Food Systems in Dryland Communities: Challenges and Opportunities in Gutu District, Masvingo Province, Zimbabwe

Tendayi Mutimukuru-Maravanyika, Lazarus Chapungu, and Felix Majeke

Abstract Despite several efforts to reduce hunger, the number of people suffering from hunger in the World has been growing over the years, and the number of undernourished people has also been increasing. The situation is worse in most regions of Africa where the number of children under five years of age suffering from stunting and wasting, has been rapidly increasing. Other forms of malnutrition have been experienced with an increase in adult obesity, and anemia in women. Understanding food systems is therefore a critical step in influencing the food security and nutritional status of communities. Improvements in efficiency and productivity of food systems have been found to result in successes around the World in reducing the prevalence of hunger and improving nutrition status of populations. Identifying major areas of weaknesses in food systems is therefore critical for shaping interventions for alleviating food-related illness. This study aimed to understand the food system challenges in Gutu communal areas of Zimbabwe, and come up with ways for dealing with these. The study used a case study approach, as well as a mixed participatory research approach for data collection and analysis. Both quantitative and qualitative data collection techniques were employed. The study unveiled a myriad food system along the entire value chain in Gutu communal area. Crop sector challenges include, expensive inputs, poor productivity, limited processing and value addition, and seasonal production of crops. Livestock sector challenges ranging from input supply, production as well as value addition and processing. The paper ends by discussing various strategies that can be employed to effectively deal with these challenges and turn the drylands into bread baskets.

T. Mutimukuru-Maravanyika (✉)
Gary Magadzire School of Agriculture, Great Zimbabwe University, P. O Box 1235, Masvingo, Zimbabwe
e-mail: tmaravanyika@gzu.ac.zw

L. Chapungu · F. Majeke
School of Natural Sciences, Great Zimbabwe University, P. O. Box 1235, Masvingo, Zimbabwe
e-mail: lchapungu@gzu.ac.zw

F. Majeke
e-mail: fmajeke@gzu.ac.zw

X. Poshiwa and G. Ravindra Chary (eds.), *Climate Change Adaptations in Dryland Agriculture in Semi-Arid Areas*, https://doi.org/10.1007/978-981-16-7861-5_11

Keywords Food systems · Food system challenges · Agriculture · Communal areas · Zimbabwe

Introduction

New evidence show a rise in world hunger with the number of people who suffer from hunger growing over the past three years (FAO et al. 2018). The number of people in the World suffering undernourishment, is estimated to have increased from around 804 million in 2016 to nearly 821 million in 2017 and the situation is worsening in most regions of Africa (FAO et al. 2018). Despite progress made in reducing child stunting, over 22% of children under five years of age in the World are still affected. Other forms of malnutrition are also growing with an increase in adult obesity in countries irrespective of their income levels. Several countries in the World still suffer from other forms of malnutrition including anemia in women, and child stunting and wasting.

In Zimbabwe, about 1.1 million people were estimated to be food insecure in 2018 and thousands of rural dwellers are threatened by malnutrition (WFP 2018) and projections showed that about 2.5 million people were at risk of food insecurity and malnutrition if the existing food systems were not improved (WFP 2018). Research carried out show that (MAMID, WFP and FAO 2013):

- 56% of children 6–59 months old are anemic.
- 28% of women & 14% of men are anemic.
- 1 in 3 women are overweight, 11% of women are obese
- Less than 10% of Zimbabwean children under the age of 2 receive the recommended minimum acceptable diet–eggs, meat, milk products, and legumes are rarely included in the diets of young children.

Several challenges to food security were identified: high food prices, climate change, lack of holistic planning, small farmers switching to cash crops such as tobacco, lack of market/value addition, lack of robust extension services, poor watershed management practices, lack of credit facilities, high costs of labour, high cost of farming inputs such as lime, seeds, fertilizers, limited irrigation development/rehabilitation and post-harvest losses. Projections showed that many poor households especially in deficit-producing areas in the south (Gutu included), west, and extreme north would experience food security challenges mainly because of a poor 2017–18 cropping season and increasing macroeconomic hardships in the country (e.g. the increasing non-staple food and other commodity prices) making it difficult for poor households to access food (FEWS NET 2018).

Understanding the challenges in communal food systems is critical (Chase and Grubinger 2014) as improvements in efficiency and productivity of food systems have resulted in successes around the World in reducing the prevalence of hunger and improving nutrition status of populations. Understanding food systems and the major areas of weaknesses helps in devising interventions to alleviate food-related illness.

