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EXAMINING THE ROLE OF MILLET ENTREPRENEURIAL PRODUCTION IN IMPROVING FOOD SECURITY AND NUTRITION IN CHIVI RURAL DISTRICT

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ABSTRACT

Introduction: Existing research extensively documents food shortages, hunger, and poverty in Africa and Asia. Climate change is a major driver of worsening food insecurity, contributing to these problems and negatively impacting a growing global population's health, nutrition, and economic well-being. Smallholder farmers face significant challenges in improving food security and nutrition through millet cultivation. This study examined the role of millet entrepreneurship production among 15 farmers, enhancing food security and nutrition in rural households within Zimbabwe's Chivi District.

Methods: Data were collected through in-depth face-to-face interviews and focus groups, using a descriptive qualitative case study design. To capture the diverse landscape of smallholder farmers in an informal context, both purposive and snowball sampling methods were utilized to select participants for the study.

Results: According to the findings, millet entrepreneurship in the Chivi district has improved community households' food security and nutrition, demonstrating that small grain agriculture thrives in climatically challenging regions and raises living standards. Among the favorable benefits, rural farmers produce better food nutrition, have higher incomes, improved living conditions, and increased educational opportunities for their children.

Conclusion and suggestion: The study concludes that, despite difficulties with labor-intensive farming and a lack of farming inputs, millet entrepreneurial production generally improved livelihoods. The study suggests that to optimize the results for livelihood, the Zimbabwean government's food security policy agenda should support smallholder rural farmers in their efforts to increase entrepreneurial millet production. Ultimately, smallholder farmers in dry regions are encouraged to adopt small grain cultivation due to its high yield potential despite climate change challenges.

INTRODUCTION

While millet entrepreneurship offers a promising solution to hunger, especially in drought-prone regions, food insecurity and undernutrition remain significant threats to poverty in many countries, despite efforts to address global hunger (Sibhatu & Qaim, 2017). Therefore, significant investments in millet entrepreneurship cultivation might lead to the achievement of long-term and renewed food security. While millet enterprise farming has gained prominence in lowering hunger and enhancing household living standards, intensifying its production through farming entrepreneurship is essential for generating money, ensuring food security, and improving nutrition, but surprisingly, little research has been done in this field in developing countries like Zimbabwe (Tadele, 2014; Tadale & Assefa, 2012). Zimbabwe has received relatively little attention in millet entrepreneurship cultivation, even though millet is a viable small grain that thrives even in climate-challenging regions. Moreover, millet consumers who consume a diet rich in nutritious foods are less likely to suffer from malnutrition and lifestyle disorders like diabetes, obesity, high blood pressure, and others (WHO, 2021). Furthermore, diseases that result from malnutrition have claimed the lives of 41 million people, or 71% of all deaths worldwide (WHO, 2021). Increased consumption of processed and unhealthy foods may be contributing to rising death rates, even as healthier diets with improved quality, safety, and health benefits are gaining traction (Jaffee et al., 2018). The production and consumption of safe and nutritious foods, such as millet, rapoko, and sorghum, have been strongly encouraged by international organizations and lawmakers to attain a sound and healthy status (Chera, 2017). According to Shah et al. (2022), it is understandable why there is a growing interest among entrepreneurs worldwide in the millet-based food industries. This is consistent with the findings of Shah et al. (2021), who found that consumer demand for the nutritious, economical, and ecological advantages of millets has led to a rise in their use.

Given that 9.2 billion people will inhabit the planet by 2050, there will certainly be a sharp increase in demand for food, with estimates ranging from 59% to 102% (Silva, 2020; Wheeler & Braun, 2013). Similarly, to support feeding the growing population, the agricultural sector plays a critical role in accelerating efforts to ensure food security by promoting small grain varieties that even thrive in harsh climate change, such as millet varieties (Wegren and Elvestead, 2018). Investments in millet enterprise production are likely to have a big impact on reducing hunger and poverty, especially in Asian and African nations. Millets are gluten-free, drought-tolerant cereals that require very little water to grow (Bhatt et al., 2016; Chera, 2017). They also cost less to use in pesticides and fertilizers (Shah, 2021). As previously said, there are several benefits to cultivating finger millet and pearl millet in drought-prone regions of Africa. These benefits include the maintenance of

food and nutritional security as well as the utilization of the plants for feed, starch, and drinks. Finger millet holds significant value as it contains abundant amounts of amino acids, including methionine, a beneficial component absent from starchy diets like those including maize and cassava (Taylor & Duodu, 2022). In this context, Kumar et al. (2022) underscored that low-impact diets contribute to biodiversity and a well-preserved ecosystem, as well as guaranteeing food and nutrition access. Further strengthening supportive measures, the Government of India has taken a positive move and announced the year 2023 as the international year of millets and emphasized their health and nutritional benefits (Chaudhary & Shelar, 2023). The Government of India encourages their production and consumption, highlighting the role it plays in sustainable agriculture, coping with climate change, and ensuring food security.

