is disseminated doesn't suit the literacy prowess of most rural farmers particularly in Umzingwane, Gwanda, and Tsholotsho districts (Soropa et al. 2015; Ndlovu et al. 2020). Failure to grasp the tenets of climate change is transcending to the lack of understanding about the need for adaptation, challenges in perceiving the changes or grasping the impacts of these changes in the climate. It is important to infer that the determinants of adaptive capacity encapsulated in the previous section serve as barriers to effective adaption when they are not sufficiently available. In that regard, inadequate awareness and information about climate change adaptation is serving as a barrier towards effective adaptation among smallholder farmers in Zimbabwe's rural communities. In Chundu and Nyamakate resettlement areas, Kupika et al. (2019) established that seasonal forecasting is weak to enable farmers to adjust their cropping patterns. Climate change knowledge is regarded as cardinal to influencing the other determinants of adaptive capacity and this is missing among small holder farmers in Zimbabwe's rural communities. To add on, inadequate information about adaptation is making people not to take normative positions in responding to climate change. In light of this, some of the strategies employed by rural people especially in Umzingwane, Tsholotsho and Silobela districts such as gold panning is detrimental to the environment that must be protected from degradation and erosion (Soropa et al. 2015; Chanza et al. 2019). On the same note, the livelihood activities that involve selling of firewood are accelerating the cutting down of trees in Chivi south and Bikita districts causing deforestation (Nyahunda and Tirivangasi 2019).

In continuation, the molding of bricks as part of livelihood diversification is also serving as a backlash on the environment stemming from the lack of adequate information about viable adaptation in the wake of climate change perturbations. Besides causing land degradation, these activities also cause mass deforestation because people use biomass fuels for curing the bricks (Chanza et al. 2019). A study conducted in Hwedza district by Zvamasiya et al. (2017) revealed that farmers with access to climate change information adopted sustainable adaptation strategies than their counterparts. Bowen et al. (2012) posit that a myriad of barriers can arise in the adaptation process from understanding the adaptation problem to devising appropriate adaptation measures that goes beyond managing the planned measures and the outcomes. Furthermore, availability of sufficient information enables people to respond to climate change impacts in a manner that serve their interests and ability

without compromising the environment for the benefit of the present and posterity. It is of paramount importance to infer that the availability of adequate and broad-based knowledge about climate change adaptation influences proper decision making thereby contributing to adaptive capacity. Thus, the deficiency of adequate information about adaptation is serving as a barrier towards effective climate change management in Zimbabwe's rural communities.

Lack of Adequate Institutions that Support Adaptation

The success of adaption and mitigation in the climate change terrain is premised on the availability of institutions that support these processes. Basically, the availability of institutions that stimulate adaptation means rural farmers have buffer zones in the wake of climatic shocks. As mentioned earlier, institutions essential for adaptation might be the government through promulgation of policies that enhance adaptation, Non Governmental Organisations, Civic societies and Community Based Organisations among others. Institutions that support adaptation may provide subsidies, insurance and credit facilities to smallholder farmers. It should also be noted that ensuring the needs of marginalized, vulnerable, and remote communities are fully integrated in the national adaptation mechanisms is still a challenge for the government of Zimbabwe (Chanza and Gundu-Jakarasi 2020). Earlier, Muzari et al. (2016) denoted that ensuring that the needs of vulnerable populations are fully integrated in climate change measures is still a challenge for the Zimbabwean government. The country's Climate Change Policy envisages the commitment to set up climate change hubs in every province for easy gathering and collating of information. Furthermore, these hubs are poised to serve as climate information dissemination points aimed at reducing vulnerability through establishment of climate resilient infrastructures, efficient irrigation technology, crop and livestock insurance systems. Conversely, such commitments, are still being deliberated in the boardrooms without them translated to benefit s rural people (Zhakata et al. 2017).