Food security exists, when all people have physical and economic access to sufficient, safe and nutritious food that meet their dietary needs and food preferences for an active and healthy life at all times (MAMID, WFP and FAO 2013). Community food security exists when all members obtain a safe, personally acceptable and nutritious diet through a sustainable food system that maximizes healthy choices, community self-reliance and equal access for everyone.

Food systems are an inter-connected web of activities, resources and people that are involved in the provision of human nourishment and sustaining health (Tansey and Worsley 2008). These activities include production, processing, packaging, distribution, marketing, consumption and disposal of food. Production includes activities involved in producing plants and animals for food and other related products; distribution includes the networks of people, companies and institutions and processes involved in transporting food from places of production (e.g. farms, factories) to places where it can be purchased, used, or consumed e.g. wholesalers, farmers markets and retail stores; processing includes activities that add value to food or transform food into various food products such as slaughtering, butchering, packaging; and consumption refers to all activities and processes by which an individual or group acquire and utilize food after it has been produced and distributed (Hanna et al. 2012). Food systems also include other issues such as: governance and economics of food production; its sustainability—the degree to which food is wasted, and how food production affects the natural environment; how food affects health and well-being—including nutrition and food safety; and finally inputs and products of each of the steps (Grubinger et al. 2010). In a nutshell, a food system is made up of the environment, people, institutions and processes by which agricultural products are produced, processed and brought to consumers.

There is need for a deeper understanding of the food systems to identify the main challenges faced so that they can be addressed in order to strengthen the food security situation in the communities. This is what this study aimed to do. Specifically, the main objectives of the study were to:

- Assess the challenges that are faced in the Gutu food systems
- Identify and recommend potential areas for intervention to deal with identified challenges to food system.

The Study Site

The study was carried out in four wards of Gutu District namely: ward 2-Tongogara resettlement, ward 14-Mataruse communal land, ward 16-Mutambwi communal land and ward 30-Nerupiria mixture of resettlement and communal land] (Fig. 1). Gutu district, is one amongst several districts in Zimbabwe where malnutrition is high, hunger is rife and poverty is a norm (FNC 2018).

Gutu District is the third largest district in Masvingo Province, southern Zimbabwe, after Chiredzi and Mwenezi. It is the northernmost district in the province. Climatically, the area falls under Natural Regions III and IV. Natural Regions (NRs)

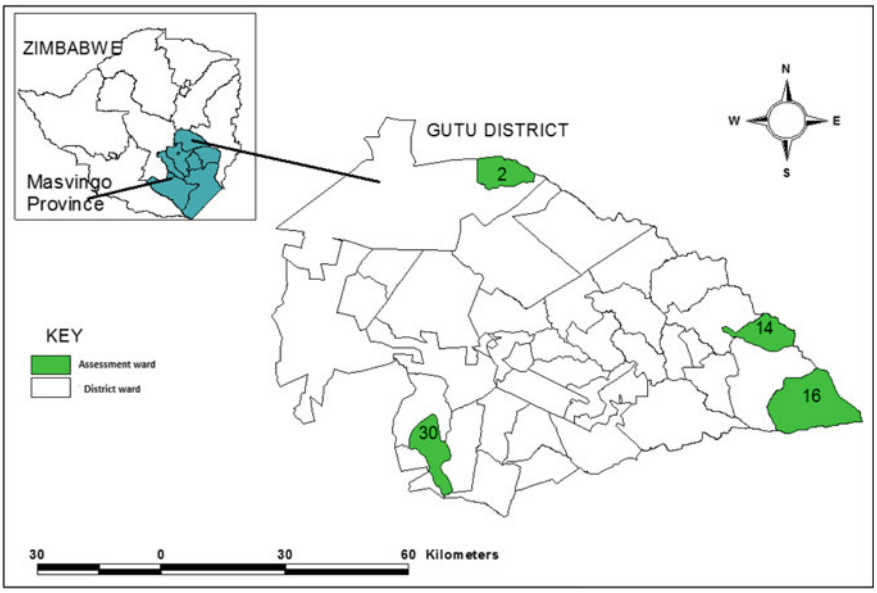

Fig. 1 Map of Gutu district showing the study sites

in Zimbabwe's context are areas delineated on the basis of soil type, rainfall and other climatic factors. It is one of the few districts in the country that suffers from over-population. It has a population of 203 083 people with a density of 22.08 per square kilometer (Zimbabwe National Statistics Agency 2014).

