Assessing the Impact of Drought Risk on Rural Livelihoods in Chipinge South, Zimbabwe

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Keywords: Drought risk; Vulnerability; livelihoods and coping capacity.

Abstract
The study assessed effects of drought risk on the livelihoods of rural communities in Chipinge South, Zimbabwe. It explored their main sources of livelihood and how drought shapes their lives either negatively or positively. Furthermore, the studylooked at efforts by government, Non-Governmental Organisations (NGOs) and Community-Based organisations (CBOs), in providing services and goods to the community, and how they have been a stumbling block to the efforts. On the other hand, the study evaluated whether food aid promoted livelihood strategies to cope with drought risk.

The research adopted a mixed method approach, which included quantitative and qualitative techniques. It administered structured questionnaires to a random sample of 110 households in the study area. The study discovered that effects of drought risks directly affect sources of livelihoods of most households in Chipinge South. Most households depend on farming as their major source of livelihood, and the bulk of them fail to harvest as a direct result of drought.

The study recommends development of the area in aspects such as rural electrification, service provision, irrigation, infrastructure, and decentralising vital services. This can improve the conditions in the community and allow for diversification of the sources of livelihood.

Introduction
Globally, drought has affected more than one billion people during the period from 1994 to 2013. That total amounts to 25% of the global total, notwithstanding the fact that droughts only accounted for around 5% of global disasters within the same period (1). Drought is a complicated natural hazard that directly affects peoples' production, lives, health, livelihoods, assets, and infrastructure negatively, when it occurs. Zimbabwe has experienced drought for many years. Together with a lack of irrigation and exhaustion of the land, drought has exacerbated the poverty levels and famine in rural communities such as Chipinge South (2). Drought force households to accept any amount for their limited disposable belongings (3).

Close to 80% of the population of Zimbabwe lives in rural areas where they earn a living through subsistence mixed farming (4). During the former time of colonial rule, the government focused on developing urban areas and commercial farms. It did not provide rural communities, where black communities were concentrated, with infrastructure that could help them to realise better livelihoods. The succeeding government was slow in addressing issues of drought risk affecting rural communities, and they continue to suffer from drought-related hardships. The agricultural sector's reliance on seasonal, rain-fed cultivation makes the sector particularly vulnerable to climate variability and change (Andear, 2009) in(5).

Most small-scale farmers in Sub-Saharan Africa (SSA) rely on rain-fed agriculture for their livelihood. As a result, they are afflicted by unreliable weather patterns and climate change(1). This is a challenge which worsens droughtin most of SSA countriescoupled with the need to review drought-risk management strategies, more importantly the likely usefulness of including technology and policies intended to manage drought risks in order to protect livelihoods and reduce vulnerability (2).
Even though there is no universally accepted definition of drought, it is defined as a period of unusual dryness which can be experienced in both wet or cold areas and semi-arid areas globally(8). A generally accepted definition of drought is "*a temporary reduction in water or moisture availability significantly below the normal or expected amount for a specified period*" (3 p. 98)(4 p. 12).

Droughts and floods alone are believed to account for 80% loss of lives and 70% of the economic losses in SSA (10). A number of studies done in Zimbabwe and SSA indicate that people have to come to terms with nature impacts, and come up with remedies to address effects of droughts. This study was not an extension of efforts of

previous researchers. It examined specifically the effects of drought risks on livelihoods of rural communities in less developed countries, with a specific focus on Zimbabwe's southern parts of Chipinge district.

In order to have a better understanding of why droughts continue to ravage rural communities in less developed countries, this research investigated the reasons why droughts seem to be unbearable events in rural communities; yet they are also inevitable in most instances. The harmony of these two scenarios creates a resilient community.

