ASSESSING THE RESILIENCE OF FEMALE SMALLHOLDER FARMERS TO DROUGHT: A CASE STUDY OF FRANCES BAARD DISTRICT, SOUTH AFRICA

By

MENDI SIGENU

2009011061

Mini-Dissertation submitted in the partial fulfillment of the requirements for the degree Master of Disaster Management

In the

DISASTER MANAGEMENT TRAINING AND EDUCATION CENTRE FOR AFRICA (DiMTEC)

FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

At the

UNIVERSITY OF THE FREE STATE

Supervisor: Dr Olivia Kunguma

BLOEMFONTEIN

2021

DECLARATION OF ORIGINALITY

I, **Mendi Sigenu,** student number 2009011061 declare that the Mini-dissertation that I herewith submit for the degree Master's of Disaster Management at the University of Free State is the outcome of my investigation and research. All external sources have be acknowledged in the reference section and in comments included in the body of the dissertation. This dissertation has not been submitted in part or in full to any other University or College for any other degree or programme.

I declare that I am cognisant of the University of the Free State's policy on research ethics and I have taken caution to cooperate with the regulations. I have obtained an ethical clearance letter from the University of the Free State's Research Ethics Committee and my reference number is **UFS-HSD2021/1090/21**.

Student Name : Mendi Sigenu

Signature :

Date:

ACKNOWLEDGMENTS

I would like to first thank God Almighty for seeing me through this research and making it a success.

- My supervisor Dr. O. Kunguma for the helping hand, guidance, effective criticism amid the proceedings of my study, and shaping of data collection instrument.
- My research assistant for helping me with data collection and her patience with the society.
- Research experts for their valuable advice on the research process especially on the development of research instruments, their administration, and data analysis.
- Special gratitude to my mother Tembazana Sigenu, my sister Nomxolisi Sigenu, my daughter Cebo Sigenu, and my family at large for all the moral support and reassurance they gave me.
- My manager Mr Orren Gronewaldt for encouraging words and for appreciating the education.
- My friends and classmates for their unwavering support.
- Respondents who participated in the research, who preferred anonymity.

Matthew 19:26. Jesus looked at them and said, "*With man this is impossible, but with God all things are possible*".

DEDICATION

I dedicate this dissertation to my family. Thank you very much for the support and encouragement you gave me during the research period. This achievement is dedicated to my late grandmother Vivian Makheswa Sigenu for bringing me up and loving me unconditionally, my late cousin sister Ntombozuko Sigenu, who left a void never to be filled in my life, who supported me before COVID-19 decided to take her life, and both of them for strongly supporting education. To my granddaughter Othawe Hlaluminathi Sigenu I hope this will be one of your inspirations when you grown-up.

ABSTRACT

The main objective of this study was to investigate the effect of drought hazards on smallholder female farmers of Frances Baard District Municipality district and to assess their coping, adaptation, and resilience to droughts as compared to smallholder male farmers in the rural communities. The study also sought to assess the vulnerability of smallholder female farmers regarding drought hazards in Frances Baard District Municipality. In addition, the study sought to investigate drought resiliency of smallholder male farmers as compared to smallholder female farmers. Furthermore, the study investigated drought coping and adaptation mechanisms of smallholder female farmers use as compared to the male farmers. Lastly, the research assessed the communication strategies employed by male and female smallholder farmers to foster drought resilience. This paved way for the provision of recommendations to address drought challenges for smallholder female farmers.

The Harvard Framework guided this study for gender analysis; it was applicable and relevant in a variety of ways for this research. The study adopted a qualitative single case study. It also applied an interpretivist philosophy to understand how female smallholder farmers are affected by drought, and to what extent are they resilient compared to their male counterparts. The study adopted a qualitative research approach. Primary data was collected using a Focus Group Discussion Interview Guide. This research followed Terre Blanche, Durrheim, and Kelly's (2006) guidelines for data analysis.

The study found that drought has various economic, environmental, and social consequences in Dikgatlong, Sol Plaatje, Magareng, and Phokwane farming communities. Even though the study sought to investigate the resilience of female smallholder farmers to drought, it concluded that both male and female smallholder farmers are vulnerable to drought. The study also found that both smallholder male and female farmers are resilient, but male farmers are more resilient since they have access to and control farming resources and agricultural benefits. This study concluded that both smallholder farmers preserve agricultural income for future use, as well as harvest and keep livestock for future use. The study recommends the preservation of biodiversity, open space, and trees, and reduction of land degradation, diversification of crop varieties, crop insurance, and maintenance of soil health and continued use of communication strategies. Further research may cover other antecedents of the resilience of female smallholder farms to drought.

Key words: Resilience, Smallholder Farms; Drought; Vulnerability

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LIST OF ACRONYMS AND ABBREVIATIONS

DAFF	Department of Agriculture Forestry and Fisheries
DEA	Department of Environmental Affairs
FAO	Food and Agriculture Organisation
SA	South Africa
SASSA	South African Social Security Agency
SDGs	Sustainable Development Goals
UN	United Nations
UNDAC	United Nations Disaster Assessment and Coordination
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations International Strategy for Disaster Reduction

DEFINITION OF TERMS/CONCEPTS

Small-scale farmers-Smallholder farmers contribute only a small portion of their social reproduction and only in limited cases that it can generate a substantial surplus, enabling

income to be reinvested and creating initiatives within which capital can be raised (Cousins, 2010).

Sustainable Development Goals- In 2015, the world leaders set out on an ambitious path to end poverty, fight inequality and injustice and protect the planet with the 2030 Agenda for Sustainable Development. United Nations member states unanimously agreed on the 17 SDGs, making them the blueprint for sustainable development for the world.

The Paris Agreement- It was signed in 2016 under the United Nations Framework Convention on Climate Change (UNFCCC), is a climate change mitigation, adaptation, and financing agreement. The agreement's language was ratified by 196 state parties at the UNFCCC's 21st Conference of the Parties in Le Bourget, near Paris, France, on December 12, 2015, and was accepted by consensus. As of March 2021, 191 UNFCCC members have ratified the pact (Seo, 2017; Blau, 2017).

Drought- Meteorologists widely describe drought as protracted dry conditions caused by a lack of rainfall, resulting in extreme water shortages for any operation, populace, or ecosystem (Van Loon, Stahl, Baldassarre, Clark, Rangecroft, Wanders, Gleeson, Van Dijk, Tallaksen, Hannaford & Uijlenhoet, 2016).

CHAPTER 1: INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 Introduction

Climate change, especially drought, has a profound and unprecedented impact on women due to inequality. Financial and institutional support is sometimes denied to women (Wouterse, 2019). The destabilising effects of drought place women at even greater risk. Drought is a risk that affects the health and well-being of humans and causes costly damage to agricultural, hydrological, and environmental systems. A thorough assessment of the resilience to the threats of drought in different communities and the identification of key variables affecting resilience is needed to cope with the dangers of drought and to promote resilience (Ngaka, 2012; FAO), 2013).

The Department of Rural Development and Land Reform (2013) recognises that, in terms of overall economic losses and the number of people affected, drought is a major challenge in South Africa. Most of the gender and climate change literature accepts that women are more vulnerable to climate change and that women are considered a homogeneous group (Arora-Jonsson, 2011). Gender alone, however, is not a significant determinant of vulnerability (Ajibade *et al.,* 2013). Male and female farmers face varying degrees of vulnerability and adaptive capacity to climate change in many developing countries (Denton, 2002). In general, the role of female households in agricultural activities in comparison to male households is under-resourced and under-capitalised. This restricts investments that enhances resilience and reduces uncertainty to climate change (FAO, 2011). Gender plays an important role because it causes a lack of access to or management of assets or asset control or cognitive, social, or cultural limitations (Meinzen-Dick *et al.,* 2014; Meyiwa *et al.;* 2014, Nyantakyi-Frimpong and Bezner-Kerr, 2015), such individuals may be prevented from pursuing specific adaptation options.

Resilience is the capacity of a social-ecological system to manage financial, political, and environmental changes and to adapt to them (Adger, 2006; Folke, 2002; Gallopin, 2006; Marshall, 2007). This study is founded on the premises of agricultural resistance by small-holder farmers. Agricultural resilience refers to farmers' ability to absorb and recover from shocks and pressures on their agricultural productivity and livelihoods. Some shocks are temporary, while others are long-term. Some arrive unexpectedly, while others are foreseeable. And some are more severe than others, while others gradually degrade farmers' capacity to farm (Adger, 2006; Folke, 2002; Gallopin, 2006; Marshall, 2007).

The study examined the effects of drought on female farmers in the Frances Baard District. Women’s awareness of the adverse effects of drought was assessed to contribute to the development of women's adaptation strategies in Frances Baard. Smallholder farmers,

especially female farmers in rural communities, cannot effectively avoid natural disasters such as droughts but can reduce risks and negative impacts. This can only be done by changing behaviour, effective governance, and enhancing scientific progress to reduce the effects of climate change (United Nations International Strategy for Disaster Reduction (UNISDR), 2015). The agricultural research area in the Frances Baard District Municipality is covered in this chapter. The chapter outlined a brief history background of the research problem. In addition, the problem statement, the research questions and goals were stated.

1.2 Description of study area

The study was conducted in FBDM, South Africa. Frances Baard district municipality was selected because it was declared a disaster zone. A map of the province showing the different municipalities is highlighted in Figure1.1. Frances Baard District Municipality is an urban area, which is surrounded by rural communities where both subsistence and commercial agricultural activities exist on different levels (StatsSA, 2011). Frances Baard District Municipality is one of the five districts in the Northern Cape province of South Africa, the District is bordered by the North West and Free State provinces on the eastern side and accommodates a population of approximately 353, 198 people (Community Survey, 2007). Frances Baard District Municipality consists of four local municipalities, Sol Plaatje, Dikgatlong, Magareng, and Phokwane.

FBDM landscape is characterised by vast arid and semi-arid plains covered with grass in the Kalahari and low shrub land in most of the province. The province receives summer rainfall with only a narrow strip along the west coast receiving winter rains. The main farming system in FBDM is extensive commercial livestock (i.e. cattle, sheep, and goats) communal farmers are concentrated in Sol Plaatje, Dikgatlong, Magareng, and Phokwane, whom were the focus of the study. The province has fertile agricultural land along the Orange River valley where high-value products like grapes, maize, cotton, and peanuts, and wheat are produced utilising irrigation water from the Orange River. The Northern Cape in which FBDM is located was recorded as having the second-largest agricultural loss due to disasters of all the provinces in South Africa.

According to the Department of Agriculture Northern Cape (2018), there were 868 smallholder livestock farming units in the FBDM and were assisted by all four local municipalities. During 2015/2016, 127 female smallholder farmers were assisted. These female farmers were used as the population to determine the sample size for female smallholder farmers.

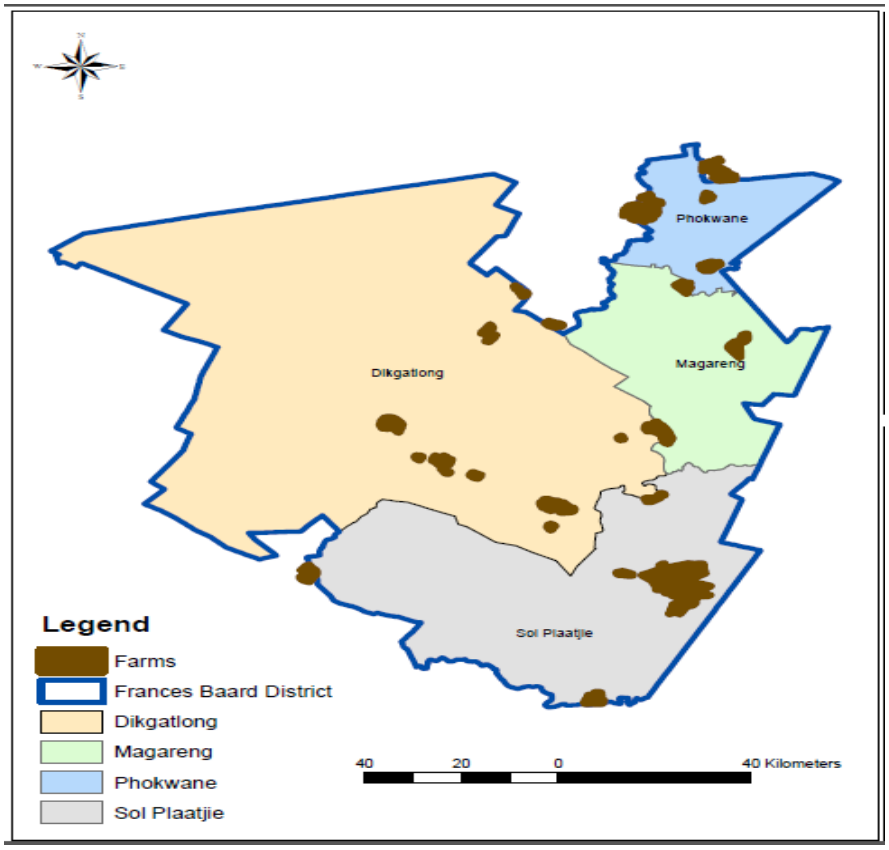

Figure 1:1 Map of Frances Baard District Municipality
Source: Frances Baard District Municipality, 2018

1.3 Background to the study

In 2018, drought was declared a provincial disaster in the Northern Cape Province (Tandwa, 2018). In 2016, the Department of Agriculture Forestry and Fisheries (DAFF) declared seven provinces, including the Northern Cape, a "*provincial state of drought crisis",* (DAFF, 2016b). Another drought disaster was declared in 2020 affecting 80 percent of the Northern Cape, with the western portion being affected the most (Times live, 2020). Jordaan *et al*. (2013) reported that the adaptive capacity of farmers to adapt to drought is determined by the level of their education, the financial resources available, asset ownership, and social capital, access to knowledge and technology and productivity tools available.

Khoza *et al.* (2019) and Murray *et al.* (2016) state that the severity and duration of drought has increased. The increase in frequency and severity is due to man-made causes, as well as the rise in temperatures. Smallholder male farmers are more resilient relative to female smallholder farmers. Smallholder female farmers are less likely to have labor and disposable income that adversely affects their resilience negatively (Khoza *et al*., 2019; Murray *et al.,* 2016).

Women are side-lined in most parts of the world when it comes to livestock matters, as most research has concentrated solely on the role of women in nurturing and caring for the household (Turner, 2014). These studies, however, lack assessments in local municipalities (communities) and are often limited to a comparison of households headed by males and females. In addition, other studies emphasize on vulnerability that depicts women as victims of climate change, without exploring to what degree men and women can be proactive in mitigating the adverse effects of drought hazards and building resilience to the effects of drought hazards. Hence, this study believed that increasing the resilience of female smallholder farmers to drought hazards would boost the livelihoods of female smallholder farmers in these local municipalities.

Droughts such as decreased rainfall can seriously threaten women's livelihoods in Frances Baard because of crop failure, decreasing food grain yields that weaken women's and another vulnerable part of the community's livelihoods (Udmale *et al.,* 2014). Therefore, it is imperative to understand how women perceive changes in climate and weather conditions, and how they can adapt to future changes to become more resilient (Hallegatte and Durmas, 2007).

Drought is a major problem in the FBDM due to lack of rainfall and the high temperatures that often result in heat waves (Udmale *et al.,* 2014). The role of women in society has changed; there is not enough literature that focuses on the impacts of climate change affecting women's resilience during drought. In most parts of the world, women are side-lined in matters of livestock, as most studies have concentrated solely on the role of women in household care and treatment (Turner, 2014). The role women play in protecting livestock during drought has being ignored. With all these adverse effects of drought in FBDM a study was necessary to check how women cope and adjust to the effects of severe weather changes and drought and whether their coping strategies are adequate.

This inquiry examined the vulnerability of female smallholder farmers to drought and aimed to recommend measures to create drought resilience for smallholder female farmers by improving food security and increasing household income. The study sought to understand the threats to drought and adaptation possibilities for smallholder female farmers and to understand how women are affected illustrating the difference in coping and adapting capacities, and the causes and effects of differential vulnerability (Eakin and Luers, 2006; McLaughlin and Dietz, 2008; Miller *et al.,* 2010).

1.4 Problem statement

Based on the background of the study, there is a possibility that male farmers are more resilient to the impacts of drought as compared to female farmers. Additionally, several

studies have been carried out on the effects of drought on farmers, especially smallholder female farmers in the FBDM; however, there is limited literature on the drought disaster impacts and resilience of female farmers in the FBDM. Therefore, this study aimed to investigate the perceptions of both males and female farmers to compare how drought affects them, how resilient they are to drought impacts and how they cope and adapt to the drought impacts. The purpose of this study was to provide recommendations that can add to the strengthening of female farmers farming practices.

1.5 Research questions

Deriving from the problem statement, the main research question was, what are the drought effects that make smallholder female farmers more vulnerable than smallholder male farmers and what are the female farmer's adaptation strategies, and are these strategies sustainable for their livelihoods?

- Are smallholder female and male farmers in Frances Baard vulnerable to drought?
- Are smallholder male farmers more resilient to the effects of drought compared to female farmers?
- What mechanisms do smallholder male and female farmers explore to cope and adapt to drought hazards in Frances Baard?
- What communication strategies do male and female smallholder farmers explore to foster drought resilience?
- What are the recommendations for addressing drought challenges for Frances Baard smallholder female farmers?

1.6 Research objectives

1.6.1 Overall aim

The study sought to investigate the effects of drought hazards on female smallholder farmers of FBDM and to assess their coping, adaptation, and resilience strategies to droughts as compared to smallholder male farmers in the rural communities.

1.6.2 Specific objectives

- To assess the vulnerability of smallholder female farmers to drought hazards in FBDM;
- To investigate drought resiliency of smallholder male farmers as compared to smallholder female farmers;

- To investigate drought coping and adaptation mechanisms of smallholder female farmers as compared to male farmers;
- To assess communication strategies used by male and female smallholder farmers to foster drought resilience; and
- To provide recommendations to address drought challenges for smallholder female farmers.

1.7 Conceptual framework

The study followed the Harvard or Overholt (1985) framework of gender analysis. Drought hazards are felt in a community, which is exposed to social, political, economic, psychological, and cultural factors. The framework shown below in Figure 1.2, stresses the importance of establishing adaptation strategies for smallholder female farmers. It is also important to note that this framework portrays gender as a social attribute but also as having influence in determining the vulnerability and adaptation strategies of smallholder female farmers. While the framework indicates that social, political, economic, psychological, and cultural factors influence vulnerability and adaptation; this study explored how similar factors can influence resilience.

Chapter 2 sought to analyse this framework, identifying the advantages and disadvantages of the framework. One disadvantage identified is that the model only identifies factors that influence vulnerability but it does not identify factors that influence resilience and this is where the research question will be addressed

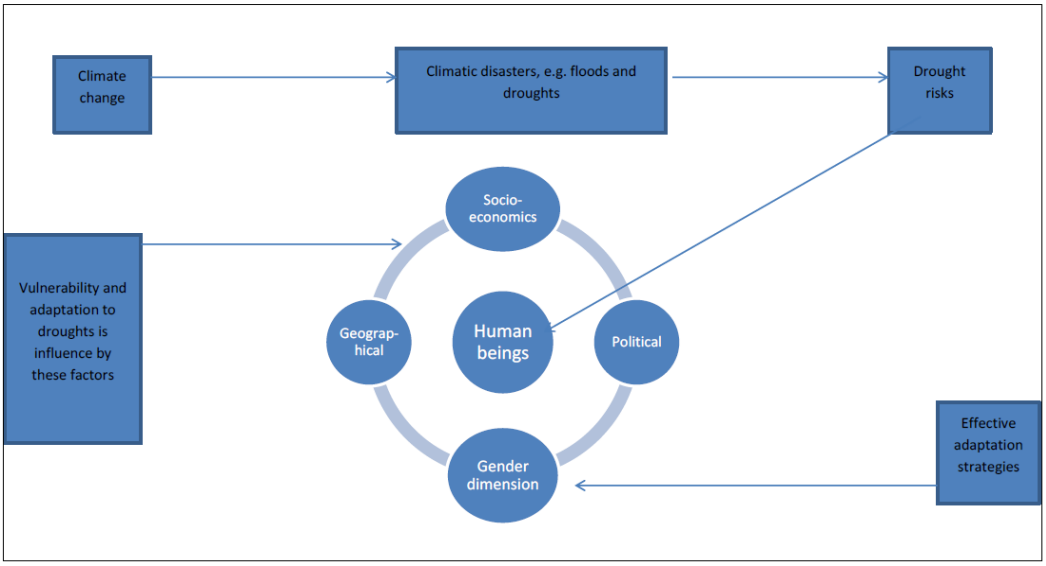

Figure 1:2: Harvard framework for gender analysis
Source: Conceptual Framework Overholt, 1985

1.8 Research design and methodology

This section discussed the research design and methodology that the study used to answer the research questions and objectives.

1.8.1 Research methodology

Research methodology refers to a scientific and systematic way of solving a research problem. According to Dawson (2002), methodology highlights the logical steps taken by research in a study. Research methodology refers to the whole research process, from the conceptualization of an issue to report writing, research questions, data collection, analysis, and interpretation. A research design is a method that describes the procedures for conducting the analysis, including when, from whom, and under what conditions, data will be obtained to determine the plan used to produce empirical evidence that will be used to address the research questions (Creswell, 2007; Mcmillan and Schumacher, 2010).

1.8.2 Research design

Leedy (1997) describes research design as a study plan, including the overall data collection structure. Similarly, MacMillan and Schumacher (2001) describe a research design as a plan for selecting topics, research sites, and procedures for collecting data to answer research questions. Durrheim (2004) argued that research design is a strategic action process that acts as a bridge between research questions and research strategy implementation. A case study enables the researcher to carry out a detailed analysis of the research topic; in this case, it investigated the impact of drought, and resilience strategies mechanisms employed by smallholder female farmers.

According to Creswell (2009), study design refers to the devices, methods, and procedures that are used to obtain evidence in the form of qualitative research. There are two forms of research design available, both qualitative and quantitative (Creswell, 2014). This study is qualitative research design and used a descriptive study as the researcher tried to understand the research problem from the point of view of female smallholder farmers. Purposive sampling is recommended as the success of a focus group relies on the capacity and willingness of participants to provide relevant information. A purposive sample was used by the study (Morgan, 1998).

In addition, research shows that mixed gender groups appear to increase the consistency of discussions and their findings (Freitas *et al.,* 1998). As a result, it is critical to examine the number of members in a certain focus group. Although between six and eight participants are agreed to be appropriate (Kruger & Casey, 2000). Given the limited number of participants in a focus group discussion and the overall design as a once-off

experience, by conducting a single group discussion, one cannot exhaust a subject. As a result, some writers have proposed at least three or four group meetings for research topics (Burrows & Kendall, 1997).

1.8.3 Population and sampling

The research population is the group of participants from which the investigator expects to draw data that can be analysed to address the research questions (Babbie & Mouton, 2013; Wild & Diggines, 2013). Lunenburg and Irby (2008) indicated that qualitative analysis uses a sampling method that yields samples that are often small and non-random, making it impossible to generalise the results of the study. Therefore, an acceptable sample size for a qualitative analysis offers sufficient information to address the research question adequately (Lewis & Sheppard, 2006). Lunenburg and Irby (2008) agree with Welman *et al.* (2005) that non-probability sampling approaches are used in qualitative studies and, in particular, purposive sampling, rather than random sampling techniques.

To research a specific characteristic, feature, or function, purposive sampling is necessary, such as evaluating the resilience of female smallholder farmers to drought in the Frances Baard District Municipality. It guarantees that the study focuses on data that is important to the study and prevents wasting time on survey items that do not have anything to do with the problem under investigation. Therefore, in this analysis, purposive sampling was used. This allowed the researcher to rely on personal judgment and practical knowledge of the research field in the selection of the respondents whose knowledge and experience could provide good information for analysis (De Vos *et al.,* 2005; Lunenburg & Irby, 2008; Thomas, 2013). For this reason, the study gave priority to participants who had adequate information about the resilience of female smallholder farmers and the activities in the communities of different municipalities because of their expertise and experience. The use of purposive sampling falls back to the claims of Lunenburg and Irby (2008), who argued that qualitative research uses sampling strategies that create small and non-random samples in line with their focus on in-depth description of the experiences and context of participants.

Furthermore, Lunenburg and Irby (2008) maintained that for qualitative research, respondents who meet requirements are likely to generate the type of information required to achieve research objective should be selected deliberately. Thomas (2013) argues that purposive sampling allows the researcher to decide who is knowledgeable or experienced enough to be included in the study. Furthermore, purposive sampling helps the researcher to determine who is sufficiently experienced or competent to be included in the sample.

Therefore, an appropriate sample size for a qualitative study is one that adequately addresses the research question (Lewis & Sheppard, 2006).

The population selected in this study participated by way of group discussions. Two considerations were used to choose the farming community in the study area. This includes the involvement of smallholder farmers in livestock farming, taking into consideration the drought situation in the province during recent years. Thus, the FBDM as part of the Northern Cape Province was chosen because it had been declared a disaster zone by the South African government in the 2017/2018 and 2019/2020 calendar year. The researcher purposively sampled four local municipalities from the areas falling under Sol Plaatje, Dikgatlong, Magareng, and Phokwane. DAFF provided a list of smallholder female farmers from selected municipalities. This list included 127 female farmers, who were primarily livestock farmers.

The basic criterion for research participants was:

- The respondents lived in the FBDM as this was the region that was recognised as significant in terms of livestock production; and
- Respondents had to be mainly female smallholder farmers farming with livestock and ready to participate in the research study. To measure the study area's gender parity index (GPI), the focus was on married women or women living together with men who are also actively involved in farming activities, and the data was collected from single, divorced and widowed women.

Polit (2013) describes a sample as a proportion of a population, whereas Douglas (2004) observed that, in the analysis, a sample is the subset of the entire population that allows the researcher to study a portion of the population that will be a true representation of the population. Out of 127 female farmers assisted by the DAFF, the study sample consisted of 80 participants, of which 10 female smallholder farmers and 10 male smallholder farmers were part of the eight focus group discussions as per the local municipality. In conjunction with purposive sampling, participants' selection processes were followed

Table 1.1: Participants selection processes

Local Municipality	**No of farmers**	**No of females assisted**	**No of female farmers intended for focus group discussion**	**No of male farmers intended for focus group discussion**	**Total per group**
Dikgatlong	347	45	10	10	20
Sol Plaatje	263	7	10	10	20

Magareng	119	21	10	10	20
Phokwane	139	54	10	10	20
Total	868	127	40	40	80

Source: The Northern Cape Department of Agriculture, Forestry and Fisheries, 2019

1.8.4 Data collection

FBDM primary data was obtained using a focus group qualitative approach. In these discussions, drought effects and resilience strategies affecting female small-holder farmers are examined. The key data collection techniques included note-taking, tape recording, and participant observation, as well as group discussions (Stewart, Shamdasani & Rook, 2007). To ensure uniformity and reliability, interview guides were used during focus group discussions. The decision to use focus group discussions was informed by the study question and objectives and it helped to generate a vast amount of data from different viewpoints and people within a relatively short period.

1.8.5 Data analysis

Marshall and Rossman (1999) define data analysis as the process of bringing order, structure, and sense to the data collected. Therefore, it can be concluded that some type or form of logic applied to research is needed for data analysis. To strengthen content analysis, qualitative data was analysed using thematic data analysis, taking into account common words, themes, and trends. Group meetings and interviews were combined to interpret the phenomenon being discussed. A thematic content review was conducted to define main themes based on the prescripts of Van Rensburg and Smith (2004). To make the analysis easy to conduct, the audios were transcribed into texts and then the ideas that had similar meanings were grouped together and thereafter particular themes were created.

1.8.6 Validity and reliability

The validity of a measuring device or tool is to what degree the device tests what it is intended to measure (Alvi, 2016). The measuring instruments were checked for validity by making sure the instruments measure what they are meant to measure. This can be achieved by testing the instruments for content validity using a qualitative approach, ensuring that the contents of the instruments are descriptive of the intended phenomenon or objectives. The Gender Parity Index (GPI) of female farmers was used to measure the validity of the research. The outcomes were validated by the participants through group discussions and the findings of the adaptation strategies of smallholder female farmers.

The appropriateness of the instrument's content was tested using the validity of focus group discussions to verify whether the measurement instruments fit their purpose with the type of questions being discussed. In addition to the above steps the research supervisor did scrutinize the data collection methods for both validity and reliability. The instruments were tested for construct validity to assess whether they measure what they seek to measure (Alvi, 2016). Reliability is the accuracy with which a measuring instrument yields a result if the measured object has not changed (Welman *et al.,* 2005).Data collection instruments were checked for validity by making sure the instruments measure what they are meant to measure. This was achieved by testing the instruments for content validity, which is; by ensuring that the contents of the instruments were descriptive of the intended phenomenon or objectives. Validity was used to measure the Gender Parity Index of female farmers. The outcomes were validated by the participants through the findings of the adaptation strategies of smallholder female farmers. The appropriateness of the instrument's content was tested using the validity of questions to verify whether the data collection instruments were fit for their purpose.

1.9 Secondary data

Secondary data was conducted in order to establish the study background information. For the purpose of this study, secondary data collection platforms mainly used was Google Scholar, Weather Base, the University of Free State library in the form of previously done dissertations, as well as the various government records on drought, resilience and small-holder farmers. The information collected from the Department of Agriculture was used to identify the impacts on women's resilience of drought.