Access to safe drinking water is 60.4%. Poverty prevalence is 66.8%. The high poverty prevalence rate, lack of access to water, dry climate in collaboration with other related factors influence the food security situation in the district. Thus generally the district is classified as acutely food insecure, facing up to four months of food deficits per year (ZimVac 2017). As a result, it is amongst the districts with the highest prevalence rates of stunting for children of 6–59 months of age in Zimbabwe (MAMID, WFP and FAO 2013). Gutu district is amongst the most nutritionally starved districts in the country, partly because of inefficient food systems. It is for this reason that any study that seeks to understand the prevailing food systems in the district merits attention.

The selected wards (Fig. 1) present areas of different land tenure systems and it is assumed they have different food system scenarios. Thus, the wards are representative of some of the key tenure systems in the district. This will provide better understanding of the district's food systems.

Materials and Methods

The study was undertaken with a multi-sectoral/multi institutional and multi-disciplinary approach in close interaction and collaboration with local NGOs (e.g. Zimbabwe Council of Churches), government departments including the Ministry of Health and Child Care, the government extension organization, AGRITEX, the local governance structure—Gutu Rural District Council and the traditional leadership authority.

A mixed methods design was adopted as the strategy of inquiry and made use of both quantitative and qualitative methods (Gary 2011). The quantitative approach is rooted in the positivist paradigm (Collins 2010) while the qualitative approach is grounded in the phenomenological philosophy (Corbetta 2003). (Morgan 2008) postulates that the mixed methods design emanates from the pragmatic school of thought and is being widely used by researchers from various disciplines. The approach is also rooted in the argument that knowledge is generated from activities, circumstances and consequences and not antecedent conditions as in the positivist philosophy (Sango 2013). The choice of the mixed methods design was based on the sense that it reduces the weaknesses of each of the research paradigms by capitalizing on the strengths of both. (Punch 2011) reiterates that the mixed method design is highly pragmatic and convenient as it allows the researcher to use quantitative and qualitative techniques either interdependently or independently. Thus, it is vastly flexible and can be used in diverse research projects. While quantitative methods focus on the collection of facts, qualitative methods place prominence on the meanings derived from the facts. Figure 2 shows the methodological approach used in this study.

The choice of the mixed methods approach was dependent on a variety of reasons. These include, *inter-alia*; to analyses problems from different standpoints to develop

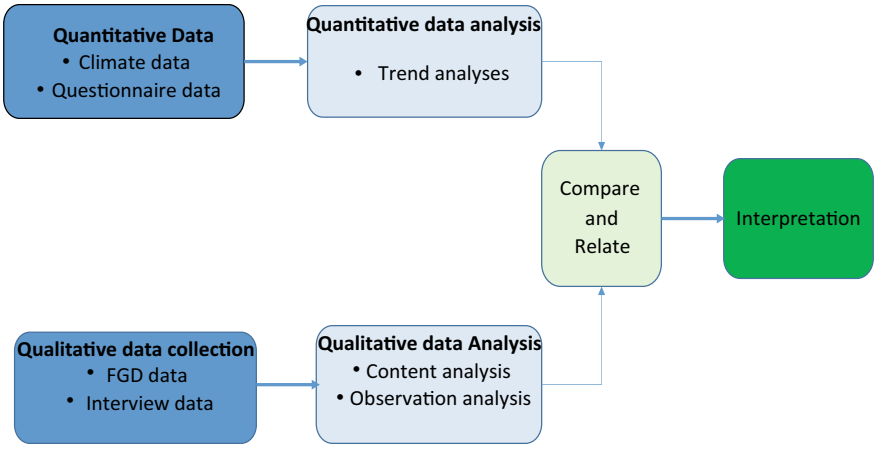

Fig. 2 The mixed method approach adopted in the study

and understand the meaning of a singular perspective, to make use of both quantitative and qualitative data to better understand a problem; to develop a complementary picture; to compare, validate, or triangulate results; to provide illustrations of context for trends; or to examine processes/experiences along with outcomes.

Data Collection

Data collection involved a number of processes and activities that were performed over time. Each activity and process was assessed in terms of appropriateness, efficiency and effectiveness in achieving the intended goal and specific objectives of the assessment. The processes and timeline for the participatory situational assessment are shown in Table 1.

Different tools were used to develop a shared understating of the local food system including the livelihoods mapping, transect walks, key informant interviews, secondary data collection, historical trends, FGDs.