Study area

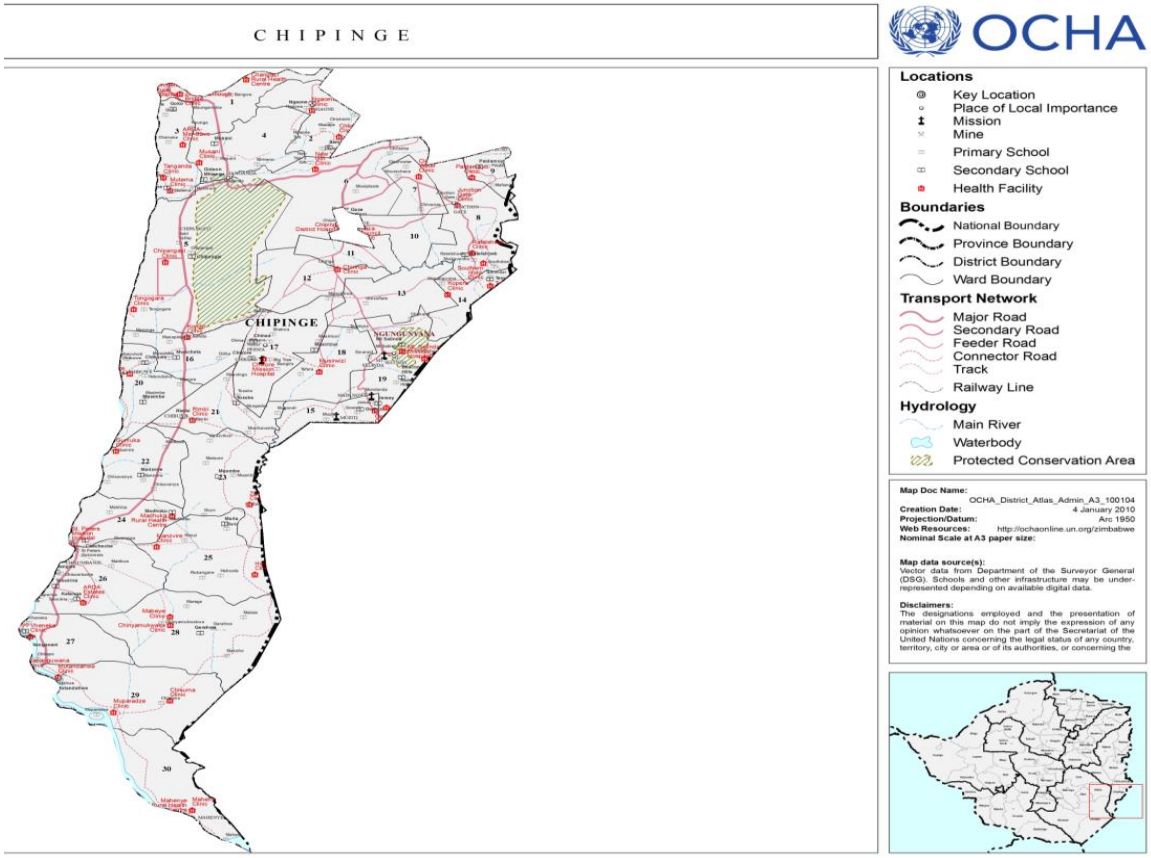
Chipinge South Constituency is located in the extreme south of the Manicaland Province, bordering on Mozambique to the east and south. It comprises of 12 wards, namely ward 16 and ward 20 to 30. The area is arid and most of it lies in a valley. It covers approximately 5 393km^2. The whole district of Chipinge has a total population of approximately 298 841 people, 68 291 households, and an average household size of 4.4 people, as of 2014 statistics from 2012 census (5) and Fig. 1 below shows location of Chipinge.

Chipinge South is found along the highway from Tanganda Halt on the way to Chiredzi, with the greater part situated on the southern and northern part of the highway. Most parts of Chipinge South lie on the rain-shadow of the eastern highland mountains. "*The low-lying areas are located in the rain shadow of the Chimanimani Mountains"* (6). Most of the rainfall received in this area is orographic, caused by moist air blowing inland from the Indian Ocean. As the air rises above the mountains, it cools and forms rain. Most of the rain falls on the windward side of the mountains. By the time the winds blow over to the leeward side, they bring little or no rain to the area. The vegetation there is more drought resistant, evidenced by the acacia, baobab, and other hardwoods such as *musharu*, which are typical low-veld trees. Although Chipinge South lies between the perennial Sabi River and Musirizwi River, the rivers are too far away for people to be able to rely on them for their water needs.