1.10 Delimitation of the study

There are different scales of farming in the area. This study concentrated on female smallholder farmers; meaning that large-scale commercial farmers were not included despite the fact that both may be facing drought impacts. The focus of the study was on more vulnerable smallholder female farmers who may lack adaptive capacities when compared to smallholder male farmers.

1.11 Limitation of the study

The dynamics around COVID-19 had an impact on the study. First, the lockdown limitations had an impact on the study in that the researcher was not totally allowed to contact with the individuals. The data collection technique was governed by curfew times, social distance, and the amount of persons who should be told about the project. Instead of calling the whole community of small-holder farmers to brief them on this study, COVID-19 regulations

made it so difficult that the entire farming community was only notified about it through referrals. Second, the data collecting procedure was hampered since people were not entirely free to socialize with one another owing to worries of getting the virus from one another.

1.12 Significance of the study

By focusing on the 2015-2020 drought event, this study will add to the existing literature by developing the Agricultural Drought Resilience Index, which will be used to assess the resilience of smallholder female farmers in the Frances Baard District Municipality and other areas, as well as propose solutions to the deficits identified. The findings of this study will help policymakers and stakeholders to formulate future adaptation strategies and policy interventions that will boost female farms' resilience to climate change.

1.13 Ethical considerations

Ethical concerns are crucial to any analysis of research as needed during the planning process. The researcher sought access to organisations and individuals during the study phases of planning, data collection, analysis and reporting.

According to Lewis *et al.* (2008:178), ethics relate to the suitability of the actions of the researcher in relation to the interests of those who become the subjects. Blumberg, Cooper and Schindler (2005:124) describe ethics as the "moral values, norms or behavioural standards that govern moral choices about our actions and our relationship with others". Cooper *et al.* (2005:124) further mention that research ethics relate to concerns about how the researcher formulates and clarifies the research subject, research designs and achieves access, collects data, processes, and stores data, analyses data and publishes research results in a morally acceptable manner.

During the course of the study, the report on disaster management considered research ethics; the interviewees were not coerced to participate.

1.14 Outline of the study

The study is structured into seven chapters. **Chapter one** provided an explanation of the background as well as indication of the study in the form of a problem statement, purpose, goals, and objectives. The contribution of the research to the disaster management body of knowledge was given. A brief description of the study area of Frances Baard District Municipality was provided. **Chapter two** gave an overview of the conceptual /theoretical framework that is relevant to this study of women in farming and in agricultural drought resilience, the effects of drought as well as adaptation strategies of female smallholder farmers.

Chapter three explored international and national legislation. **Chapter four** reviewed literature, gave an overview of the literature to the subjects of the study, and linked it to the research study. **Chapter five** covered the procedure that is taken in the study to achieve the objectives of the research this included the methodology, research design, sampling procedure, and data collection. **Chapter six** documented an analysis of the data and interpretation of the data and it presented the results linking it to the study aim and objectives. **Chapter seven** highlighted the conclusion and recommendations to the study in conjunction with the research questions and objectives.

1.15 Conclusion

The main aim of the study was to explore the resilience strategies of smallholder female farmers' within Frances Baard District Municipality. A stratified random sampling technique was used to identify research subjects to inform the study. The rationale underpinning the study is that smallholder female farmers are more vulnerable to disaster risks than male farmers are.

CHAPTER TWO: THEORETICAL FRAMEWORK

2.1 Introduction

This chapter explored the Harvard framework, also known as Overholt framework (1985) as the theory underpinning this study. The core principles of this framework in relation to development are highlighted in this chapter. The chapter also unpacked the Harvard framework for gender analysis based on the four components, which are the activity profile tool, the access, and control profile tool, the influencing factors tool, and the project cycle analysis tool. This is followed by the applicability of the theory in this study and the chapter is concluded by a criticism of the framework.

2.2 Background and core principles of the Harvard Framework for Gender Analysis

The Harvard framework for gender analysis, also referred to as gender roles framework or simply gender analysis (Ludgate, 2016), is one of the earlier concepts used in developmental works to ascertain gender as the central part in relation to access to resources. Overholt, Anderson, Cloud and Austin (1985) coined this framework after a request from the women in development arm of the World Bank. The framework was further amended by the Harvard Institute for International Development and elaborated on by various other scholars, for example Kabeer (1999) with the Social Relations Framework and the Women's Empowerment Framework, and Moser's (1993) with the Gender Planning Framework.

Gender analysis is a kind of socio-economic analysis, which is applied as a medium for illuminating the ties between current gender relations in a community and development challenges that need to be discussed in the form of developmental assistance (Overholt *et al.,* 1985). Overall, the framework shown below in Figure 2.1 unpacks the issue of gender analysis in developmental projects by providing an understanding of the different roles that men and women play in a particular project aimed at economic and local development (Sanginga, Ochola & Bekalo, 2010). According to Sanginga *et al.,* (2010), this framework is a gender design concept that seeks to:

- explain the economic reasons for investing in women;
- assist policymakers in designing more productive programmes and increasing competitiveness;
- stress the value of better data to achieve the efficiency or equity target; and;

- Map the work of women and men in society and identify key discrepancies.

Using this framework, data is gathered at the community and household levels during particular developmental projects. At the centre of the Harvard framework for Gender Analysis is the recognition of women for the roles they play in development. This framework, emphasizes that to increase efficiency in development, women should be given access to relevant resources. To place the women at the focal point of the Harvard framework for Gender Analysis, there are four distinct but complementary components that this tool is structured. According to Overholt *et al.* (1985), these are:

- Activity profile tool;
- Access and control profile tool;
- Influencing factors tool; and
- Project cycle analysis tool.

Once the framework is highlighted in terms of the four components identified, carefully crafted interventions can be discussed and mitigated. The components outlined above are reviewed in the following sections in terms of what they are and how they necessitate women's inclusivity in developmental aspects. Where applicable, the analysis of these components incorporates practical examples of situations that are inherent in the farming communities.

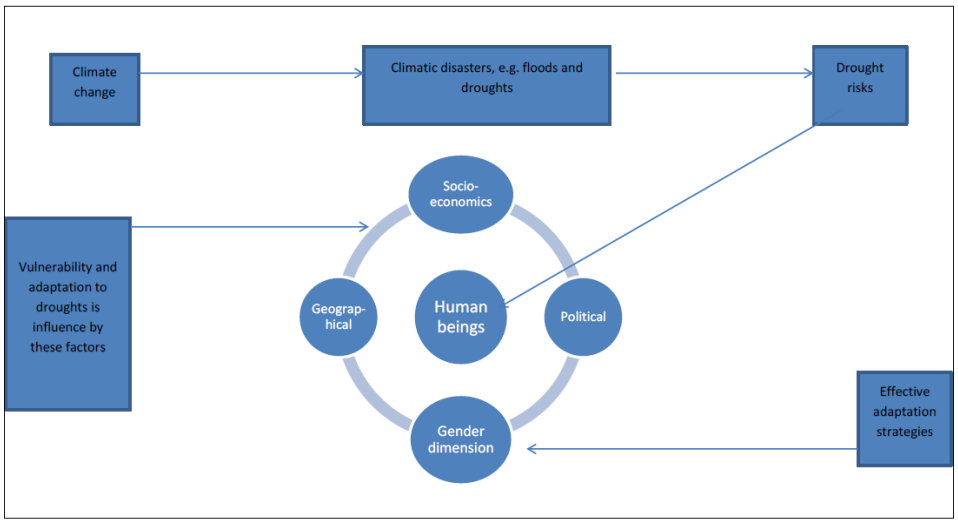

Figure 2.1: Conceptual framework
Source: Conceptual framework Overholt, 1985

2.2.1 Activity profile tool

Originally, the Harvard framework for Gender Analysis reviews the activity profile of participants in any developmental initiative in two ways: (i) either as productive; or (ii) as

reproductive (Overholt *et al.,* 1985). In terms of these two distinct roles, the framework attempts to answer question; who does what? The design of the project determines how much information is needed in a project. In this light, the fields of operation in which the project will be specifically engaged needs more detail (March, Smyth & Mukhopadhyay, 1999).

For example, an activity profile for an agricultural project would list, according to the gender division of labour, each agricultural activity, which includes steps such as land clearing, planning, and etcetera for each plant or type of land in question. According to Sanginga *et al.* (2010), other parameters can also be tested, depending on the context:

- Gender and age denominations – that is if adult women, adult men, children, or elderly people are involved in an activity;
- Time allocation – which is a determination of the percentage of time devoted to each operation and whether it is carried out on a seasonal or regular basis; and
- Locus of operations – which involves the determination of where the activity is carried out to reveal the movement of individuals.

Moser (1993) amended the framework by adding a third activity, which was named community activity. The community activity component speaks of the different developmental activities that are implemented at a community level by local people (Moser, 1993). In many developing countries, including South African community development, these activities may include Local Economic Development (LED) programmes implemented by relevant stakeholders (Doss, Meinzen-Dick & Quisumbing, 2018). Community activities include some agricultural corporations, community-based natural resources management, and any other initiatives that group local community members to work together (Jones, Holmes, Presler-Marshall & Stavropoulou, 2017).

Moser (1993) furthermore divided community activity into two categories, (i) community management, and (ii) community politics. Under community management, Moser (1993) propound that this is where women are stationed and their role is feminine in nature. For instance, scholars such as Baskin (2020) associate these ‘women roles’ with being custodians of the family and children and taking care of domestic duties such as childbearing and nurturing, fetching firewood, and being the head when the ‘husbands’ or men are not available. Concerning the second category which relates to ‘community politics’; Moser (1993) notes that these are dominantly male-centered duties that are mostly masculine in nature. Community political positions are dominated by male figures (Côte, 2020) and in South African rural communities; traditional leaders mostly hold the positions. Thus, it is assumed that the ‘Activity Profile Tool’ provides a distinction between

reproduction, production, community management, and community politics among men, women, boys, and girls.

2.2.2 Access and control profile tool

This is an additional component of the Harvard framework for Gender Analysis, which takes into consideration participant's access to resources and the extent to which they control them for development (Overholt *et al.,* 1985). Two important distinctions are made on this profile – access to developmental resources and control over these resources, and this applies to both men and women. The framework clarifies and documents information on who has access to resources and who controls their use in relation to the tasks identified in the activity profile (True, 2003). The following questions are asked in this regard:

- Who has access to and control over resources, for example; land, labour, extension services, capital and entrepreneurship?
- Who has access to and control over benefits that come out of developmental projects?

This component of the Harvard framework for Gender Analysis is subdivided into two sub-categories, resources and benefits (Overholt *et al.,* 1985; Moser, 1993; Kebeer, 1999). Under these two sub-categories, the framework provides access of both men and women to the resources and identifies who controls them. This is also applicable to the benefits in question where the framework outlines who gets access to the benefits and who controls them (Overholt *et al.,* 1985). According to Leach (2003: 38), the distinction on the access to and control of the resources is important because according to Heilman and Caleo (2018),

> *"…..all too often projects have focused only on ensuring access for women or marginalised groups, and have ignored the issue of who controls them (and the subsequent outputs)".*

Assuming other factors are constant, the Harvard framework for Gender Analysis outlines that there should be gender equity in terms of access to resources. This, as similar studies shows, implies that women should have easy access to resources and be in a position to control them towards the intended developmental goals (Bordalo, Coffman & Gennaioli, 2019). Similar to the resources provided to men or male participants, the framework specifies that there should be an outline of the resources available to women and specifies the extent they have control over them. Thus, a sort of a parallel, but no comparison, range of activities undertaken by men and boys is placed on one side, and on the other hand,

activities available to women and girls are outlined. This component unpacks what men, women have access to, and to what extent they have authority over such.

2.2.3 Influencing factors tool

In addition to participants' extent of control of the resources and activities in question, the framework also outlines the influencing factors. The influencing factors category is a complement of the 'Access and Control Profile' because it outlines important factors that determine who accesses and controls resources (Overholt *et al.,* 1985). They refer to different variables that have an implication on access to resources, some of which are the norms and values of the community in question, the economic factors and cultural elements observed in a particular setting (Leach, 2003; Moser, 1999). Put differently, scholars such as Heilman and Caleo (2018) propound that this component identifies factors that shape differences between men and women. Other studies conducted by Doss *et al.* (2018) in the agricultural field concluded that when influencing factors are underpinning access to and control of resources, the following questions are then asked:

- What are the political, economic, or cultural factors affecting gender differences (as identified in the above two profiles)?
- What are the past and present influencing factors?
- What are the opportunities and constraints of these influencing factors? (Doss *et al.,* 2018)

As the last question identified above shows, it is important that these factors are outlined in terms of constraints and opportunities that affect the influencing factors. For instance, Leach (2003: 38) notes that the constraints that affect access to and control of resources may include

> "…..lack of mobility, early marriage, poverty, lack of political will while opportunities may include…..government priorities, lobbying by women's groups, externally funded projects…" (ibid.).

Through the identification of the constraints regarding the influencing factors, and the opportunities from accessing resources, stakeholders are able to look for possible solutions that will enable the equitable sharing and distribution of inputs and outputs for any project in question. This improves the well-being and income of stakeholders.

2.2.4 Project cycle analysis tool

The Harvard framework for Gender Analysis also consists of a project cycle analysis tool, which is a checklist that is used for needs analysis. The checklist outlines questions or options to indicate sensitivity of developmental interventions and resources on gender issues. The framework also contains checklists of key questions for each project cycle (identification, design, implementation, and evaluation) that are attached in Appendix A.

2.3 Applicability of the Harvard framework for Gender Analysis in this study

The Harvard framework for Gender Analysis is applicable in this study and relevant in a variety of ways. Firstly, the framework identifies different activities done by men and women in the farming community. These are outlined in the activities checklist as previously explained in this chapter. An example of the template that may be used as an 'Activity Profile Tool' is presented in the table below:

Table 2:1 Activity profile for the farming community

	Women	**Men**	**Girls**	**Boys**
Productive activities				
Agriculture • Activity 1 • Activity 2 **Income-generating** • Activity 1 • Activity 2 **Employment**				
Reproductive activities				
• Fuel • Water • Childcare • Cooking • Health • Repairs • Cleaning				
Community Involvement				
• Agricultural-related meetings • Helping people in need • Labour in community agricultural projects				

Source: Adapted from Ludgate (2016) and modified by the author

The information presented in the table above, about the different roles is important in this study because it helps to organise information about gendered division of work. This classification is important since it helps to make the roles played by women clear (Overholt *et al.,* 1985), particularly in the farming community. In circumstances where the framework presented above is not applied to group the different roles played by men, women, boys

and girls, it is highly likely that having knowledge about who did which particular roles will not be possible. Thus, it would be difficult to hold particular people responsible or accountable for losses or other unfortunate events, which include some forms of incompetence in completing duties.

The use of the Harvard framework for Gender Analysis ensures that men do not take credit for the work done by women as this is always the case particularly in African communities where men are viewed as 'heads of the house' (Madsen & Andrade, 2018; Jones *et al.,* 2017). The framework will therefore make it easy to measure how resilient female small holds are to drought and what mechanisms have they put in place to cope with the consequences of these natural disasters.

Since the current study reviews the resilience of female smallholder farming initiatives, this framework provides a starting point on which women are assessed in terms of their access to farming-related resources, and the extent to which they can control them. The checklist tool for access to and control of resources may look like the one presented in the table below:

Table 2:2 Access and control profile tool for the farming community

	Access		**Control**	
	Women	Men	Women	Men
Resources				
• Water resources • Land and natural resources • Seed, fertilisers and chemicals • Extension knowledge • Labour				
Benefits				
• Income from agriculture • Assets in the farming community • Education and training • Political power and prestige				

Source: Adapted from Ludgate (2016) and modified by the author

As the table above shows, this is a useful toolkit for determining the form and amount of work done by women and men in a home, farm, or community. It also aids in the recording of gendered gaps in resource access and control, such as land, water, plants, and extended knowledge (Overholt *et al.,* 1985). The applicability of this component in this study is that it triggers the proposal and implementation of policies that are sensible to gender inclusivity especially in smallholder farming communities. If for instance, there is a shortfall in terms of women's access to important agricultural resources that enable them to navigate around the challenges arising from the prevailing draught, the framework will

provide a point of reference for the formulation of policies and the design of developmental programmes that takes care of gender discrimination.

In addition, the Harvard framework for Gender Analysis is also important and relevant in this study because it provides a distinction between access to resources and control of such resources. A distinction between these two prevents situations where 'access' and 'control' are treated as homogenous blocks whereas in actuality there are not (Ludgate *et al.,* 2016). What this implies is that smallholder female farmers may have access to the important drought-related resources such as ideas, funds and information, but they may not be in a position to determine how such resources should be used and when they should be distributed.

For example, women may have access to good soils that are resistant to drought (hence, their particular level of resilience to drought) but they may not be able to control who owns that particular piece of land at the end. The issue is further complicated by the fact that all the land in South Africa, whether traditionally owned or privately owned, is subject to government dominion through what is referred to as eminent domain (Moshood, Ikechukwu, & Mazibuko, 2020). This means that the government may allocate the land for 'public good' if they see it necessary. Therefore, the distinction between 'access' and 'control' of resources is an important element in this study because it firstly evaluates whether or not women have access to resources which can enable them to be resilient to draught. Secondly, it assesses their level of control. In the end, the two elements might provide a different view on how the available resources affect the resilience of female smallholder farmers to drought. The framework also helps to unpack what resources women have in terms of fighting drought and to what extent they control the resources as far as navigating the challenges of drought is concerned.

Furthermore, the influencing factors may be applied in this study based on common beliefs and values within the farming community, and how these can be a factor in the resilience of female smallholder farmers to drought. These factors may include aspects such as political factors that affect farming activities, the community norms in terms of what should be respected and valued in the society, the hierarchical structures and other psychosocial variables. These variables will be allocated to women, men, girls, and boys as shown in the table below.

Table 2:3 Influencing factors tool for the farming community

	Women	**Men**	**Boys**	**Girls**
Factors				
• Community norms; • Social hierarchy;				

• Institutional stakeholder policies; • Economic factors; • Political factors; • Psycho-social elements; • Cultural expectations etc.				

Source: Adapted from Ludgate (2016)

As shown in the table above, the Harvard framework for Gender Analysis can be applied in this study to provide an outline of gender analysis within the smallholder farming sector. If the framework is applied correctly, it will be in a position to reveal all forms of stereotyping and discrimination which may be formally sanctioned or that may be indirectly experienced in daily procedures within the farming community. Thus, this framework is relevant and applicable in this study because it contributes to gender mainstreaming and to supporting equal opportunities for both male and female farmers. The information from the application of the framework provides an opportunity on which gender-sensitive developmental policies, particularly those relating to drought and farmers' resilience, can be implemented.

Lastly, this framework can also provide users with in-depth information on the gendered nature of the farming community in question than any statistics can reveal. For instance, information about the extent to which female smallholder farmers are resilient to ongoing drought cannot be easily gathered unless if the framework is applied. If the framework is collaborated with a variety of farmers within the farming community under this study, it can raise awareness about gender issues and a platform to discuss the causes and outcomes of the lack of equitable representation of women in agricultural resiliency programmes.

2.4 Criticism of the Harvard Framework for Gender Analysis

This Harvard Framework for Gender Analysis has been criticised in a variety of ways because of its simplicity and generalisation of factors. Firstly, while it is important to provide gender analysis in terms of the four components discussed in this chapter, the framework does not *"…..capture the complexity of the circumstances to which it is applied"* (Leach, 2003: 36-37). What the entire framework does is that it only clarifies the activity and influential factors as well as the accessibility and control of male and female participants in developmental projects. It does not necessarily go deeper into the understanding of how these variables can be a factor in creating female resilience. The framework identifies factors that influence vulnerability of women in any developmental activities but it does not identify factors that influence their resilience, which is the focus of this study. The framework provides a sort of checklist, which merely compares the resources, activities and project cycle analysis for men, women, boys and girls in development.

The Harvard framework for Gender Analysis is also criticised for its lack of depth in terms of what needs to be done to increase the access of women to 'decision making'. The framework clearly shows that more focus is placed on enabling women to have access to the input resources – and farming resources in this study – rather than focusing more on strategic gender needs. This study bases its argument on Baskin's (2020) study, which states that to escape the gender discrimination and stereotypical challenges faced by women; focus should be placed beyond merely ensuring that women have access to resources. An effective solution will be to ensure that women are placed in strategic positions that enable them to have influence on the resources in question before they are distributed. Thus, in the smallholder farming communities, female farmers need to be placed in strategic positions in resiliency programmes. This whole idea is however contrary to Madsen and Andrade (2018) who notes that women are culturally associated with traditional roles to the extent that their voice is not heard in the developmental processes.

Furthermore, the framework underpinning this study provides an oversimplified and homogenous tool to explain the role of women in the society. The main argument behind this assumption is that the roles of women in the community – or more specifically the farming society – are not homogenous. The general belief is that women are traditionally associated with indigenous and domestic roles but this is not applicable to all circumstances. Contemporary global laws on gender and inclusivity have been advocating for the inclusion of women in key areas for economic development. This has even reached higher levels in areas such as Europe and America where women hold powerful positions in agricultural projects (Griffeth, Tiller, Jordan & Sapp, 2018). Thus, the generalisation of women in terms of their perceived traditional beliefs (see Madsen and Andrade, 2018) is a simplification of facts because it is gradually changing with time. Thus, the framework may fail to present the actual status quo of the agricultural community in question in terms of the activities conducted, access to and control of resources and other influencing factors in the drought resiliency programmes.

A close analysis of the Harvard Framework for Gender Analysis also shows that it generalises other controlling factors, which play significant roles if applied to the agricultural community. For example, the framework does not take into consideration the impact of inequalities in terms of social classes, race, population group membership, and employment status among women regarding production. These factors can have implications on the extent to which women have access to resources and to what extent they can control the resources (Doss *et al.,* 2018). For example, in the traditional South African farming communities, Akinola (2018) notes that white people have access to

resources due to a historical past characterised by apartheid. To date, the white population group still owns vast land in provinces such as the Free State and Western Cape compared to their black (African) counterparts (Jankielsohn & Duvenhage, 2017). Thus, generalising the availability of resources in a group of women who have different levels of inequalities would be biased and the findings will not be a true reflection of the status quo of the 'Access and Control Profile' and the 'Influencing Factors' tools in drought resiliency initiatives.

The Gender Framework fails to differentiate the different roles played by women of different societal standing. Culturally in African societies, women have different roles based on who they are in the society (Cheeseman, Onditi & D'Alessandro, 2017). One of the dominant and outstanding societal positions is that of daughters-in-law and mothers-in-law. The daughters-in-law are expected to be below their mothers-in-law and the latter take custodian of the whole family before the husbands (Nganase & Basson, 2019). The fact that the Harvard Framework for Gender Analysis bypasses all these differences implies that it tends to homogenize inequalities of women based on their societal and family status. Thus, even if policy recommendations regarding resilience of female farmers against drought are to be provided based on this framework, they will fail to explain the state of affairs within the farming communities since all farmers are treated as homogenous blocks with similar characteristics.

2.5 Conclusion

This chapter explored the Harvard Framework or the Overholt Framework (1985) which underpins this study. The theory is used for gender analysis. The chapter began by reviewing the background of the theory, highlighting the core principles of the framework towards development(s). The chapter unpacked the Harvard Framework for Gender Analysis based on the four components, which are the activity profile tool, the access and control profile tool, the influencing factors tool and the project cycle analysis tool. The study found out that the theory was applicable to this study.

CHAPTER THREE: INTERNATIONAL AND NATIONAL LEGISLATIVE FRAMEWORKS ON DISASTER MANAGEMENT

3.1 Introduction

This chapter explores the international and national legislative frameworks on disaster management. First, the chapter discusses the international frameworks on disaster management, the Paris Agreement, the Sustainable Development Goals (SDGs), and the Sendai Framework for Disaster Risk Reduction. These frameworks are conceptualised according to how they can be used and how relevant they are in supporting the resilience of female smallholder farmers during times of drought. The disaster management legislation in South Africa is discussed. The South African legislative frameworks discussed include the Constitution of the Republic of South Africa, Act No. 108 of 1996, the White Paper on Disaster Management, the Disaster Management Act, No. 57 of 2002 as amended by Disaster Amendment Act No. 16 of 2015, and the White Paper on Climate Change Response. These frameworks are unpacked in this chapter as well as their relevancy to resilience of female smallholder farmers to drought.

3.2 Global frameworks on disaster management

Various international mechanisms have been developed and introduced to assist United Nations (UN) member states in dealing with disasters of differing magnitudes as they are affected. The following section discusses the international frameworks for disaster management such as the Paris Agreement, SDGs, and the Sendai Framework for Disaster Risk Reduction. These frameworks are important to this study because they can be used to analyse the resilience of female smallholder farming initiatives.

3.2.1 The Paris Agreement

The Paris Agreement, signed in 2016 under the United Nations Framework Convention on Climate Change (UNFCCC), is a climate change mitigation, adaptation, and financing agreement. The agreement's language was ratified by 196 state parties at the UNFCCC's 21st Conference of the Parties in Le Bourget, near Paris, France, on December 12, 2015, and was accepted by consensus. As of March 2021, 191 UNFCCC members have ratified

the pact (Seo, 2017; Blau, 2017). The goal of the agreement, as stated in Article 2, is to provide a stronger response to the danger of climate change; it seeks to improve the implementation of the UNFCCC through:

- Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognising that this will significantly reduce the risks and impacts of climate change;
- Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and
- Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development (UNFCCC, 2015).

The Paris Agreement calls for restricting global warming to 1.5 C to reduce the possibility of increasing climate change and, hence; disasters such as drought. To reduce global temperatures, there should be a reduction of global emissions of greenhouse gases, among other substances. As outlined in the Paris Agreement, there is an expectation that emissions have to decrease by 45% between the period 2010 to 2030, and then drop precipitously to reach net zero emissions by 2050. However, as research shows, at the current rate of the nationally defined contributions of carbon emissions, the planet is far from reaching this goal (UN Statistics, 2020, online). Instead of decreasing the emissions of carbon gases into the atmosphere, UN Statistics (2020, online) found that the global greenhouse gas emissions from developing countries and economies in transition has been gradually increasing during the period 2000 to 2018. Developed nations carbon gasses emissions have increased by approximately 43.2% during the period 2000 to 2013 (UN Statistics, 2020, online).

These dynamics have a significant impact on the weather and climate, as they are a direct cause of drought, which affects all the economies. The main argument in this study is not what the Paris Agreement mentions about changing climates and the associated disasters thereof, but how affected persons are resilient to disasters. Focus is placed on the extent to which female smallholder farmers are resilient to drought. The Paris Agreement urged member states to contribute to the UNFCCC Secretariat about long-term strategies and adaptation plans to raise the ambition of planned climate change action (Dimitrov, 2016). The COVID-19 pandemic, which has slowed economic growth and undermined business as usual around the world, even provides an opportunity for nations to re-evaluate their

goals and reconstruct their economies to be more environmentally friendly and resilient to climate change and the resulting disasters.

The majority of developing nations have been increased formulation and implementation of strategies that enable themselves to be highly resilient to climate change, drought, and other associated disasters (Tollefson & Weiss, 2015). One of the initiatives adopted is the National Adaptation Plans (NAPs) (Morgan, Nalau & Mackey, 2019; Tompkins, Vincent, Nicholls & Suckall, 2018). NPAs enable member states to attain the mandated goals under the Paris Agreement, which include enhancing their capacity to adapt to climate change and its consequences, improving their resilience, and reducing their vulnerability to these global changes (Morgan *et al.,* 2019; Tompkins *et al.,* 2018). There has been significant progress in the adoption of the NPAs by different countries in the world and the year 2019, approximately 120 countries submitted their strategies to the UNFCCC Secretariat on how they intend to face climate change impacts. The figure below shows summarised measures that have been taken by developing nations in the formulation and implementation of NAPs.