Rainfall and temperature data were obtained from weather stations within Masvingo province operated by the Meteorological Services Department of Zimbabwe. The trends of climate and ascertain the effects on food systems since crop production in the region is dependent on meteorological conditions was assessed. Other data was obtained from the National Climate Data Centre (NCDC), National Oceanic and Atmospheric Administration (NOAA) programs for preserving, monitoring and provision of climate and historic weather data (www.ncdc.noaa.gov). The assessment tested if there was a significant change in precipitation and temperature variables over a 40 year period using the Mann–Kendall (MK) trend test (Hirsch et al. 1993). An add-in of Microsoft excel, XLSTAT 2015 was used to

Table 1 Study activities and timelines

	Period (Weeks)																																					
	Week 1							Week 2							Week 3							Week 4							Week 5							Week 6							Week 7						
Process/Activity																																																
Team building and sensitisation																																																
Tools development																																															
Pretesting of tools																																															
District level sensitisation meetings																																															
Ward level Community level sensitisation																																															
Training of Enumerators																																															
Data collection																																															
Transcription of data																																															
Organisation of data																																															
Data coding																																															
Data Validation																																															
Data analysis																																															
Report development																																															

carry out this test due to its ability to take into account and removing the effect of autocorrelations.

Sampling Design

The maximum variation purposive sampling design was employed in this assessment. In this approach, study participants are purposively selected to provide a diverse range of cases relevant to a particular phenomenon or event. The purpose of this kind of sample design is to provide as much insight as possible into the event or phenomenon under examination. Local actors were purposively sampled based on their contribution to the understanding of food systems in Gutu district. Actors who were involved in the study include the Provincial Administrator; the Provincial Crop and Livestock Officer; the Provincial Social Services Officer; the Provincial Gender Officer; the Provincial Environmental Health Officer; the Provincial Nutrition Officer; the District Administrator; the District Crop and Livestock Officer; the District Social Services Officer; the District Environmental Health Officer; the District Nutrition Officer; local Chiefs and Headmen; ward councilors for the 4 wards; village health workers for the targeted wards; women, men, youths, people with disabilities representatives in the target communities and agro dealers in the respective committees.

Local councilors assisted in the process of purposively identifying participants for interviews, focus group discussions and questionnaire surveys. Key informant interviewees were also purposively sampled considering their roles in the community with regards to food systems.

Data Analysis

The data collected during assessment was organized and analyzed to draw conclusions on the food systems. The deductive approach was used.

Results

The communities in Gutu District were mainly involved in crop and livestock production—both were basically for subsistence and crop production was mainly rain-fed. Although community members in the study sites had access to land for crop production, the sizes of the land has been shrinking over time due to increasing population. Although limited, community members also had access to wetlands, rivers and boreholes and dams.

Crop Food Systems

The major crops grown are maize, sorghum and pearl millet grown extensively largely for subsistence. Surplus food produced (Maize and Sorghum) is however sold for cash to meet other household needs. Groundnuts, roundnuts (bambara), finger millet, cow peas are also grown to a lesser extent by a few individuals.

The study also revealed that most households produce vegetables in small individual gardens either at their homesteads or along streams and rivers and in wetlands. Vegetables produced include leafy vegetables, onions and tomatoes. The most common farming method is conventional with few farmers practicing conservation farming. This is mainly because conventional farming is deemed easy, fast and less labour intensive compared to conservation farming. Despite the fact that most households do not own livestock for draft power, conventional land preparation is common to most of the household through hiring draft power.

Several challenges were identified related to crop production including the following.

- ***Pest outbreaks***: The past two years recorded incidences of fall armyworm with devastating effects on mostly maize and sorghum production. Lack of proper pest control measures as well as lack of extension advice was said to have resulted in farmers losing their crops.
- ***Poor soils***: Most of the soils were said to be sandy soils of granitic origin which exhibit poor characteristics in terms of fertility, water holding capacity and structure. This had been worsened by continuous mono-cropping practices of cereals (maize and small grains).
- ***Lack of draught power***: Farmers reported increased livestock deaths due to disease outbreaks like anthrax, foot and mouth and tick bone diseases (such as the January Disease). It was reported that some households did not own livestock and hence this made it difficult for them to prepare land for crop production. Such households were said to only produce crops on very small pieces of land.
- ***Climate change***: Farmers indicated that they were no longer able to predict the advent of rains like before. They said that sometimes they experienced early rains, while in other times they had late onset of rains, with delays going to as far as January. Incessant, very low and erratic rains, caused by La Nina and El Nino respectively, are experienced. The farmers also said that sometimes they were experiencing too much rains, resulting in water logging of crops. They also said that there were cases when they experienced prolonged dry spells resulting in permanent wilting of the crop.
- ***Poor transport systems.*** Farmers reported poor transport networks—most roads in the district were in a poor state making it difficult for them to transport their produce to the market. The transport systems were also said to be unreliable, making it difficult for them to market their crops.
- ***High input costs.*** Farmers blamed the declining economic condition in the country for the rapidly increasing input costs. Many farmers said that they were no longer able to afford the improved hybrid seeds and were therefore using retained seed

of various crops in their production process—this was one of the reasons they were obtaining very low yields. In addition, despite the poor soils in their area, farmers said they were unable to purchase fertilizers due to the high costs and this was also a major contributor of the low yields of their crops. Pesticides were also said to be expensive and some farmers were said to be resorting to traditional methods such as hand picking and use of ethnobotanical such as spraying crushed aloe vera plant, and using raw tobacco leaves dipped in water.