The staple food in Zimbabwe is *sadza* made from maize meal and relish; it can also contain vegetables and meat. "*Maize is a staple food crop in Zimbabwe accounting for over 50% of the average calorie consumption for about 13.1 million people"* (ZIMSTATS, 2012) in (7). Most families in the Chipinge South area take their maize grain to the local mill for grinding into mealie-meal because that is less expensive compared to buying commercially processed maize meal in a shop. Recurring drought exposes them to risk of hunger and starvation. Amid its worst economic era, in 2008 Zimbabwe imported maize meal from South Africa and sold it at exorbitant prices. Naturally, the most vulnerable members of the population, being the poor, marginalised, women, children and the elderly, suffer the most during droughts.

Fig 1: Study area (Map of Chipinge South in OCHA).

Because much of Zimbabwe relies on rain-fed subsistence agriculture, it is very vulnerable to climate change (Intergovernmental Panel on Climate Change (IPCC), 2010; Tigere, 2010; Chamunoda, 2011) in (14). The area is susceptible to droughts;therefore, it is not advisable for communities to rely solely on rain-fed agriculture. Agricultural modernisation is about replacing old practices with better scientific methods that reduces drought



impact (Smith, 1973) in (15). There is an urgent need for rural communities in Zimbabwe to have water harvesting methods and irrigation facilities to enable them to survive droughts.

Zimbabwe has five agro-ecological regions, known as Natural Regions (NR), based on the rainfall regime, soil quality, vegetation, and other factors. Chipinge South has Natural Regions 3, 4 and 5:

- NR 3 is semi-intensive farming with an average annual rainfall ranging from 650mm to 800mm
- NR 4 is semi-intensive farming with an average annual rainfall ranging from 450mm to 650mm
- NR 5 is extensive farming with an average annual rainfall of below 600mm (16)
- The quality of the land resource declines from NR I through to NR 5 (Moyo, 2000; Vincent & Thomas, 1961) in (17)

Drought has been a recurrent phenomenon since the year 2000, unlike years before the millennium. Crop yields are generally poor; thus, people whose livelihood depends solely on subsistence farming are themselves poor, and they have to rely on humanitarian organisations for food aid (18). They sometimes manage to sell surplus produce during successful harvests, which are not common.

Although NR 4 and 5 are not suitable for crop production, households in these regions still grow grain crops (maize and millet) for their food security, and some cash crops such as cotton. Crop yields are extremely low, and the risk of crop failure is high in one out of three years. Cattle and goat production are major sources of cash income (Rukuni and Eicher, 1994) in (8).

"*Climate change related effects continue to dominate smallholder systems of Zimbabwe that are dependent on rain-fed agriculture. Zimbabwe as a whole has an unreliable rainfall regime and is impacted by one to three severe droughts every ten years, which represent a risk to the livelihood systems of smallholder farmers that depend on rain-fed agriculture*" (9). So, this means that relying on rain-fed agriculture in Chipinge South is unsustainable.

Research design

A case study can yield valuable results in social sciences and behavioural sciences (Cook & Campbell, 1979:p96) in (10). A case study can be defined as an intensive investigation, which is done on a single unit (Handle, 1991; Runyan, 1982 & Yin, 1994) in (10).This research used a case study approach to investigate the effects of drought on the rural communities' livelihood in the Chipinge South area. The objective of the study is that the results may assist in improving livelihoods by increasing capacity and resilience of rural communities in the face of drought. The limited time available for conducting research made an intensive case study of one district a suitable method for gathering information, rather than covering a wider area more thinly.

Methodology and sampling techniques

In the 2011 report, Chipinge South constituted 24% of the population of Chipinge district.There were 7 296 households with an average household size of 4 people (18). This case study of the entire populace of households in Chipinge South included all 12 of its wards, subdivided into villages. The sample selectedpeople for interviewsrandomly, using random numbers, from 110 village households in Wards 21, 22, and 23. These wards were selected for their accessibility, and to reduce transport costs for field officers.

Data collection

The research collected data by using a survey questionnaire and individual interviews. The structured questionnaire enquired about the demographics of the households; forms of livelihoods; farming practices and beliefs; drought mitigation, preparedness and coping capacities; institutions and policies in place; and general economic level of the households. Individual interviewees included the village headman, elderly men and women, the youth, churches, and politicians such as the Member of Parliament for the constituency. In addition, focus-group interviews with youth, churches and political organisations enabled 'colleague correction' to enhance the capture of authentic information.