Chanza and Gundu-Jakarasi (2020) further opine that governments are seen as key actors to intervene and circumvent existing barriers to adaptation by changing legislations or providing additional resources but this is not the case in Zimbabwe. To substantiate this, Nyahunda et al. (2019) allude that, Zimbabwe has an array of good climate policies that are not being converted into action because of misdirected priorities. As such, humanitarian organisations close much of the climate change management gaps created by the government. What is evident in some parts of Chivi south and Umzingwane districts are institutional support from NGOs such as World Vision Zimbabwe, Action Faim and MELANA in Umzingwane district. These NGOs are standing in the gap through the facilitation and provision of small grain crops and borehole drilling for small scale irrigation which has seen some gardening activities running in some communities. In Kariba rural district, Mubaya and Mafongoya (2017) found that that various nongovernmental institutions were supporting rural people's adaptation initiatives with inputs and forecast information. This cannot be said in some communities in Chiredzi district where Mamombe

(2017) discovered that most impoverished communities remain marginalized in terms of support services that enhance climate change adaptation and resilience. As such, most smallholder farmers lamented that there is no support in terms of access to timely weather forecasts, information about adaptation and credit facilities to motivate them to participate even in adaptation strategies and this is constraining their ability to adapt. Similar findings were made by Nyahunda and Tirivangasi (2019) in Bikita district that rural people lack adequate support systems that foster adaptive capacity against the vagary impacts of climate change. On the same note, in Chimanimani district, Mutandwa et al. (2019) discovered that institutional support services were very minimal despite the visibility of climate change impacts in these communities.

The footprints of the tropical cyclone Idai which caused wanton death and destructions in March 2019 bears testimony to the deficiencies of institutional support in Zimbabwe's rural communities. This is because, early warning systems should have been disseminated to the communities since the tropical cyclone struck Mozambique weeks earlier before ravaging the eastern areas of Zimbabwe. Similar findings were reported by Chanza (2014) in the Muzarabani area that has a recurrent experience with floods. The author bemoaned lack of broad-based institutional support and disaster management systems before the floods strike and in the aftermaths of the floods. Furthermore, this study found that the institutional roadmaps at policy levels are a top down approach that disregard the local initiatives on adaptation. Consequently, this is constraining the local adaptation efforts devised at local levels which most smallholder farmers can define in tandem with their abilities and circumstances. Additionally, the lack of potential interventions to sustain livelihoods disrupted by climate change at institutional level is serving as a barrier towards effective adaptation. Policy measures are not being converted to become tangible deliverables meaning the poor marginalized communities remain trapped under unpleasant circumstances without means to leap back.

Gender Inequalities

In the history of climate change adaptation in countries with weak socioeconomic rights for women, gender defines who has the ability to adapt to the vagary impacts of climate change particularly between men and women. To shade more light, Mazuru (2019) posits that gender is an important variable in the relationship between climate change and its human impacts. On that note, men, women, children and the elderly have different roles, needs, interests and opportunities, therefore, they are affected by climate change differently. This study was conducted amongst people of Shona and Ndebele cultural descents where cultural prescriptions are predominant in sanctioning interactions, access to opportunities, developmental initiatives and decision making between men and women. As such, patriarchal dominance is still pervasive in these rural communities like in other rural communities of Zimbabwe (Nyahunda and Tirivangasi 2020). It emerged in this study that gender inequalities are acute between men and women where cultural gender roles tend to assign more

household responsibilities such as cooking, laundry, water and firewood collection on women. The primary caregiving responsibility of women is making them to be predominant in the agricultural sector and reliance on the climate volatile natural resources to provide for their families. This is making them more vulnerable to the calamities stemming from the climate risks than men.