Similarly, to address significant difficulties with food insecurity, the Zimbabwean government has developed a national agricultural policy that encourages smallholder farmers in rural areas to enhance the production of traditional small grain crops to reduce poverty and hunger. Coping measures to foster and strengthen food insecurity and nutrition are significant to mitigate adverse health impacts associated with poor food production globally. While maize has been favored due to modernization efforts, climate change is increasingly impacting its yields, particularly in high-temperature regions like Zimbabwe's Chivi district. This area, known for food insecurity due to repeated maize crop failures, presents an opportunity to explore the potential of millet entrepreneurship cultivation, a more climate-resilient crop. However, there is a research gap in understanding the specific factors driving the recent adoption of millet cultivation by smallholder farmers in Chivi, including the extent to which this shift is occurring, the motivations behind it, and its impact on household food security and nutrition. This study aims to address this gap by examining the experiences of smallholder farmers in Chivi who are now cultivating millets. The study aims to fill this information gap by attempting to respond to the question below.

What part does millet entrepreneurial production play in providing nutrition and food security in Zimbabwe's arid Chivi district climate?

The structure of this study is as follows: After this introduction, the second section discusses nutrition, food security, and millet entrepreneurship in Zimbabwe's Chibi district. In Section 3, the research profile of the participants is presented together with the study methods. The study's findings, implications, and debate are covered in section four. Section five summarizes, identifies limitations, and suggests directions for future research.

LITERATURE REVIEW

Sustainable Livelihood Framework

The sustainable livelihood approach is a dynamic concept that strengthens efforts to end poverty and improve the lives of the impoverished (Li et al., 2020). This concept holds that improving the quality of life for the vulnerable is necessary to promote rural development in rural areas (Gweshengwe, 2021). The following definition of sustainable livelihood is emphasized by the Institute for Development Studies (IDS) (Scoones, 1998).

> *"A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of survival. A livelihood can achieve sustainability when it can manage and recover from stresses and shocks, maintaining or improving its capabilities and assets, while the resource base remains intact."*

Thus, it is believed that sustainable livelihoods improve the chances for the coming generation to survive as well, creating a net benefit that supports other livelihoods (Turner, 2017). Li et al. (2020) go on to say that the framework for sustainable livelihoods helps analyze the livelihoods of smallholder farmers, particularly those millets entrepreneurs, to comprehend the decisions and innovations they make to ensure a sustainable way of life. The study's main analytical tools were the livelihood strategy of cultivating millets as a business or small-scale grain farming in arid regions employing rain-fed agriculture, and the sustainable livelihood results, improved nutrition, and increased food security. The primary goal of the SLF's analytical tools is to help millet entrepreneurs increase the yield of tiny grain crops like finger millet and pearl millet. Diversification techniques are necessary to produce sustainable livelihood outcomes in the areas of nutrition and food security. Similarly, the livelihood methods and sustainable results that are employed as analytical tools in SLF are contingent upon the kinds of resources available to millet entrepreneurs. A livelihood is shaped in part by how individuals use their resources and modes of subsistence to improve food security and nutrition, income, and assets (Mclean, 2015). To achieve their goals, millet entrepreneurs might employ a variety of tactics. The result of livelihood illustrates how millet producers build a livelihood over time and how that builds into a livelihood system pathway to escape poverty (Matita et al., 2021; Dou et al., 2020).

To this end, achieving the sustainable development goals which include among others improving food security, reducing poverty (SDG 1), ending hunger (SDG 2), promoting good health and well-being (SDG 3), and building sustainable cities and communities (SDG 11) can be accelerated by utilizing the sustainable livelihood framework (Khambule, 2022).

Food Security

Many governments worldwide consider food insecurity a serious issue, which means that food security is crucial to people's health and well-being (Giller, 2020). While it is true that, in rich nations, food production has increased more quickly than global population growth, this is not the case in emerging nations (Poleman, 1981). Many people have had negative health consequences as a result of food insecurity. Food insecurity and poverty are not social determinants of health; rather, they are strongly linked to serious and expensive health problems in the majority of cases (Food Research and Action Center, 2017). The Food Agricultural Organisation (FAO), the International Fund for Agricultural Development (IFAD), and the World Food Programme (WFP) (2013 p. 50) have defined food insecurity as "The inadequacy supply and access to food that is sufficient enough to render safe and nutritious food for normal growth, development and good healthy style". According to Roser and Ritchie (2013), there is evidence of serious food scarcity in SSA countries, where approximately one-third of the population is classified as highly food insecure, out of the 800 million people worldwide who were undernourished in 2018. In the countries of Sub-Saharan Africa, hunger is very common. As a result, hunger and diseases associated with hunger claim millions of lives worldwide (The Word Count, 2020).

For example, the above studies show that, in addition to population expansion, climate change exacerbates food insecurity, with sub-Saharan Africa being the most affected region. Thus, there is a major influence of climate change on the likelihood of food insecurity and malnutrition. Zimbabwe is a nation in southern Africa that is considered a climate hotspot. It appears that cyclones and persistent droughts are getting worse, contributing significantly to food insecurity and having serious negative effects on human well-being (Bhatasara, 2017; Manyeruke et al., 2014; Mpambela & Mavurira, 2017). Furthermore, the development of weeds, pests, and diseases as well as changes in the nutritional value and composition of crops due to climate change have recently reduced crop productivity (Rao et al., 2022; Adhikari et al., 2015). This suggests that food security in Zimbabwe is highly vulnerable and that chances for food security appear to be reduced as crop production declines. A study by Gebreyohannes et al. (2024) in South Africa on finger millet improvement challenges prospects established that India is the leading producer of finger millet in the world with 1.8 million tons, followed by Ethiopia with 1.2 million tons, Nepal with 0.31 million tons, Uganda with 0.20 million tons and Tanzania with 0.10 million tons. Surprisingly, their findings indicate that the global finger millet production is too low to address food security and nutrition despite its resilience in varying climatic conditions. Furthermore, studies conducted worldwide reveal that hunger and malnutrition have become more severe worldwide exacerbated by the COVID-19 pandemic's effects and geopolitical unrest (Hendricks et al., 2022). When the population grows in tandem with rampant unstable climatic changes, smallholder farmers must foster