Results and discussion

1. Socio-economic characteristics of participants

Socio-economic characteristics of participants in this study are important because they determine respondent's level of capability to adapt to drought (11). Their degree of adaptability may positively or negatively affect their livelihood. The majority of respondents were adults. According to information in Fig.2, 35% of participants were between 41 and 55 years of age. Those aged 55 were 27% whilst 31 to 40 age group were 23%. On the other hand, least number of participants were 30 years and younger who constituted 15% of the total respondents. The probable reason why over half of the respondents (62%) in the sample were older than 41 years is thatpeople younger than 30 years predominate in rural to urban migration. Furthermore, most youths are reluctant to go into farming as it is laborious for them.

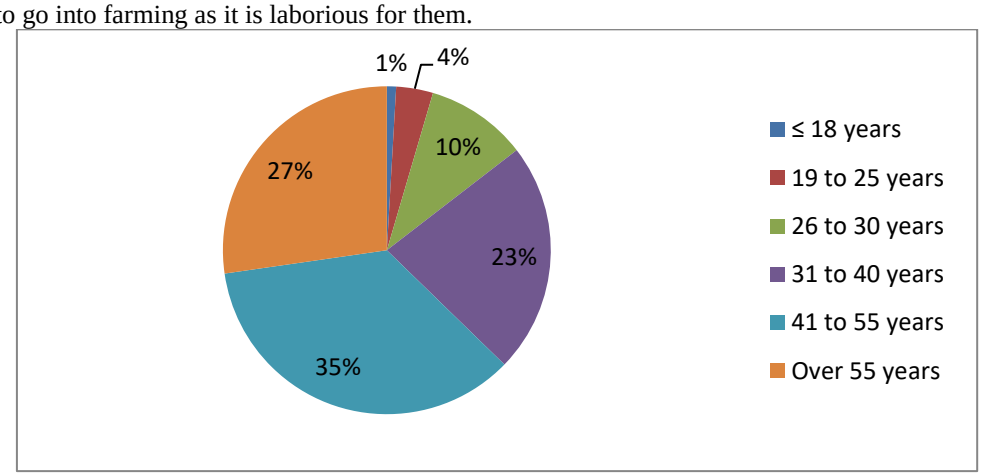


Fig2:Age of respondents.

The study also looked at the distribution of respondents according to gender.Most rural economies are agro-based. In the traditional division of labour, men perform tasks such as ox-drawn ploughing and weeding. Therefore, the availability of men to perform those tasks could be a determining factor in whether or not farming is a success(Waidyanatha, 2007) in (12), (13). Accordingly, looking at labour distribution according to gender is important. The sample shows that 35% of the interviewed people were males and 65% were females. This corresponds with 2011 national statistics where communal lands had populations of 52.9% females and

47.1% males (14). The male Zimbabwean who is the head of a family is expected to provide for his family. Unfortunately, a poor success rate in farming, with resulting impoverishment, drives most men to urban areas in search of employment. That leaves their wives to perform all of the necessary farming duties in rural areas(15).