In light of the above, in Chivi south and Umzingwane districts, gender inequality is manifesting through discrimination of women from decision making planning processes, access to climate change information and opportunities, ownership of essential resources such as land and property rights. This study found that women have limited involvement in community politics and in other instances they face discrimination from decision making at household level particularly those from male headed households. In Gwanda district, Ndlovu et al. (2020) found that gendered responsibilities caveat the social mobility of women where they remain confined to the households as men exercise freedoms in up taking several adaptation strategies such as migration. To add on, in Mutoko rural district, Mugambiwa (2018) avers that women face cultural restrictions on mobility when climate change induced risks strike because culture require them to be confined to their homes and look after the family. Furthermore, in Marondera district, Garutsa et al. (2018) established that there are pervasive stereotypes embedded against women where their contributions even on cropping systems and livestock rearing are considered invaluable.

To worsen the situation, the measures taken by women in response to climate change are creating extra work load on top of other responsibilities that they shoulder mostly on food security, cooking, primary caregiving, water and fuel collection (Nyahunda et al. 2019). Rural women are spend most of their time scouting for scarce resources such as water, fuel and food. This is inhibiting them from being actively involved in decision making processes regarding climate change or embarking on income generating activities that warrants adaptation. In the Domboshava rural areas, Tanyanyiwa and Mufunda (2020) exposit that the social inequalities are making women vulnerable to drought because they shoulder the primary responsibility of securing and providing food amidst failed agricultural production owing to climate change. To extrapolate from the determinants of adaptive capacity premised on equity, evidence from this study bears testimony that there is no fairness and equality in sharing the burdens of climate change, distribution of resources essential for adaptation between men and women. The burden of walking farthest distances in search of water and firewood is detrimental to their health and this has a boomerang effect on their ability to adapt to climate change like men. Women continue to be absent from climate change decision making processes where adaptation measures are devised. The pervasiveness of patriarchal dominance in Zimbabwe's rural communities serve as a barrier for adaptation to climate change impacts for women despite them being heavily impacted.

Inadequate Extension Services

The commitment by the Zimbabwean government to promote training and extension support that would allow climate change management practices as encapsulated in

its climate change policy is not being converted into tangible deliverables in rural areas. In Zimbabwe, the Agricultural, Technical and Extension services (AGRITEX) department is responsible for the agricultural advisory role, provision of crop and livestock management and food and input distribution from the Grain Marketing Board (GMB). Some extension services are shouldered by the Communal Area Management Programme for Indigenous Resources (CAMPFIRE). What emerged in this study is that most smallholder farmers in Chivi south and Umzingwane districts are running short of the training and awareness that influence adaptive capacity (Hinkel 2011). In several communities which this study investigated, it emerged that extension services are scant and in cases where they are available, they are parochial to an extent that some farmers have not benefited from the extension services at all.

Inadequate access to extension services is serving as a barrier towards climate change adaptation in these districts. Similar findings were reported by Mugambiwa (2018) in Mutoko rural district that inadequate access to extension services has a negative effect on the farmers ability to adapt to climate change. This is because access to agricultural extension services contributes to the smallholder farmers' knowledge of climate change, its impacts and the need for adaptation (Zvamasiya et al. 2017). In the light of this, the inadequacy of information about climate change adaptation which serve as another barrier in Zimbabwe's rural communities stems from the lack of adequate and broad-based extension services that enhance training and awareness which resultantly informs adaptation. In Bikita district, Nyahunda and Tirivangasi (2019) established that farmers bemoaned the lack of commitment by extension officers unlike before where they used to conduct field visits and provide improved climatic information as well as technical assistance. Mavhura (2020) further argues that farmers with access to extension services are likely to develop a positive attitude and are willing to take contingent actions to reduce its impacts. In Chivi south and Umzingwane districts, small holder farmers lamented that extension officers appear to have parochial knowledge about climate change. This can be attributed to lack of adequate training about climate change (Nyahunda et al. 2019). Nevertheless, it should be highlighted that, extension services have a positive influence on behavioral patterns that can foster adaptation measures. At this juncture, it is important to infer that the more the Zimbabwean government clings to its climate policies without implementation, the more the daunting circumstances of rural farmers remain unattended.