- ***Water shortages for production with farmers resorting to rainfed agriculture***. Farmers said that they were mainly doing rainfed agriculture and there were limited options for irrigation in the district.
- ***Limited value addition to produce***. Farmers reported that value addition to the crops was very limited (see Table 1). This was mainly because of lack of technologies for processing and adding value to the produce. Small grains for instance were processed using the traditional pounding, which is tedious and laborious, and consequently discouraging the production of these crops. The products made from the current processing of crops was limited as well (see Table 2).
- ***Increased post-harvest losses***. Farmers indicated that they were losing their grain due to post harvest pests such as weevils, rodents and termites. They said that

Table 2 Processing of crops in Gutu district

Produce	Post–harvest handling and storage methods	Value addition processes	Consumers/markets
Maize	Thrashing, application of pesticides	Making of samp	Mainly household consumption, Local buyers from local households
	Packaging in 50 kg bags		
Groundnuts	Stored in an unshelled state in 50 kg bags	Making of peanut butter	Household consumption
Finger millet	Packaged in 50 kg bags	Pounded to make mealie meal for sadza and making of traditional beer	Household consumption, local buyers
Beans	Packaging in a bucket	Boiling to make delicacy	Local buyers, household consumption
Vegetables	Sun dried vegetables	Drying and mixing with tomatoes	Local buyers, household consumption
Sweet potatoes	Not usually stored	Boiling and addition of salt	Mainly for household consumption
Round nuts	Packaged in 50 kg bags	Unshelled and boiled to make a delicacy (mutakura)	Household consumption
Tomatoes	Sun drying	Sun drying and mixing with vegetables	Local buyers

pesticides were expensive and they could not afford them. They also indicated a general lack of knowledge on post-harvest storage and handling technologies that can help them to preserve their crops.

Livestock Food Systems

The common livestock in Gutu communities are cattle, goats, sheep, indigenous chicken, turkeys, donkeys, pigeons and guinea fowls. Many of the livestock were kept on extensive systems, with very limited/ minimal supplementary feeding. Almost all households owned chickens and goats, though in varying numbers. A few households owned cattle. Production of livestock by farmers was said to be mainly for subsistence.

Challenges faced in livestock food systems are:

- ***Livestock diseases***: The main diseases threatening cattle and goats included heart water, red water, foot and mouth, lump skin and January disease (*Theileriosis*). Tick bone diseases were said to have become a menace to the whole district—with many farmers losing entire herds. The reason why they were having challenges with *theileriosis* was mainly because there was a general lack of acaricides for dipping animals as well as lack of water to fill in the tanks—over the years, the government veterinary department has failed to purchase the required acaricides and most farmers, who rely on the public dipping facilities had no other options. Cattle in the districts were said to go for more than three months without dipping, causing a buildup of tick population in the area. Poultry in the communities was said to be affected by pests like fowl tampans and diseases like swollen eyes, new castle disease and bird flu and over time, the number of chickens owned per household had declined by 60% across the district.
- ***Droughts***: Farmers said that the frequent occurrence of droughts had affected the availability of grazing material for livestock. Livestock production was thus affected by food shortages resulting in poor productivity. Wetlands which used to provide abundant grazing material for livestock for the greater part of the year were said to be drying up. Most of the rivers which were perennial and could supply water for livestock throughout the year were also said to have turned seasonal.
- ***Predation***: Most areas in the district were said to be mountainous and rocky inhabited with wild animals like hyenas that prey on livestock, reducing livestock numbers significantly. Goats were said to be mainly targeted by hyenas.
- ***Lack of value addition to livestock products***. The livestock production was said to be mainly for subsistence. Selling of livestock was done mainly to neighbors and other farmers in the areas and there was limited value addition as most animals were sold alive. In an event that an animal got sick or injured, the owner would then kill it and sell it as meat (this is the little value addition that farmers were said to be doing). Meat drying using smoke was said to be a common practice by farmers to preserve meat for household consumption.

Cross Cutting Issues Influencing Crop and Livestock Food Systems in Gutu

Ineffective agricultural extension services: Although public extension providers were said to be present in the communities, many of them were said to lack basic resources for them to do their work. They were also said to be demotivated due to poor remuneration from the government and hence they were not providing much assistance to farmers.