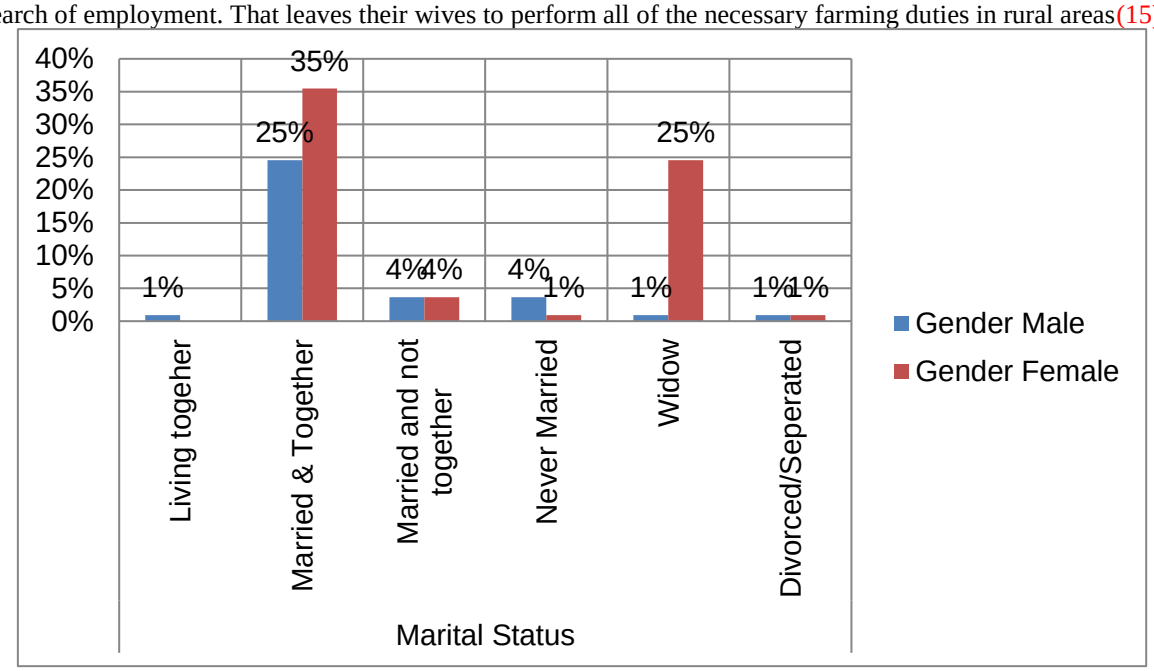


Fig.3: Marital status by gender

Fig. 3 above exhibits that 60% of respondents were married and living together with their partner. Additionally, 8% were married but not living with their partner. Maybe, one of them had to go away to work in town or city. Furthermore, 26% were widowed of which 25%of the widowed were females and only 1% of the widowed were males. This possibly means females in the area live longer than males. Fig. 3 also reveals that 2% were divorced and 1% were living together as a couple.

The advantage of married couples living together, especially in the face of drought, is that they can share ideas and the work load. Also, one of them can move to an urban area to look for work, whilst the other partner remains behind to look after the family.

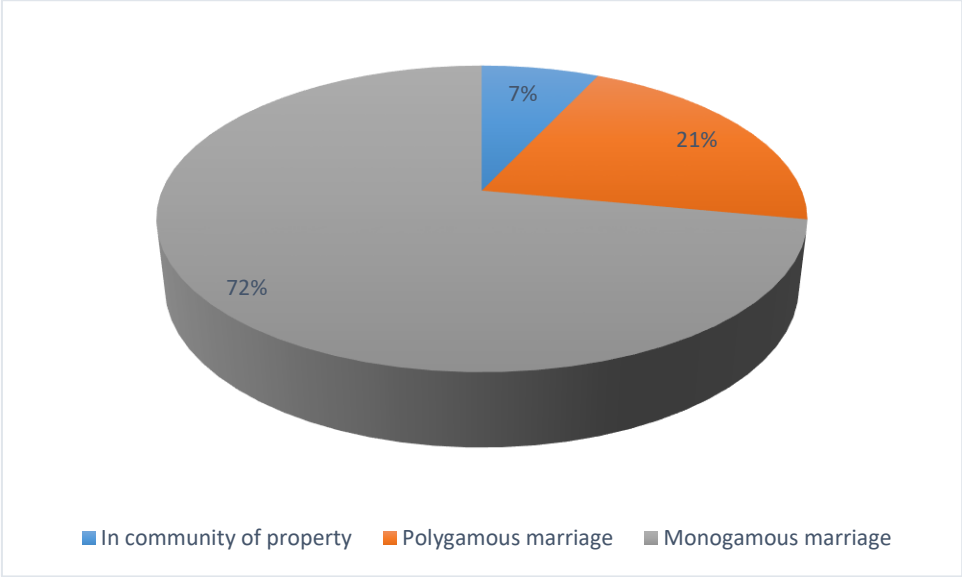


Fig 4: Types of marriage.