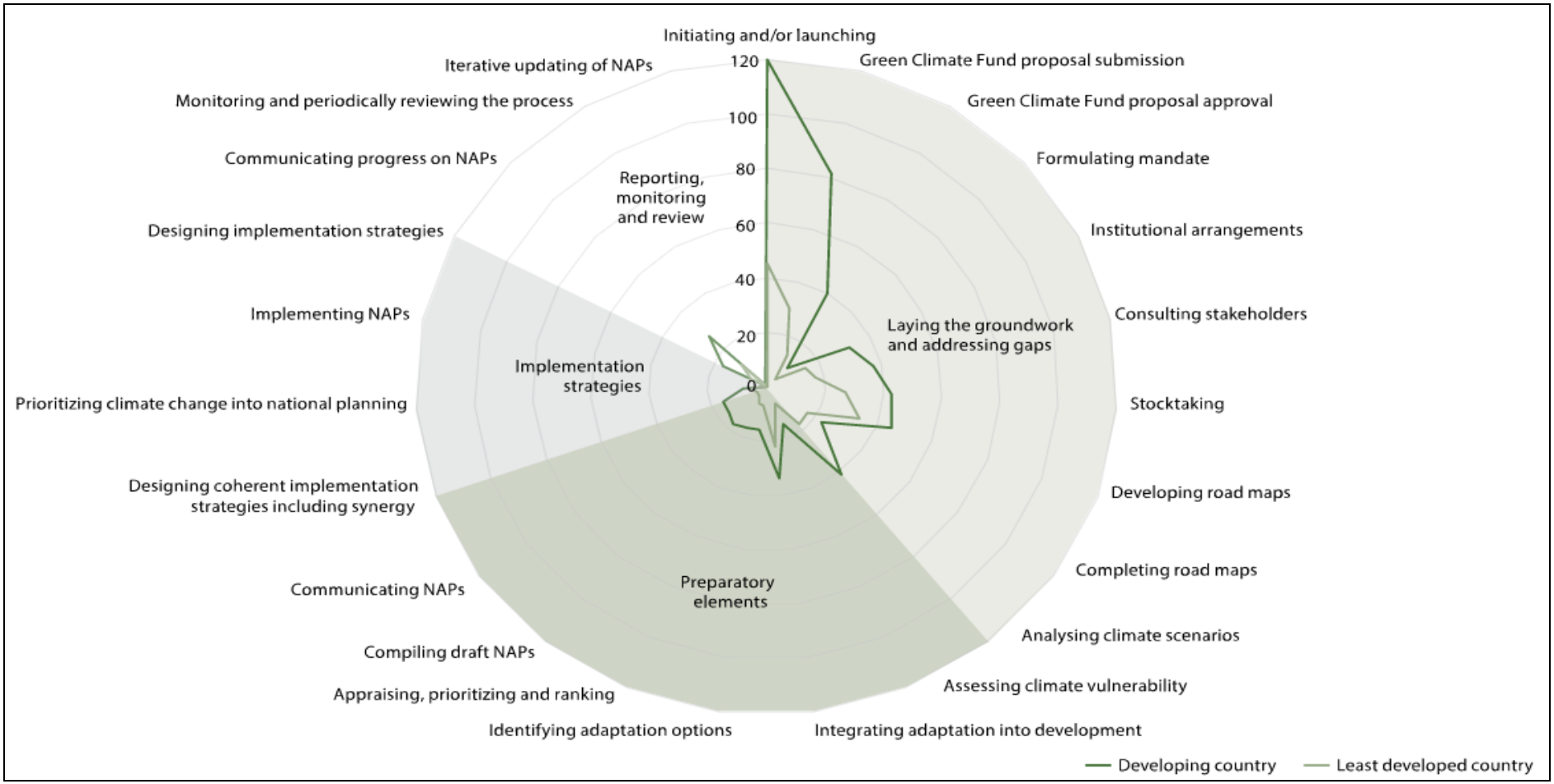

Figure 3:1 The Paris Agreement targets
Source: UN Statistics (2020)

Figure 3.1 shows that developing countries are advanced in terms of NPA adoption and implementation. The strategies adopted may have a significant impact on the resilience of natural disaster victims, which include farmers. One of the strategies that are relevant in this study is that of the role of institutional structures as one of the dimensions that has had a significant effect on the resilience of smallholder farmers. South Africa has also implemented systemic stakeholder participation in the execution of policies to deal with climate change and disasters that stem from it. Institutional partners can help farmers become more resilient in the face of changing climates by providing support, education, regulations, and policies. This context is important in this study because it enables the researcher to investigate the degree to which the strategies (in this case, institutional arrangement) enable female farmers to withstand or be resilient during drought.

Another strategy to increase farmer's resilience to drought is to prioritise climate change into national planning. This is also evident in South Africa, where climate change adaptation strategies have been incorporated into the Constitution, allowing each juristic to be bound by specific laws. One of the legislative measures introduced in South Africa, which is discussed in detail in this chapter, is the Disaster Management Act, No. 57 of 2002 as amended by Disaster Amendment Act No. 16 of 2015. The Disaster Management Act is enshrined in South African local governments by various laws that local populations (including smallholder farmers) must follow to avoid disasters and respond to disasters as they occur. This is more or less the same as the designing of coherent implementation strategies as well as the identification of adaption options as presented in Figure 3.1. The primary goal of this research was to determine if the introduction of NPAs on a global and local level has any effect on the drought resilience of female smallholder farmers. The investigation also looked into whether male smallholder farmers benefit more from these frameworks than their female counterparts do.

3.2.2 Sustainable development goals

In 2015, world leaders set out on an ambitious path to end poverty, fight inequality and injustice and protect the planet with the 2030 Agenda for Sustainable Development. United Nations member states unanimously agreed on the 17 SDGs, making them the blueprint for sustainable development for the world. The SDGs provide a clear, comprehensive, interconnected roadmap to tackle the world's most pressing environmental issues and create a better future for everyone. The success of the sustainable development agenda is based on the collaborative efforts of various stakeholders in the society, including

governments and private enterprises (Cairns, Hielscher & Light, 2019; Raub & Martin-Rios, 2019).

One of the SDGs, goal number 13, commends the UN member states to *"take urgent action to combat climate change and its impacts".* This call came because of climate change and recently the world has experienced the highest temperatures for the first time in history. According to UN Statistics (2020, online), the year 2019 was the second hottest on earth, and it was the culmination of the warmest decade (2010–2019), which was marked by major wildfires, storms, droughts, flooding, and other climate disasters across continents. With the rate that the temperatures are raising, UN Statistics (2020, online) notes that the world temperatures are expected to increase by up to 3.2°C by the end of the century. On this note, UN Statistics (2020, online) is of the view that to meet the Paris Agreement requirements of 1.5°C – or even 2°C – maximum target, greenhouse gas emissions must begin dropping by 7.6% a year beginning in 2020. Nonetheless, despite the dramatic decrease in human activity caused by the COVID-19 crisis, the estimated 6% in emissions for 2020 falls short of this goal, and emissions are predicted to even increase in 2021 and beyond as constraints are lifted (UN Statistics, 2020).

The SDGs were created to ensure that UN member states adhere to specific clauses on how to avoid rising temperatures and, most specifically, how to be resilient in the face of climate-related disasters (Cairns *et al.,* 2019; Raub & Martin-Rios, 2019). SDG 13.2 advocates for incorporating climate change interventions into national policy as one of the priorities. Because of this SDG, governments should take steps to ensure that efforts to mitigate climate change and deal with the effects are in place. SDG 13.3 also calls for changing the educational framework and increasing awareness about how to combat climate change and respond to environmental changes. This aim is closely related to stakeholders' education regarding response to climate change-related hazards like drought.

The key issues surrounding the relevance of the SDGs to the resiliency of female smallholding agricultural communities will be what tools are available to ensure that these farmers engage in climate change mitigation? Are there policies in place to ensure that female smallholder farmers can effectively respond to the effects of climate change and its resulting crises, such as drought? Is there equality and justice in the resources provided to male and female smallholder farmers in order for them to be resilient during drought? Each of these issues is a vital aspect of this research. The research looked at how SDGs help smallholder farmers to be more resilient during droughts. SDG13 resulted in the creation and application of the Sendai Framework for Disaster Reduction. In particular, the Sendai

Framework was inspired by the SDGs since it discusses how parties mitigate climate change while simultaneously adapting to global environmental changes.

3.2.3 The Sendai Framework for Disaster Risk Reduction

The most relevant framework currently is the Sendai Framework for Disaster Risk Reduction, which was instituted by the United Nations Disaster Assessment and Coordination (UNDAC) wing. This Sendai Framework, was developed in 2015 and is planned to last until 2030, it enables nations to cooperate and formulate plans to navigate possible risks. The outcome of the Sendai Framework is too substantially:

> *"…..reduce disaster risk and losses in lives, livelihoods, and health and the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries"* (UNDAC, 2021).

The goal of the Sendai Framework – According to UNDAC (2021), the primary aim of the Sendai Framework is to ensure that UN member states introduce integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political, and administrative measures that avoid and minimise disaster exposure and susceptibility.

Targets of the Sendai Framework – the main targets of the Sendai Framework, according to UNDAC (2021), are diagrammatically presented below:

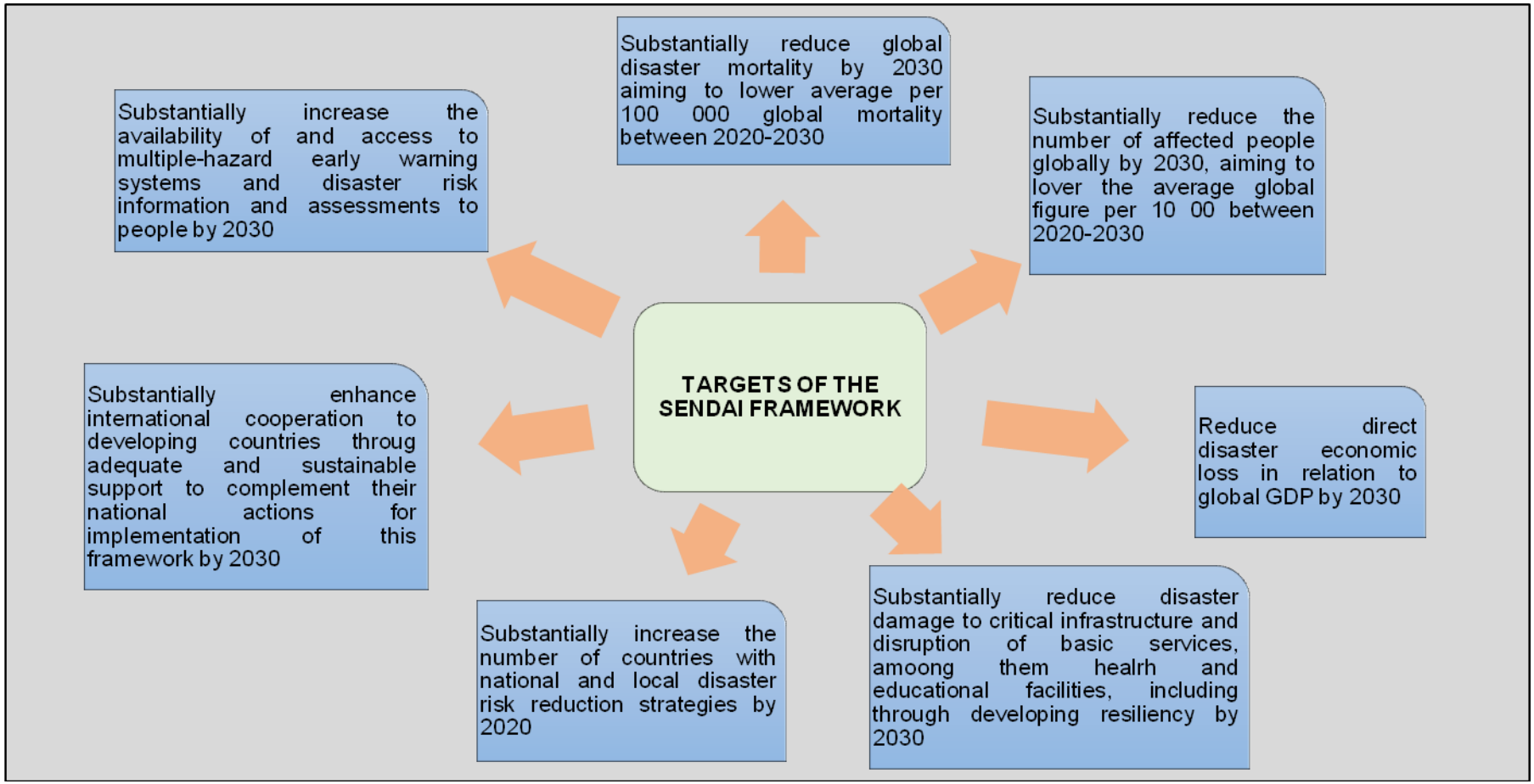

Figure 3.2: The Sendai Framework targets
Source: Information adapted from UNDAC (2021)

With the above-mentioned goals in mind, the Sendai Framework was developed and adopted to enable member states to focus on four main priority areas, which are described below:

Priority 1: Understanding disaster risk – In this regard, member states are informed that to handle a disaster and maneuver through it, they must consider the hazards and their dimensions of vulnerability, capability, exposure of persons and assets, threat characteristics, and the environment.

Priority 2: Strengthening disaster risk governance to manage disaster risk – This priority asserts that disaster risk governance at the national, regional, and global levels is vital to ensuring the coherence of national and local structures of legislation, regulations, and public policies. These guide, encourage and incentivize the public and private sectors to take action and resolve disaster risk by defining responsibilities and obligations.

Priority 3: Investing in disaster risk reduction for resilience – Investment in disaster risk management and reduction through institutional and non-structural interventions by the public and private sectors is vital for enhancing the economic, social, health, and cultural security of people, communities, countries, and their resources, and the environment. This will act as a stimulus for increased innovation, growth, and career creation. Such approaches are both cost-effective and advantageous in terms of saving lives, avoiding and reducing fatalities, and ensuring effective healing and regeneration.

Priority 4: Enhancing disaster preparedness for effective response – Disaster preparedness, based on previous experience, needs to be strengthened to provide a more robust solution and ensure sufficient capacity for effective recovery. Disasters have also shown that the recovery, reconstruction, and recovery phase, which must be planned in advance, provides an opportunity to restore faster by adopting disaster risk reduction measures. During the reaction and restoration processes, women and people with disabilities should be provided with priorities to easily navigate through the risks and disasters experienced.

Considering the outline of the Sendai Framework presented above, it is important to note that South Africa played a role to play in its formulation and implementation. The formation of the Sendai Framework has influenced the South African legislative frameworks for disaster management greatly. The Sendai Framework contributes to South African legislation in terms of emergency relief preparation activities, alignment of efforts, and the various ways in which

stakeholders mitigate risks once they are confronted with one. The Sendai framework will be applied in this study based on its key priorities.

In terms of priority 1, which prescribes that the stakeholders should understand disaster risk, efforts it was applied to determine the extent to which female smallholder farmers understand the intensity of risks they currently face due to drought. Secondly, concerning priority 2, which focuses on strengthening disaster risk governance to manage disaster, an inquiry was made to examine the extent to which some frameworks are there to ensure that disaster management in terms of drought is effective and efficient. This was followed by the third priority, which focuses on investing in disaster risk reduction for resilience. This enabled the researcher to understand if there are any investments available to protect female farmers for them to be resilient during drought. The study also looked into the different investments available to both male and female farmers. Priority 4 investigated the extent to which the female farmers have initiatives in place to enhance disaster preparedness for effective response.

3.3 Disaster management legislation in South Africa

In the South African context, disaster management is instituted through the Constitution of the Republic of South Africa, Act No. 108 of 1996. The constitution then guides other legislative measures such as the White Paper on Disaster Management Act, No. 57 of 2002 as amended by Disaster Amendment Act No. 16 of 2015, as well as the White Paper on Climate Change Response. These national legislations are discussed in the following sections.

3.3.1 The Constitution of the Republic of South Africa, Act No. 108 of 1996

According to the Constitution, all spheres of government are responsible for maintaining the welfare of South Africans and other legitimate bodies. This means that they should be safe from all types of hazards in their lives. The Constitution, Part A, Schedule 4, notes that disaster management is one of the critical areas that require special consideration. To ensure that stakeholders easily navigate around the impacts of disasters, all three spheres of government are required to invest their resources towards disaster management.

Stakeholders regulate these government spheres. The Intergovernmental Relations Framework Act, No. 13 of 2005 states that government should make a deliberate attempt to collaborate toward a shared purpose. This act was adopted to ensure that the three branches of government build agreements from which they can align their efforts to create mechanisms and protocols to help in the settlement of intergovernmental conflicts, as well as to address related

issues (Republic of South Africa, 2005). Thus, to effectively and efficiently manage disasters, the Intergovernmental Relations Framework Act, No. 13 of 2005 notes that each participating stakeholder should be well vested in their roles and responsibilities and how best they can provide for disaster management.

At the local level, municipalities are mandated to administer all the disaster needs as per the prescripts of Section 156(4), Part A, Schedule 4 of the Constitution. The Constitution, through Section 4 and 5, Part B, further mandates local municipalities to coordinate all the activities that are important in managing disasters experienced at this level. Thus, if smallholder farmers, in general, are affected by drought, local municipalities should devise strategies to deal with such. This study focused on how female agricultural initiatives are resilient to drought. Therefore, focus was placed on what role the municipalities play in assisting women.

3.3.2 White paper on disaster management

In addition to the relevancy of the constitution in ensuring female smallholder farmers resiliency during drought, the White Paper on Disaster Management provides for the protection of different stakeholders. The White Paper on Disaster Management incorporates the disaster management policy for South Africa and lays out the roles of different stakeholders in facing and mitigating disasters of varying magnitudes. Additionally, the White Paper states that disaster management is the responsibility of the government and is regulated by different legislative frameworks prescribed in the constitution.

For instance, in terms of Section 41(1) (b) of the constitution, all three spheres of the government, namely; the national, provincial and local government should "…..secure the well-being of the people in South Africa". Based on this, the three spheres of government should have mechanisms in place to ensure that they assist the people during time of need, hence; female smallholder farmers should benefit from government intervention during drought. With specific reference to disaster management, the White Paper states that Part A of Schedule 4 of the Constitution, which prescribe that disaster management is a key priority within the national and provincial branches guides the three spheres of government. Thus, national and provincial government is vested with the authority and responsibility to deal with and assist stakeholders during disasters, or precisely drought in the case of this study. The proposed disaster management policy outlined in the White Paper also gives reference to the rights of every juristic as outlined in the Bill of Rights namely; "…..the right to life, equality, human dignity, environment, property, health care, food, water and social security".

In terms of disaster management in South Africa, the policy on disaster management specifies how to reduce all the risks associated with disasters. In this regard, the White Paper on Disaster Management states that there should be intensive efforts to deal with risks associated with loss of life, damage to property particularly in marginalised communities. The issue of environmental related risks is the centre of this study since drought can be classified as an environmental-related outcome.

The White Paper on Disaster Management also shifts the widely perceived phenomena that the occurrence of disasters is rare. This is relevant in contemporary times where climate change and drought perpetually affect farmers in different regions of the world (Cannon, Twigg & Rowell, 2003). Thus, the White Paper on Disaster Management states that all the authorities and stakeholders responsible for the management of these disasters should have a framework to ensure that there is:

> *"…..a shared awareness and responsibility needs to be created to reduce risks…in homes….communities, places of work…..and society in general".*

Additionally, the strategy further advocates for the assistance of disaster-affected and disaster-prone parties in terms of recording, monitoring and disseminating information on the causes and impacts of disasters and how to navigate them. Different public institutional stakeholders within the three spheres of government implement this initiative. The White Paper on Disaster Management furthermore mobilises the integration of the risk reduction strategies into the present and future policies in all the spheres of government such that when disasters hit, people have action plans, which can be used to mitigate risk. The White Paper consists of seven key policy proposals outlined and conceptualised in the current study in the following sections.

- The urgent integration of risk reduction strategies into development initiatives;
- The development of a strategy to reduce the vulnerability of South Africans – especially poor and disadvantaged communities – to disasters;
- The establishment of a National Disaster Management Centre:
- The introduction of a new disaster management funding system:
- The introduction and implementation of a new Disaster Management Act:

- The establishment of a framework to enable communities to be informed, alert and self-reliant and capable of supporting and co-operating with government in disaster prevention and mitigation; and
- The establishment of a framework for coordinating and strengthening current fragmented training and community awareness initiatives.

In terms of the applicability of the principles above in this study, the White Paper on Disaster Management gave birth to the National Disaster Management Centre (Cannon *et al.,* 2013). This is the third policy of the White Paper as indicated above. This legislation is in charge of ensuring that disaster risk management policies are established and executed in a consistent and coordinated manner. The National Disaster Management Centre, on the other hand, places responsibility for the establishment and execution of disaster risk management policies on state organs and other administrative role players engaged in disaster risk management. The entire white paper and all the branches that fall under it are important in this study because they address disaster management issues and how the victims can be assisted in the process.

In terms of this study, emphasis is placed on the extent to which the White Paper on Disaster Management is relevant in assisting female smallholder farmers to be resilient during drought. During the analysis of the assistance available to smallholder farmers, efforts were done to examine whether there are any disparities between help given to male and female farmers. Additionally, since the White Paper advocates for the participation of various actors in the process of reducing risks associated with disasters, the study also inquired into the efforts used by the female smallholder farmers in assisting themselves before assistance is made available from the government. All these variables, among others, formed an important element in this study. Another important dimension of the White Paper is that it provides provision for the introduction and implementation of a new Disaster Management Act, which is discussed in the following section.

3.3.3 Disaster Management Act No. 57 of 2002 (as amended by Disaster Amendment Act No. 16 of 2015)

The Constitution makes provision for every juristic person or organisation in South Africa to be protected and his or her well-being ensured. Due to disasters that occurred decades earlier, South Africa developed the Disaster Management Act, which is governed by the United Nations, to regulate disaster management operations and mechanisms. The Disaster Amendment Act No. 16 of 2015 makes provision for:

> *"…..an integrated and coordinated disaster management policy that focuses on, preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery"* (Republic of South Africa, 2015).

Since the Constitution, through Section 156(4) localises disaster management to local municipalities, the Disaster Management Amendment Act No.16 of 2015 enables municipalities to create resources for the municipality's emergency management plan creation and coordination, as well as the introduction of a disaster management mechanism. This is one of the important elements in this study because it evaluated the extent to which there are mechanisms that enable female smallholder farmers to be resilient during drought. The study therefore, unpacked the initiatives available to male and female smallholder farmers during drought and how resiliency was affected. The purpose was to determine if women can be more resilient compared to their male counterparts, or if they are less resilient, or if they have similar resources available. The study also focused on the availability of relevant interventions needed by smallholder farmers during times of drought. Another important legislative framework in South Africa is the White Paper on Climate Change Response.

3.3.4 2011 White paper on climate change response

This white paper is also another important piece of legislation that was implemented to deal with disasters associated with climate change in 2021. This White Paper is relevant to this study because it addresses the issues of drought, which is one of the disasters that resulted from climate change. South Africa is a relatively large contributor to global climate change, owing to high levels of GHG emissions from its energy-intensive, fossil-fuel-powered economy. However, due to its socio-economic and environmental background, South Africa is vulnerable and exposed to climate change impacts (Sarkodie, Owusu & Leirvik, 2020). The climate variability, including the higher frequency and severity of severe weather events, affects the poor disproportionately. Therefore, the South African government has drafted a response to improve its society and economy's resilience to climate change impacts, as well as establish and enforce policies and measures that protect the most vulnerable.

The White Paper was approved in 2011 and it sets out the government's vision to institute a responsive intervention system to effectively mitigate the underlying forces of climate change and moderate its deleterious impacts on citizens (Department of Environmental Affairs (DEA), 2013; Garland, 2014). Building capacity and resilience in the country's agricultural sector, as

well as establishing disaster risk mitigation and management structures to address vulnerability to severe climate change threats, are among its top priorities. In terms of its purposes, the White Paper on Climate Change Response emphasizes effective communication to increase climate change literacy among South Africans.

It aims to influence actions in response to climate change and ensure that climate change awareness informs farmers' decision-making processes. Further, the White Paper emphasizes the importance of climate change knowledge and response plans for South Africa's most vulnerable farmers (Popoola, Yusuf & Monde, 2020). Among its other purposes, the White Paper on Climate Change Response also proposes a system for managing risks concerning climate change, advocates for resilience and adaptation, and lays the foundation for education and awareness through outreach campaigns and human capacity development. Ebi (2021) emphasizes the roles played by the White Paper on National Climate Change Response in encouraging investments in human and productive capital that will help to develop the green economy. To do so, the government assesses the different sectors' vulnerability to climate change and builds relevant responsive plans.

The White Paper on Climate Change Response is relevant to South African female farmers in a variety of ways; hence, it can assist smallholder farmers to be resilient during times of drought and climate change. The White Paper is important to the South African agricultural system because it forms one of the most important facets for economic development. According to Elum, Modise & Marr (2017), with an annual average rainfall of less than 500 mm, South Africa is considered a dry country, with around 1.3 million hectares of farmland irrigated, making it the largest 'irrigation country' in the Southern African region. This White Paper is also important in the scope of this study as it involves prescripts that emphasize the role of women in agriculture (Ngema, Sibanda & Musemwa, 2018). The impact of the White Paper, if implemented well, is likely to be visible as women make up nearly two-thirds of those involved in rural agriculture, especially household food production (Ngema *et al.,* 2018).

Within smallholding agricultural initiatives, the White Paper on Climate Change Response has implemented adaptive steps such as improved transportation infrastructure, improved irrigation quality, and water management (DEA, 2013). Irrigation is inextricably related to the problem of agricultural climate change adaptation. This is in addition to drought-resistant varieties being available, increased drought preparation and support for farmers, and changes to design standards such as legal guidelines for water-sensitive urban design and flood operating rules for

flood-prone areas. Smallholder farmers, especially women, are undoubtedly less adapted to climate change because they often lack the resources to improve their adaptive ability. Therefore, this legislative framework will be taken into consideration to determine the extent to which it is relevant in assisting women to navigate around the problems of drought. Emphasis was made to evaluate the extent to which the climate change mechanisms implemented through the White Paper are effective. In addition, since the White Paper on Climate Change Response prescribes that there should be initiatives to ensure that farmers have access to credit and insurance to protect against climatic risks, among others, efforts were made to ascertain the extent to which female smallholder farmers have such resources.

3.4 Conclusion

In conclusion, this chapter addressed international and national disaster management systems. From an international perspective, the disaster management regulatory mechanisms were examined, and it was found that the procedures are enshrined in the Paris Agreement, the SDGs, and the Sendai Framework. All three agreements complement each other since they hold common viewpoints. The SDGs gave birth to the Sendai Framework, which encompasses other countries' disaster response regulatory structures, including South Africa. South Africa is required by the Constitution to respond to and be resilient to disasters of various magnitudes, including drought, under specific statutory provisions. These legislative structures include the White Paper on Disaster Management and the Disaster Management Act No. 57 of 2002, as amended by the Disaster Management Act No. 16 of 2005. The following chapter reviews scholarly literature on smallholder farmers' resilience to drought.

CHAPTER FOUR: LITERATURE REVIEW ON RESILIENCY OF WOMEN TO DROUGHT

4.1 Introduction

The previous chapter reviewed legislative literature that underpins this research. This chapter explores scholarly literature on women as smallholder farmers', their vulnerability and resistance to drought. The chapter also makes a comparison of drought resistance and its impact on female and male smallholder farmers. Coping and adaptation to drought, as well as communication strategies that smallholder farmers, in particular, the women employ, are discussed in this chapter. This chapter discusses the literature from a global to a local perspective.

4.2 An overview of smallholder farmers

Smallholder farmers are defined in many ways. According to Robert (2005), smallholder farmers are agricultural cultivators who practice vigorous, permanent, diversified farming on comparatively small farms in densely populated areas. Robert (2005) furthermore states that depending on the background in question, the farming region, and even ecological zone, smallholder farmers can be described in different ways and they can be a mixed group of individuals and households who face a range of limitations in their ability to participate in potentially lucrative agricultural activities. Zeidler, Kandjinga, & David (2010) state that; the concept 'small-holder farmer' is often used interchangeably with other terminologies such as small-scale farmers, resource-poor farmers, and peasant farmers.

In general, the word smallholder refers to these farmers' lack of capital in contrast to other farmers in the industry. Smallholder farmers hold small plots of land on which they cultivate a variety of crops and one or two cash crops (Robert, 2005). The farms usually include small plots of land that are owned communally and they are dependent almost entirely on family labourers (Zeidler *et al.,* 2010). Smallholder farmlands can also be physically isolated and located in high-risk areas (Morton, 2007). In addition, these farmers are heavily dependent on natural resources and they are continually affected by land-use policies, human activities, and development patterns such as population growth and other demographic variables (Zeidler *et al.,* 2010; Barnes, Macgregor & Alberts, 2012). Under these circumstances and the prevalence of limited resources, Morton (2007) claims that smallholder farmers generate their own income from agricultural production.

The definition of smallholder farmers may vary by country and agro-ecological region, but Dixon, Tanyeri-Abur, & Wattenbach (2004) argue that these farmers cultivate less than one hectare of land – but in semi-arid regions, they can cultivate ten hectares or more – or maintain ten (10) heads of livestock. In South Africa, the DAFF (2012) sought to characterise smallholder farming by concentrating on the characteristics of producers. They contend that women lead the majority of work in smallholder farming which family members perform.

Cousins (2010) also attempted to describe smallholder farming since the different forms of these '*small-scale'* farmers are not distinct. It was concluded that smallholder farmers contribute only a small portion of their social reproduction and only in limited cases do they generate a substantial surplus, enabling income to be reinvested and creating initiatives within which capital can be raised. Cousins (2010) therefore concluded that smallholder farmers are:

> "…..*small-scale farmers who use farm produce for home consumption to some degree and use family labour within the farming operation to some degree, but for whom farming contributes a highly variable amount of cash income via marketing of farm produce. Levels of mechanisation, capital intensity, and access to finance are also variable amongst such farmers*."

The definitions examined in this section demonstrate that there is no all-encompassing term for smallholder farmers in South Africa. The definitions of smallholder farmers are dependent on different variables, which include; the small size of land, the use of naturally available income, operating with a small budget, and low levels of revenue generated from the sale of outputs. Smallholder farmers' production is also low.

4.3 An overview of drought, its types, and sequence of occurrence

Meteorologists widely describe drought as protracted dry conditions caused by a lack of rainfall, resulting in extreme water shortages for any operation, populace, or ecosystem (Van Loon, Stahl, Baldassarre, Clark, Rangecroft, Wanders, Gleeson, Van Dijk, Tallaksen, Hannaford & Uijlenhoet, 2016). Coles and Eslamian (2017) define drought as a situation in which water supplies in a country or geographic area decline to the point where the population lacks adequate or proper access to water. This is supported by Yang, Li, Zheng, and Ma (2017), who define drought as a lack of rainfall from scheduled or natural precipitation that is unlikely to fulfill the needs of human activities throughout a season or longer, resulting in financial, societal, and ecological effects.