Outbreak of Health Emergencies

As the researchers traversed in gathering data to find answers to the objective of this study, it emerged that the outbreak of pandemics such as malaria and Corona Virus Disease (COVID-19) is stalling the adaptation efforts of rural people. Matebeleland south province where Umzingwane district is located has been reeling with the surge of malaria disease. Also, in the Chiredzi district in Masvingo province, Zengenene et al. (2020) allude that malaria prevalence is always recurrent. As such, rural farmers' meagre resources have been channeled towards meeting health care costs among

other exigencies (Tapera 2019). The outbreak of the COVID-19 as a global pandemic exacerbated the situation in Zimbabwe like in many countries around the globe. Response mechanisms adopted by the Zimbabwean government in tandem with the guidelines provided by the World Health Organization (WHO) resulted in the pronouncement of the nationwide lockdown on the 26th of March 2020 to curb the transmission of the virus (Mhlanga and Ndhlovu 2020). The lockdown measures prescribed citizens to be confined to their homes only to leave to procure basic commodities including medications or as essential workers. On the same note, businesses, schools, and borders were closed (Dzobo et al. 2020). The most daunting factor about the pronouncement of the nationwide lockdown is that, it disrupted most livelihoods particularly those in the informal sector where most rural people are involved as part of their livelihood diversification strategies to withstand the impact of climate change.

To add on, the most poignant factor is that the lockdown measures were decreed without safety nets in place for the poor neither the availability of disaster relief packages to the already vulnerable populations by the government. As such, the outbreak of the COVID-19 pandemic serves as a double blow for rural farmers that have been reeling with climate change impacts for some time. What should be underscored is that adaptation efforts employed by most rural people to withstand the impacts of climate change through a cocktail of strategies were shattered, disrupted and disfigured by the outbreak of the COVID-19 pandemic. The eruption of the COVID-19 pandemic juxtaposed to the resurgence of malaria disease is disruptive and could potentially lead to food security and stunted livelihoods in most rural communities.

This has a boomerang effect on the ability of rural people to adapt to the impacts posed by climate change such as drought. It is also important to infer that its only when people are healthy, with resources and with the liberty to embark on their livelihood activities that they can adapt to risks dovetailed by climate change. This is not the situation in the wake of the COVID-19 pandemic where gatherings that are the hallmark of social capital are prohibited and migration which is a common adaptation strategy is not feasible amidst the lockdown restrictions. Again, poverty levels among rural farmers are being widened under the confluence of climate change impacts and COVID-19 pandemic where most farmers are compelled to dispose their meagre resources to withstand the pressure of hunger and other losses. Lastly, the outbreak of health emergencies such as the COVID-19 pandemic stands to reverse the gains of adaptation made by rural people. To worsen the situation, the government is now focusing on devising contingent measures to mitigate the impacts of the disease and associated risks and climate change risks are no longer a priority despite them being visible in rural communities.

Conclusion

This book chapter provided a synopsis of barriers towards effective climate change management in Zimbabwe's rural communities to guide policy developments and interventions dedicated to ameliorate the identified barriers and others that were not

captured in this study. As contemplated in the themes of this chapter, barriers can be circumvented or subjugated through the development and implementation of broad-based policy regimes that addresses the plights of the disadvantaged farming communities. To extrapolate from this, rural people can only triumph over the barriers to effective climate change adaptation when they are rescued from the jaws of poverty. This is because most challenges that inhibit adaptive capacity for rural people are hinged on poverty therefore other challenges evolve from the conundrums of poverty. As such, Zimbabwe still needs strong institutions that support climate change adaptation and mitigation. The presence of these institutions should be complemented by the recognition of the ability to adapt to climate change for citizens as the responsibility of the government and its subsidiary organs. This initiative should not remain in the board rooms or demonstrated on paper but it must be translated into practical interventions that addresses the felt needs of rural farmers. On the same note, there is need to improve the country's disaster preparedness planning, rescue and recovery systems where rural communities are beneficiaries of disaster proof mechanisms. Efforts to foster effective adaptation to climate change should mainstream the best practices of rural people hinged on indigenous knowledge and social capital. This is because these practices can be easily defined and accessed by every rural household regardless of socioeconomic status. Lastly, gender equality is essential to enhance adaptive capacity especially for women that are highly encumbered by climate change impacts than men. Cultural and traditional patterns that insubordinate women and exclude them from decision making processes need to be extinguished in Zimbabwe's rural communities for women to be able to adapt and remain resilient in the wake of climate change impacts.