Results in Fig.4 indicate that72% of the respondents were married to one person (monogamous marriage), 21% were in a polygamous marriage (one partner was married to more than one partner at the same time). During drought, polygamous marriages might be more vulnerable as there might be more people to feed. Participants married in community of property were 7%. In such a relationship,women are protected from family members

who might want to take the property of their relative after he passes away.And Fig.5 below further demonstrates respondents in different types of marriages.

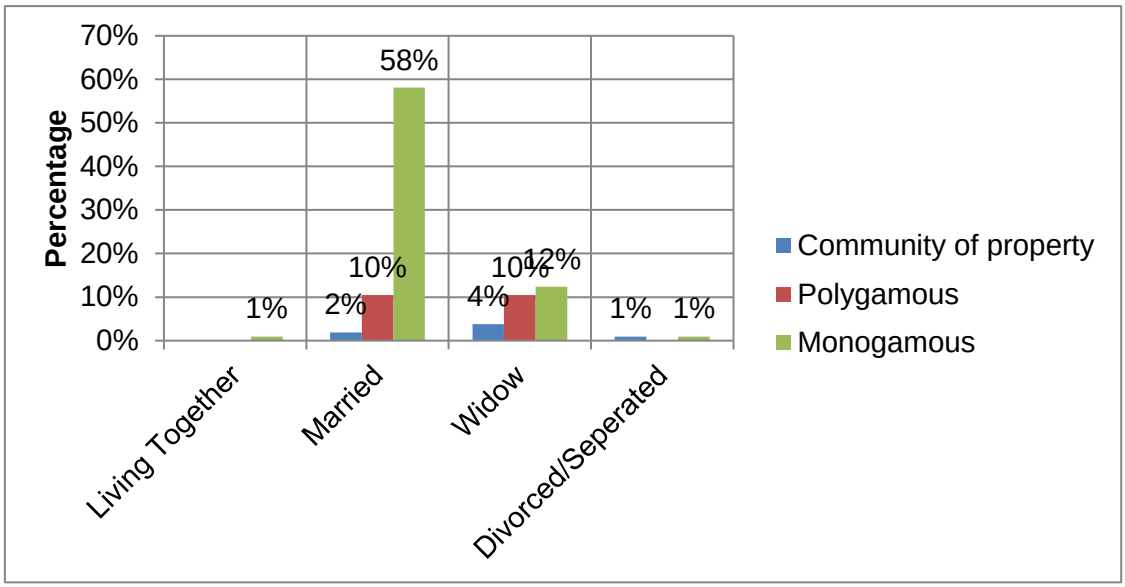


Fig5: Marital status by type of marriage

In Fig.5, 58% of the married people were in a monogamous marriage and 10% were in a polygamous marriage. Only 2% were married in community of property. On the other hand, the widows interviewed, 12% indicated to have been in a monogamous marriage; 10% were in a polygamous marriage and 4% had been married in community of property.

Household size determines level of sensitivity to drought in rural areas whose source of livelihood is predominantly agriculture (11) et al. Big households can have both merits and demerits. During drought, they are more vulnerable to drought. On a positive note, if all household members can provide labour, then that willbenefit the household. Generally, the study area has big average sizes of households. Cumulatively, 88% of the respondents had 4 or more people within the household. And information in Table. 1 below illustrates that only 12% participants had households with less than 4 people.

Table 1: Sizes of households for respondents

Size of Household	One	Two	Three	Four	Five	> Five	**Total**
Percentage of Respondents	3%	1%	8%	15%	22%	51%	**100%**

A farmer's level of education plays a big role in his or her rate of success. Changes in climate and technology necessitate an understanding and adoption of newer scientific drought-coping stratagies. Therefore literacy level,as observed in other studies (4) influences one's ability to be prepared and efficient in coping with the deleterious effects of frequent or prolonged drought (16)(17)(18). Uneducated people might be less able to understand and use new technology that could improve their means of production; this can increase their vulnerability to drought.The comparison of levels of education on a gender basis shows that, 17% had a primary or elementary level of education than men (9%). Over and above that, more women (23%) had a General Certificate of Education(GCE), Ordinary Level, than men (17%). On the other hand, 21% of women had no any academic qualification, compared to only 1% of men.