better methods of crop cultivation to upscale finger millet productivity to strengthen food security and nutrition. As an alternative, farm entrepreneurs can expand the production of traditional crops like millet, which can withstand high summer heat and drought. Failing to intensify food production in extreme temperatures will escalate food shortages leading to people enduring ill health and compromising the achievement of the SDGs of ending hunger by 2030 (The Word Count, 2020). However, there are other long-term effects of food insecurity. For example, food insecurity raises or lowers hemoglobin and vitamin A levels, and is linked to poor physical and mental health (Stuff, 2005). In addition, efforts to abolish hunger by 2030 by the Sustainable Development Goals, which state that all countries in the world must aim toward zero hunger, food insecurity and nutrition are points of debate. As Beyene (2023) reiterates, millions of deaths stem from people living with hunger, malnutrition and food insecurity.

Due to this situation, academics and decision-makers have recently become very interested in millet entrepreneurship as a potent weapon to guarantee food security and nutrition, particularly in developing nations. For example, Khlikva's (2020) research in India reveals that the concept of healthy eating is seen as a globalized body of biological knowledge that places a strong emphasis on a nutrient-dense diet. Numerous scholars have discussed the importance of millet and how it can be used to treat a range of illnesses (Bhatt et al., 2016). In today's diets, the health food trend is becoming more and more popular. The impact of millet entrepreneurial cultivation on maintaining food security and nutrition in Zimbabwe's agricultural communities has piqued the interest of researchers and policymakers. Despite these appeals, however, a lack of studies looking into millet entrepreneurship cultivation exists in Zimbabwe.

Millet Entrepreneurship

Recent trends suggest that health habits are changing, progressively emphasizing the need to manage one's eating habits for optimal health outcomes. Eating white bread, white rice, and wheat rotis is thought to be the cause of early obesity in India and other countries (Wee & Henry, 2020). Given that millet grains are inexpensive, nutritious, and gluten-free, Thakur and Tiwari (2019) suggested consuming them to support nutrition and food security as a wise healthy decision. Recently, millets have become well-known as an immunity-boosting and superfood (Mirza, 2021; Shah et al., 2021; Singh et al., 2020) leading to dominant choices of food prominence in traditional communities. Since millet has so many nutritional and health benefits, some millet-eating people in Zimbabwe are asking that millet be the main ingredient in their diet. It has been observed that a large number of millet entrepreneurs grow millet for both food and profit. A study in the Indian Himalayas reported that the main goals of finger millet breeding are food security, high

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grain yield potential, nutritional quality, tolerance to biotic and abiotic stresses and high-income marketability (Gebreyohannes et al., 2021; Mbinda & Mukami, 2021; Puranik, et al., 2023). With some of the reasons lauded for the production of millet, the crop is gaining a heightened interest among rural farmers in Zimbabwe. According to the researcher, millet entrepreneurship cultivation is the farming and agricultural production of millet in Zimbabwe's communal areas. The researcher refers to millets and millet interchangeably in this work. In Zimbabwe, millets known as Finger Millet (FM), Pearl Millet (PM), (rapoko) and (mhunga) are farmed in the Chivi Rural District.

Both Saxena et al. (2018) and Sabuz et al. (2023) claim that there are several health advantages to eating food products made from millet, among them dietary fiber, lipids, proteins, carbs, minerals, vitamins, and other important components. Millets contain anti-hyperglycemic, anti-cholesterol, and antioxidant properties that may help with gastrointestinal management (Dhaka et al., 2021). Millets are recognized for their climate-resistant qualities, such as their low water irrigation requirements, high yields under low nutrient input circumstances, minimal demand for synthetic fertilizers, and low susceptibility to environmental stressors (Kumar et al., 2022). Some of the Sustainable Development Goals (SDGs), including SDG 1 (no poverty), SDG 2 (zero hunger), SDG 3 (excellent health and well-being), and SDG 15 (life on land), are addressed by successful millet cultivation (UN, 2021).

Millets Entrepreneurship Cultivation in Chivi District

The Chibi district lies in Zimbabwe's natural regions IV and V, which are semi-arid and dry regions with marginal soils, little rainfall, and limited ability for adaptation. Despite relying on rain-fed agriculture and natural resources for their livelihoods, the people of Chivi have experienced high temperatures, prolonged droughts, and erratic rainfall patterns over the past few decades (Mawere et al., 2013). Characteristically, in Zimbabwe, smallholder farmers are those who primarily cultivate rain-fed crops and are considered food insecure (Nciizah et al., 2021). Such communities are under the trap of rapid climate change which has escalated food insecurity as the traditional methods of food production could not match the impact of climate change and food security. Accordingly, smallholder farmers are prompted to increase their entrepreneurial farming endeavors with the impact of climate change in mind. In response to the effect above, effect above farmers are losing interest in maize, the favored staple diet that is climate-stifled in the Chivi district mostly due to high temperatures and irregular rainfall patterns. Instead of maize, which is the staple diet, the Chivi smallholder farmers are now turning to farm finger millet and pearl millet, which are more resilient and adaptive to climate change.