References

- Abdul-Razak M, Kruse S (2017) The adaptive capacity of smallholder farmers to climate change in the Northern Region of Ghana. *Clim Risk Manag* 17:104–122
- Aldrich DP, Meyer MA (2015) Social capital and community resilience. *Am Behav Sci* 59(2): 254–269
- Bhatasara S (2018) Understanding adaptation to climate variability in smallholder farming systems in eastern Zimbabwe: a sociological perspective. *Rev Agric Food Environ Stud* 99(2):149–166
- Biesbroek R, Klostermann J, Termeer C, Kabat P (2011) Barriers to climate change adaptation in the Netherlands. *Climate Law* 2(2):181–199
- Bowen A, Cochrane S, Fankhauser S (2012) Climate change, adaptation and economic growth. *Clim Chang* 113(2):95–106
- Chanza N (2014) Indigenous knowledge and climate change: insights from Muzarabani. Zimbabwe by Nelson Chanza Doctor of Philosophy in Faculty of Science
- Chanza N, Gundu-Jakarasi V (2020) Deciphering the climate change conundrum in Zimbabwe: an exposition. In: *Global warming and climate change*. <https://www.IntechOpen.org>
- Chanza N, Chigona A, Nyahuye A, Mataera-Chanza L, Mundoga T, Nondo N (2019) Diagnosing barriers to climate change adaptation at community level: reflections from Silobela, Zimbabwe. *GeoJournal* 84(3):771–783
- Dodman D, Mitlin D (2015) The national and local politics of climate change adaptation in Zimbabwe. *Clim Dev* 7(3):223–234
- Dube K, Nhamo G (2019) Climate change and the aviation sector: a focus on the Victoria Falls tourism route. *Environ Dev* 29:5–15