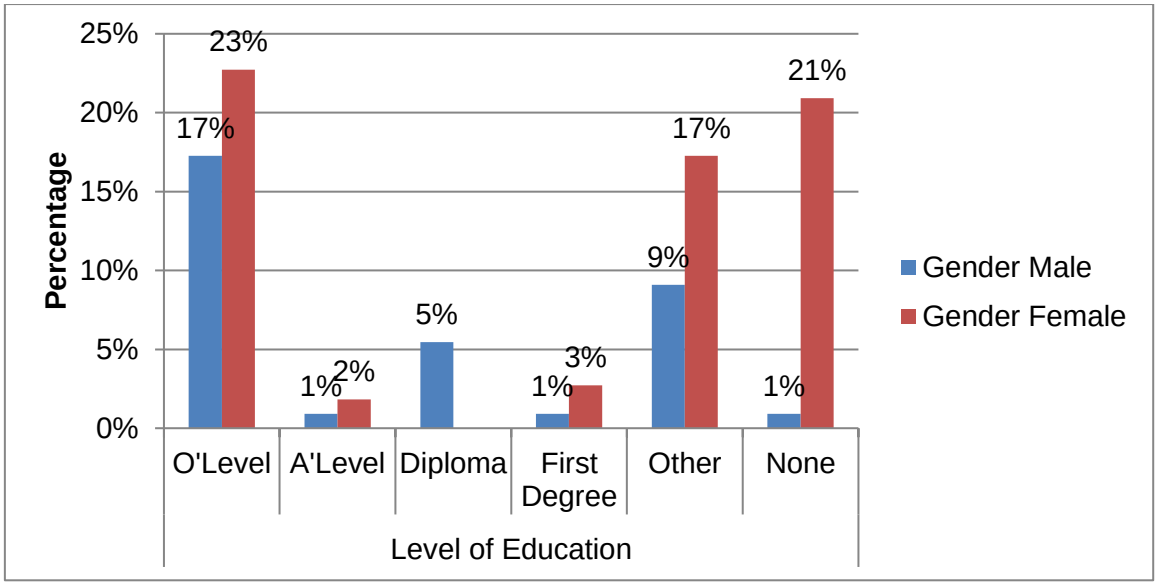


Fig 6: Comparison of level of education by gender

In Fig.6 above, more men (5%) had a higher qualification like a diploma than women (0%). The above figure also shows that more women (3%) had a first degree compared to 1% men. There were 2% women with GCE Advanced level than men (1%). Unfortunately, the level of achievement in education within the Chipinge Southdistrict of Zimbabwe is generally low. Consequently, low literacy level puts the community at risk of drought because education isthe key to building their coping mechanisms for surviving drought.

2. Sources of Livelihood

Farming

The study found that 85% of the households interviewed rely on farming as their main source of livelihood. The other options had percentages below 10%: piece jobs at 7%; formal employment at 6%; and remittances from family and friends at 1%. Although farming is the most affected source of livelihood if drought occurs, prolonged drought affects almost all professions(19). Limited variation in other reliable sources of livelihood is a major threat to the rural community in the event that drought occurs. Fig.7below demonstrates percentages of households and their sources of livelihood.

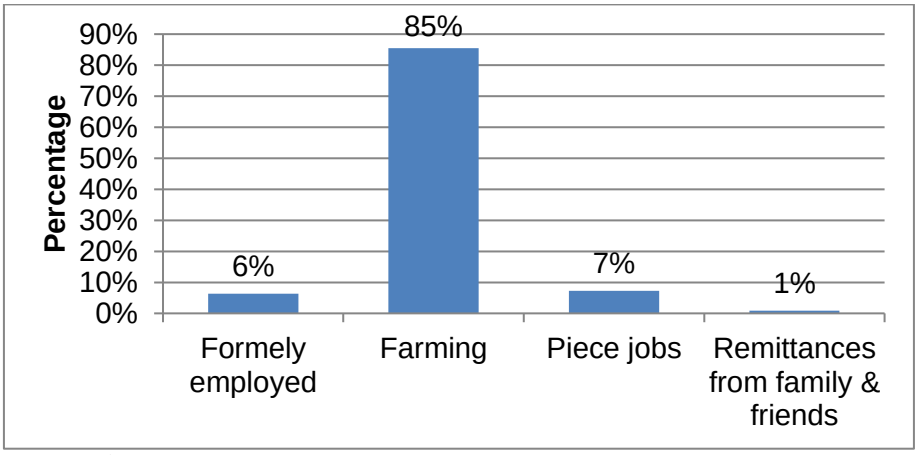


Fig *7: Percentage of households compared to main sources of livelihoods*.