Hagenlocher, Meza, Anderson, Min, Renaud, Walz, Siebert & Sebesvari (2019) define drought as the effect of a natural decrease in the amount of rainfall received over a long period, typically a season or longer. Hagenlocher *et al.* (2019) further state that drought is also associated with other climatic factors, such as high temperatures, high winds, and low relative humidity, and can greatly exacerbate the intensification of occurrence. Eslamian, Ostad-Ali-Askari, Singh, Dalezios, Ghane, Yihdego & Matouq (2017) add that drought is a long-term and regionally common phenomenon in which natural water supplies are below normal. This could be a result of low rainfall and increased evaporation rates. Additionally, temperatures below the freezing point, particularly in cold climatic regions, can also cause winter drought (Ojo & Baiyegunhi, 2020). As a result, drought is expected not only in dry and hot areas but also in colder climates. Generally, drought is characterised as a manageable risk because it allows the identification of susceptibility and the reinforcement of resistance to it (Van Loon *et al.,* 2016).

4.3.1 Definitions of drought

There are four categories or types of drought that all result from inadequate precipitation. These types are, meteorological, hydrological, socio-economic, and agricultural drought, and they are explained below.

Meteorological drought – The meteorological type of drought is defined by the degree of dryness and the duration of dry time caused by a precipitation deficit than the expected annual rainfall (Guo, Huang, Huang, Leng, Fang, Wang & Wang, 2020). In this study, information was gathered to determine the extent to which meteorological drought affects female smallholder farmers and how resilient they are to this form of drought compared to their male counterparts.

Hydrological drought – According to the National Drought Mitigation Centre (2021), this kind of drought results from successive periods of shortfalls in rainfall to the extent that the supply of water on the surfaces or sub-surfaces is compromised. The effects of this type of drought are evidenced in the decline of the levels of surface water sources such as streams, lakes, reservoirs, groundwater, river basins, or watersheds (Huang, Li, Huang, Leng, Hou & Ma, 2017). While the intention is not to determine the types of drought that affect female smallholder-farming communities, knowing the types of drought will help to determine the levels of resilience of farmers.

Agricultural drought – According to the National Drought Mitigation Centre (2021), agricultural drought is directly associated with meteorological and hydrological drought in the sense that the impacts of these two have implications on agricultural production. To give a clear definition of

agricultural drought, Dai, Huang, Huang, Leng, Guo, Wang & Zheng (2020) and Sánchez, González-Zamora, Martínez-Fernández, Piles & Pablos (2018) provide clarification of plant growth on one side and controlling variables such as its biological properties, stage of growth, weather and climate and its water needs on the other side. This type of drought is more relevant in this study because it affects the agricultural sector where the primary participants in this study are based.

Socio-economic drought – Socio-economic drought is associated with the demand and supply of economic goods and services in relation to the aforementioned different types of drought, namely; agricultural, meteorological and hydrological drought. According to the National Drought Mitigation Centre (2021), the difference between socio-economic drought and the other types of drought identified above is that for the former to occur it depends on "…..*time and space processes of supply and demand to identify or classify droughts*". For example, some Southern African countries, like Zambia and Zimbabwe, have recently experienced socio-economic droughts that have been specifically linked to insufficient hydroelectric power generation because of reduced stream flow in major rivers (Libanda, Bwalya, Nkolola & Chilekana, 2020; Nyahwo, Hlalele & Ncube, 2020). Given the different types of drought, the figure below presents the sequence of the occurrence of drought.

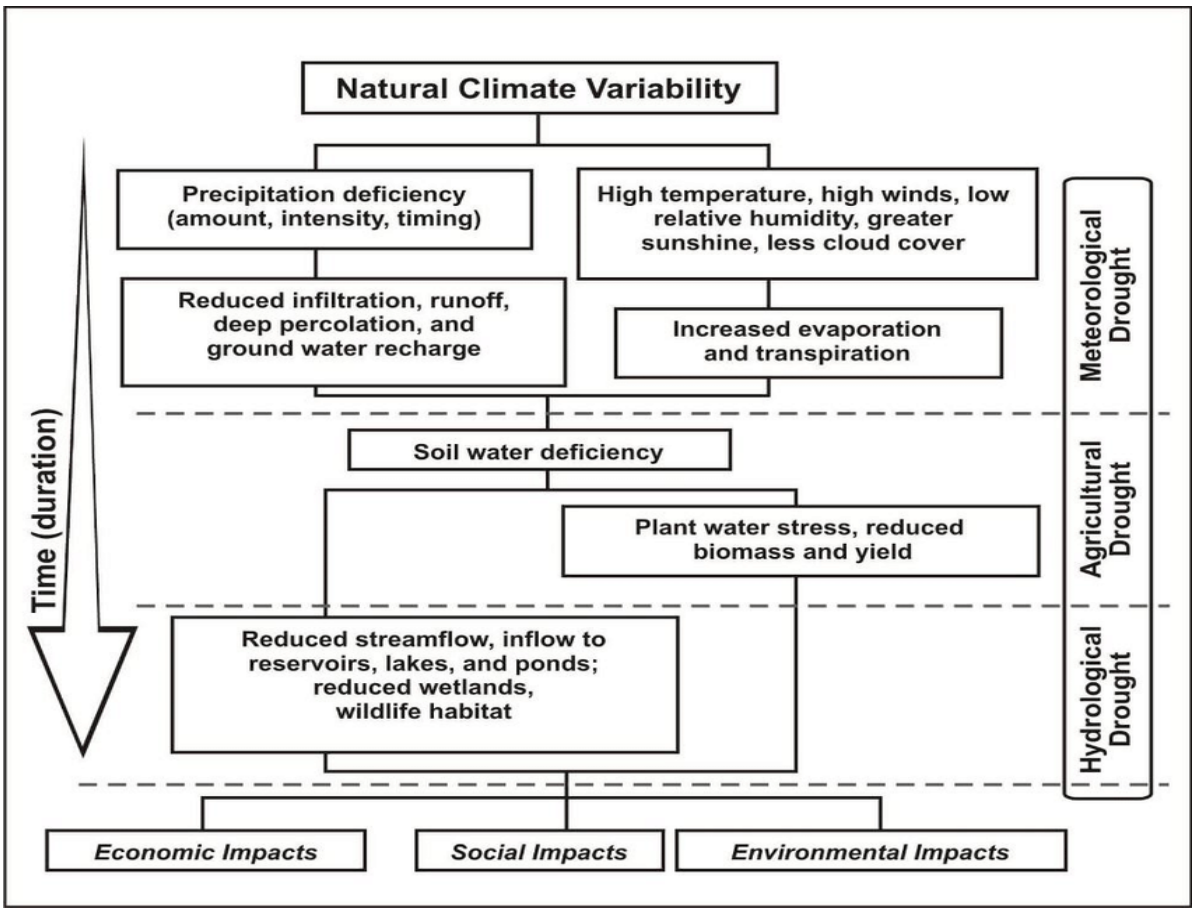

Figure 4:1 Sequence of the occurrence of drought
Source: National Drought Mitigation Centre (2021)

As Figure 4.1 shows, all the different types of drought occur because of inadequate precipitation or, put simply, meteorological drought. The other types of drought cascade from meteorological drought and affect farmers and other sectors of the economy. Furthermore, various descriptions can be drawn from the above definitions of drought. Drought can occur in low-precipitation areas, semi-arid areas, or even moderate-precipitation areas. Moreover, the above definitions imply that drought is a slow on set condition that is difficult to predict when it will begin or end. This means that, unlike other hazards like earthquakes and floods, drought is a slow-moving occurrence. Following its occurrence, drought affects farmers and in particular female smallholder farmers.

Given the concepts of meteorological, hydrological, agricultural, and socio-economic droughts, smallholder farmers are likely to be the most affected by all of them. The main drought that affects them is meteorological drought, which is caused by dryness due to a precipitation shortfall less than the predicted annual rainfall. They are then impaired by hydrological drought, which is caused by successive cycles of low rainfall to the point that the flow of water on the

surfaces or sub-surfaces is jeopardised. These two factors result in agricultural drought, which affects farmers. Finally, all farmers are affected by socio-economic drought, which is caused by unstable supply and distribution of agricultural outputs because of drought.

4.4 Global perspective on the impact of drought and the resilience of small-holder farmers

According to literature reports, the smallholder farming sector seems simple, but it is complicated and complex (Phuong, Biesbroek, Sen & Wals, 2018). This industry is complicated in the sense that it is sensitive to a variety of hazards, such as climate variability, unpredictable environmental patterns, and other natural hazards beyond human control (Phuong *et al.,* 2018). As a result, farmer's resilience in response to the consequences of drought is becoming increasingly important.

Smallholder farmers' resilience is related to psychosocial dynamics, which involves local farmers' capabilities, transformability, adaptability, and ecological processes that enable them to learn about current problems, coping with the situation, and adapting in response to the stresses and shocks faced (Kumar, Mishra, Pramanik, Mamidanna & Whitbread, 2020). Kumar *et al.* (2020) also found that the affected communities should strike a balance between progressive and sudden transition to achieve resilience. Thus, when farmers are affected by drought, they either should immediately or progressively deal with it depending on the circumstances faced. Therefore, the whole idea about resiliency to drought is that regardless of whether the drought is anticipated or not, unpredictable, gradual or sudden, farmers should have the potential to deal with transition in tumultuous times (Folke, 2017; Colburn & Seara, 2011).

Scholars such as Colfer, Achdiawan, Roshetko, Mulyoutami, Yuliani, Mulyana & Adnan (2015); and Galié, Teufel, Korir, Baltenweck, Girard Webb, Dominguez-Salas & Yount (2018) stress that; the resilience of female smallholder farming initiatives to drought is affected by their position in decision-making and their cultural status. Culturally, Galié *et al.* (2018) found that many women are often trapped by societal biases such as the belief that women are restricted to household chores, that they cannot own property, and that they must marry to provide for their families.

Agarwal (2000) explains the position of women in the communities by stating that women are at the core of resilience and resistance to extreme effects of drought. According to Agarwal (2000) historically, women are associated with domestic duties such as fetching firewood, gathering

water, and raising children. These conclusions are confirmed by scholars such as Baskin (2020), who equate women's positions with becoming custodians of the family and children, as well as taking charge of household duties such as child carrying and caring, and generally being the head when the husbands or men are not present. As a result, as part of the above obligations, women predominately participate in subsistence agriculture to satisfy the needs of the household (Agarwal 2000; Baskin, 2020). In this light, the resiliency of women to drought, particularly those that practice small-scale farming, is aligned to the traditional and subsistence practices due to the environment they stay and operate.

Colfer *et al.* (2015) conducted a study and concluded that while women regularly make decisions about domestic chores, parenting, and diet, males are routinely in charge of financial and agricultural production decisions. This can also be because since men own the majority of the important assets in the farming communities, they retain the authority to make decisions on production (Johnson, Kovarik, Meinzen-Dick, Njuki & Quisumbing, 2016). Thus, a distinction between how men and women are resilient to drought can be explained based on the differences in their roles, land ownership, and other cultural systems, which place men in dominating positions. This makes women more vulnerable to drought and, less likely to be drought tolerant than men.

In another study, Greenhill, King, Lane, and MacDougall (2009) discovered intriguing complexities regarding the effect of profitability on rural Australian farmers' resilience to drought. Greenhill *et al.* (2009) discovered that smallholder farmers who indulge in farming for profit are more resilient than those who produce for subsistence consumption. This distinction was because farming operations undertaken for profit inject financial, physical, and human resources to reap the profits thereof (Greenhill *et al.,* 2009). In this regard, Greenhill *et al.* (2009) learned that farmers who conducted adequate studies, read extensively on drought and related issues, and sought advice from experts were more resilient to drought. In contrast, subsistence smallholder farmers depend primarily on free natural resources for production. Hence, their resilience to drought is severely affected. Based on these findings, it is clear that the resiliency of female smallholder farmers will be greatly affected because they are dominantly located in environments where they rely on subsistence resources for survival. These farmers become more vulnerable compared to their male counterparts (Greenhill *et al.,* 2009).

4.5 Regional perspective on the impact of drought and the resilience of smallholder farmers

In a study conducted in Malawi by Fan, Brzeska, Keyzer, and Halsema (2013), it was discovered that smallholder farmers suffer greater losses than medium- to large-scale farmers do. Fan *et al.* (2013) studied the complexities of tobacco cultivation in farming communities and uncovered substantial variations in planning, seed choice, and agricultural process execution. It was discovered that medium and large-scale farmers predominantly use drought-resistant tobacco crops, while smallholder farmers primarily cultivate drought-sensitive crops. Fan *et al.* (2013) concluded that the key reason smallholder farmers still fall behind is a lack of critical knowledge that enables them to keep up with drought, weather, and climatic changes. The rural poor in developing countries, who are the most vulnerable due to a lack of adaptive capabilities, feel the effects of drought more intensely.

Farmers' adaptation capacity in developing countries is severely constrained by their reliance on natural forces, as well as a scarcity of complementary resources and institutional support systems. According to Fan *et al.* (2013), female smallholder farmers are more vulnerable and may suffer greater losses than their male counterparts do, due to traditional African systems that prioritize men in property rights. These losses, along with most women's low educational backgrounds in rural African countries, make most female smallholder farmers vulnerable to drought because they lack adequate information about the types of crops to adopt during drought.

The literature reveals other factors influencing smallholder farmer's resilience to drought. Although the focus of this study is on women, it should be noted that other factors influence farmer resilience besides gender. Banda (2015), for example, conducted a study in Malawi and concluded that various demographic characteristics of smallholder farming households affect how resilient they are in drought periods. These influences include the number of people in a household, access to and ownership over land, and the availability of family and community resources. Banda (2015) discovered that the age of smallholder farmers in a farming society has a major impact on their resilience, with older and more seasoned farmers being found to be more resilient than younger and less experienced ones.

Opiyo, Wasonga, and Nyangito (2014) conducted a study in Kenya, which concluded that demographic factors such as gender, farming experience, level of education, access to farming resources, weather information, marital status, farm size, livestock herd size, and employment status all had a major impact on the resilience of small-holder farmers. Opiyo *et al.* (2014)

revealed that there are differences in the level of vulnerability to drought for male and female smallholder farmers. Male smallholder farming groups were found to be more robust because they have access to and control of land, and they are in charge of managing and distributing farming resources (Opiyo *et al.,* 2014). In general, they prosper more than their female peers do. In the end, women are left with little or no opportunities, and in most situations, they are only placed in roles where they can make choices that have a minor effect on society as opposed to decisions taken by men. This can be explained by a study conducted in Burkina Faso, which concluded that women are given power and decision-making authority over lower-income-generating services, while men are given control over higher-income-generating activities (van den Bold, Dillon, Olney, Ouedraogo, Pedehombga & Quisumbing, 2015).

Female farmers are more vulnerable to drought than their male counterparts are because they normally carry most of the responsibility (caring for many people in their households) before they even consider ways to be drought tolerant. Furthermore, since females have less access to agricultural opportunities than males, they are more vulnerable to drought. However, in terms of maturity, as measured by age, women are more likely to have higher resiliency due to their frequent experiences with drought, and hence their capacity to formulate alternative plans of action.

In addition to the above, women's networks can increase their resilience to drought. In light of women's household and community responsibilities, Agarwal (2000) discovered that they build a pivot in which they can be resilient to drought when it occurs. For example, they are more likely to invest in group insurance, which helps them to share the risks of drought with their society, families, and friends. Cleaver (1998) inferred that during tough times, such as drought and other natural disasters, women assist one another in the farms in exchange for money, labour, or produce. Furthermore, during natural disasters such as drought, women look after one another, share their harvest, and even donate money to support the needy.

The results discussed above demonstrate that women's resilience to drought is based on internal village communities rather than several external factors. Women have variable and maneuverable networks of mutual insurance and risk-sharing groups at their disposal if they depend on internal village communities. These comprise both informal mutual organisations and formal alliances based on secular and religious principles (Berkes and Siaxas, 2005). Women's village-level groups, both formal and informal, succeed at solidarity and local initiative. Women depend on certain social relationships to cope with, maintain, or respond to tension in their everyday lives, including the effects of drought on their agricultural activities.

In addition to the information presented above, Perez, Jones, Kristjanson, Cramer, Thornton, Förch, & Barahona (2015) conducted a study in East and West Africa to investigate farming households' resistance to climate change (including drought). The research was carried out in agricultural communities around Ethiopia, Kenya, Uganda, Tanzania, Ghana, Burkina Faso, Senegal, Mali, and Niger. Perez *et al.* (2015) discovered a strong negative association between gender and resistance to changing climate and drought. This was mostly attributed to gender-based differences in natural resource access between men and women. Perez *et al.* (2015) concluded that all of the countries demonstrated a strong gender-based division in resource access and division of labour in farming operations.

Women in farming communities were mostly involved in household tasks such as harvesting forest goods and firewood and, to a lesser extent, subsistence agriculture. Men on the other hand, were predominately engaged in agricultural work in all participating countries (Perez *et al.,* 2015). This meant that men had access to the bulk of the resources, placing them in a greater position to be resilient in the face of drought than their female counterparts. Perez *et al.'s* (2015) study also revealed interesting dynamics on the issue of land ownership, access to and management of farming inputs between men and women. The study found that both men and women might participate in agricultural production,

> "…..*but only men own and inherit land*"…as a result…..*women cultivate land given to them by their husbands (inherited, not purchased private land) or by the community (communal land)*" (ibid: 100).

These ownership and land tenure structures make women vulnerable to the extent that their resilience to drought is seriously affected because they lack control over land ownership and management of agricultural inputs. This was evident in Burkina Faso, where men controlled almost all of the land and technical resources needed for agricultural production and mitigating the effects of droughts (Perez *et al.,* 2015). In general, Perez *et al.* (2015) discovered that women were less resilient to climate change and drought than men were because they lacked the productive capacity and prospects needed.

In another study, Makate, Makate, Mango & Siziba (2019) conducted a study in Malawi and Zimbabwe where 1172 smallholder farmers were asked to share their experiences and resilience to drought in their farming communities. The study concluded that the gender of the smallholder farmers had a significantly negative impact on their resilience to drought. Out of the

1172 farmers that formed part of this study, 70% were resilient while the remaining 30% were not. The study found that of those smallholder farmers who were resilient, 80% were men while the remaining 20% who were women were not resilient (Makate *et al.,* 2019). This study concluded that men had better access to resources that enabled them to be more resilient to drought compared to their female counterparts.

The findings presented above are consistent with studies conducted in Malawi by Banda, Phiri, Mapemba & Maonga (2016) which found similar results that men were more resilient. However, Banda *et al.* (2016) concluded that while there appears to be a negative correlation between male and female smallholder farmers in terms of their resilience to drought, the levels were slightly insignificant. Banda *et al.* (2016) concluded that smallholder farming initiatives headed by women were more likely to be vulnerable and less resilient than those headed by men. However, Andersen and Cardona (2013) concluded that there is no significant relationship between the gender of smallholder farmers and resiliency to drought. An analysis of Andersen and Cardona's (2013) study indicated that the equality observed was because both male and female small-scale farmers were provided with similar resources that enabled them to be resilient to drought.

4.6 South African perspective on the impact of drought and the resilience of smallholder farmers

Drought has devastating impacts on agricultural activities. In certain cases, smallholder farmers in South Africa must contend with additional restrictions in addition to the effects of drought. Some of the constraints they must address before focusing on drought mitigation include a lack of financial resources for production, a rise in the price of agricultural inputs, a lack of capital assets and other institutional and physical resources, increased demand for land, and limited access to information (Swemmer, Bond, Donaldson, Hempson, Malherbe & Smit, 2018). Swemmer *et al.* (2018) note that some of the effects associated with the current drought in South Africa include loss of capital and financial resources, loss of agricultural produce, and the presence of psycho-social issues among small-holder farmers.

According to studies undertaken by the South Africa's Department of Water and Sanitation (2016), the 2015/2016 drought, has comparable consequences to the 1982 and 1933 droughts. Bahta, Jordaan & Muyambo (2016) link these events to severe El Nino conditions, which have all had disastrous consequences for smallholder farmers. According to Maltou and Bahta (2019), the 2015/16 drought-impacted nearly 180 of South Africa's roughly 1600 water supply systems, causing agricultural activity to worsen. These 180 water supply systems collectively

had a supply threshold of up to 2.7 million South African homes; hence, one can explain the extreme effects of this drought on small-scale farming (ibid.).

In other studies, Bahta *et al.* (2016) found that drought caused smallholder farmers to suffer losses exceeding approximately R10 million in 2015. Agricultural production dropped by nearly 9% during the same time as compared to other farming seasons, owing primarily to the effect of January 2015, which was drier than anticipated (Bahta *et al.,* 2016). Agri SA (2016) furthermore revealed that livestock production was among the most severely affected sectors of the agricultural economy, with a national herd loss of 15% occurring. Overall, this had several other effects on smallholder farmers that were closely linked to their cash flows, psychosocial problems, and resilience status quo (Maltou and Bahta, 2019).

Despite the social and economic benefits of small-scale farming, South Africa's agriculture sector, like the rest of the world, is heavily affected by drought (Baudoin, Vogel, Nortje & Naik, 2017). Prolonged droughts are a common and recurring phenomenon that affects smallholder and developing farmers and are among the most serious economic, social, and environmental disasters in Southern Africa (Baudoin *et al.,* 2017). Drought has a serious impact on smallholder farmers because they lack enough means to cope with its consequences. For example, drought has harmed smallholder farmers in South Africa to the point that their ability to produce sufficient outputs has been compromised (Baudoin *et al.,* 2017). Women, especially those who live in rural areas, suffer even more because of traditional and cultural rules that recognize men as the primary beneficiaries of land. As a result, in times of drought, women-led smallholding farming efforts are less robust than men-led initiatives.

Additionally, a study conducted in Limpopo by Mpandeli, Simalenga, Siambi, Ramugondo, Mailula & Liphadzi (2008) concluded that the prevailing drought has had a severe impact on vegetable and fruit production, affecting the livelihoods of rural communities. In a separate study, Ziervogel, New, Archer van Garderen, Midgley, Taylor, Hamann & Warburton (2014) discovered that drought effects are severe on important crops such as maize and rice. This is because maize and rice are food staples in Southern Africa. In this situation, women are more vulnerable due to their presumed motherly duties to 'place food on the table,' particularly if they rely on subsistence farming. In the end, when faced with drought, women bear the double responsibility of caring for their families while still attempting to find solutions to make their agricultural practices more robust. Jordaan (2012) conducted a study in Northern Cape on drought risk reduction, which found that smallholder farmers are vulnerable to drought because they lack enough resources to deal with its consequences. This is mostly applicable to women

who are left with only communal services, which are mostly rooted in community groups, family and friend care, and, to a lesser extent, government aid.

Maltou and Bahta (2019) to assess the resilience of 207 smallholder farmers to drought conducted a study in Northern Cape. This study used regression analysis, a quantitative research methodology, to test the implication of different factors that affect smallholder farmers to be resilient to drought. In this study, a resilience index of -6.31 was obtained after tests were run. This index means that the average number of farmers who participated in this study were not resistant to drought. The study also found that out of the 207 participating farmers, both male and female, only 18 farmers who represented 9% of the participants were resilient while the remaining 189 farmers (or 91% of the respondents) were not resilient (Maltou & Bahta, 2019). This study recommended that to reduce the resilience of smallholder farmers to drought, farmers needed support interventions such as government assistance during dry times, financing, fodder, and other agricultural inputs (Maltou & Bahta, 2019). The study additionally recommended that the farming community should assist one another, for example; allowing access to water or allowing livestock from other farmers to graze together, and sharing of resources if they are available. However, given the essence of resource allocation, as discussed so far, female-led small-scale farming operations are more likely to remain insecure, as there is a predominance of disparity in the distributive structures (Roberts, 2005; Agarwal, 2000).

4.7 Conclusion

This chapter reviewed scholarly literature on farmers and their vulnerability to drought. The literature also made special reference to women and how their resilience is affected by drought. Drought coping and adaptation strategies, as well as communication strategies that smallholder farmers, in particular, that women explore, were discussed in this chapter. The chapter also looked at the impacts of drought and resilience of women from a global to a local perspective. The following chapter outlines the research design and methodology used in this study.

CHAPTER FIVE: RESEARCH DESIGN AND METHODOLOGY

5.1 Introduction

The previous chapter reviewed scholarly literature on farmers and their vulnerability to drought. The literature made special reference to how women are affected by drought as well as their resilience. This chapter outlines the research design and methodology that was adopted. The chapter reviewed the research design, philosophical worldview, research approach, methodology, data collection tools and process, pilot study, data analysis, reliability and validity, limitations and delimitations, and ethical considerations.

5.2 Research design

A research design shows an accurate profile of persons, events, or accounts of characteristics, for instance, behaviour, opinions, abilities, beliefs, and knowledge of a particular individual, situation, or group (Cooper & Schindler, 2011). It guides the researcher in the process of collecting, analysing, and interpreting observations, allowing them to draw inferences concerning causal relations among the variables under study. Snyder (2019) describes the research design as a study plan, including the overall data collection structure. Ørngreen and Levinsen (2017) describes the research design as a plan for selecting topics, research sites and procedures for collecting data to answer research questions. Mohajan (2018) argued that the research design is a strategic action process that acts as a bridge between research questions and research strategy implementation.

For the purpose of this research, a qualitative single case study was used. Burns and Grove (2013) argue that case studies are used to give detailed explanations of an event to come out with a justification of a phenomenon. Yin (2014) explained that the rationale for a single case study is that it allows the researcher to do intensive research on a specific case, such as an individual, group, institute or community. Therefore, the results obtained from the study were applicable to Frances Baard District Municipality. A case study enabled the researcher to carry out a detailed analysis of the research topic, in this case, the impact of drought, and resilience strategies mechanisms employed by female smallholder farmers.

5.3 Philosophical worldview

Research philosophy relates to the development of knowledge and the nature of that knowledge concerning the research (Khalid, Hilman & Kumar, 2012; Kumar, 2011). The philosophy is based on assumptions that underpin the research strategy and methods used. An awareness of

the philosophical assumptions that the study makes, helps the research to move in a clear and informed manner (Kothari, 2013). Philosophies provide the foundation for quality research, guide researchers in how they approach the study and position themselves in terms of the appropriate methodologies given competing alternatives.

There are two main groups of research philosophies, the positivist and the interpretive. This study adopted an interpretivist research philosophy, as the study was qualitative in nature. According to Saunders, Lewis & Thornhill (2016) the interpretivist paradigm was derived from social sciences and it believes that reality is contextual or relative, therefore, cannot be statistically generalised. The inquirer or the researcher gains or draws meaning and creates knowledge by interpreting the experiences and feelings of respondents. Therefore, in this study, interpretivist philosophy was applied to understand how female smallholder farmers are affected by drought, and to what extent are they resilient compared to their male counterparts. This was done by interpreting their lived realities as farmers and based on their experiences in navigating around drought and related challenges. Thus, there is a high risk of subjectivity, which is associated with a qualitative approach (Saunders, Lewis & Thornhill, 2016).

5.4 Research approach

The study adopted a qualitative research approach. The study used an inductive approach as it sought to determine the impact of drought and resilience strategies mechanisms employed by female smallholder farmers. The qualitative research approach is linked to the interpretivist research philosophy (Thomas, 2013); which was also adopted in this study.

5.5 Methodology

Research methodology focuses on solving research problems in a scientific and systematic way (Trochim, 2010). It refers to the whole research process, from the conceptualisation of an issue to report writing, research questions, data collection, analysis, and interpretation. It highlights the logical steps taken by the researcher in a study. Walliman (2011) states that a research methodology describes the procedures for conducting the analysis, including when, from whom, and under what conditions data will be obtained to determine the plan for producing empirical evidence that will be used to address the research questions. The following section discusses the methodological steps that were followed in this study.

5.5.1 Population and sampling

The research population is the group of participants from which the investigator expects to draw data that can be analysed to address the research questions (Babbie & Mouton, 2013; Wild & Diggines, 2013). According to the Northern Cape Department of Agriculture, Forestry and Fisheries (2019), there are approximately 868 small-holder farmers in Frances Baard District Municipality. These farmers comprise 347 from Dikgatlong, 263 from Sol Plaatje, 119 from Magareng, and 139 from Phokwane.

From this population, a sample was selected. Ngozwana (2018) indicates that qualitative analysis uses a sampling method that yields samples that are often small and non-random and the results cannot be generalised. In this study, purposive sampling was used to select smallholder farmers. According to Etikan, Musa, and Alkassim (2016), purposive sampling also known as judgmental, selective, or subjective sampling, is a type of non-probability sampling in which researchers choose individuals to participate in a study based on their own judgment. To determine the level of resilience of female smallholder farmers compared to their male counterparts, separate focus groups for male and female smallholder farmers had to be selected. Two focus groups were selected purposively in each of the four farming regions, Dikgatlong, Sol Plaatje, Magareng, and Phokwane. From each of these regions, a maximum of 10 male smallholder farmers and 10 female smallholder farmers had to be selected. In total, four (4) focus group discussions for female smallholder farmers and four (4) focus group discussions for male smallholder farmers participated in this study, in total 80 participants. Table 5.1 illustrates the sample distribution based on the four areas identified above.