- Dube T, Phiri K (2013) Rural livelihoods under stress: the impact of climate change on livelihoods in South Western Zimbabwe. *Am Int J Contemp Res* 3(5):11–25
- Dube N, Moyo F, Sithole M, Ncube G, Nkala P, Tshuma N, Maphosa M, Mabheha C (2016) Institutional exclusion and the tragedy of the commons: artisanal mining in Matabeleland South Province, Zimbabwe. *Ext Ind Soc* 3(4):1084–1094
- Dussaillant F, Guzmán E (2014) Trust via disasters: the case of Chile's 2010 earthquake. *Disasters* 38(4):808–832
- Dzobo M, Chitungo I, Dzinamarira T (2020) COVID-19: a perspective for lifting lockdown in Zimbabwe. *Pan Afr Med J* 35(Suppl 2):1
- Eisenack K, Moser SC, Hoffmann E, Klein RJ, Oberlack C, Pechan A, Rotter M, Termeer CJ (2014) Explaining and overcoming barriers to climate change adaptation. *Nat Clim Chang* 4(10):867–872
- Garutsa TC, Mubaya CP, Zhou L (2018) Gendered differentials in climate change adaptation amongst the Shona ethnic group in Marondera Rural District, Zimbabwe: a social inclusions lens. *AAS Open Res* 1(14):14
- Gukurume S (2013) Climate change, variability and sustainable agriculture in Zimbabwe's rural communities. *Russ J Agric Socio-Econ Sci* 14(2):89
- Hinkel J (2011) "Indicators of vulnerability and adaptive capacity": towards a clarification of the science–policy interface. *Glob Environ Chang* 21(1):198–208
- Intergovernmental Panel on Climate Change (IPCC) (2014) Fifth assessment report. Impacts, adaptation and vulnerability. Cambridge University Press, Cambridge, UK/New York. Introduction. *Int J Soc Welf* 21(3):230–238
- Jiri O, Mafongoya PL, Chivenge P (2017) Building climate change resilience through adaptation in smallholder farming systems in semi-arid Zimbabwe. *Int J Clim Change Strat Manag* 9:151
- Kamwi JM, Chirwa PWC, Graz FP, Manda SOM, Mosimane AW, Kätsch C (2018) Livelihood activities and skills in rural areas of the Zambezi Region, Namibia: implications for policy and poverty reduction. *Afr J Food Agric Nutr Dev* 18(1):13074
- Kruse J, Simon J, Rennenberg H (2013) Soil respiration and soil organic matter decomposition in response to climate change. In: *Developments in environmental science*, vol 13. Elsevier, Amsterdam, pp 131–149
- Kupika OL, Gandiwa E, Nhamo G, Kativu S (2019) Local ecological knowledge on climate change and ecosystem-based adaptation strategies promote resilience in the middle Zambezi biosphere reserve, Zimbabwe. *Scientifica* 2019:1
- Makaudze EM (2016) Assessing the economic value of El Niño-based seasonal climate forecasts for smallholder farmers in Zimbabwe. In: *Climate change and multi-dimensional sustainability in African agriculture*. Springer, Cham, pp 591–612
- Mamombe V (2017) The impact of climate change on the rainfall patterns over Chiredzi district, Zimbabwe. *J Public Adm Dev Altern* 2(1–1):109–125
- Mashizha TM (2019) Adapting to climate change: reflections of peasant farmers in Mashonaland West Province of Zimbabwe. *Jamba: J Disaster Risk Stud* 11(1):1–8
- Mavhura E (2020) Learning from the tropical cyclones that ravaged Zimbabwe: policy implications for effective disaster preparedness. *Nat Hazards* 104(3):2261–2275
- Mazuru N (2019) Chapter nine climate change in Zimbabwe: challenges and prospects for rural women in Bikita District. In: *Necroclimatism in a spectral world (dis) order: rain petitioning, climate and weather engineering in 21st century Africa*. Langaa RPCIG, Mankon, p 255
- Mhlanga D, Ndhlovu E (2020) Socio-economic implications of the COVID-19 pandemic on smallholder livelihoods in Zimbabwe. Accessed at <https://www.preprints.org>
- Mubaya CP, Mafongoya P (2017) Local-level climate change adaptation decision-making and livelihoods in semi-arid areas in Zimbabwe. *Environ Dev Sustain* 19(6):2377–2403
- Mudzonga E (2012, August) Farmers' adaptation to climate change in Chivi district of Zimbabwe. In: *TRAPCA trade policy research forum*, Arusha, Tanzania, pp 7–8
- Mudzonga E (2016) The social protection policy responses in the primary and secondary education sector during the crisis period. *Economic management in a hyperinflationary environment: the political economy of Zimbabwe*, p 403:1980–2008