Agriculture is the primary source of income in the Chivi district despite its arid climate (Mugiya & Hofisi, 2017). Sorghum is one of the principal crops farmed in this dry

region for both food and trading surplus grain. However, finger millet is far more popular than pearl millet (Nciizah, 2014). Nevertheless, even though maize is the primary crop of Zimbabwe, smallholder farmers cultivate millets because of the region's consistently variable rainfall patterns and dry weather. Nevertheless, farmers benefit from sporadic heavy rainfall seasons, which boost maize production and improve community food security. Under the Zimbabwean Government's new agricultural policy drive known as "Pfumvudza Agriculture," national programs are encouraging the cultivation of traditional cereal grain crops to harness the achievement of the National Development Policy (NDP) (Government of Zimbabwe's National Development Strategy 1, 2022). The importance of traditional grain crops has grown significantly, with widespread recognition of the need to expand their production, processing, and marketing. This resurgence is supported by agricultural policies aligning with the African Union's Agenda 2063 (African Union, 2019). Such policies have created an awareness in African governments to encourage smallholder farmers to grow small grain crops. The Food and Agriculture Organization of the United Nations STAT (2019) affirms that Ethiopia is indeed a major player in finger millet production, second only to India. Finger millet is a nutritious and important crop, especially in semi-arid regions. It is good to see its significance being recognized globally although, admittedly, the terrain in Chivi is better suited for growing even drought-tolerant crops that are typically impacted by sudden variations in temperature and rainfall than maize, the staple diet.

In recent years, there has been a noticeable decrease in rainfall which has impacted maize production due to a rise in temperatures (Jiri et al., 2015). The occurrence of such dry spells creates numerous difficulties for maize cultivation. Thus, crop productivity is negatively impacted by the consequences of climate change, which also jeopardizes local food security and sustainability. A study conducted by Mugiya and Hofisi (2017) claims that because of the severe effects of climate change on Zimbabwe's Region IV, Chivi is no longer a maize-producing area. This puts the communities at high risk of succumbing to prolonged droughts occasionally failing maize production, and exacerbates food insecurity. Literature suggests that small grain dry areas such as the regions of Chivi, Buhera, Zvishavane, and Chikomba cultivate small grain crops. It is common knowledge that millet has several advantages over maize, some of which include nutritional content, tolerance to drought, and a longer shelf life before going bad (Mukarumbwa & Mushunje, 2010). However, despite the call to grow drought-tolerant crops, millet entrepreneurs are perceived to be facing many challenges. Several barriers have been ascribed to the decline in the cultivation of small crops including millet cultivation. Gukurume (2013) implicated the decline in small grain production to some challenges smallholder farmers encounter. According to Nciizah (2021), small grain entrepreneurs lack inputs, have challenges with

birds (Quealea birds) and experience a lack of storage facilities. In addition, millet cultivation is extremely laborious, from planting to harvesting and grain processing. Due to the small sizes of millet, it is extremely laborious to mill finger millet (Nciizah, 2014).

In light of the above discussion, it is clear that many rural communities face food insecurity which persistently escalates poverty levels, and that food insecurity has become a threat to rural communities and it needs to be addressed. Furthermore, in Zimbabwe, agriculture is primarily seen as the primary intervention strategy against starvation and hunger. In light of this, millet entrepreneurial farming has been suggested as a cutting-edge and effective method to guarantee nutrition and food security in Chivi's rural areas. Mehta et al. (2024) conducted a study titled “Significance of Indian millets in enhancing global food security: A comprehensive review” Through a literature review approach, the study revealed that millets are essential crops for ensuring the world's food security because of their exceptional resistance to harsh environmental factors, including drought and salinity. Their abundant nutritional profile offers a chance to improve dietary diversity and fight malnutrition. With the above findings in mind, addressing food insecurity is significantly imperative, notwithstanding the paucity of empirical data that can assist practitioners and policymakers in making decisions about the reduction of hunger and food security in Zimbabwe.

RESEARCH METHODS

In Chivi, Zimbabwe, the study looked at how millet entrepreneurial cultivation contributes to nutrition and food security. Among the farmers, there were seven male and two female smallholder millet farmers. The research is grounded in a qualitative research perspective and is guided by the interpretivism philosophy. The research philosophy is one of the most essential research attributes in qualitative research, for this reason, it was applied in this study. Drawing on people's ideas, perceptions, and opinions in their natural environments permits the phenomenon to be researched (Creswell, 2014). As a result, each participant could provide more information, which will help us learn in-depth details about the role that millet entrepreneurial production plays in the drought-stricken rural communities in Zimbabwe's Chivi district.

Research Design

A descriptive study design was employed by the investigator. Academics consider the design to be an effective instrument for gathering information about a certain occurrence as it offers a thorough and precise depiction of the traits and actions of the participants. In the rural parts of Zimbabwe's Chibi district, millet entrepreneurship farmers were chosen through the use of purposive and snowball sampling techniques. Chivi’s dry-prone climate in Zimbabwe makes it an ideal location to research small grain

cultivation under water-scarce conditions. This allows researchers to develop and test drought-tolerant varieties and farming practices.