Climate Change: Results from the Mann–Kendall trend tests show statistically significant ($p = 0.001$, $\alpha = 0.05$) changes in monthly mean maximum temperatures in the district for the period 1974 to 2014. The trend is shown in Fig. 3. The linear model presented shows an increase in mean maximum temperatures from 1974 to 2014.

Analysis of the total annual precipitation (the sum of all precipitation received and recorded throughout the year under consideration) over a forty year period (1974–2014) for Masvingo province show that there is a statistically significant ($P = 0.049$, $\alpha = 0.05$) trend (Fig. 4). The trend line equation shows that the amount of rainfall recorded throughout the year decreased with time over the period.

Temperature is increasing whilst annual rainfall is decreasing over time. The trends shown in Figs. 3 and 4 show high variability. Such trends have influence on crop production, post-harvest processes and food management in general. Climatic changes have had some impact on livelihoods. Table 3 shows selected climate change variables and their influence on livelihoods.

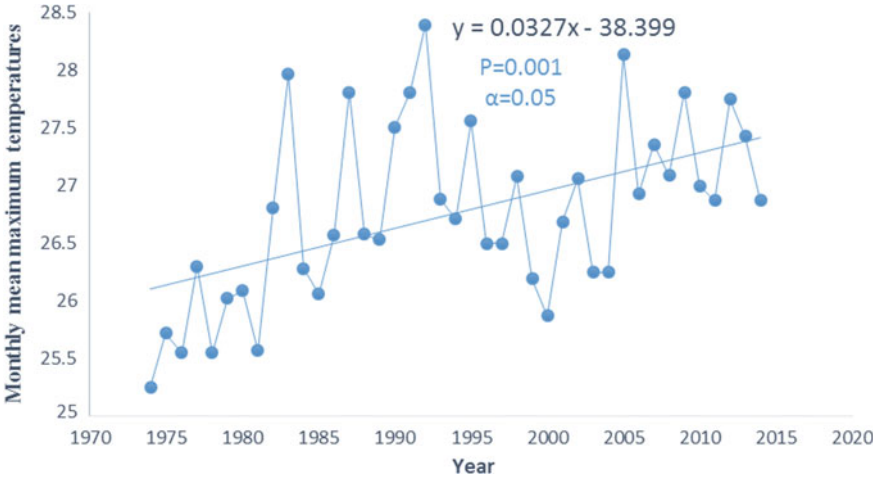

Fig. 3 Monthly mean maximum temperatures

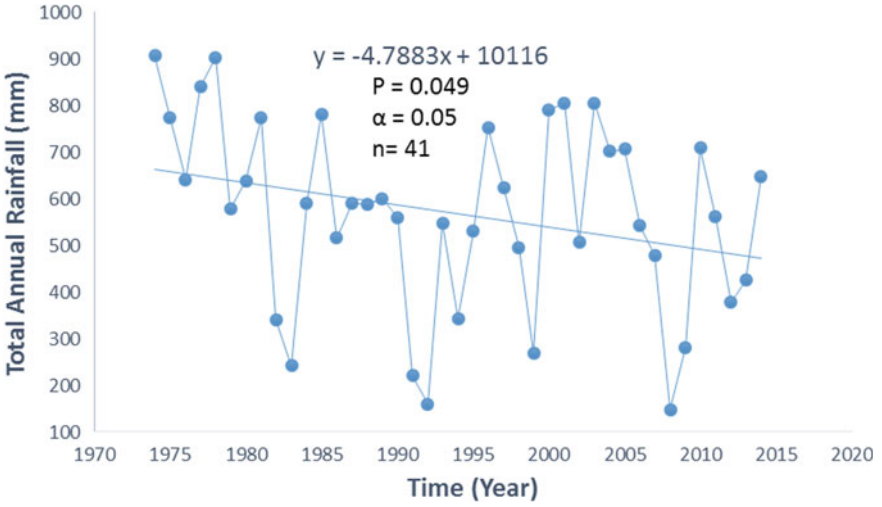

Fig. 4 Total annual rainfall (mm)

Table 3 Climate change impacts

Climatic changes	Impact of hazards
Low and erratic rainfall (prolonged mid-season droughts)	• Rivers are now seasonal, hence fish are now rare • Recurring droughts • Livestock deaths and reduced productivity • Wetlands dried up hence the community's farming is now seasonal • Change of crop mix where brown rice which used to be grown abundantly in the areas could not be grown due to dryness
Increase in temperature	• Rivers are now seasonal, hence fish are now rare
Incessant rainfall	• Land degradation • Stunted growth of crops resulting in low crop yield • Rapid dam siltation
Late onset of crop growing season	• Farmers are not able to properly plan for farming

Gutu Food Security Situation

Farmers said that food availability in wards 2, 14, 16 and 30 of Gutu Rural District was highly seasonal and hunger was experienced from September/October to March. A summary of food availability calendar is represented in Fig. 5.