- Mugambiwa SS (2018) Adaptation measures to sustain indigenous practices and the use of indigenous knowledge systems to adapt to climate change in Mutoko rural district of Zimbabwe. *Jamba: J Disaster Risk Stud* 10(1):1–9
- Mugambiwa SS, Rukema JR (2019) Rethinking indigenous climate governance through climate change and variability discourse by a Zimbabwean rural community. *Int J Clim Change Strat Manag* 11:730
- Muroombo T (2019) Climate change in Zimbabwe: towards a low carbon energy industry. Forthcoming in climate change law in Zimbabwe: concepts and insights (Konrad Adenauer Foundation)
- Musavengane R, Simatele DM (2016) Community-based natural resource management: the role of social capital in collaborative environmental management of tribal resources in KwaZulu-Natal, South Africa. *Dev South Afr* 33(6):806–821
- Mutandwa E, Hanyani-Mlambo B, Manzvera J (2019) Exploring the link between climate change perceptions and adaptation strategies among smallholder farmers in Chimanimani district of Zimbabwe. *Int J Soc Econ* 4(4):6–9
- Muzari W, Nyamushamba GB, Soropa G (2016) Climate change adaptation in Zimbabwe's agricultural sector. *Int J Sci Res* 5(1):1762–1768
- Ndebele-Murisa M, Mubaya C (2015) Climate change: impact on agriculture, livelihood options and adaptation strategies for smallholder farmers in Zimbabwe. In: *Beyond the crises: Zimbabwe's prospects for transformation*. Weaver Press, Avondale, pp 155–198
- Ndlovu S, Mathe B, Phiri K, Nyathi D (2020) Factoring water harvesting into climate change adaptation: endogenous responses by smallholder farmers in Gwanda district, Zimbabwe. *Cogent Soc Sci* 6(1):1784652
- Nyahunda L, Tirivangasi HM (2019) Challenges faced by rural people in mitigating the effects of climate change in the Mazungunye communal lands, Zimbabwe. *Jamba: J Disaster Risk Stud* 11(1):1–9
- Nyahunda L, Tirivangasi HM (2020) Effects of climate change on rural women in Makhado municipality, Limpopo Province, South Africa. *Gender Behav* 16(4):12013–12020
- Nyahunda L, Matlakala FK, Makhubele JC (2019) Role of social workers in mitigating the effects of climate change in Makonde communal lands, Zimbabwe. *e-Bangi* 16(9):1–8
- Phiri K, Ndlovu S, Chiname (2014) Climate change impacts on rural based women: Emerging evidence on coping and adaptation strategies in tsholotsho, Zimbabwe. *Mediterr J Soc Sci* 5(23):1–9
- Soropa G, Gwatibaya S, Musiyiwa K, Rusere F, Mavima GA, Kasasa P (2015) Indigenous knowledge system weather forecasts as a climate change adaptation strategy in smallholder farming systems of Zimbabwe: case study of Murehwa, Tsholotsho and Chiredzi districts. *Afr J Agric Res* 10(10):1067–1075
- Soropa G, Nyamangara J and Nyakatawa EZ (2019) Nutrient status of sandy soils in smallholder areas of Zimbabwe and the need to develop site-specific fertiliser recommendations for sustainable crop intensification. *S Afr J Plant Soi* 36(2):149–151
- Tanyanyiwa VI, Mufunda E (2020) Sociocultural impact of climate change on women and the girl child in Domboshawa, Zimbabwe. *Clim Action* 5(2):827–837
- Tapera O (2019) Determinants of long-lasting insecticidal net ownership and utilization in malaria transmission regions: evidence from Zimbabwe demographic and health surveys. *Malar J* 18(1):278
- UNFCCC (2014) Report of the conference of the parties on its nineteenth session, held in Warsaw from 11 to 23 November 2013, decision 2/CP.19, Warsaw. Retrieved from <https://www.unfccc.int/resources/docs/>. Accessed 10 Oct 2019
- Yaro JA, Teye J, Bawakyillenuo S (2015) Local institutions and adaptive capacity to climate change/variability in the northern savannah of Ghana. *Clim Dev* 7(3):235–245
- Zengenene MP, Soko W, Brooke BD, Koekemoer LL, Govere J, Mazarire TT, Mberikunashu J, Munhenga G (2020) Anopheles species composition and breeding habitat characterisation in Chiredzi District, Zimbabwe. *Afr Entomol* 28(1):84–94

- Zhakata W, Jakarasi VN, Moyo EN (2017) Zimbabwe's actions towards climate resilience and low carbon development. *Int J Green Growth Dev* 101:13
- Zvamasiya B, Nyikahadzo K, Mukamuri BB (2017) Factors influencing smallholder farmers' behavioural intention towards adaptation to climate change in transitional climatic zones: a case study of Hwedza District in Zimbabwe. *J Environ Manag* 198:233–239

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