Sample and Information Gathering

In Chivi's northern area, 14 sampled participants who were cultivating millet both for food and as well as for business provided data for the qualitative study. An extension officer in the area was the fifteenth person interviewed. In-depth face-to-face interviews and focus group discussions were used by the researcher in accordance with the qualitative data-gathering methodology. According to Creswell (2014), qualitative researchers should identify and research participants with a purpose to ensure that the data they provide are accurate and valuable. Consequently, the subjects were sampled using purposive and snowball sampling strategies. The two sampling techniques were chosen because they made it possible to collect comprehensive data from research participants in their particular fields. The data collected from their answers were utilized to verify member checking and ensure the findings' plausibility (Merriam & Grenier, 2019). There were eight male and six female entrepreneurs present, with the Agritex officer making up the fifteenth participant. On average, interview sessions lasted between thirty to forty minutes.

Study Site

The Chivi district is located in Regions IV and V of the Masvingo province in Zimbabwe. Specifically, the district is located in a semi-arid area that experiences frequent climate shocks, especially droughts (UNDP, 2015). This Zimbabwean district is among the most severely impacted by a confluence of meager rainfall, persistent drought, and the resulting widespread hunger and poverty. Rainfall in the Chivi district is often less than 650 mm (Manatsa et al., 2020). Furthermore, there is a 60–80% chance that the region will get more than 500 mm of rain; in contrast, the temperature ranges are 28–300 C (Manatsa et al., 2020). This area has long been plagued by drought-related conditions, including unequal seasonal rainfall distribution. Prolonged dry spells also lead to ongoing maize failure in the district. The sandy soils' limited ability to retain water makes the situation worse. Traditional crops like finger millet are being grown by communal farmers once again to stabilize household food supplies. Despite these challenges, maize production persists in the district, sustained by occasional seasons of higher rainfall.

Participants

Data were gathered in the Chivi region of Masvingo province from 15 sampled participants. The study's 14 smallholder millet farmers volunteered to take part. The participants range in age from 27 to 56. Every smallholder millet farmer knew that taking

part in the study was completely voluntary and that they might leave at any time, for any reason, without being victimized. All interviews and group discussions were recorded as part of the study's confidentiality measures, and participants were assured that the data collected would only be utilized for research. The opinion leaders in this instance, the chief and headman of the village, requested and received ethics approval.

Method of Data Analysis

Following the data collection on the contribution of millet entrepreneurship to nutrition and food security in Chivi Ward 21, the researcher used the thematic technique of data analysis. The themes surfaced from the data gathered from focus groups and in-depth in-person interviews (Nowell et al., 2017). Many insights were gained from a single case study involving individuals with specialized knowledge, which also made it possible to reach data saturation at the fourteenth interviewee (Boddy, 2016). Listening to field recordings and reading transcripts as a whole were both part of the data analysis process. This improved the researcher's comprehension of the farmers' experiences in millet entrepreneurial production from a comprehensive standpoint. To enhance comprehension and interpretation, additional analysis was conducted on the generated lists of codes. Ultimately, the coded replies were categorized by the author into distinct themes (Howitt, 2019). The farmers' comments were further aggregated into each key theme, resulting in a final review of the issues covered below.

RESULT AND ANALYSIS

Four overarching themes about the contribution of millet entrepreneurial cultivation to food security and nutrition in the Chivi area emerged from the analysis of the interview transcripts. Among these themes were: sources of income generating, better health conditions, a contribution to food security, and a means of income generation.

Theme 1: A source of food security through millet cultivation

The findings showed that, through ensuring food security, millet entrepreneurial cultivation significantly contributed to the reduction of poverty in the Chivi rural district. The assertions that were supported during data production and collection are discussed below.

The results of the study showed that successful millet entrepreneurial cultivation is attributed to creative smallholder farmers. It shows that, particularly in arid regions like the Chivi district, millet cultivation necessitates supplementary knowledge in line with the shifting patterns of the climate. Farmers appeared to be completely aware of the changing climate and the variety of tactics they needed to use to argue for food security. P4, for instance, discussed his understanding of typical farming circumstances by saying, *"I have*

to be creative and choose the crops that can help me survive with my family." Chivi has an extremely arid climate, making it unsuitable for growing a wide range of crops. He added *"In this area, I have a tiny plot under irrigation. I cultivate little garden crops, maize, beans, and veggies. I provide the locals with garden vegetables, and to combat food insecurity all year long, I'm currently cultivating millet."* Numerous attendees discussed the difficulties brought on by food insecurity. *"I don't have a large hectare to grow a variety of crops,"* P1 stated:

> *"Although maize is a staple grain, I haven't been able to raise my family out of poverty with its yield for the last five years. For example, "In actuality, certain crops like maize and potatoes struggle in this climate due to the intense heat. Because millet can survive drought, I'm growing it now that I know more about it. I was able to sell the extra food from my great crop the previous year." (Participant 1).*

Knowing it can withstand drought is a huge advantage, especially in a region like Chivi. The success in selling the extra food from last year's harvest is a testament to the value of this crop. Interestingly, another farmer reiterated this idea of producing millet. In addition, to growing millet, the outcome reported shows that some Chivi farmers have pieces of land dedicated to irrigation farming. In the words of a millet farmer in an FGD 8:

> *"We are not strategically located in the province. But we cannot always cry. I now know how to combat hunger and starvation without depending on government food handouts I consider myself fortunate to have a plot of land under the irrigation project plan, where I raise cash crops to combat poverty and hunger."*

In summary of the benefits of millet farming and irrigation projects, it accurately reflects how these agricultural practices are contributing to improved food security and living standards in the district. By being drought-resistant, millet allows farmers to reliably grow food even in harsh conditions, ensuring they have enough to eat. Moreover, irrigation projects enable farmers to increase their yields and diversify their crops, leading to greater income and improved livelihoods.