Table 5:1 Sample distribution of smallholder farmers

	Dikgatlong	Sol Plaatje	Magareng	Phokwane	Total
Females	10	10	10	10	40
Males	10	10	10	10	40
	20	20	20	20	80

Source: Authors own

The number of participants was an acceptable sample size for a qualitative analysis as it offered sufficient information to address the research question (see Saunders, Lewis & Thornhill, 2016). The researcher relied on their judgment and practical knowledge of the research field in the selection of the respondents whose knowledge and experience is likely to provide good information for analysis (Saunders et al., 2016). The study gave priority to participants who had adequate information about the resilience of female smallholder farmers and the activities in the

communities of different municipalities. The use of purposive sampling is in line with Ngozwana (2018) who argued that qualitative research uses sampling strategies that create samples that are mainly small and non-random in line with their focus on the in-depth description of the experiences and context of participants.

5.5.2 Data collections

Primary data was collected using a Focus Group Discussion Interview Guide. The use of Focus Group Discussion Interview Guide followed Kumar (2018) and Polit and Hunger's (2013) assertions that specify that this data collection include note taking, tape recording, and participant observation. From the sample of 40 female smallholder farmers drawn from four (4) farming communities, four (4) focus groups were created – that is, each focus group had 10 farmers. The same number of focus groups was created for male farmers, in total eight (8) focus group discussions were held.

The eight (8) focus group discussions were done at community halls in Sol Plaatje, Dikgatlong, Magareng, and Phokwane that were booked and reserved for this purpose. To conduct these eight (8) focus groups, the researcher collected data over a two-week period. This allowed for one focus group discussion to be conducted per day. While the researcher had the opportunity to conduct two (2) focus groups per day, one session per day was chosen to have time to reflect on the data collection sessions. The focus groups were managed so that each discussion lasted up to a maximum of 2 hours.

A research assistant was hired to assist with taking down notes, observations, and recording some of the conversations using electronic means. The researcher also jotted down some notes when respondents were answering the prepared questions and these were later compared to check completeness thus enabling effective data analysis. The researcher ensured confidentiality of the Focus Group Discussion Interview Guide to eliminate the fear of victimisation and all records including the recorded audios were kept safe for later transcriptions and references. In these discussions, drought effects and resilience strategies for female smallholder farmers were examined. The focus group discussion included the following themes:

- Demographics data
- Types of smallholder farming in Frances Baard
- Understanding drought in Frances Baard
- Assessing vulnerability to drought
- Assessing resilience to drought

- Assessing coping and adaptation strategies explored
- Communication strategies used by the farmers

5.6 Data analysis

Data analysis is the process of bringing order, structure, and sense to the mass of data collected (Bairagi & Munot, 2019; Rahi, 2017).This research followed Terre Blanche, Durrheim, and Kelly's (2006) guidelines for data analysis. According to these scholars, there are five steps followed in qualitative data analysis. The first step, namely; familiarisation and immersion, allows the researcher to engage and understand the processes and the methods used to collect data (Terre Blanche *et al.,* 2006). This enabled the researcher to establish an understanding of the intensity of the data in terms of answering the research questions. Familiarisation and immersion also enabled the researcher to gain a thorough understanding of the overall raw data as well as the kinds of interpretations that could be generated from it.

Furthermore, Terre Blanche *et al.* (2006) points to inducing themes as the second step in the data analysis process. This was achieved by examining the extent to which small-holder farmers are affected by drought and how resilient they are. Additionally, the researcher developed numerous themes, sub-themes, definitions, concepts, and sentences as the third step in support of the various themes formed in step two. All these particulars were deduced from the prescribed data. In step four, Terre Blanche *et al. (*2006) recommends that the researcher should objectively examine the collection of qualitative data – be it in the form of audio-visual aids or any additional information reflecting the collected data. The researcher reviewed the focus group discussion sessions conducted on the resilience of female small-holder farmers under this study. The last stage involved writing a detailed account of the small-holder farmers' experiences. The narration was based on the six themes mentioned above and other sub-themes formed during the data collection. The focus was on the female farmers, while the data obtained from the male farmers were used to compare with the experiences of the female farmers.

Based on the five steps identified above, data analysis was conducted as follows: Firstly, demographic details were presented. These demographics included the type of farming conducted in the study area, the sociological characterisation of the farmers in terms of what they do, their location, their level of experience in the farming communities, their level of education and other dimensions. These demographics will be analysed using descriptive

statistics. A demarcation will be made between male and female smallholder farmers to allow for the comparison of these farmers on their level of resilience to drought.

Thus, the findings on the research objectives outlined will be presented based on the existing realities among these two groups of farmers. For instance, with regard to the extent to which the farmers have access to and control of farming resources during times of drought, a distinction will be made between males and females. Such comparison will, at the end, provide pointers which explain the extent to which one has over another.

5.7 Reliability and validity

Reliability tests were performed on the data collection instruments (Rajasekar, 2014). Neuman (2014) explained that reliability refers to consistency and repeatability. Reliability is important in research studies since research should be designed in a way that, the findings will be transparent and traceable so that the results can be duplicated in a similar study carried out by another person. Reliability is the accuracy with which a measuring instrument yields a result if the measured object has not changed (Worthington & Bodie, 2017). Pilot testing was done to ensure that the instruments were both reliable and valid before collecting data.

The validity of a data collection device or tool is to what degree the device tests what it is intended to measure (Alvi, 2016). There are three main ways of characterising validity in research studies namely face validity, construct validity, and internal validity (Patel, 2016). Face validity refers to convincing the non- researcher that the methods being used are appropriate for the research type and encourage them to participate or take part as objects of study or respondents. Construct validity means that the method must measure that which it intends to measure. The instruments were tested for construct validity to see whether it measures the construct, it seeks to measure (Alvi, 2016). Internal validity relates to the cause and effect relationship between independent and dependent variables. Data collection instruments were checked for validity by making sure the instruments measure what they are meant to measure. This was achieved by testing the instruments for content validity, which is; by ensuring that the contents of the instruments were descriptive of the intended phenomenon or objectives. Validity was used to measure the Gender Parity Index of female farmers. The outcomes were validated by the participants through the findings of the adaptation strategies of smallholder female farmers. The appropriateness of the instrument's content was tested using the validity of questions to verify whether the data collection instruments were fit for their purpose.

5.8 Limitations and delimitations

South Africa is currently facing COVID-19, which influenced the willingness of the participants to engage in focus group discussions or meet with the researcher because of the fear of the virus or thinking about their safety. For this reason, the researcher followed safety, preventative measures, and other COVID-19 regulations. Authority was sought from relevant authorities such as ward councilors and the headmen in the study field. The headmen, also known as the sub-chiefs, were basically the local community heads who hold a local authority position to allow outsiders to conduct research or any developmental initiatives within the areas. These headmen helped to spread information about the study at hand since it was impossible to have a collection of individuals at one interval. The services provided by the headmen in turn increased the response rate.

Regarding delimitations, there are different scales of farming areas in FBDM. However, this study concentrated on female smallholder farmers; meaning that large-scale commercial farmers were not included although they may be facing drought impacts. The focus of the study was on vulnerable smallholder female farmers who lack adaptive capacities when compared to male smallholder farmers.

5.9 Ethical considerations

According to Lind, Marchal and Wathen, (2015) ethical considerations mean the suitability of the actions of the researcher in relation to the interests of those who are the subjects. Mathers, Howe and Hunn (2018), describe ethics as the moral ideals, norms, or behavioural standards that guide people in making moral decisions regarding our acts and interactions with others. Pietilä, Nurmi, Halkoaho and Kyngäs (2020) further mention that, research ethics relate to concerns about how the researcher formulates and clarifies the research subject, designs the research, collects data, processes, and stores data, analyses data and publishes research results in a morally acceptable manner. Ethical concerns are crucial to any research from the planning process up to submission of the project. The researcher sought access from smallholder farmers during planning, data collection, analysis and reporting stages. The following key ethical considerations were applied in this study:

5.9.1 Confidentiality

All the participants were assured that all the information collected would be kept confidential and used for academic purpose only.

5.9.2 Disclosure

The researcher fully disclosed to the participants the purpose of the research and information, which was being collected.

5.9.3 Participant's consent

The researcher respected the participants' right to withdraw or deny participation and promised to work with those who were willing to take part.

5.9.4 Integrity

The researcher was honest and straightforward in carrying out the research.

5.9.5 Action and permission of the researcher

The research was conducted in an ethically sound manner. Firstly, the research was conducted with the permission from both the University of the Free State and the small-holder farmers, therefore all the ethical considerations were observed. To acquire good collaboration from the participants, the researcher took into consideration their requirements and actions. The researcher made no judgments regarding the participants during the study. Additionally, the researcher maintained confidentiality of the respondents in the sense that the data they provided was utilized solely for this study only and no other.

5.10 Conclusion

This chapter described the research design and methodology that was adopted. The areas covered were: research design, philosophical worldview, research approach, methodology, data collection tools and processes, piloting, data analysis, reliability and validity, limitations and delimitations, and ethical considerations. The study chose a case study design, interpretivist philosophy, qualitative method and ensured that the data collected was reliable and valid. COVID-19 regulations and ethical considerations were followed in collecting and analysing data. A thematic approach was adopted in analysing the gathered qualitative data. The following chapter presents the research findings.

CHAPTER SIX: DATA ANALYSIS, PRESENTATION, AND DISCUSSION OF FINDINGS

6.1 Introduction

This chapter presents the data collected through focus group discussions. The scope of this study was to assess the resilience of female smallholder farming communities in FBDM to drought. In an effort to reveal women's resilience to drought, the study also included male farmers to compare and gauge the females' level of resiliency. As such, data was analysed to answer the five proposed research questions, namely:

- Are smallholder female and male farmers in FBDM vulnerable to drought?
- Are smallholder male farmers more resilient to the effects of drought compared to female farmers?
- What mechanisms do smallholder male and female farmers engage to cope and adapt to the drought hazards in FBDM?
- What communication strategies do male and female smallholder farmers explore to foster drought resilience?
- What are the recommendations for addressing drought challenges for FBDM female smallholder farmers?

This chapter begins with an analysis of the response rate based on the number of people who formed part of the focus groups discussions. This is followed by an analysis of the demographic details of the participants, particularly; their gender, age groups, level of experience, and the participants' general understanding of drought. An analysis of the vulnerability of smallholder farmers to drought is presented together with comparisons of who is more resilient to drought between the male and female smallholder farmers. Furthermore, the chapter analyses the coping mechanisms used to fight drought as well as the communications strategies used to foster drought resilience. The following section provides an analysis of the response rate of the people that participated in the study.

6.2 Response rate

According to the information obtained from primary research, the response rate of 100% was achieved. This implies that the findings can be generalised to the entire population of the smallholder farmers operating within Dikgatlong, Sol Plaatje, Magareng and Phokwane. This response rate also implies that the reliability of the findings is high since the entire sample participated in the study.

6.3 Demographic data

To assess the resilience of female smallholder farmers to drought, the demographic details of the participants were provided. The section below shows the distribution of the participants based on their gender, age group, educational qualifications, location of their farms, and levels of experience in farming. These demographics are presented per every municipality to provide distinctions between the smallholder farmers in the study area.

6.3.1 Gender and age of the participants

There were 40 female and 40 male smallholder farmers. The 80 smallholder farmers were drawn from the four municipalities, namely; Dikgatlong, Sol Plaatje, Magareng and Phokwane. Ten male and 10 female smallholder farmers represented each municipality. As mentioned earlier, it was important to sample both female and male smallholder farmers because it enabled comparisons to be made, and therefore show how resilient female smallholder farmers are to drought.

Figure 6.1 shows the distribution of the male smallholder farmers from the four municipalities based on their age groups. According to the information presented, there were few male participants aged 18 years and these were $(\frac{2}{10})$ for Dikgatlong, $(\frac{2}{10})$ for Sol Plaatje, $(\frac{1}{10})$ for Magareng and $(\frac{2}{10})$ for Phokwane. The majority of the participants in each of the focus groups were in the 19-29 years age group. These were $(\frac{3}{10})$ for Dikgatlong, $(\frac{4}{10})$ for Sol Plaatje, $(\frac{4}{10})$ for Magareng and $(\frac{3}{10})$ for Phokwane. The 30-41 years age group had a fair number of participants as shown by $(\frac{2}{10})$ for Dikgatlong, $(\frac{2}{10})$ for Sol Plaatje, $(\frac{1}{10})$ for Magareng and $(\frac{2}{10})$ for Phokwane. This distribution was similar among the 42-53 year olds. The remaining participants were in the age group of over 54 years and this is shown by $(\frac{1}{10})$ for Dikgatlong, $(\frac{1}{10})$ for Sol Plaatje, $(\frac{2}{10})$ for Magareng and $(\frac{1}{10})$ for Phokwane. Figure 6.1 shows the age distribution of the men from the same local municipalities.

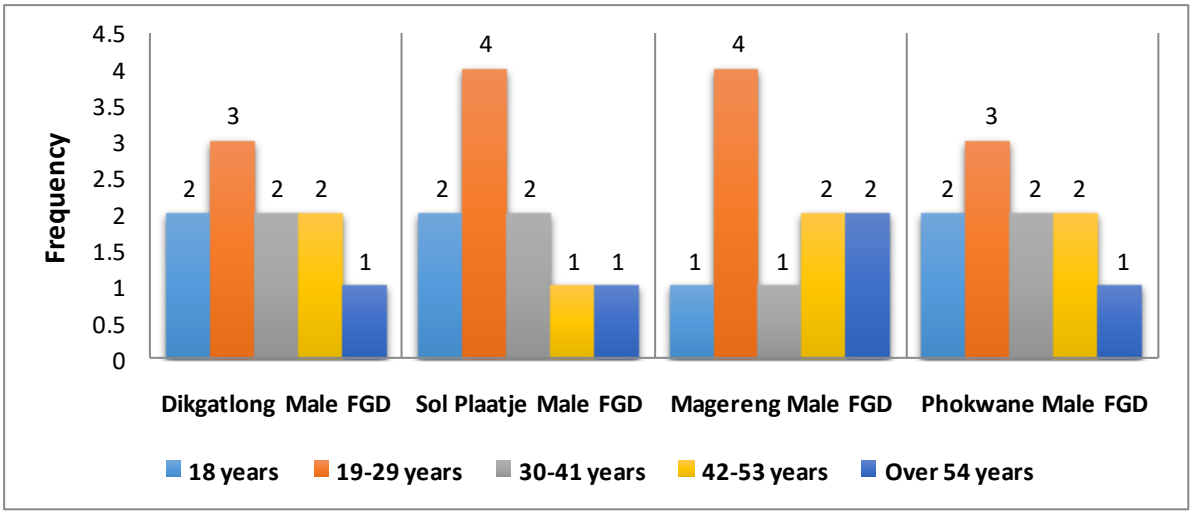

Figure 6.1: Distribution of male smallholder farmers based on age groups
Source: Author's own, 2021

Following the findings presented in Figure 6.1, the following figure represents the age distribution of the female participants from the four municipalities. From the information presented in Figure 6.2, there was also a fair distribution of female smallholder farmers based on their age groups. For instance, the 18-year-olds were uniformly distributed in Dikgatlong, Sol Plaatje, and Magareng with $(\frac{1}{10})$ in each of these places with the exception of Phokwane Municipality where there were $(\frac{2}{10})$. The 19-29 year-olds formed the majority of the female smallholder farmers with $(\frac{3}{10})$ drawn from Dikgatlong, $(\frac{3}{10})$ represented Sol Plaatje, $(\frac{4}{10})$ for Magareng and $(\frac{2}{10})$ for Phokwane. The 30-41 year old age group was also represented by a significant number of participants with $(\frac{3}{10})$ for Dikgatlong, $(\frac{2}{10})$ for Sol Plaatje, $(\frac{2}{10})$ for Magareng and $(\frac{2}{10})$ for Phokwane. There was also a fair distribution of female smallholder farmers in these municipalities among the 42-53 years olds except for the fact that there were more in Sol Plaatje represented by $(\frac{3}{10})$ of the participants. This was similar to female farmers in the 53+ age group across the entire municipality with the majority of their representation in the Phokwane municipality with $(\frac{2}{10})$ participants.

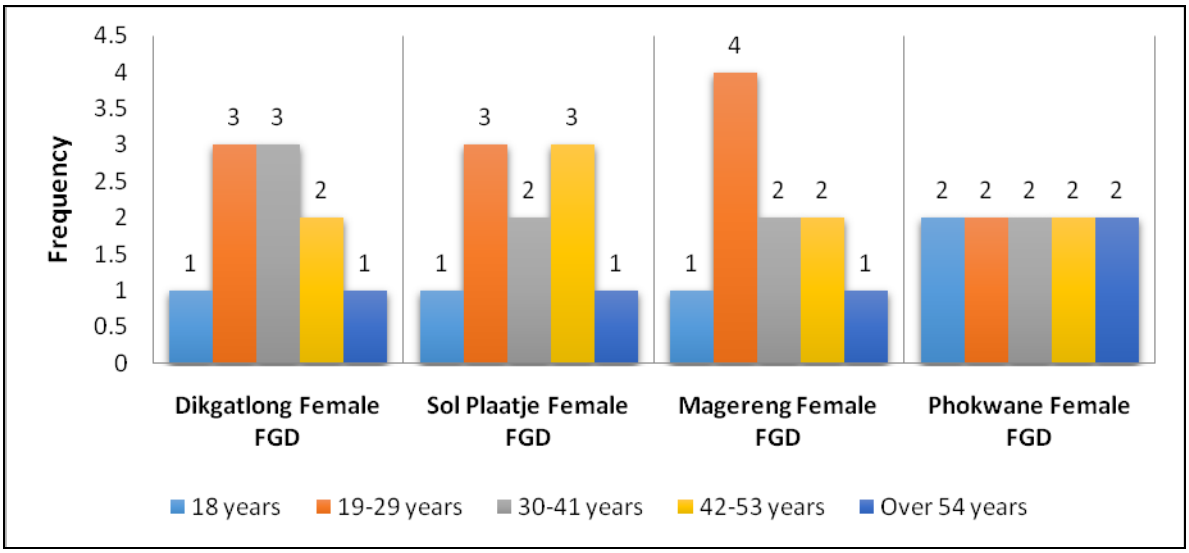

Figure 6.2: Distribution of female smallholder farmers based on age groups
Source: Author's own, 2021

A possible explanation of the uniform distribution of the participants across these municipalities could be because agriculture has become a common source of income and employment among the people in rural communities. White (2012) states that development in agricultural provides rural communities with employment. White (2012) also states that the lack of industrial and commercial development in the agricultural sector is the main reason why agriculture becomes the primary employment opportunity for rural households.

6.3.2 Educational qualifications of the participants

Figure 6.3 provides an analysis of the male smallholder farmers based on their educational qualifications. Figure 6.3 show that the majority of the male smallholder farmers ($\frac{18}{40}$) had a high school diploma as their highest level of qualification. Some participants had vocational training and tertiary qualifications. In comparison, the educational dynamics of the female smallholder farmers are presented in Figure 6.4.

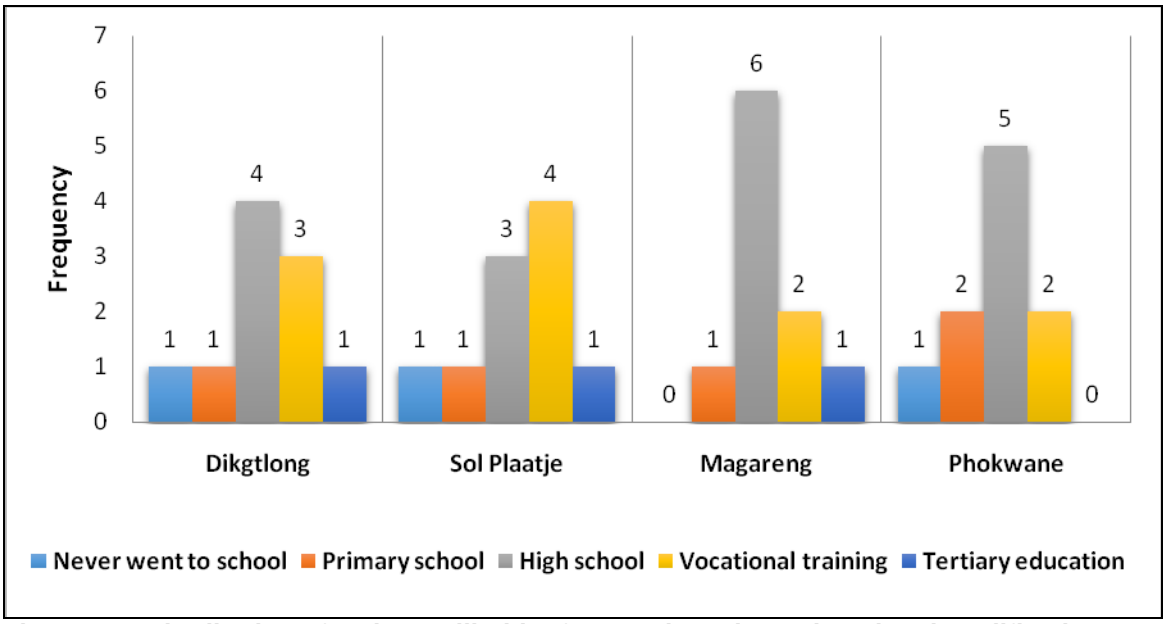

Figure 6.3: Distribution of male smallholder farmers based on educational qualifications
Source: Author's own, 2021

The figure above shows that eight out of the 40 participants from all the four focus group discussions 'never went to school'. Twelve of them had 'primary school education as the highest qualification. The majority (15) had a high school qualification, followed by three 'vocational training' education holders. Lastly, only two participants had tertiary education as the highest qualification.

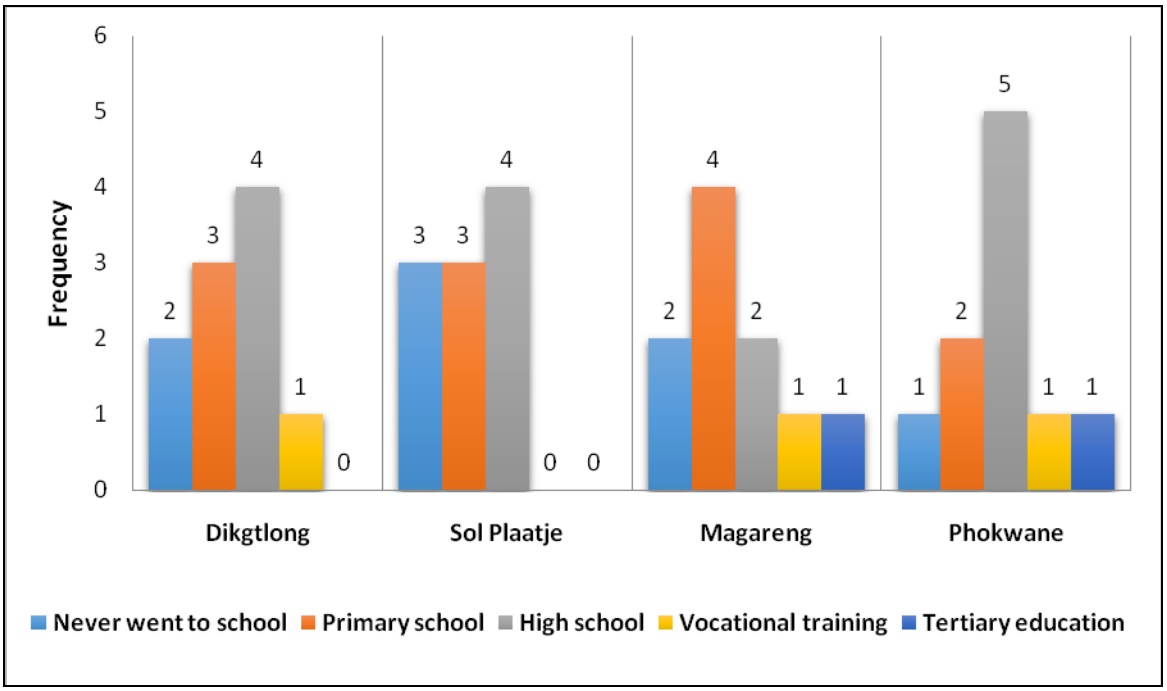

Figure 6.4: Distribution of female smallholder farmers based on educational qualifications
Source: Author's own, 2021

The findings presented above show important dynamics regarding the educational qualifications of the smallholder farmers who participated in this study. From the findings presented, it can be concluded, the male farmers seem to be a little bit more educated than their female counterparts. This is evidenced by the data, which shows that the majority of the male farmers had a high school diploma, vocational training or tertiary education as compared to female smallholder farmers. On the other hand, the majority of the female farmers indicated either that they never went to school or they had primary education as compared to their male counterparts.

The explanations of the discrepancies in the educational qualifications could be because of the slow adoption of the equality legislation among farming communities, which gives every individual the right to education (Dilli, Carmichael & Rijpma, 2019). In some instances, particularly in the rural areas, educational priorities are given to men at the expense of women who are expected to conduct domestic duties. Hoadley (2017) notes that since male farmers undergo additional training and development through vocational education and other forms, they tend to be experienced in solving various agricultural related challenges.

6.3.3 Level of experience as a smallholder farmer

Figure 6.5 presents data collected in relation to the years of experience of smallholder farmers. From the findings presented, male farmers who had 0-2 years' experience were ($\frac{1}{10}$) for Dikgatlong, ($\frac{2}{10}$) for Sol Plaatje, ($\frac{1}{10}$) for Magareng and ($\frac{3}{10}$) for Phokwane. Those who had 3-5 years of experience were ($\frac{4}{10}$) for Dikgatlong, ($\frac{3}{10}$) for Sol Plaatje, ($\frac{4}{10}$ for Magareng and ($\frac{1}{10}$ for Phokwane. Those who indicated that they had 8-10 years of experience were ($\frac{3}{10}$) for Dikgatlong, ($\frac{3}{10}$) for Sol Plaatje, ($\frac{2}{10}$) for Magareng and ($\frac{3}{10}$) for Phokwane. The remaining farmers had been working in the farming industry for more than ten years. These were five out of the 40 respondents from the four farming communities.

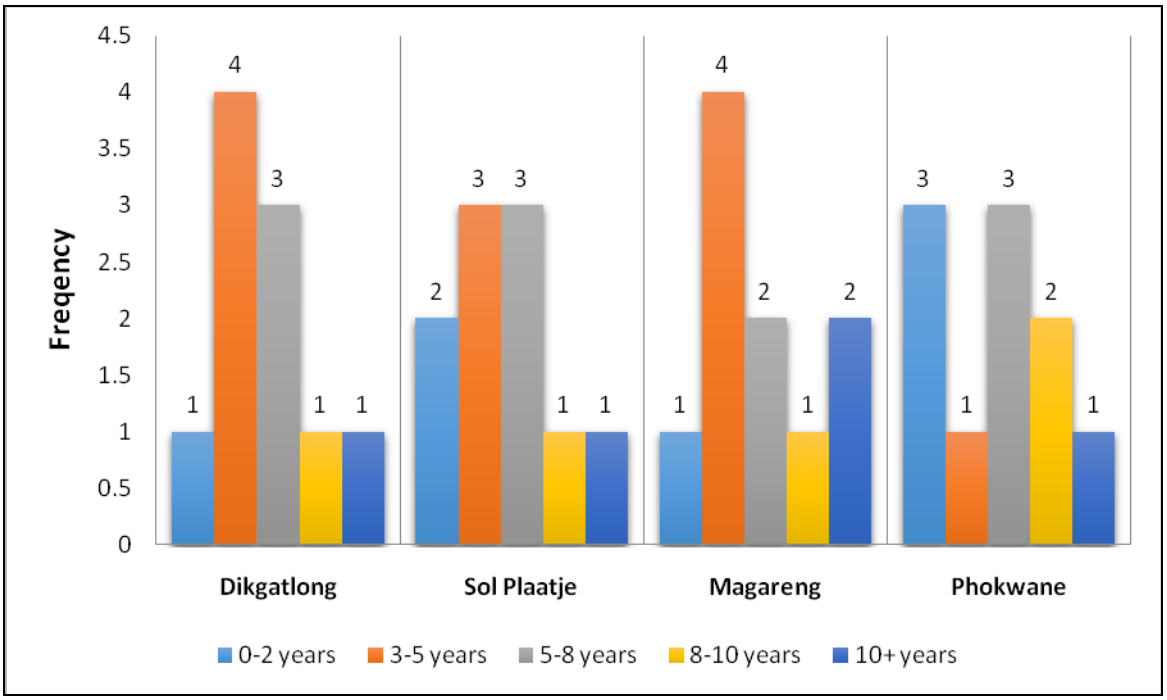

Figure 6.5: Distribution of male smallholder farmers based on their experiences
Source: Author's own, 2021

As presented in the figure below, the majority of all the female smallholder farmers had level of experience that ranged from 3 years and above. The majority of the female participants $(\frac{12}{40})$ indicated that they had between 3-5 years of experience while $(\frac{9}{40})$ worked as smallholder farmers for a period of 5-8 years. On the other hand, a high number of female farmers $(\frac{9}{40})$ had more than 10 years of experience while $(\frac{9}{40})$ had worked in the smallholder farming communities for a period of 8-10 years.