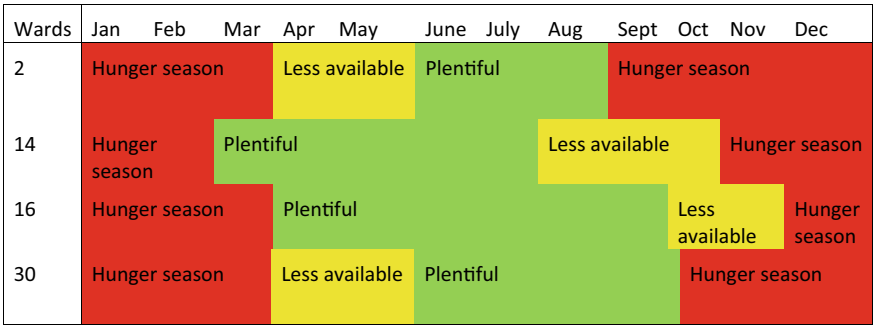

Fig. 5 Seasonal food availability

Discussion

Results have shown a myriad of challenges faced by small holder farmers along the entire value chain, from input supply, production, processing and post-harvest handling and marketing. With regards to input supply, farmers in the district are unable to access critical inputs like seeds and fertilizers and this greatly affect their productivity. Production challenges as seen above are linked to input supply—with poor inputs, coupled with poor soils, productivity is greatly reduced. Livestock production in the district also face many challenges that have seen a reduction in livestock numbers over time. Post-harvest handling, processing and value addition were said to be almost non-existent for most of the produce, both crop and livestock.

These challenges are not new and have been there for many years. Dealing with these challenges requires one to think '**outside of the box**' in order to come up with lasting solutions to these challenges. Efforts to deal with these food system challenges should include:

- ***Promotion of adoption of precision agriculture farming by farmers***. Farmers need to embrace new digital technologies such as satellite farming and the use of GPS systems. Precision farming is a farm management concept that is based on observing, measuring and responding to inter and intra field variability (Dwivedi et al. 2017). Precision agriculture has many advantages including: improvements in efficiency, reduction in costs of production, increased yields, improved decision making by farmers and reduced environmental impacts (Dwivedi et al. 2017).
- ***Revamping the extension provision system to make it vibrant and efficient***. Having an effective extension system with effective extension provision will go a long way in helping farmers deal with the production challenges they face. Extension providers need to be capacitated to ensure that they are up to date with current developments and new technologies. Updating extension providers' skills and knowledge on new developments (e.g. in environmental changes taking place in the district), helps them to provide appropriate support for improving the production, processing and storage processes by local communities.

- ***Developing affordable technologies for post-harvest handling and processing of agricultural products***: Currently farmers have periods of plenty and periods of hunger. Developing simple and affordable post-harvest processing technologies should be a priority. With processing, it is possible to preserve food so that it can be used during the lean times. For example, simple technologies for processing tomatoes into tomato paste and drying fruits (e.g. mangoes) for future use are necessary. Capacity development for farmers in recipes for processing fruits (e.g. mangoes) into pickles, making fruit jams and many other processed foods that can be canned and stored for a long way will help improve community food safety situation.
- ***Developing affordable irrigation technologies for farmers***. Current irrigation facilities (e.g. drip irrigation technologies) are expensive and unaffordable, a reason why farmers continue to rely on rainfed agriculture. There is need to come with cheaper more affordable irrigation technologies so as to promote production throughout the year. Such technologies should be powered by solar energy that is so abundant in the country.
- ***Developing and promoting low cost and effective rainwater harvesting technologies***. From the farmers' perceptions as well as the climate analysis done, climate has been changing with more climate extremes such as droughts and floods. There is need for water harvesting technologies that can help farmers to preserve the little water they get and put it to productive use. Several techniques for rainwater harvesting by farmers have been shared widely in literature, from in situ conservation that makes efficient use of rain in the field, concentration of runoff to crops in the field, to collection and storage of rainwater in different structures (Farooq and Siddique 2017). In addition, technologies that can help farmers to also tap into ground water will also go a long way in reducing the impacts of droughts and this will for sure help to improve the food security situation as well (Farooq and Siddique 2017). Farmers in Zimbabwe can learn about technologies for tapping into ground water from countries such as United Arab Emirates that depend mostly on ground water for their agricultural production, to avoid reinventing the wheel (FAO 2008).
- ***Promoting collaboration amongst various stakeholders along the value chain***. The challenges farmers face will require a value chain approach as they are interlinked and connected..Dealing with the challenges as a piece meal will not help at all. This requires a multi-stakeholder approach with NGOs, community based organisation (CBOs), private sector players, academic institutions, government departments joining hands and pulling resources together to deal with challenges identified.
- ***Exposure trips to promote learning from successes***. Proposal for change, even when the change is good, always meets resistance—many are always happy to remain with the status quo. To transform production systems in Zimbabwe's communal areas, there is need for a complete change in mind-set for all stakeholders including farmers and their support institutions. Changing mind-sets is not an easy task and one way to do this is to facilitate exposure trips to places where similar challenges have been successfully dealt with (e.g. to Brazil, Israel,