As P3 put it, *"Those days when we were taken for granted by other people because of food vulnerability are gone. We are becoming more self-sufficient than before, despite the previous years of food insecurity. We don't need food handouts from non-governmental organizations because we can feed ourselves."* The population of Chivi used to receive food handouts from government and non-governmental organizations, yet it was mentioned that millet entrepreneurs have eventually adjusted rather well. An intriguing explanation for this was the province's dismal state of food security.

Theme 2: Using millet cultivation to generate revenue

Considering that the majority of millet farmers in Chivi stated that millet entrepreneurial cultivation guarantees nutrition and food security there are tenable benefits to growing millet, like earning extra cash from the sale of extra produce. Other folks were selling their millet in 20-litre tins at the growth points. Smallholder farmers highlighted the potential for income generation through sales of their crops to local neighbors and larger-scale buyers from the towns of Masvingo and Zvishavane. P7 noted that: *"Growing millet is the only way to fight hunger in Chivi. The price of a bucket of millet ranges from $15 to $30 US. People want to use millet for both making beer and meals, therefore, it's the way to go."* The study findings claim that the cultivation of millet entrepreneurship has led to an increase in income and food for farmers and their families.

Farmers also mentioned some of the difficulties they faced when cultivating millets. However, their tenacity is seen in their determination to grow millet. For example, FGD10 stated, *"It is not easy to grow millet, but a good harvest is guaranteed during a good season. Millet is a multi-purpose crop. Locals come to buy from me, and they pay a good price in US dollars, of course. I do not sell it in Zimbabwean dollars. I need money that has value."* The financial flows were linked to crops grown in the irrigation scheme project. Some of the participants questioned expressed the following sentiments.

> *"As a widow and mother struggling to provide for my children since my husband's passing shortly before the COVID pandemic, I've found millet farming to be a lifeline. Millet's resilience, thriving despite limited rainfall and less fertile soil, makes it a reliable crop. I use it both for our meals and to generate income. Here in Chivi, there's a strong demand for millet due to its use in local beer production, making it a valuable cash crop. Finger millet, while also important for food, is sometimes supplemented with maize." (FGD12)*

> *"We live on finger millet (mhunga) and pearl millet (rapoko), both of which support the district's food sustainability. I am the headman of the ward and I am well informed of how we encourage one another to fight hunger. I occasionally bring my millet to Zvishavane so, I may obtain cash and buy goods for my family. I used farming to pay for this young man's education." (FGP9).*

The statement highlights the crucial role of finger millet and pearl millet in supporting the district's food sustainability. This implies that these crops are well-suited to the local environment and provide a reliable source of nutrition for the community. Furthermore, the narratives suggest a collective effort to address food insecurity. This could involve sharing resources, knowledge, or labor during difficult times. Overall, this statement paints a picture of a community largely reliant on subsistence farming, facing

the challenges of food security and limited access to cash, but also demonstrating resilience, mutual support, and a commitment to education. The irrigation scheme project has gone a long way toward promoting sustainable agriculture and boosting community livelihoods. For example, P2 remarked, *"The area is very arid, but those who were assigned pieces of land in the irrigation project scheme are doing very well. Through careful saving and investment, I was able to drill a borehole, which has significantly expanded the area I can cultivate, as you can see. Now, during the rainy season, I can focus on my millet crops without the worry of relying solely on maize."*

The aridity of the area underscores the harsh conditions and limitations it places on agriculture. Nevertheless, those with access to schemes are thriving, suggesting that irrigation is a key solution to overcoming the challenges of aridity and ensuring food security. Personal initiative and investment such as drilling a borehole enables them to gain control over their water source, expand their cultivatable land, and reduce their reliance on unpredictable rainfall. The shift toward millet cultivation alongside maize demonstrates a move toward diversification and greater resilience.

Theme 3: Millet cultivation can improve health issues.

Another major theme that evolved was improved health. Four participants emphasized the necessity of improved health conditions in light of the district's situation and issues with sustainable agriculture. The findings highlight the relevance of improving health conditions when smallholder farmers receive appropriate food and income to supplement the affordability of food that they would not be able to obtain without sufficient funds. P13 described how he felt when they had adequate food security:

> *"The rains are irregular in most seasons, and the protracted dry spell has an impact on our crops, except dry-tolerant millets. On the one hand, growing millets is a blessing because they are healthy for our nourishment and our children grow up healthier than those who depend on rice, maize and wheat as their food."*

The irregular rains and dry spells severely impact crops, but millets, being drought-tolerant, offer a buffer against these challenges, ensuring some level of food security even in harsh conditions Farmers who successfully raised their harvests had a surplus, which benefited them. FGD6 mentioned this when he said:

> *"As you are aware, food insecurity is caused by an insufficient supply of safe and nutritious food for appropriate growth and development. Although the rains are unpredictable, with millets as our primary crop, we are well fed and appear healthy because millet food is resistant to many ailments."*

This statement links food insecurity to a lack of safe, nutritious food for development. It acknowledges unpredictable rainfall as a challenge but highlights millets as a key solution. Millet cultivation ensures food security despite erratic rains. The statement also asserts that millet consumption promotes health and disease resistance. A Male Participant 3 reiterated this sentiment, stating that any sort of vulnerability requires a reliable source of income to combat poverty. He elaborated:

> *"Our children are gradually developing a fondness for sadza cooked with millets. I believe my revenue as a millet farm entrepreneur has improved as a result of my return to millet production, which I had discontinued in the late 1970s. I can improve our family's nutrition by using the money I earn from crop growing to purchase food and ingredients that we were previously unable to consume. Many people can meet their fundamental necessities, including food, and provide for their children's educational needs."*

This statement highlights the resurgence of millet farming and its positive impacts. It shows the growing acceptance of millet-based foods among children. The speaker's increased income from millet production has improved family nutrition and access to previously unaffordable goods. Furthermore, it demonstrates the wider potential of millet farming to address basic needs and support education within the community.

Female P14 expressed her satisfaction with farming millets, stating that it had improved her livelihood compared to before. *"Now that I am supplementing millets agriculture with irrigation scheme crops, we never run out of food. Millets, according to our agricultural extension officer, are a healthful food. The COVID-19 epidemic came and went; I was strong enough, and no members of my family were ever struck by that fatal sickness. We were taught that millet cuisine boosts our immune system, offering us a health guarantee and peace of mind." (Participant 14).*

Theme 4: Millet cultivation challenges

The main subject arising from farmer interviews was the difficulty in growing millet in the Chivi area. Five participants emphasized the necessity to complement the inadequate labor required for full millet cultivation. Furthermore, concerns with cultivation, weeding, and post-harvesting necessitate a great deal of assistance. For instance, Female P15, an Agritex officer, elaborated:

> *"Millet enterprise cultivation necessitates dedication and perseverance. It is tough to handle until it is harvested and processed into clean grain. Weeds develop in your fields, especially in finger millet (zviyo) crops, but pearl millet (mhunga) crops must be protected against birds (Quelea birds), which can harvest an entire acre in two days. Furthermore, during post-harvesting, a large amount of labor is required, and*

much of the task must be completed with the cooperation of neighbors from the entire village."

This statement describes the challenges of millet farming, emphasizing the need for hard work and community support. It highlights the labor-intensive nature of millet cultivation, from weeding to bird control (especially for pearl millet) and post-harvest processing. The statement underscores the importance of communal collaboration ("cooperation of neighbors") to manage these demanding tasks, suggesting that millet farming is often a community effort. Furthermore, a FGD 14 discussant stated:

"Some farmers abandoned millet cultivation in the early 1980s, and those without irrigation plots are on the verge of hunger because maize rarely grows well in this area. Finger millet presents obstacles in the sense that our young children may not be able to distinguish between weeds and crops, causing them to destroy both when weeding."

This statement explains why some farmers abandoned millet in the 1980s (likely due to changing agricultural policies or market conditions), and the negative consequences of that shift, particularly for those reliant on rain-fed agriculture. It highlights the vulnerability of maize crops in the area and the resulting food insecurity. It also points out a specific challenge with finger millet: the difficulty young children have in distinguishing it from weeds, leading to potential crop damage during weeding. The following quote was taken from female P6 who echoed that:

"Small grain processing is arduous since it requires hand threshing and winnowing. However, we have little choice because maize does not thrive in hot, dry weather."

According to a female farmer in a focus group discussion, many smallholder farmers in Chivi are still hesitant to transition to millets production due to challenges in planting, gathering, and post-harvesting, as well as low yields and taste preferences (Female P5).

The business has sometimes made farmers face market obstacles. One participant added: *"We are obliged to board a bus to sell our produce in Masvingo City or Zvishavane. At times we experience price drops so that I can have buyers easily and spend my money on other items and return home the same day to avoid sleeping over, which incurs rental fees."* (Male P 11).

This statement reveals the challenges faced by farmers in accessing markets. It highlights the cost and effort involved in transporting produce to urban centers like

Masvingo or Zvishavane. The mention of price drops suggests farmers are often forced to sell at lower prices to ensure quick sales and avoid the additional expense of overnight stays (lodging) in the city. This implies a vulnerability to market fluctuations and a desire to minimize costs to maximize returns. Overall, millet cultivation presents obstacles that may discourage its cultivation and ultimately render communities always on the losing end, leading to food insecurity unless adequate support and resources are provided.

DISCUSSION

Many studies have found that millet entrepreneurial cultivation plays a crucial role in decreasing hunger and poverty. This finding has been affirmed in the Chivi rural millet entrepreneurship agriculture. Community farmers promote food security by planting millet in drought-prone areas. These studies indicated that millet production increases food security and thereby reduces vulnerability in the Chivi community. The cultivation is further strengthened by an irrigation plan, which has been regarded as a positive source of income by growing a variety of crops in addition to millet production. The findings are consistent with Kumar et al's (2022) quantitative analysis study in rural India. They found that millets were identified as a suitable crop for maintaining food security and environmental resilience when the country's monsoon cereal output changes. This augurs well with the advocacy of the capability approach that supports the social human capabilities as propounded by Sen (2000). Furthermore, the findings suggest that rural farmers recognize that the environment is changing and have developed realistic adaptation methods to prevent food insecurity within their communities.