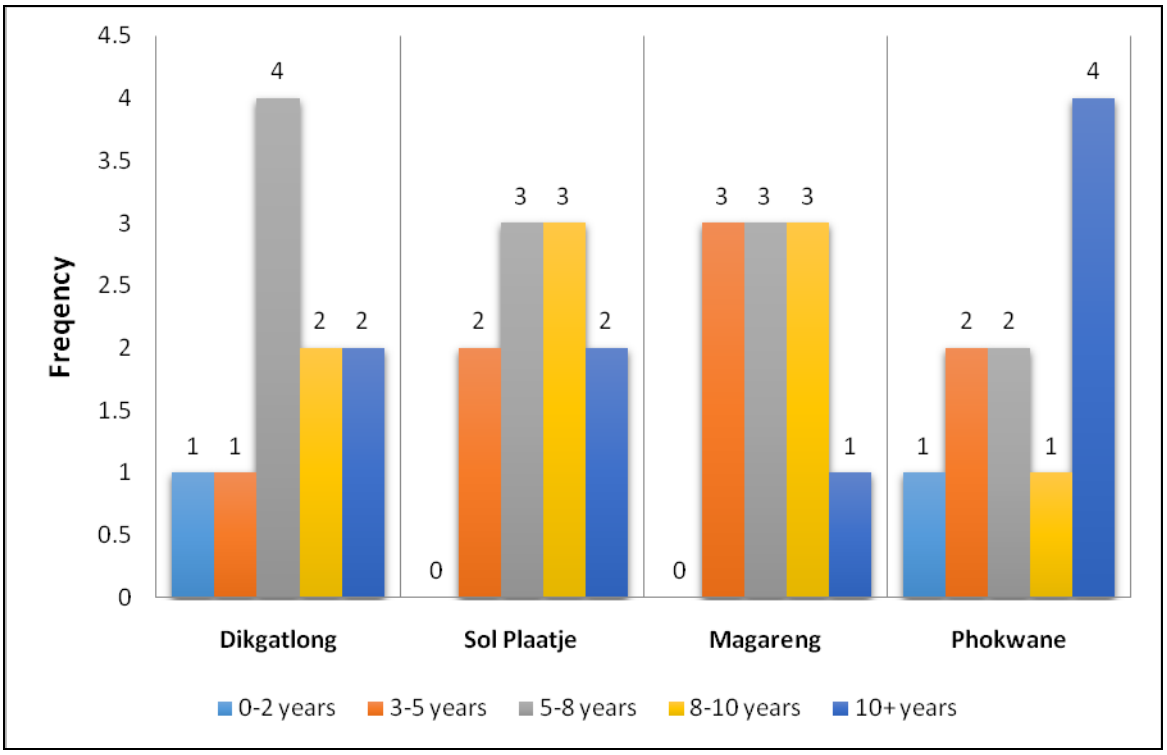

Figure 6.6: Distribution of female smallholder farmers based on their experiences
Source: Author's own, 2021

The findings presented above shows that there was high level of experience among the male smallholder farmers as most of them indicated that they were in business for a period of three years and above. Importantly, most of them were in the range of 3-5 years and 5-8 years of experience. Overall, the data collected shows that there was uniform level of experience among male and female smallholder farmers, even though the males were slightly more experienced. Greenhill *et al.* (2009) explain the differences that men are mostly custodians of farming communities in most circumstances as females are allocated less laborious domestic duties in the farming communities. Overall, these findings help to explain the extent to which experience has an impact on the resiliency of female smallholder farmers to drought.

6.4 Understanding drought in Frances Baard

6.4.1 Smallholder farmers' understanding of drought

The purpose of the following question was to provide an understanding of drought from the perspectives of smallholder farmers. The question was as follows:

- What is your understanding of drought and what types of drought do you think affects this area?

With regard to the first question about the understanding of smallholder farmers on the meaning of drought, the following answers were obtained and classified into themes, which are:

- Drought refers to a shortage of rainfall as a result of natural causes;
- Drought refers to a shortage of rainfall as a result of man-made causes; and
- Drought refers to a shortage of rainfall due to natural and man-made causes.

Both male- and female smallholder farmers answered the questions. Following the classification of the understanding of farmers on drought and the inherent types, further analysis was conducted to acquire knowledge regarding the farmers' perceptions. It should be noted that while the question was purely open-ended, the quantification of the answers is used in this regard to provide the frequencies of various perceptions of the key answers. As Figure 6.7 and 6.8 shows, the farmers did not explicitly name the different types of drought, but merely its meaning and causes.

The findings presented in Figure 6.8 show that the majority of the male smallholder farmers,$(\frac{30}{40})$, held the perspective that drought is a shortage of rain as a result of natural and man-made causes. On the other hand, $(\frac{5}{40})$ of the male smallholder farmers were of the view that drought refers to shortage of rainfall due to natural causes. The remaining $(\frac{5}{40})$ of the male smallholder farmers indicated that drought relates to shortage of rainfall due to man-made causes.

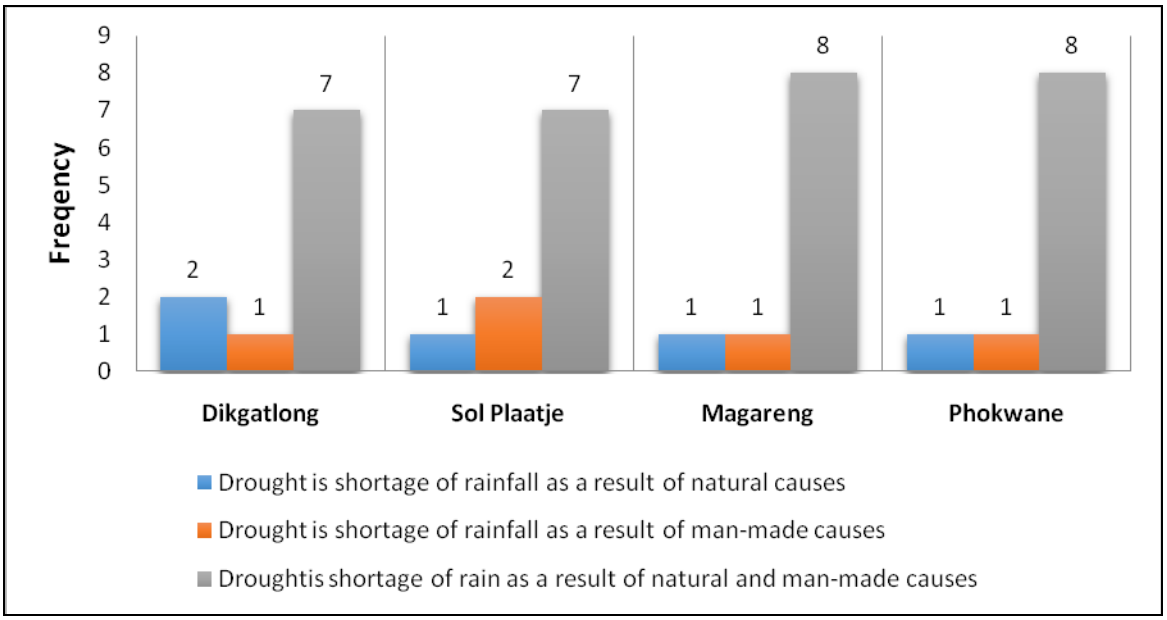

Figure 6.7: Perspectives of male smallholder farmers on the meaning and types of drought
Source: Author's own, 2021

On the other hand, female smallholder farmers also held similar perspectives in terms of the meaning of drought. However, most of the female farmers, as shown in Figure 6.8 indicated that drought is a period of shortage in rainfall mainly attributed to natural and man-made factors. These were $(\frac{34}{40})$ of the participants. Three out of the 40 participants indicated that it is shortage of rainfall because of man-made events while the remaining three participants noted that it comes because of natural events.

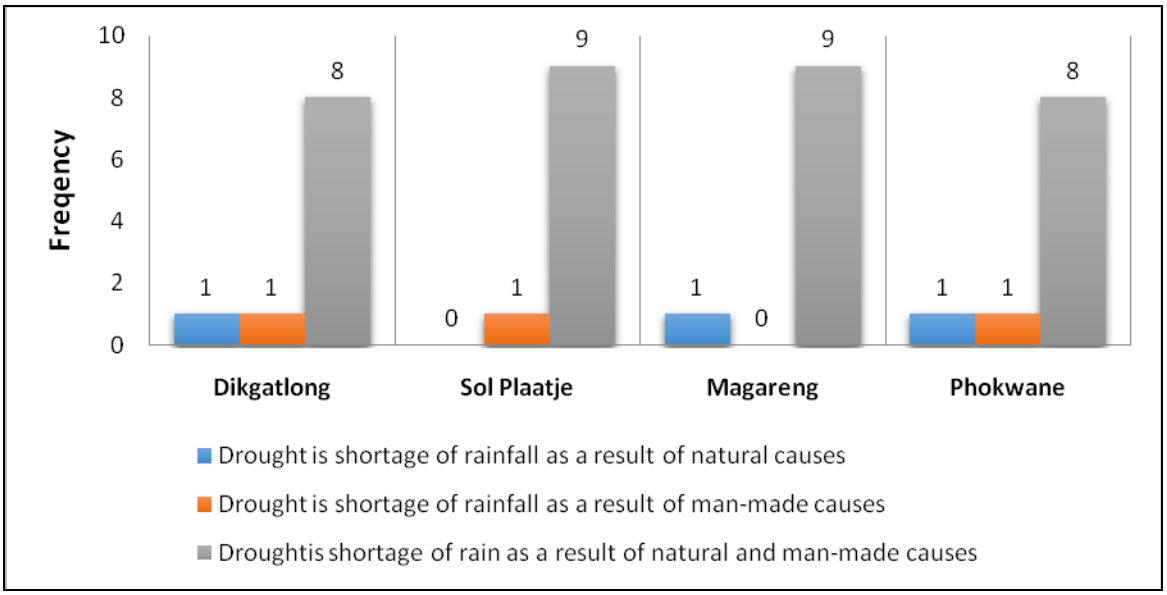

Figure 6.8: Perspectives of female smallholder farmers on the meaning and types of drought
Source: Author's own, 2021

Scholars and officials support these opinions and arguments. For example, Van Loon *et al.,* (2016), support this definition of drought who state that drought refers to a situation in which water supplies in a country or geographic area decline to the point where the population lacks adequate or proper access to water. Additionally, Hagenlocher *et al.* (2019) define drought as the effect of a natural decrease in the amount of rainfall received over a long period, typically a season or longer. This is associated with climatic factors, such as high temperatures, high winds, and low relative humidity, and can greatly exacerbate the intensification of occurrence, as well as other human factors that induce climate change.

An understanding of the perception of small-holder farmers on drought is supported by the Sendai Framework which requires UN member states to introduce integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political, and administrative measures that avoid and minimise disaster exposure and susceptibility. Thus, having knowledge about the perception of smallholder farmers on the meaning of drought has clearly shown that they know that both natural and man-made factors are the cause. This forms the basis on which the Sendai Framework can be applied.

6.5 Assessing vulnerability of smallholder farmers to drought

6.5.1 Effects of drought on smallholder farmers

The purpose of this section is to provide answers obtained from the study on the extent to which smallholder farmers are vulnerable to drought. Two questions were posed,

- How has drought affected you as a smallholder farmer?
- Who is more vulnerable to drought, man or women and why?

To understand how farmers are affected by drought, data was collected through focus group discussions. An open-ended question was used to ensure that the participants provide adequate answers about how drought affects their farming activities. This question was important because it provided the basis on which research can be conducted on how male and female smallholder farmers are susceptible to drought. The findings obtained are presented below using verbatim where the prefix 'M' is used to refer to male farmers while 'F' refers to female farmers. For example, M7 represents participant 7 from the male smallholder farmers. From the findings obtained, the common themes among male and female smallholder farmers are as follows:

- Economic impacts of drought
- Environmental impacts of drought
- Social impacts of drought

6.5.1.1 Economic impacts of drought on smallholder farmers in Dikgatlong

One of the themes deduced from the findings obtained is that drought has adverse economic impacts which in turn affect the way farming is conducted. Presented below are the verbatim responses from both the male and female smallholder farmers from Dikgatlong on the economic impacts of drought on smallholder farming.

One of the male smallholder farmers, M1, noted that drought affects the prices of commodities. He had the following to say:

> "…..*Drought has had devastating implication on the prices of different commodities. Everything is now expensive. We cannot even buy farm inputs to prepare for the next season because things are now expensive*" (M1).

This view was also seconded by M3 who indicated that drought has caused incomes to severely decline. In his argument, M3 noted that:

> *"…..Due to drought, my income has severely been affected. I have even used my few savings so that I cover my dues*" (M3).

Female smallholder farmers also noted that drought has had devastating impacts on their revenue because they no longer produce their supplies in large quantities. One of the female farmers, F5, noted the following:

> *"…..I used to play stockvels with other women in our village. We would know that after we grow our vegetables and corn many people will come and order in bulk from us. That is practically impossible now because even the quality of our produce has been compromised" (F5).*

Another female participant noted that due to drought, there are no ways in which they can pay up their debts because drought has affected their produce. This is indicated in the verbatim below:

> *"…..as a woman who depends on smallholder farming, we are always left with no clue as to how we are going to survive because surely farming is not paying at all" (F6).*

6.5.1.2 Economic impacts of drought on smallholder farmers in Sol Plaatje

Similar economic impacts of drought were experienced in Sol Plaatje. Male farmers indicated that they do not have adequate income to feed their families. This is indicated by the verbatim presented below:

> *"…..the drought has many negative impacts on our incomes. Now we are not working and the only way we are left with is to go to towns and look for work. It is now difficult to feed the families because the money we are getting is not enough compared with other years when there is adequate rains" (M4).*

Participant M6 who noted that due to drought, they cannot pay off their loans also seconds this view. M6 noted the following:

"…..even if you go to the bank now, they tell you that the risk criteria to borrow the money are not there because smallholder farming cannot even give us enough money to pay up our loans" (M6).

On the other hand, female farmers also noted that their incomes have been affected to the extent that they primarily depend on the income from the South African Social Security Agency (SASSA). Participant F2 indicated that:

"…..most of the ladies in our farming cooperatives are now relying on social grants. SASSA has become our major source of income these days, unlike old days when you know that SASSA money is like a bonus to us because we had enough" (F2).

The economic effects of drought have also led smallholder farmers to become subsistence farmers, which is a different situation from the previous years when rainfall was adequate. Participant F4 indicated:

"…..the money that we are currently getting from our farming activities is basically subsistence in nature. It is never enough to pay all our expenses. Now we just choose what to pay up because we cannot afford it all" (F4).

6.5.1.3 Economic impacts of drought on smallholder farmers in Magareng

Similar to the findings obtained in other municipalities, male participants in Magareng have been affected economically. Participant M5 noted that their revenues were affected because there are no income-generating projects in the local communities. This is indicated in the verbatim below:

"…..shortage of rainfall has had a significant detrimental impact on our revenue. We are unemployed because there is no works in the farming communities" (M5).

Similarly, participant M10 indicated that they cannot provide physiological needs to their families, such as food and shelter. This situation is different from the other years, as they were able to provide for their families. This is indicated in the verbatim below:

"…..Due to lack of employment, the only option is to travel to towns and look for work. It is currently difficult to feed the family since the money we receive is little in comparison to previous years with good rainfall" (M10).

Women in this municipality also shared a similar story in the sense that they have to rely on SASSA as their main source of income, and that they cannot afford to pay up their debts. This is shown by the responses provided by Respondent(s) F8 and F9 below:

"…..The majority of the women now have their eye on social assistance such as SASSA because there is nowhere else to get the money from since the farming business is not paying anymore" (F8).

"…..The money we are now earning from farming is essentially subsistence in nature. It is never enough to have all of our costs covered. Now we simply have to decide what to pay up because we can't afford anything" (F9).

6.5.1.4 Economic impacts of drought on smallholder farmers in Phokwane

Presented below are the verbatim obtained through focus group discussions, which show that the economic impacts of drought in Phokwane are similar to other municipalities. Among the male participants, the issue of compromised incomes and insufficient funds to support the families are prevalent. This is supported by the verbatim presented below:

"…..if you need a loan, the bank would tell you that the risk requirements for borrowing money do not exist since small-holder farming cannot even provide us with enough money to pay off our debts" (M7).

The farmers also indicated that they have resorted to loan sharks to earn a living. This is shown by the verbatim presented below:

"…..we are now resorting to loan sharks for us to have income to feed our families. We even have accounts in spaza shops because they are the ones available for our immediate needs" (M8).

Female participants indicated that they cannot pay up their debts and they have SASSA as their main source of income. This is supported by the argument provided by F1.

"…..during the old days, farming used to pay off. Now things have changed because of drought. Now we treat SASSA money as the main source of income whereas back in the day it was just treated as extra income" (F1).

Other female participants noted that they have become subsistence farmers in the sense that they no longer have anything to spare from the revenue they get from selling produce. In other words, the prevailing drought has affected their incomes compared to the previous years. This is presented by respondent F2 as follows:

"…..the money that we are currently getting from our farming activities is basically subsistence in nature and not enough for survival" (F2)

6.5.2 Environmental impacts of drought on smallholder farmers

6.5.2.1 Environmental impacts of drought on smallholder farmers in Dikgatlong

Further analysis of the impacts of drought also found that drought has severe environmental impacts in the farming communities. Similar to the impacts of drought discussed above, primary data collection revealed that drought affects the environment to the extent that farming is affected. Male participants indicated that their soils have lost their quality because of inconsistent rainfall. This is supported by respondent M5 who indicated that:

"…..our soil types have been heavily affected because of the inconsistencies of rainfall" (M5).

Similarly, another male smallholder farmer noted that the existing water reservoirs dried out because of lack of adequate supply of water. The participant, M8, indicated the following:

"…..we used to have water reservoirs where we can store water for long periods of time even after rainfall. All these have changed because there is no rainfall at all" (M8).

The female smallholder farmers, on the other hand, were concerned with the quality of their plants because of drought. Since water supply is not stable as it should be under the circumstances where there is adequate rainfall, the plants have severely been affected. One of the female smallholder farmers in Dikgatlong, F7, noted that:

"…..the plants qualities have long been affected because of the drought." (F7).

Another female participant, F9, noted that the soil moisture has been lost due to drought. In her own words, F9 stated that:

> *"…..the soil used to keep adequate moisture for us to continue carrying out our agricultural activities normally"* (F9).

6.5.2.2 Environmental impacts of drought on smallholder farmers in Sol Plaatje

In Sol Plaatje region, smallholder farmers were concerned with the fact that their livestock has been affected by drought. This concern was mainly affecting male smallholder farmers. As noted by M1:

> *"…..the quality of the pastures for our livestock has gone so bad because of poor rainfalls" (M1).*

This could be because there is more of livestock production in this place than any other. Another participant, M3, was mainly concerned with the deterioration of the mild quality due to drought. Participant M3 noted that:

> *"…..Those involved in commercial milk and meat production are left with little options than to buy supplies because you cannot really rely on the natural pastures" (M3).*

The female smallholder farmers, on the other hand, noted that environmental impacts of drought are more to do with changes in agricultural activities and domestic duties as well as the unsustainability of their rural livelihoods. One of the participants, F4, raised concerns that drought has led to the drying up of water sources which makes it difficult to perform domestic duties. This view is indicated in the following verbatim:

> *"…..the waters from the available streams would help us a great deal in our agricultural activities and other domestic purposes, but everything changed" (F4).*

On the same note, participant F5 noted that the lack of availability of rainfall has affected the sustainability of agriculture in Sol Plaatje Municipality. This is shown in the verbatim below:

"…..Now the whole village is just dry and we rely on the tap water for even small agricultural projects. This is not sustainable at all" (F5).

6.5.2.3 Environmental impacts of drought on smallholder farmers in Magareng

In Magareng Municipality, the male smallholder farmers were concerned about the environmental implication of drought on soil quality. Male farmers raised two concerns that due to drought, the soils do not rejuvenate and dry out because of irregular rainfall. One of the participants, M7, noted that:

"…..When rainfall is constant, it rejuvenates our soils but now at times there are heavy rainfalls followed by scotching sun" (M7).

Similarly, participant M8 argues that:

"…..The constant hot temperatures, scorching sunlight followed by heavy rainfall has led to the hardening of the soils. When that happens, nothing grows on the soil" (M8).

The female smallholder farmers in Magareng also raised similar concerns and mentioned that drought has affected the irrigation dynamics of this area. According to F3,

"…..These days, even if you have irrigation, it is not similar to how it was when we were relying on constant natural rainfall" (F3).

Other female smallholder farmers raised similar concerns to the men and stated that the prevailing drought mainly affects the soil quality and its moisture content. For instance, F6, indicated that:

When the drought started, the soil became hard and so dry to the extent that attempting to do agricultural activities would be a waste of time and resource (F6).

6.5.3 Social impacts of drought on smallholder farmers

The study revealed that drought is associated with negative social impacts, which may leave female smallholder farmers more vulnerable than their male counterparts. The verbatim

presented below describe the extent to which drought has negatively affected the social lives of the farmers, and how this negatively translates to the farming activities.

6.5.3.1 Social impacts of drought on smallholder farmers in Dikgatlong

Male smallholder farmers were mostly concerned about the fact that they are no longer in a position to provide for their families, which is something that will classify men as failures in the African communities. Participant M5 noted that:

> *"…..drought has affected our social well-being as parents. We can no longer afford to provide simple luxuries for our children as our parents provided to us" (*M5).

Male smallholder farmers from Dikgatlong also noted that drought has socially affected him and his counterparts. M10 argued that:

> *"…..there are different social problems that people are experiencing because of drought. Some of us feel so embarrassed that we are the men who are just idle in the villages because there is nothing to do."* (M10).

The female smallholder farmers from Dikgatlong noted that they end up getting into conflicts with other community members because of access to water sources. For instance, smallholder farmer F4 noted that:

> *"…..we are having severe conflicts with other people from the local communities over water sources"* (F24).

Other female participants associated drought with many illnesses. Participant F9 was of the view that:

> *"…..some of our people in this village have become so vulnerable and sick due to weather changes"* (F29).

6.5.3.2 Social impacts of drought on smallholder farmers in Sol Plaatje

The study concluded that the impacts of drought affecting both male and female smallholder farmers in Dikgatlong are almost similar to those in Sol Plaatje. The male farmers in this farming

region were mainly concerned about the fact that the prevailing drought has left them bankrupt to the extent that recovering from it would be difficult. For an example, from the verbatim presented below, the participant raised concerns that agriculture is no longer a viable employer to the extent that there is a high level of unemployment among villagers:

> *"…recovering from the on-going drought is becoming very difficult. People are not employed at all and very few in this village have the capacity to recover from the losses suffered"* (M9).

Additionally, participant M10 supported this fact and noted that there has been increased migration of local villagers to urban centres to search for employment. M10 noted that:

> *"…..Most of the men from this village have left for bigger cities such as Johannesburg and Cape Town. Some never come back and others even start families wherever they go*" (M10).

The female smallholder farmers in Sol Plaatje instead associated the prevailing drought with the end times. For example, participant F6 indicated that:

> *"…..some villagers even associate the drought with some calamities that are mentioned in the bible that during the last days there will be hunger, drought and other social challenges"* (F7).

At the end, other female farmers in this region showed high levels of hopelessness as the drought continues to exist. This is indicated in the verbatim below:

> *"…..some people have become so hopeless that they think the world is coming to an end"* (F6).

6.5.3.3 Social impacts of drought on smallholder farmers in Magareng and Phokwane

In addition to the findings presented above, findings obtained from both Magareng and Phokwane indicate that there are significant impacts of drought, which affect the social lives of male and female smallholder farmers. The majority of the male participants have the belief that if drought has not been in existence for a number of years, people would be living good lives that are above poverty datum line. This is indicated by the verbatim below:

"…..In short, if the country was not experiencing drought, people would be living good lives" (M3).

Other male participants noted the social ills that are associated with the on-going drought, and these include conflicts among peoples, as noted by M5's notions below:

"…..besides, due to drought, you end up fighting with other people because of the frustrations that will be building up" (M5).

Female smallholder farmers have raised concerns that the water sources available from the wells have to be accessed by everyone who lives in the local community. This is indicated in the quotations obtained through focus group discussions as follows:

"…..The water resources available from the natural and man-made wells have to be easily accessible by everyone. This, however, is now a challenge because some people even finish it without thinking about other people's needs" (F1).

Other people have indicated that due to the selfishness of the people, the water gets finished up before others can have a share. This is indicated below:

"…..the issue of greediness in using the available water in man-made wells is a challenge that is beyond drought only. It has had severe impacts on the mental being of our people, their health and other social dynamics" (F6).

6.6 Level of the vulnerability of smallholder farmers as a result of drought

This section presents the findings obtained from the study to answer the following question:

- Who is more vulnerable to drought, man or women and why?

To provide a clear understanding of the level of vulnerability of smallholder farmers to drought, answers were deduced from the findings obtained above on how drought affects farmers. As a result, three themes were proposed as follows:

- Vulnerability of smallholder farmers to economic impacts of drought;
- Vulnerability of smallholder farmers to environmental impacts of drought; and
- Vulnerability of smallholder farmers to social impacts of drought.

6.6.1 Vulnerability of smallholder farmers to economic impacts of drought

The data presented in the preceding discussion shows the different perspectives of smallholder farmers from Dikgatlong on how drought has had an impact on their economies. These impacts, in turn, explain the extent of vulnerability of these farmers to drought. The findings indicate that the male smallholder farmers have become vulnerable to drought to the extent that they cannot afford to buy farming inputs since their incomes have been affected. On the other hand, female smallholder farmers are not able to do extra activities.

The smallholder farmers in Sol Plaatje had similar views with those operating in Dikgatlong. The male smallholder farmers indicated that they have become vulnerable to drought to the extent that they cannot qualify to borrow capital from the banks since they do not have a guarantee that they will be able to practice profitable farming. In the end, they end up migrating to towns to seek greener pastures. Female smallholder farmers tend to rely on social grants as one of the guaranteed incomes.

Smallholder farmers in Magareng also shared similar opinions about how they have become vulnerable because of the economic impacts of drought. Similar to other farming communities, the male smallholder farmers have their levels of incomes affected and unemployment has skyrocketed. At the end, they end up migrating to town. Female smallholder farmers on the other hand tend to rely on SASSA since they cannot afford to raise income through other sources. The challenges presented here are also similar to those experienced by smallholder farmers in Phokwane.

From the verbatim presented from the four municipal areas above, it is clear that the adverse economic impacts of drought are not only felt by female smallholder farmers. Male smallholder farmers have also become vulnerable. Both male and female smallholder farmers are affected in terms of their revenues, costs of buying material, and poor produce, which results in poor products that affect the market. The economic impacts associated with drought have left farmers vulnerable to the extent that some of them have started adapting themselves to smart farming practices such as the use of drought-resistant crops. However, while this change is an effective solution, it is not easy for the majority of smallholder farmers as most of them lack basic knowledge about how to overcome drought.

These findings are also in line with the scholars and officials who associate drought with severe economic implications and leave employees vulnerable. For example, Fan *et al.* (2013) conducted a study and discovered that due to drought, smallholder farmers suffer greater losses compared to medium- to large-scale farmers. Fan *et al.* (2013) studied the complexities of

tobacco cultivation in farming communities and uncovered substantial variations in planning, seed choice, and agricultural process execution. It was discovered that medium and large-scale farmers predominantly use drought-resistant tobacco crops, while smallholder farmers primarily cultivate drought-sensitive crops. The major reason behind this choice of cropping is that they lack knowledge and even financial capacity to adapt to drought-sensitive crops because most of them operate at subsistence levels.

Additionally, due to drought, Bahta *et al.* (2016) the 2015 drought had devastating economic impacts to the extent that the smallholder farmers lost close to R10 million. In the same period, Bahta *et al.* (2016) state that there was a drop in the agricultural activities by about 9% during the same time as compared to other farming seasons, owing primarily to the effect of January 2015, which was drier than anticipated. There was also a negative impact on livestock production as evidenced by a 15% herd loss during the same year (Agri SA, 2016). At the end, the smallholder farmers, both male and females, are left vulnerable to the economic consequences of drought.

6.6.2 Vulnerability of smallholder farmers to environmental impacts of drought

The farmers in Dikgatlong raised concerns that there are agricultural implications of drought, which have left them vulnerable as smallholder farmers. The male smallholder farmers indicated they have become vulnerable and cannot produce more since the soil types have been affected due to inconsistencies in the rainfall. Others noted that they hardly have reservoirs, which they used to store water during times of rainfall, which has all depleted. The female smallholder farmers in this region left women vulnerable to failing to provide produce to feed their families since the drought has affected the quality of plants, while others noted that the soil moisture content has been affected to the extent that they cannot practice agriculture like they normally do.

To explain how vulnerable smallholder farmers in Sol Plaatje Municipality are to drought, two significant impacts have been identified:

- Poor pastures as a result of inconsistent rainfall; and
- Poor production of commercial milk and meat because of poor rainfall.

Female farmers in Sol Plaatje are left vulnerable because they do not have enough water supplies to perform their domestic duties. These females indicated that their water sources and reservoirs have been negatively affected by lack of rainfall to the extent that domestic production has been affected. Additionally, female smallholder farmers can no longer practice

small-scale farming because they rely on tap water that is reserved for consumption. The male smallholder farmers in Sol Plaatje, on the other hand, are also vulnerable in the sense that their livestock production has become poor. This is seen in the quality of milk produced as well as the meat products available.

The impacts of drought have also left the smallholder farmers operating in Magareng vulnerable to poor agricultural production due to the effect that it has had on the soil type. The male farmers raised their concerns on the constant heat and heavy rain falls to the extent that nothing grows on the soils compared to previous times. Thus, in the end, the men are vulnerable because whatever efforts they put to produce something, the output does not match the inputs. The female farmers, on the other hand, raised their concerns on the lack of water sources and poor soils, thus, leaving everyone in Magareng Municipality vulnerable.

Compared to the environmental impacts of drought as experienced in Phokwane, there is a thin line on how farmers in all four places are affected. Thus, all the farmers, both male, and female, are left vulnerable to the extent that agricultural losses are inevitable. This level of vulnerability of smallholder farmers to drought are further backed by empirical evidence and official reports.