United Arab Emirates) where farmers are employing efficient technologies for soil and water conservation. Local look and learn tours (e.g. to Zvishavane to the late Mr Phiri's homestead—who is known for harnessing water using local technologies) are also critical for enhancing learning and stimulating farmers in dry areas such as Gutu District to venture into new ways of doing farming.

Conclusions

Many challenges that farmers face in Gutu food systems have been there for time immemorial and it is high time to rethink African agriculture and come up with solutions that will bring an end to poor agricultural performance. Communal farmers in Zimbabwe and many other African countries are highly endowed with huge land resources that are rare to find in other continents like Europe, for instance. Armed with this resource, there is need for a complete rethinking of current production processes to new ways that can turn the precious land resources into highly productive landscapes. With commitment and effort from various actors, it should be possible to turn these low productive drylands into '**bread baskets**' that can support many livelihoods.

Acknowledgements We would like to thank the Zimbabwe Council of Churches (ZCC) Masvingo for funding this research.

References

Chase L, Grubinger V (2014) Food, farms and community: exploring food systems. University Press of New England.

Collins H (2010) Creative research: the theory and practice of research for the creative industries. AVA Publishing, Lausanne

Corbetta P (2003) Social research: theory methods and techniques. SAGE, London

Dwivedi A, Naresh RK, Kumar R, Yadav RS, Kumar R (2017) 'Precision agriculture', encyclopedia of earth sciences series, (December), pp 515–517. https://doi.org/10.1007/978-0-387-36699-9_132

FAO (2008) 'Country profile: United Arab Emirates (UAE)', AQUASTAT country profile—United Arab Emirates, pp 57–94

FAO, IFAD, UNICEF, WFP, WHO (2018) 'The state of food security and nutrition in the world: building climate resilience for food security and nutrition', (Vi), pp 1–174

Farooq M, Siddique KHM (2017) Innovations in Dryland agriculture. https://doi.org/10.1007/978-3-319-47928-6

FEWS NET (2018) 'ZIMBABWE food security outlook update'

FNC (2018) Zimbabwe national nutrition survey. Harare

Gary DE (2011) Doing research in the real world. SAGE, London

Grubinger V, Berlin L, Berman E, Fukagawa N, Kolodinsky J, Neher D, Parsons B, Trubek A, Walin K (2010) University of Vermont transdisciplinary research initiative spire of excellence proposal: food systems

Hanna V, Frazier R, Parker K, Ikatova I (2012) 'Food system assessment', p 92. Available at: http://www.iser.uaa.alaska.edu/Publications/2012_09-FoodSystemAssessment.pdf
Hirsch RM, Helsel DR, Cohn TA, Gilroy EJ (1993) Statistical analysis of hydrologic data. McGraw Hill, New York
MAMID, WFP and FAO (2013) Sustainable food systems for food security and nutrition in Zimbabwe. Harare
Morgan DL (2008) 'The mixed methods reader'. In: Vicki, Clark PL, Creswell J (eds) London, Sage
Punch K (2011) Introduction to social research. SAGE, London
Sango I (2013) An investigation of communal farmers' livelihoods and climate change challenges and opportunities in Makonde rural district of Zimbabwe. Unpublished PhD Thesis. University of South Africa. Department of Environmental Science
Tansey G, Worsley T (2008) The food system: a guide, animal genetics. Earthscan, London
WFP (2018) Zimbabwe country strategic plan (2017–21). Italy, Rome
Zimbabwe National Statistics Agency (2014) 2012 Census Provincial Report: Masvingo
ZimVac (2017) Zimbabwe monthly food security monitoring report. Harare