The data revealed that farmers made significant decisions to boost millet entrepreneurship cultivation, which, while not common among other farmers, was aggravated by repeated dry spells that did not coincide with maize production. It highlights the vulnerability of maize crops in the area and the resulting food insecurity. For example, the cultivation of millet is necessary because it improves food security and nutrition in Chivi Ward 2. Aside from millets being grown for food security, they are also sold to generate revenue. The millet entrepreneurs feed the local community, thereby combating food insecurity in the area. It is important to note that some individuals in the area have turned farming into a business, and they can live, especially if they use entrepreneurship as a survival strategy to lessen poverty through agricultural production. This implies that millet entrepreneurial cultivation promotes food security and nutrition in Chivi's rural areas.

This is consistent with Fuglie et al.'s (2019) theoretical arguments, which emphasize that increased agricultural labor productivity is a crucial predictor of farmer income. However, increased income combats poverty and contributes to attaining the UN SDGs number 1 on zero hunger. Smallholder farmers, by the sustainable livelihood framework, deliberately adopts strategies to either intensify millet cultivation through

continuous increase in production or diversify their livelihoods to increase income and reduce poverty to improve their livelihood or food security (Yeboah et al., 2023).

The findings of this study support the importance of millet production in arid rainfed environments. Millets are utilized as a source of food, and they are healthier than other foods. Thus, millet provides nutritional value to smallholder farmers in the Chivi district. The respondents stated that some of the millet is sold together with food supplements from the irrigation scheme, and the proceeds are utilized to purchase additional food supplies to balance their meals. Generally, persons who are food secure have a higher life expectancy. Beyene et al. (2023) support this finding by stating that food security improves health outcomes, whereas an increase in dietary energy supply reduces newborn mortality and increases life expectancy. This means that millet entrepreneurial farming contributes to food security and nutrition in the Chivi district. Generally, agriculture allows even the impoverished to afford food security and nutrition, lowering food costs. In support of this viewpoint, Sah et al. (2009) found that expanding agricultural entrepreneurship has the potential to reduce food costs.

The interviewees stated that millet production is arduous and demands commitment; otherwise, some are demotivated but have little choice because maize crops cannot resist the high heat in the area. According to the farmer's perspective, the increase in income from millet production has remained a deterrent to planting, harvesting, and post-harvest issues. For farmers who are becoming interested in millet farming, Akyereko et al. (2022) stated that the growth in revenue for smallholder farmers is due to millet's global importance and high market value. Farmers are resolved to continue cultivating food crops in the district. Certain millets entrepreneurs cited the lack of adequate local markets for their harvests and the need to ferry their harvests to towns where they may be forced to drop prices so that they return home the same day and avoid the additional expense of overnight stays (lodging) in the city. However, half a loaf is preferable to nothing. Danso-Abbean et al. (2021) found that improved incomes contribute to the fight against poverty and hunger, notwithstanding limitations highlighted in cashew production in Ghana.

CONCLUSION

The study sought to examine the role of millet entrepreneurial farming in maintaining food security and nutrition for smallholder farmers in Masvingo province's Chivi area. The study concludes that millet enterprise cultivation has both good and negative livelihood effects. The negative results include tedious labor necessary in the millets crop cultivation, a 24-hour guard against Quelea birds that mostly consume finger millets, and the lack of local

marketplaces, where expenses are incurred while taking the products to the city for sale. Despite these unfavorable livelihood effects, the study found that the benefits of millets production outweighed the drawbacks. Millets enterprise farming improved food security and nutrition for smallholder farmers in the Chivi district. Improved living standards among millet entrepreneurs are reflected in the output of millet production combined with irrigation-crop supplements, as previously mentioned. Millets growers have improved their children's nutrition, education, and social position.

It would be interesting if the Zimbabwe government developed policies to encourage agricultural entrepreneurship. Policies must be intended to benefit smallholder farmers in semi-arid regions that have chronic food shortages in drought-prone areas. The findings show that millets' entrepreneurial farming has an important role in promoting food security and nutrition in semi-arid regions like Chivi. This is a beneficial technique for responding to extremely low maize and other agricultural yields caused by the effects of climate change (The Chronicle, 2020). Thus, the researchers emphasize the potential for promoting millets production as a tool for ensuring food security and nutrition while also reducing poverty among smallholder farmers in Chivi and many other rural areas in developing countries, including Zimbabwe. The study contributes to the existing literature on millets entrepreneurial farming for food security and nutrition in the Chivi district. Notably, rainfed agricultural rural communities have received little attention when it comes to maintaining food security and nutrition for smallholder farmers. As a result, the study addressed this literature gap with a particular emphasis on the Chivi district in Masvingo province, as it established that millet entrepreneurial farming has a catalytic role in providing food security and nutrition in rural populations within the area.

The investigation is a cross-sectional study and does not contain longitudinal aspects that could provide a global perspective if several districts were studied. On that note, it removes the goal to generalize the findings to other districts at the provincial and national levels. Future studies could employ diverse samples to demonstrate how millets' entrepreneurial cultivation supports food security and nutrition in various provinces of Zimbabwe.

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