For instance, the Department of Water and Sanitation (2016) analysed the devastating environmental impacts of drought and it was likened to the famous 1982 and 1933 droughts, which led to the dilapidation of water sources, soil quality and the entire environment. Similarly, Bahta *et al.* (2016) acknowledge the actions of drought for its negative implications on the environment. Bahta *et al.* (2016) links drought with the concept of El Nino and its implications on the environment. In other studies, Maltou and Bahta (2019) conducted a longitudinal analysis of the 2015/16 drought and found that it had negative impacts on nearly 180 of South Africa's roughly 1600 water supply systems, causing agricultural activity to worsen. These negative impacts furthermore affected 2.7 million South African homes, which relied on those water sources.

The environmental implications of drought are also consistent with research conducted by Zeleke (2017) and Van Loon *et al.* (2016) which revealed that the distortion of water sources and soil quality tends to affect the plant and animal ecosystems, vegetation, woodlands, fauna and flora. The environmental consequences can be short-term or long-term in nature, some of which may become permanent if effective management is not implemented (Van Loon *et al.,* 2016). For instance, if the destroyed ecosystems and water bodies are not rehabilitated properly, the damage may become permanent. Consequently, one can conclude that the

impacts of drought on the environment affect the entire farming community and other sectors that rely on it. Thus, both male and female smallholder farmers are vulnerable to drought.

6.6.3 Vulnerability of smallholder farmers to social impacts of drought

From the analysis of the findings obtained from the focus groups that participated in primary research from Dikgatlong, it is clear that both male and female smallholder farmers are left vulnerable due to the social impacts that come along with drought. For instance, male farmers indicated that they suffer from social challenges, which include the fact that they can no longer afford to provide basic needs for their families. Other male farmers noted that they are left in situation where they become embarrassed to stay in their local communities due to unemployment and being idle. These challenges on their own explain the extent of vulnerability to which men in Dikgatlong are exposed due to drought. The female farmers, on the other hand, noted with great concern that they are exposed to conflicts on water sources amongst themselves. Some indicated that they have fallen ill due to unpredictable changes in the environment.

Such susceptibility is almost similar to what is experienced in Sol Plaatje among both male and female smallholder farmers. The male smallholder farmers showed their high level of vulnerability through lack of employment, which has since brought in different challenges. The male smallholder farmers indicated that they have been unemployed for a long time and that they have fallen into debt to the extent that recovering from it will take some time. As a result, the men have become vulnerable and have decided to migrate to urban areas to search for greener pastures. The female smallholder farmers in Sol Plaatje, on the other hand, indicated that some have just become helpless in the communities, while some even believe that the world is ending due to perpetual drought. This shows the extent to which the drought has left female smallholder farmers vulnerable to many social and societal dynamics.

In Phokwane and Magareng farming regions, similar findings were obtained on how drought leaves farmers vulnerable. Based on the findings obtained, it can be concluded that drought leaves smallholder farmers vulnerable in terms of their social contexts. However, while both male and female smallholder farmers are vulnerable, female smallholder farming communities are left far worse off than male farmers. The fact that drought tends to affect the way in which women live in societies, particularly within the cultural context in the societies, leaves them in compromised positions that exposes them to less resilience positions. Since drought leaves the majority of people in the farming communities with unemployment and reduced household

income, women are affected the most since they form the majority of smallholder farmers. This is particularly true in marginalised communities like the ones under this study as many men migrate to urban areas to seek for jobs. These findings are backed by the literature as discussed below.

Stagge *et al.* (2017) conducted a study and concluded that the immediate social consequences of drought are the drop in the employment levels of the female smallholder farmers, and consequently their income. Drought primarily affect the female smallholder farmers to the extent that the revenues generated significantly drop (Stagge *et al.,* 2017). Studies by Ojo and Baiyegunhi (2020) furthermore points to the fact that the reduced farm income has multiplier consequences on multiple stakeholders such as the suppliers of farm inputs, the buyers, the retailers and other market players. This will even have devastating financial implications as seen in the rising cost of food supplies among other socio-economic variables.

The bottom-line of these negative implications of drought on female smallholder farming communities is that the women become vulnerable since farming is dominantly their primary and/or only source of income. Rapholo and Makia (2020) furthermore associates the negative impacts of drought to other psycho-social implications such as high levels of depression and stress, especially in cases where women are left with no capacity to fend for their families. Rapholo and Makia (2020) indicate that drought has huge impacts that lead to conflicts among community members especially when they have to share scarce water sources. Given that women conduct most of the domestic duties in the farming communities, conflicts among other women in the community become inevitable. Additionally, female smallholder farmers carry the whole burden since the societal administrative structures are mostly biased towards men.

6.7 Assessing resilience of smallholder farmers to drought

The purpose of this section is to provide answers to the second research question of the study outlined below:

- Are male smallholder farmers more resilient to the effects of drought compared to female farmers?

To find appropriate answers to make conclusions on whether male or female farming communities are more resilient to drought, data was collected on the extent to which both participants have access and control of the resources available. Various dimensions are

analysed in this section and the answers are deduced in the discussion. The following questions are analysed in this section:

- To what extent do you have **access** to the following resources during times of drought or in any other periods during your agricultural cycle? Please explain your answer.
- To what extent do you have **control** of the following resources during times of drought or in any other periods during your agricultural cycle? Please explain your answer.
- There are different **benefits** that come out of agriculture. This can be through the sale of produce or the assets available on the farm. Can you please explain the extent to which you have access to the following benefits during times of drought or in any other periods during your agricultural cycle?
- Based on the question above, can you explain the extent to which you have control of the benefits listed.

6.7.1 Access to and control of farming resources by smallholder farmers

This section provides answers to the first half of the questions presented above. These questions are outlined below:

- To what extent do you have **access** to the following resources during times of drought or in any other periods during your agricultural cycle? Please explain your answer
- To what extent do you have **control** the following resources during times of drought or in any other periods during your agricultural cycle. Please explain your answer

Firstly, data was collected to determine the extent to which smallholder farmers, both male and female, have access to, and control of farming resources. Table 6.1 outlines the findings obtained from primary research to determine the extent to which male and female smallholder farmers in the four municipalities under study have access to and control of the farming resources.

Table 6:1 Access to and control of farming resources by smallholder farmers in Dikgatlong, Sol Plaatjie, Magareng and Phokwane

Farming resources in Dikgatlong	Access by women	Control by women	Access by men	Control by men
Water resources such as irrigation and streams	Yes	No	Yes	Yes

Land and natural resources such as fertile soils and drought resistant soils	Yes	No	Yes	Yes
Farming inputs such as fertilisers, seeds and chemicals	Yes	No	Yes	Yes
Farming extension knowledge, education and training from the agricultural officers, schools, etc.	Yes	No	Yes	No
Labour	Yes	No	Yes	Yes

Source: Author's own, 2021

Since the findings from all the four municipalities were similar, they were all integrated into Table 6.1. As the findings indicate, male smallholder farmers have access to and control of a variety of farming resources. For instance, they have full rights to control and determine the allocation of water resources, which include irrigation infrastructure and streams. They also have full access and control of land and natural resources that is available in the smallholding farming communities. Additionally, primary research revealed that they also control farming inputs such as fertilisers, seeds, labour and other inputs. It is only the farming extension knowledge, education and training that the male smallholder farmers do not have control over.

On the other hand, female smallholder farmers have access to various resources but the challenge is that they do not have control over them. Table 6.2 shows that women have access to almost all the resources, which include water supplies, natural resources, farming inputs, education training and development in the farming system. The challenge is that they cannot control these resources, hence; they only benefit to a limited extent. This is similar to the issue of the ownership and control of the agricultural benefits as presented in the following section.

6.7.2 Access to and control of agricultural benefits by smallholder farmers

In addition, data was also collected to assess the extent to which smallholder farmers had access to and control of agricultural benefits. This section provides answers to the second half of the questions outlined below:

- Different benefits come from agriculture. This can be through the sale of products or the assets available on the farm. Can you please explain the extent to which you have access to the following benefits during times of drought or in any other periods during your agricultural cycle?

- Based on the question above, can you explain the extent to which you have control of the benefits listed.

To determine the access to and control of agricultural benefits, focus was limited to resources such as incomes, assets and political power and prestige. The findings obtained are presented in Table 6.2.

Table 6:2 Access to and control of agricultural benefits in Dikgatlong, Sol Plaatje, Magareng and Phokwane

Agricultural benefits in Dikgatlong	Access by women	Control by women	Access by men	Control by men
Income from agriculture	Yes	No	Yes	Yes
Assets in the farming communities	Yes	No	Yes	Yes
Political power and prestige in the farming communities	No	No	Yes	Yes

Source: Author's own, 2021

The findings were consolidated into one figure since there were similar findings across all the municipalities. Primary research concluded that male smallholder farmers have access to and control of income, assets, and political prestige and power in their local communities. The female smallholder farmers, on the other hand, only have access to income and assets available in the communities. They, however, do not have the capacity to control them. Based on these dynamics, it can be concluded that female smallholder farmers are less resilient to drought than their male counterparts.

In some cases, women are even allocated to less-paying opportunities at the expense of men. This can be explained by a study conducted in Burkina Faso, which concluded that women were given power and decision-making authority over lower-income-generating services, while men were given control over higher-income-generating activities (van den Bold *et al.,* 2015). The situation is even worse as these farmers do not have political power and prestige within these communities. Additionally, there is wide array of literature that supports the fact that female smallholder farmers will perpetually find it difficult to be resilient to drought because of a lack of equality in the distribution of resources as a result of rigid cultural beliefs.

To support the above claim, Colfer *et al.* (2015) and Galié *et al.* (2018) found that women will remain vulnerable, and therefore less resistant to drought, due to their cultural positions in decision making processes. In different countries, women are forbidden to participate in key decision-making processes since such positions are reserved for male participants (Galié *et al.,* 2018). In light of this argument, Galié *et al.* (2018) found that many women are often trapped by

societal biases that continuously subject women to household chores, that they cannot own property, and that they must marry to provide for their families.

However, to emancipate women, Agarwal (2000), advocates the inclusion of women in upper echelons of decision-making platforms, especially if the agenda involves community development. Agarwal (2000) claims that as long women are continuously associated with domestic non-skilled duties such as gathering firewood, and raising children, they will become less and less resilient to drought. These findings are seconded by Baskin (2020) who equates women's positions with becoming custodians of the family and children, as well as taking charge of household duties such as child carrying and caring, and generally being the head when the husbands or men are not present.

Other scholars claim that men tend to have access and control resources because traditionally they own those resources. Colfer *et al.* (2015) state that men are culturally given dominant positions in societies as they are in charge of financial and agricultural processes. Johnson et al. (2016) claims that men in African societies usually own the majority of the properties, thus; retain full access and control. This system places women in far more compromised positions given their lower levels of educational qualifications as already presented in the demographics section. The issue of lack of adequate educational qualifications has been noted by Nyangito (2015) as one of the factors that lead women to be less resilient to drought and other disasters. Considering all these arguments discussed above, female smallholder farmers are more vulnerable to drought than their male counterparts because they normally bear the brunt of the responsibility (caring for many people in their households) before they even consider ways to be drought tolerant. Thus, women are placed in positions in which they can just be followers, therefore; their expected roles will be based on domestic chores, parenting, and diet.

6.8 Assessing coping and adaptation strategies

This section is dedicated to providing answers to the third research question of this study outlined below:

- What mechanisms do smallholder male and female farmers explore to cope and adapt to drought hazards in Frances Baard?

To find answers to the third research question identified above, the following open-ended questions were asked during focus group discussions:

- What have you done as a smallholder farmer to cope with the drought conditions?
- What have you done to adapt to drought conditions?

6.8.1 Smallholder farmers' coping strategies to drought

This section presents findings to the first question above outlined as follows:

- What have you done as a smallholder farmer to cope with the drought conditions?

Throughout the discussions, various themes were identified to clearly articulate how smallholder farmers intervene to counter the challenges related to drought. Following the completion of primary data collection, the following themes were deduced as the main coping mechanisms.

- Saving income from agriculture for the future;
- Saving the available farm harvest for future consumption; and
- Keeping livestock for future consumption.

The themes identified were quantified to determine the frequencies of the participants based on their coping mechanisms. The findings obtained from the study are presented in Figure 6.9 and Figure 6.10.

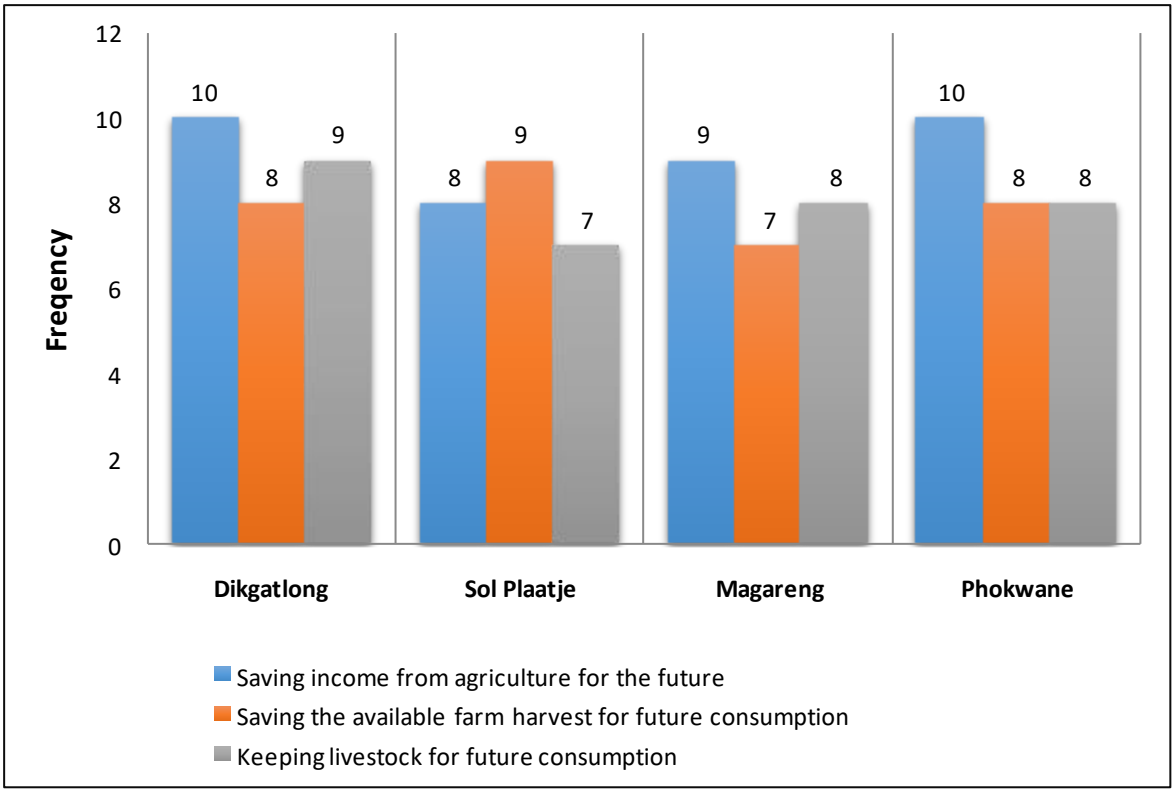

Figure 6.9: Male smallholder farmers coping mechanisms to drought
Source: Author's own, 2021

Figure 6.9 shows that among male participants from Dikgatlong, Sol Plaatje, Magareng and Phokwane, there is uniform application of the coping strategies used to mitigate the challenges of drought. As shown in the findings presented above, all the male participants from Dikgatlong and Phokwane indicated that they save money for the future. On the other hand, $(\frac{8}{10})$ of the participants from Sol Plaatje and $(\frac{9}{10})$ from Magareng also indicated that they save money. Additionally, $(\frac{8}{10})$ of the male smallholder farmers from Digkatlong and Phokwane save the available harvest for future consumption as also seconded by $(\frac{9}{10})$ of the farmers based in Sol Plaatje and the remaining $(\frac{7}{10})$. The remaining male smallholder farmers indicated that they keep livestock for future consumption with $(\frac{9}{10})$ of the participants being high in Dikgatlong and $(\frac{7}{10})$ in Magareng.

Further analysis of these findings through open-ended questions shows that the reasons behind using these coping mechanisms actually differ among male smallholder farmers. The verbatim presented below were obtained from primary data to support the reasons for the adopted mitigation strategies. Male smallholder farmers from Dikgatlong mentioned that:

"…..*while saving money for the future is a good idea, I will just migrate to the towns and look for employment there*" (M7).

"….at times we really want to invest the money to use in the future but honestly with this drought the money is never enough" (M8).

On the other hand, those stationed in Sol Plaatje mentioned indicated that:

"…..this place is really for women and young children. I think it is better that the women help in saving the grain for tomorrow. As men, we just have to go to towns to look for employment" (M3).

"…..the money that comes from agriculture cannot really be saved for future consumption. In most cases it is money that is not even enough to buy a cow, so it is money that can be earned and used there and there" (M10).

Those from Magareng shared similar sentiments and mentioned that:

"…..the money that you save here in the farming communities does not help that much. Things are expensive these days so you find out that the money you save is already inflated" (M3).

"…..saving money or grain is important but if you do not know how to save it you may not benefit from some of the advantages it comes with. So better to save money in assets than liquid form" (M8).

Lastly, the smallholder farmers from Phokwane maintained that:

"…..I agree that saving money and grain for future use and consumption is important. But at times you are caught in a situation between life and death to the point that you end up digging those savings" (M5).

"…..Saving grain for the future is important for me and my family and my livestock. If you save what you have very well, it helps you in the future. You will not suffer" (M6).

To make appropriate comparisons, Figure 6.10 shows the mechanisms employed by women to cope with drought.

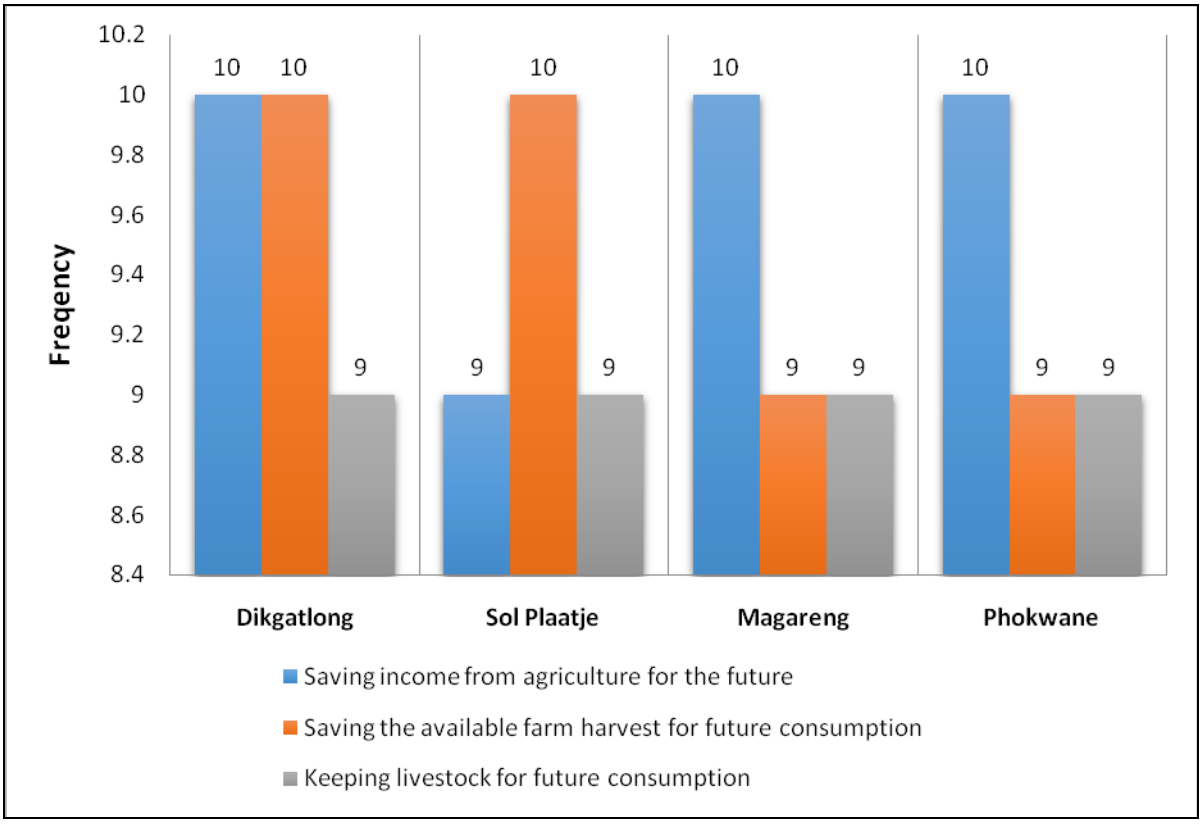

Figure 6.10: Female smallholder farmers' coping mechanisms to drought
Source: Author's own, 2021

The findings presented in Figure 6.10 shows that female smallholder farmers are more active in making use of coping mechanisms against drought compared to their male counterparts. The figure also shows that all the participants used more than one coping mechanisms as presented by the summation of frequencies which is greater than 80 participants. One of the strategies used by the female smallholder farmers is that of saving the available farm harvest for future consumption. This is indicated by a significant number of participants who were of this view, followed by others who indicated that they mitigate drought by saving the income obtained from agricultural activities for future purposes.

The findings presented above also show that men opt to save farm produce and income for future purposes but their frequency is far less than that of women. As shown by the statistics amongst men, some were of the view that they save their harvest while others indicated that they save the income generated from the farm. This is further unpacked below. The farmers went on to mention that they keep livestock for future consumption drought. Female smallholder

farmers from these four farming regions also provided information to present how much they have been coping with drought. This is shown by the verbatim presented below. Female smallholder farmers from Dikgatlong noted that:

> *"…..I prefer to save the grain that I have from the previous farming season than to migrate to other countries or looking for other alternatives to make money" (F4)*

> *"…..as a mother, it is expected of me to save grain for a year or two. If it happens that we have to buy food supplies, let it be just to add. So, no matter how bad the drought is, saving for tomorrow is important" (F5*).

Female smallholder farmers from Sol Plaatje support the above views as they mentioned that:

> *"…..we were just told ever since we were growing up that it is important to save money so that we survive in the future" (F2).*

> *"…..saving money out of agricultural production might not be enough but it covers a huge gap because as it stands there is no income available unless we receive remittances from the relatives in town or government hand-outs"* (F7).

Those farmers in Magareng also supported the findings already presented by stating that:

> *"…..my opinion for saving income and farm harvest for future consumption is that it provides me with more stability in my life. It gives me some sort of stability and security" (F1).*

> *"…..If you have money set up for emergencies, you have a safety net in case anything unexpected happens. You may also be able to take chances or try new things if you have funds saved away for discretionary costs"* (F2).

Lastly, the farmers based in Phokwane noted that:

> *"…..I would rather save income or harvest during this drought era because it gives you greater steadiness in your life" (F4).*

> *"…..I also save money because it is one of the essential aspects of building wealth and having a secure financial future. Saving money gives me a way out from uncertainties of life and provide me with an opportunity to enjoy a quality life*" (F9).

According to the frequencies, a high number of female smallholder farmers and male farmers, sell livestock in times of need. This coping mechanism has been approved by scholars, for example; Lekapana (2013) who mention that livestock acts as a shield during drought. In addition, Blamey *et al.* (2018) and Graw *et al.* (2017) opine that livestock is a capital investment which people sell when they need to boost their financial base. Graw *et al.* (2017) also states that subsistence farmers tend to sell their surplus to sustain themselves.

However, the findings presented above show mixed perceptions in relation to the coping mechanisms that smallholder farmers use to deal with challenges related to drought. What is more apparent is that they find more comfort in keeping the income and output obtained from the previous and current seasons for future purposes. In support of the results presented, a study conducted by Ayanlade *et al.* (2018) concluded that farmers have various coping mechanisms at their disposal to face drought challenges. Some of these ways include selling their livestock to get an income, migrating to urban and industrial areas to seek alternative employment, and starting new ventures outside the agricultural arena. Nonetheless, as the majority of the smallholder farmers indicated through primary data collection, Botai *et al.* (2016) noted that farmers tend to be well-positioned to cope with any predicted drought by storing harvested grain and saving money especially if they do not have access to other alternatives like those in the medium and heavily irrigated areas.

6.8.2 Smallholder farmers' adaptation strategies

The second question asked in this section was as follows:

- What have you done to adapt to drought conditions?

Two themes were provided on the adaptation strategies that smallholder farmers from the four municipalities implemented. These are outlined below.

- Adapting to drought resistant crops; and
- Changing the cropping calendar.

The findings obtained are presented in the following figures.

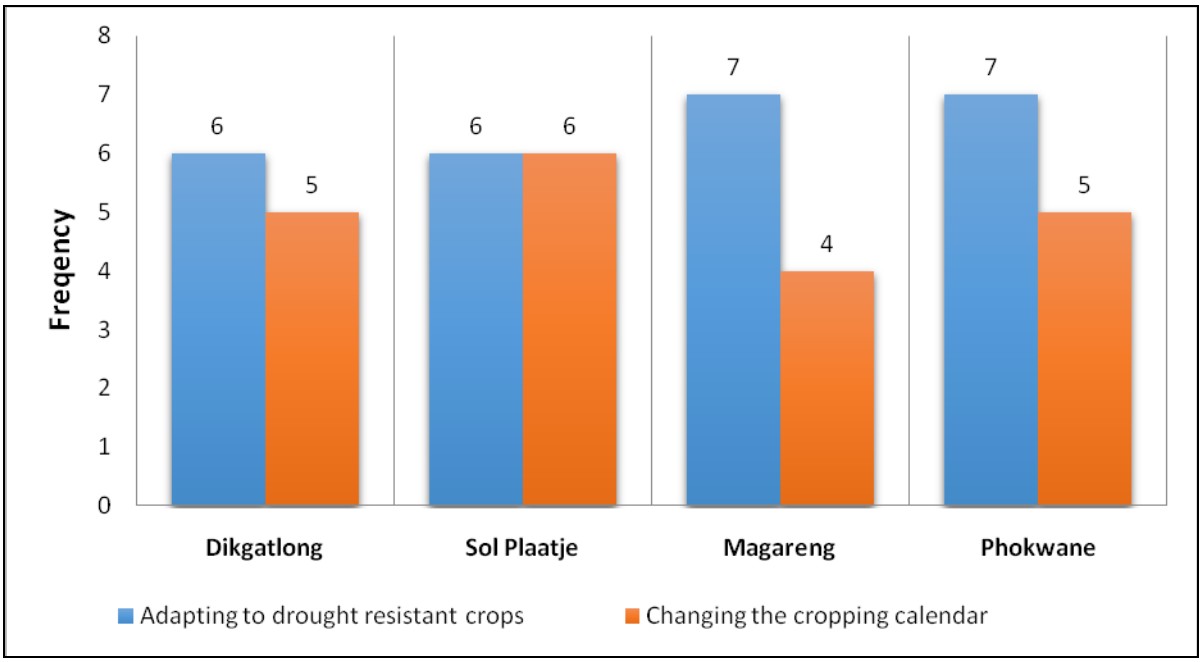

Figure 6.11: Male smallholder farmers' adaptation mechanisms to drought
Source: Author's own, 2021

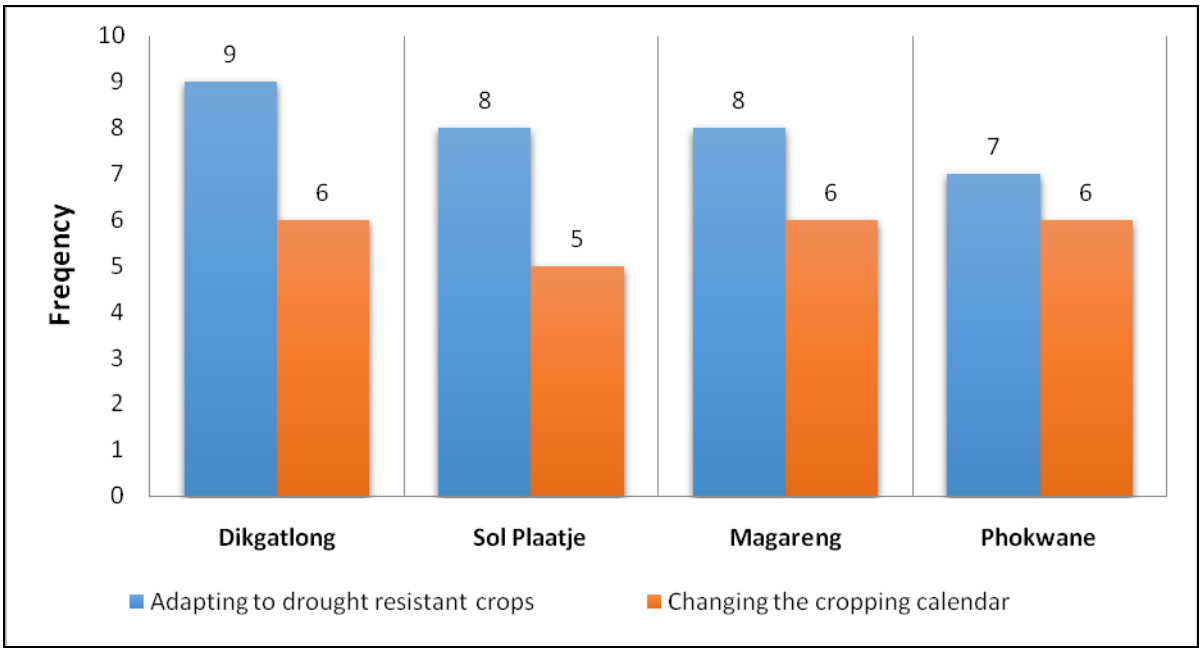

Figure 6.12: Female smallholder farmers' adaptation mechanisms to drought
Source: Author's own, 2021

Among the strategies used, the least employed is that of changing the cropping calendar. The findings obtained show that both female and male smallholder farmers rarely use this

mechanism. Although both female smallholder farmers and their male counterparts make use of this strategy, the frequency looks significantly small compared to the other strategies used to mitigate drought.

This coping mechanism is followed by that of adapting to drought resistant crops as a way to do away with drought. The findings presented in the figures above shows that a significant number of female smallholder farmers and male smallholder farmers make use of this mechanism. The uniformity in the usage of this strategy clearly shows that a significant number of farmers have knowledge about adopting the drought-resistant crops, but the rate on which it is being absorbed in this farming community is still low.

6.9 Drought information and communication

6.9.1 Communication strategies used by smallholder farmers to foster drought resilience

This section is dedicated to providing answers for the fourth research question for this study outlined below:

- What communication strategies do male and female smallholder farmers explore to foster drought resilience?

To find answers to the third research question identified above, the open-ended question below was asked during focus group discussions. These questions are:

- What communication strategies do you use and do they help you cope, adapt and become resilient to drought?

The study found smallholder farmers use various social networks to foster drought resilience. The three main networks implemented within the farming communities are:

- Agricultural cooperatives;
- Village committees; and
- Women's groups.

Similar to other themes that have been analysed earlier in this chapter, participants indicated that there are part of some communication networks to foster resilience to drought. The three

thematic areas in which the local communities communicate with one another are graphically presented in the Figure 6:13.

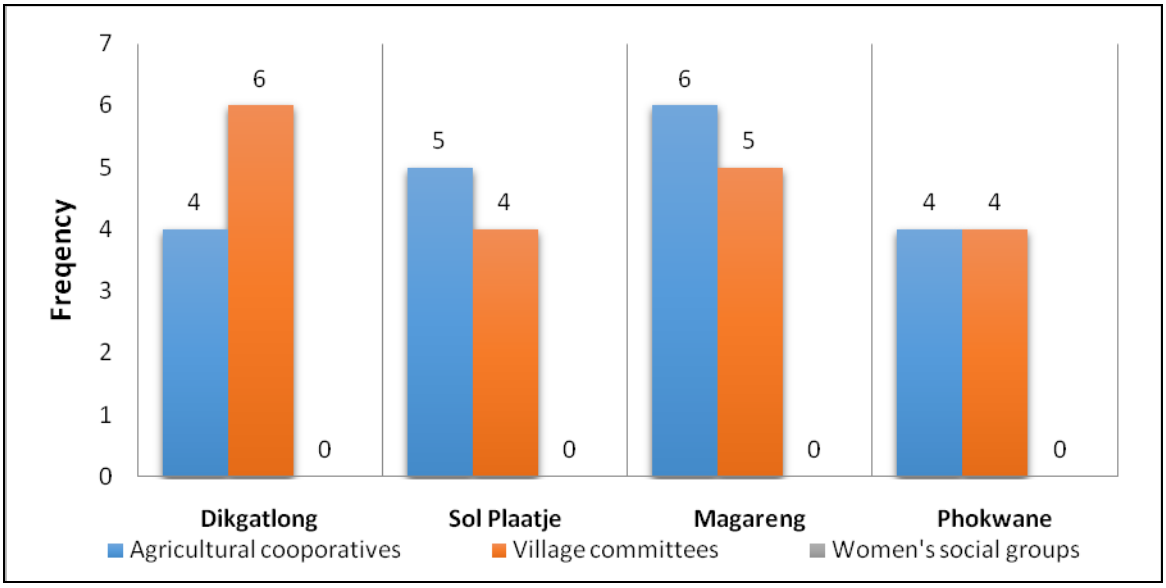

Figure 6:13 Communication networks used by male smallholder farmers to foster drought resilience
Source: Author's own, 2021

Figure 6.13 illustrates the communication networks explored by the male farmers. Male smallholder farmers indicated that they are part of agricultural corporative, only $(\frac{19}{40})$ represented these members. Primary research also indicated that the male smallholder farmers are also part of the village committees but their representativeness is fairly lower as evidenced by $(\frac{19}{40})$ who were part of these groups.

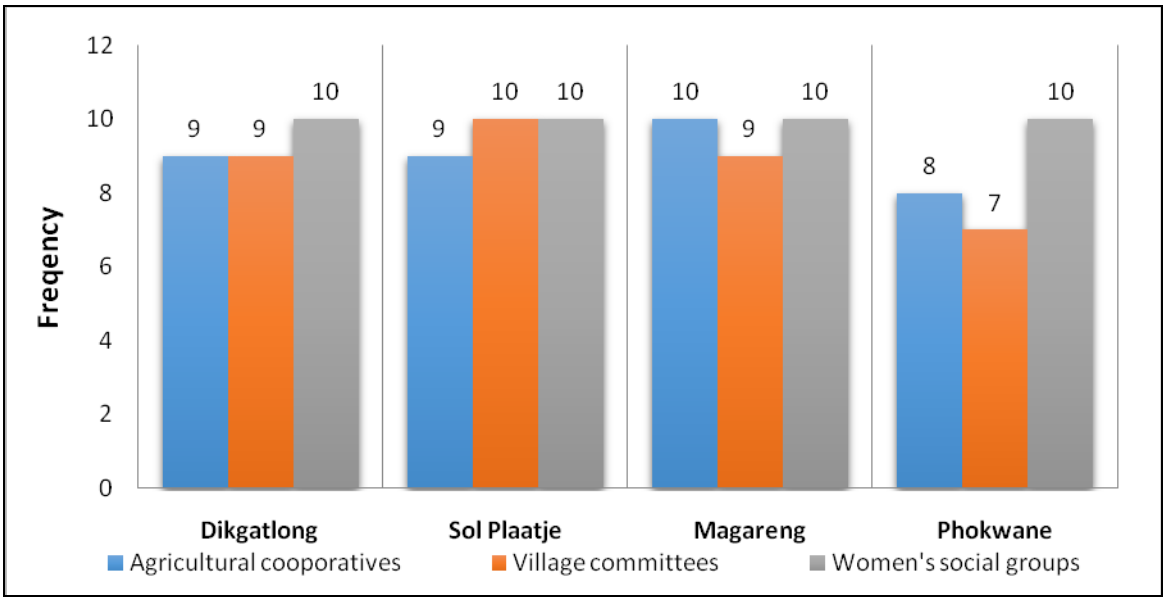

Figure 6.14. Communication networks used by female smallholder farmers' to foster drought resilience
Source: Author's own, 2021

The participation of male and female smallholder farmers in these groups is shown in Figure 6.14. All the female smallholder farmers that participated in this study ($\frac{40}{40}$) indicated that they were members of the women's group. Primary data collection also revealed that a high number of participants were part of the village committees. These represented ($\frac{85}{40}$) of the women who participated in the study. The last group of women ($\frac{36}{40}$), indicated that they belong to agricultural cooperatives.

6.10 The extent to which smallholder farmers are resilient to drought

This section provides an analysis of the extent to which the smallholder farmers are resilient to drought. In order to find answers to this section, the following questions were asked during primary data collection:

- Are smallholder female and male farmers in FBDM vulnerable to drought?
- Are smallholder male farmers more resilient to the effects of drought compared to female farmers?
- What mechanisms do smallholder male and female farmers explore to cope and adapt to drought hazards in FBDM?

- What communication strategies do male and female smallholder farmers explore to foster drought resilience?

The answers obtained from primary data collection are analysed in the following section.

6.10.1 Are smallholder female and male farmers in Frances Baard vulnerable to drought?

The study assessed the extent to which smallholder farmers are vulnerable to drought. Data gathered from both male and female smallholder farmers and literature indicates that drought has various economic, environmental, and social consequences.

Drought has adverse economic impacts which in turn affect the way farming is conducted (Madsen & Andrade, 2018).The respondents indicated that due to drought, there are no ways in which they can pay up their debts because drought has affected their produce(s). Similar economic impacts of drought were experienced in Dikgatlong, Sol Plaatje, Magareng and Phokwane.

Further analysis of the impacts of drought also found that drought has severe environmental impacts in the farming communities. Both primary and secondary data collected revealed that drought affects the environment to the extent that farming is affected. The respondents indicated that their soils have lost their quality because of inconsistent rainfall. Some were concerned with the quality of their plants because of drought. Since the water supply is not stable as it should be under the circumstances where there is adequate rainfall, plants have been severely affected. Similar environmental impacts of drought were experienced in Dikgatlong, Sol Plaatje, Magareng and Phokwane.

The study also revealed that drought is associated with negative social impacts, which may leave female smallholder farmers more vulnerable than their male counterparts. The male smallholder farmers were mostly concerned about the fact that they are no longer in a position to provide for their families, which is something that will classify men as failures in the African communities (Blamey *et al.,* 2018). The female smallholder farmers indicated that they end up getting into conflicts with other community members because of access to water sources. Respondents indicated that there are significant impacts of drought, which affect the social lives of both male and female smallholder farmers. The majority of the male participants had the belief if there was no drought for several years; people would be living good lives that are above the poverty datum line. Similar social impacts of drought were experienced in Dikgatlong, Sol Plaatje, Magareng and Phokwane.

The study concludes that all smallholder farmers are vulnerable to drought, which has affected their ability to care for their families, their income, and the quality of their produce.

6.10.2 Are smallholder male farmers more resilient to the effects of drought compared to female households?

The study investigated drought resiliency of smallholder female farmers as compared to smallholder male farmers. To find appropriate answers and make conclusions on whether male or female farming communities are more resilient to drought, data was collected on the extent to which both participants have access and control of the resources available.

Primary and secondary data were collected to determine the extent to which smallholder farmers, both male and female, have access to and control of farming resources. Findings from four municipalities indicated that male smallholder farmers have access to and control a variety of farming resources. For instance, they have full rights to control and determine the allocation of water resources, which include irrigation infrastructure and streams. They also have full access and control of land and natural resources that is available in the smallholding farming communities (Ludgate *et al.,* 2016). Additionally, primary and secondary research revealed that male smallholder farmers also control the farming inputs such as fertilisers, seeds, labour and other inputs. It is only farming extension knowledge, education and training that the male smallholder farmers do not have control over. On the other hand, the findings from both primary and secondary data indicate that female smallholder farmers have access to various resources but the challenge is that they do not have control over them (Moshood *et al.,* 2020). For instance, in all the four municipalities women have access to almost all the resources which include water supplies, natural resources, farming inputs, education training and development in the farming system. The challenge is that they do not have the capacity to control these resources, hence; they only benefit to a limited extent.

Primary and secondary data was also collected to assess the extent to which smallholder farmers had access to and control of agricultural benefits. To determine the access to and control of agricultural benefits, focus was limited to resources such as income, assets and political power and prestige. Primary and secondary research concluded that male smallholder farmers have access to and control of income, assets and political prestige and power in their local communities. However, female smallholder farmers, on the other hand, only have access to income and assets available in the communities. They do not have the capacity to control them. In some cases, women are even assigned to less paying opportunities for the benefit of men. A study conducted in Burkina Faso concluded that women were given power and

decision-making authority over lower-income-generating services, while men were given control over higher-income-generating activities (van den Bold *et al.,* 2015; Johnson *et al.,* 2016). Based on these dynamics, it can be concluded that female smallholder farmers are less resilient to drought than their male counterparts. Male farmers are more resilient since they have access to and control over farming resources and agricultural benefits.

6.10.3 What mechanisms do smallholder male and female farmers explore to cope and adapt to the drought hazards in Frances Baard?

The study investigated drought coping and adaptation mechanisms of smallholder female farmers as compared to male farmers. Throughout the discussions, various themes were identified to articulate how smallholder farmers intervene to counter the challenges relating to drought. The findings from literature and discussion done, show that the reasons behind using the coping mechanisms for female farmers differ from those of male smallholder farmers (Baskin, 2020). Female smallholder farmers were more active in making use of coping mechanisms against drought compared to their male counterparts (Madsen and Andrade, 2018). The findings also show that all the participants used more than one coping mechanism. One of the strategies used by the female smallholder farmers is that of saving the available farm harvest for future consumption. Another strategy to mitigate drought is through saving the income obtained from agricultural activities for future purposes. The findings from both primary and secondary data also show that men also save farm produce and income for future purposes but their frequency is far less than that of women. Some respondents were of the view that they save their harvest while others indicated that they save the income generated from the farm. The farmers went on to mention that they keep livestock for future consumption during times of drought. This coping mechanism has been approved by scholars, for example; Lekapana (2013) who mention that livestock acts as a shield during drought. In addition, Blamey *et al.* (2018) and Graw *et al.* (2017) opine that livestock is a capital investment which people can sell when they need to boost their financial base. Graw *et al.* (2017) also states that subsistence farmers tend to sell their surplus to sustain themselves.

Among the strategies used, the least employed is that of changing the cropping calendar. The findings obtained show that both female and male smallholder farmers rarely use this mechanism. This coping mechanism is followed by adapting to drought resistant crops as a way to do away with drought. Primary and secondary data show that a significant number of female smallholder farmers and male smallholder farmers make use of this coping mechanism(s). The uniformity in the usage of this strategy clearly shows that a significant number of farmers have

knowledge about adopting the drought-resistant crops; however, the rate at which it is being used in this farming community is still low.

In terms of coping strategies, the study concludes that smallholder farmers preserve agricultural income for future use, as well as harvest and livestock for future use. They also adapt to drought by cultivating drought-resistant crops and altering the cropping calendar.

6.10.4 What communication strategies do male and female smallholder farmers explore to foster drought resilience?

The study assessed communication strategies explored by male and female smallholder farmers to foster drought resilience. The study found out that smallholder farmers to foster drought resilience use various social networks. The three main networks implemented within the farming communities are: agricultural cooperative(s); village committees; and women's groups.

Primary and secondary research concluded that women are more active in participating in the communication groups than male smallholder farmers. The women's social groups facilitate the sharing of diverse information, of which some of the information is related to drought resistance and other ways to deal with its negative consequences. Primary data from the discussions also revealed that a high number of participants were part of the village committees. Agricultural cooperative(s); village committees; and women's groups are important because they enable the sharing of information, skills, ideas and mitigation strategies on various challenges faced within the agricultural arena (Cheeseman *et al.,* 2017). In this way, the respondents indicated that they are part of these networks where they co-exist and work together towards the fulfillment of the group's objectives.

Furthermore, the study found that men also participate in the sharing of information through the aforementioned platforms. However, the rate of their participation and membership to these particular groups is lower than that of female smallholder farmers. Literature shows that women are exposed to particular cultural subordination to the extent that they must find ways to navigate around the challenges they face within the situation they are placed in. According to Agarwal (2000), women find ways to be resilient to drought when it occurs. The study concludes that agriculture cooperative(s), village committees, and women's groups, are three main communication strategies that are currently being implemented within the farming communities in Dikgatlong, Sol Plaatje, Magareng, and Phokwane.

Primary research concluded that women are more active in participating in the communication groups than male smallholder farmers. One of the most popular groups among women is that of

the women's social group. The women's social groups facilitate the sharing of diverse information, of which some of the information is related to drought resistance and other ways to deal with its negative consequences. Kunguma (2020) supports this thinking by further stating that information sharing contributes to building resilience to drought disasters.

The village committees are normally informal groups that are formed for developmental purposes around the local communities. Among the developmental agendas are also these issues relating to agricultural development. These cooperatives are important because they enable the sharing of information, skills, ideas and mitigation strategies on various challenges faced within the agricultural arena. In this way, the respondents indicated that they are part of these cooperatives where they co-exist and work together towards the fulfillment of the group's objectives.

The study found that men also participate in the sharing of information through the aforementioned platforms. However, the rate of their participation and membership to these particular groups is lower than that of female smallholder farmers as shown by the number of female participants compared to their male counterparts. These numbers are far much lower than the membership of female smallholder farmers in similar groups.

While information sharing to foster drought resistance is done among smallholder farmers, its impact is limited among men. As such, because women are more vulnerable to drought, they always look for information to ensure that they are updated on what to do when they are faced with challenges relating to drought.

Literature shows that women are exposed to particular cultural subordination to the extent that they find ways to navigate around the challenges they face within the situation they find themselves. According to Agarwal (2000), women tend to find ways to become resilient to drought when it occurs. For example, they are more likely to invest in group insurance, which helps them to share the risks of drought with their society, families, and friends. Cleaver (1998), who inferred that during tough times, such as drought and other natural disasters, women assist one another in the farms in exchange for money, labour, or produce, confirms these results.

The findings described above show that women's drought resistance is reliant on internal mechanisms rather than a variety of external variables. If they rely on internal village communities, women have flexible and adaptable networks of mutual insurance and risk-sharing organisations at their disposal. These include informal mutual organisations and institutional

partnerships founded on secular and religious ideals (Berkes and Siaxas, 2005). Women's village-level groups, both formal and informal, are successful in their efforts to foster unity and local developments. Women rely on certain social interactions to cope with, sustain, or respond to stress in their daily lives, including the impacts of drought on agricultural operations.

6.11 Conclusion

The main purpose of this chapter was to present the findings from the data analysis to address five research questions. The chapter analysed data to understand the level of vulnerability to drought, the resilience of smallholder farmers to drought, the mechanisms they use to cope with drought, the communication strategies used during drought, and in the end to make recommendations for addressing drought. Fourty (40) male and 40 female smallholder farmers from Dikgatlong, Sol Plaatje, Magareng, and Phokwane provided information through focus group discussions. The study found that drought has various economic, environmental, and social consequences. The study then found that all smallholder farmers are vulnerable to drought, which has affected their ability to care for their families, their income, and the quality of their produce. In terms of resilience, the study found that both farmers are resilient, but male farmers are more resilient since they have access to and control over farming resources and agricultural benefits. In terms of coping strategies, the study discovered that smallholder farmers preserve agricultural income for future use, as well as harvest and livestock for future use. They also adapt to drought by cultivating drought-resistant crops and altering the cropping calendar. Agriculture cooperatives, village committees, and women's groups are used as communication strategies. The following chapter outlines the conclusions and recommendations.

CHAPTER SEVEN: RECOMMENDATIONS AND CONCLUSIONS

7.1 Introduction

The previous chapter gave an analysis of the data collected through focus group discussions. This chapter provides recommendations and conclusions on the resilience of female smallholder farming communities in Frances Baard District Municipality to drought. The overall aim of the study was to investigate the effect of drought hazards on smallholder female farmers from Frances Baard District Municipality district and to assess their coping, adaptation, and resilience to droughts as compared to smallholder male farmers in the rural communities. This chapter provides conclusions based on the study research questions.

7.2 Study conclusions

The study concluded that drought has various economic, environmental, and social consequences in Dikgatlong, Sol Plaatje, Magareng, and Phokwane farming communities. The study also concluded that all smallholder farmers are vulnerable to drought, which has affected their ability to care for their families, their income, and the quality of their produce(s). To determine if female smallholder farmers are less resilient to their male counterparts, the study concluded that both smallholder male and female farmers are both resilient, but male farmers are more resilient since they have access to and control over farming resources and agricultural benefits. When farmers are exposed to drought risks, they cannot afford to abandon their livelihoods. Therefore, they find mechanisms to cope and adapt with the drought hazard. The study concluded that both smallholder farmers preserve agricultural income for future use, as well as harvest and livestock. Smallholder farmers also adapt to drought by cultivating drought-resistant crops and altering the cropping calendar. According to Kunguma and Terblanche (2013), establishing communication links with other stakeholders is key to fostering resilience. Therefore, the study concluded that agriculture co-corporative(s), village committees, and women's groups, are used as communication strategies.

7.3 Recommendations

7.3.1 Are smallholder female and male farmers in Frances Baard vulnerable to drought?

Since all smallholder farmers are equally vulnerable to drought, the study recommends that they preserve biodiversity, open space, and trees, and reduce land degradation as small farms

provide valuable ecosystem services to the larger society. Sustainable food production entails making smallholder farms more productive and efficient.

7.3.2 Are smallholder male farmers more resilient to the effects of drought compared to female farmers?

Farmers can improve their drought resiliency by making different crop choices, taking crop insurance and other farm risk management programmes, and investing in soil health. Strategies that may be employed to sustain yield gains include the conservation and evaluation of plant and animal genetic resources, integrated pest management, conservation and enlightened management of soil and water resources, and crop and livestock diversification.

7.3.3 What mechanisms do smallholder male and female farmers explore to cope and adapt to the drought hazards in Frances Baard?

It is recommended, that smallholder farmers plant or maintain vegetation, living or dead, provide cover on the soil surface and reduce erosion. They need to keep on cultivating low-water using plants like barley, which are typically used as cover crops during droughts. Good scheduling or *"Irrigation Water Management"* also helps to stretch limited water supplies.

7.3.4 What communication strategies do male and female smallholder farmers explore to foster drought resilience?

It is recommended that smallholder farmers continue to make use of these current participatory communication strategies as part of their agricultural development interventions in face of drought. However, farmers need to put more emphasis on the latest participatory communication strategies and come up with new approaches for effective communication. In this context, continuous development in communication strategies provides interesting frameworks that can be used to improve the drought resiliency of farming communities.

7.4 Further studies

It may be worthwhile for other scholars to include other antecedents of the resilience of female smallholder farmers to drought. However, this study shed more light on the effect of drought hazards on smallholder female farmers in FBDM and their coping, adaptation, and resilience to droughts as compared to smallholder male farmers. In the future, other scholars should consider furthering the research to explore the benefits of sustainable farming to farmers and their communities.

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APPENDICES

APPENDIX A: ETHICAL CLEARANCE LETTER

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS UV

GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

27-Sep-2021

Dear Ms Mendi Siganu

Application Approved

Research Project Title:
Assessing the Resilience of Female-Headed Small-holder Farms to Drought: Case Study in Frances Baard District, South Africa

Ethical Clearance number:
UFS-HSD2021/1090/21

We are pleased to inform you that your application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. We request that any changes that may take place during the course of your study/research project be submitted to the ethics office to ensure ethical transparency. furthermore, you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for submitting your proposal for ethical clearance; we wish you the best of luck and success with your research.

Yours sincerely

Dr Adri Du Plessis
Chairperson: General/Human Research Ethics Committee

Dr Adri du Plessis
Digitally signed by Dr Adri du Plessis
Date: 2021.09.28 08:32:51 +02'00'

205 Nelson Mandela Drive
Park West
Bloemfontein 9301
South Africa

P.O. Box 339
Bloemfontein 9300
Tel: +27 (0)51 401 9537
dayleenia.s@ufs.ac.za
www.ufs.ac.za

APPENDIX B: INTERVIEW GUIDE

FOCUS GROUP DISCUSSION INTERVIEW GUIDE

I am a Master of Disaster Management student from the University of the Free State – Disaster Management Training and Education Centre for Africa (UFS-DiMTEC). I am conducting a study titled: **Assessing the Resilience of FemaleSmallholder Farms to Drought: Case Study in Frances Baard District, South Africa. This discussion is anonymous, your answers are confidential, and all information obtained is for academic purposes only.**Y our honest answers to questions will provide an understanding of the resilience of femalesmall-holder farmers to drought. The research was reviewed and approved by the University of the Free State's Ethics Review Committee,**Ethical Clearance Number: UFS-HSD2021/1090/21**. You can contact me via my email address MSigenu@solplaatje.org.za or through my phone number +27 83 261 9561for more details of the study and findings.

- I would appreciate it if you answer the questions in this discussion fully and as honest as possible
- If you do not feel like answering some of the questions, feel free to remain quiet or ask for the next question from the coordinator of the discussions;
- Again, if you feel like discontinuing from participating in this study, you are free to do so at any time. However, you cannot stop participating in the study once your input has been submitted for analysis;
- Be informed that you will not be compensated for participating in the focus group discussions. Your participation is voluntary and free.
- The discussion will take approximately an hour to two (2)hours, as we will enable the participants to bring out as many aspects as possible. Be informed that the discussions will be recorded using audio recorders to help me capture the discussion appropriately.
- Make sure you all follow and observe the Covid-19 regulations always.

Please fill in SECTION A with your demographic data, the rest of the questions will be asked by the facilitator. Once we are done with the discussion, please handover this Interview Guide to the Facilitator.

Do you consent to participate in this survey? YES NO

SECTION A: DEMOGRAPHIC DATA

1	**Please indicate your gender**				1. Male	2. Female
2	**Please indicate your age**	1. 18	2. 19-29	3. 30-41	4. 42-53	5. Over 54

3	**What is the highest level of education you attained?**	1. Never went to school 2. Primary school 3. High school 4. Vocational training 5. Tertiary education
4	**Where is your farm located within Frances Baard District Municipality**	
5	**For how long have you been practicing smallholder farming?**	
6	**What type of farming do you practice?**	

	Women	**Men**
Productive Activities		
Agriculture		
• Activity 1		
• Activity 2		
Income generating		
• Activity 1		
• Activity 2		
Employment		
Reproductive activities		

- Fuel
- Water
- Childcare
- Cooking
- Health
- Repairs
- Cleaning

Community Involvement

- Agricultural-related meetings
- Helping people in need
- Labor in community agricultural projects

SECTION B: UNDERSTANDING DROUGHT IN FRANCES BAARD

1. What is your understanding of drought?

SECTION C: ASSESSING VULNERABILITY TO DROUGHT

1. How has drought affected you as a smallholder farmer?

2. Who is more vulnerable to drought, men or women and why?

SECTION D: ASSESSING RESILIENCE TO DROUGHT

1. To what extent do you have **access** to the following resources during times of drought or in any other periods during your agricultural cycle? Please explain your answer.

(The research here probes the extent to which farmers (either male of females) have access to the following resources:

- *Water resources; Land and natural resources; Seed, fertilisers and chemicals; Extension knowledge; Labour*
- *Notes can be noted down in the following table in addition to audio recordings*

Access to resources by female small-holder farmers	**Access to resources by male small-holder farmers**

2. To what extent do you have **control** the following resources during times of drought or in any other periods during your agricultural cycle. Please explain your answer.

(The researcher here probes the extent to which farmers (either male of females) have control of the following resources:

- *Water resources; Land and natural resources; Seed, fertilisers and chemicals; Extension knowledge; Labour*
- *Notes can be noted down in the following table in addition to audio recordings*

Control of resources by female small-holder farmers	**Control of resources by male small-holder farmers**

3. There are different benefits that come out of agriculture. This can be through the sale of produce or the assets available on the farm. Can you please explain the extent to which you have **access** to the following benefits during times of drought or in any other periods during your agricultural cycle?

(The researcher here probes the extent to which the farmers have access to the following benefits:

- *Income from agriculture; assets in the farming community; education and training; political power and prestige.*

- *Notes can be noted down in the following table in addition to audio recordings*

Access to income by female small-holder farmers	**Access to income by male small-holder farmers**

Based on the question above, can you explain the extent to which you have **control** of the benefits listed.

(The researcher here probes the extent to which the farmers have control of the following benefits:

- *Income from agriculture; assets in the farming community; education and training; political power and prestige.*

- *Notes can be noted down in the following table in addition to audio recordings*

Control of income by female small-holder farmers	**Control of income by male small-holder farmers**

SECTION E: ASSESSING COPING AND ADAPTATION STRATEGIES EXPLORED

1. Who do you think is coping and adapting more to drought in this area, men or women, and why?
2. What have you done as a small-holder farmer to cope with the drought conditions?

The researcher here probes the extent to which the following influencing factors may be a factor in the coping and adaptation strategies for the farmers (either male or female-headed

- *Community norms; Social hierarchy; Institutional stakeholder policies; Economic factors; Political factors; Psycho-social elements; Cultural expectations;*

SECTION F: DROUGHT INFORMATION AND COMMUNICATION

1. What communication strategies do you use do they help you to cope, adapt and become resilient to drought? (Please list them below)

Female small-holder farmers	**Male small-holder farmers**

APPENDIX C: LANGUAGE EDITOR LETTER

) K M

LANGUAGE AND TECHNICAL EDITING • PROOFREADING • PLAGIARISM CHECKING • ACADEMIC RESEARCH
(HONS AND MASTERS) AND PROJECT SUPERVISION • BUSINESS PROPOSAL

29 November 2021

LETTER OF CONFIRMATION

I hereby confirm that I have done the language editing for the following dissertation:

Author: Ms M Sigenu

Title: Assessing the resilience of female smallholder farmers to drought: A case study of Frances Baard district, South Africa

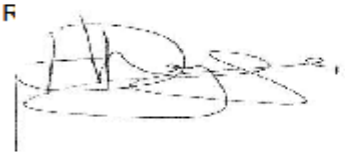
Document: Master in Disaster Management

This letter serves to confirm that I have edited Ms M Sigenu document and I have made appropriate changes and highlighted areas that the student needs to revisit. The document was edited using track changes and comments in Microsoft word.

I am not responsible for any additional information that is added to the document after I have edited it. The student is responsible for the final document submitted.

I trust you find the above in order.

F



Hazvinei Majonga
Registered Board: South African Translators Institute
Membership Number :10033691

CELLPHONE: 072 748 4133 • WORK NUMBER: 051 436 2488 • E-MAIL: hmajonga@gmail.com • ADDRESS: 14 GROOTE SCHUUR, ALWAL STREET,ARBORETUM,BLOEMFONTEIN