Besides farming being the main source of livelihood, Table 2 below reveals that 92% of the households do farming for family consumption or for sale. Eight percent indicated that they do farming for other reasons, such as cultural purposes.

Table 2: Purpose of farming

Farming Purpose	Percentage
Farming for consumption/sale	92%
Farming for other use	8%
Total	**100%**

Furthermore, Table 3 below indicates that 60% of households grow one type of crop, and 37% grow two types and this is followed by 4%who grow three or more crops.

Table 3: Number of different types of crops grown and percentage of households

Number of Crops	One type	Two types	Three or more types
Percentage	60%	37%	4%

In Fig 8 below, 76% households grow corn or maize followed by 59% who grow small grain such as millet and sorghum. Although most people grow maize or small grain, a few (5%)grow legumes and besides legumes, 4% grow cotton, known in Zimbabwe as 'white gold' because it is a cash crop. Despite the fact that vegetables are water dependent, at least 1% of households grow them.

It was observed that maize is a staple food in Zimbabwe. However, maize is not drought-resistant, and so an overdependence on maize-corn makes the community vulnerable to drought(11). What is encouraging,though,is that the second most popular crops grown are small grains. It is noted that small grains adapt much better in drought-prone areas,compared to most food crops(15).

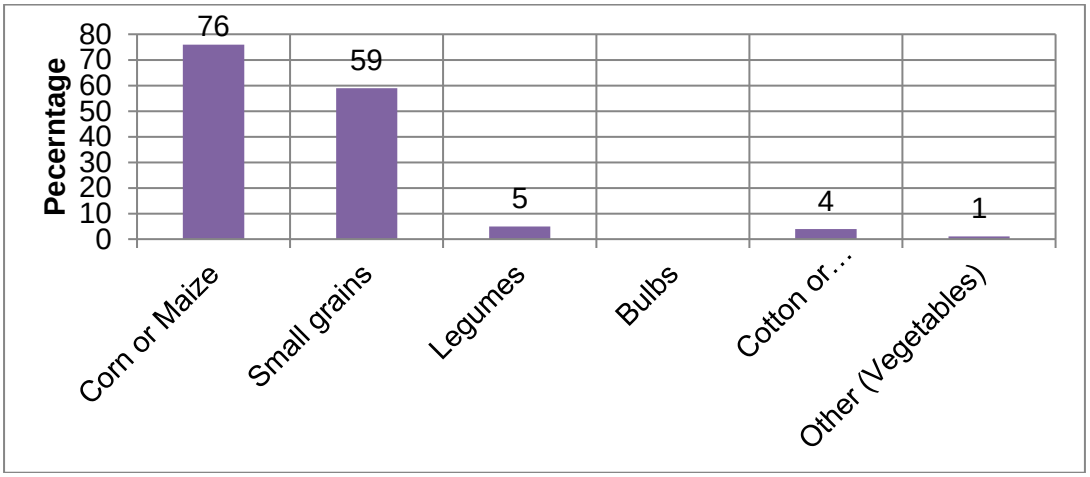


Fig 8: Types of crops grown.

Farming methods

Fig 9 below reveals that68% of the households use only traditional farming methods, and get an average of less than US$1 000 income per annum. This is followed by 24% participants whouse both traditional and modern farming practices and 23% of them still get less than US$1 000 as average income per annum regardless of the fact that they use both farming methods. Of the 7% households who use only modern farming practices.6% of them get less than US$1 000 as average income per annum. This implies thatthe method of farming used doesn't affect farmers' output favourably or negatively.

Although modern farming methods or techniques might be efficient, their use alone does not necessarily increasea household'sannual income or harvest. However, 3% households who use both methods of farming,and get between US$1 000 and US$2 500+ average income yearly might be using inputs like fertilisers or maybe they are more seasoned farmers relying on their farming experience(20), hence they are able to produce surplus for sale.

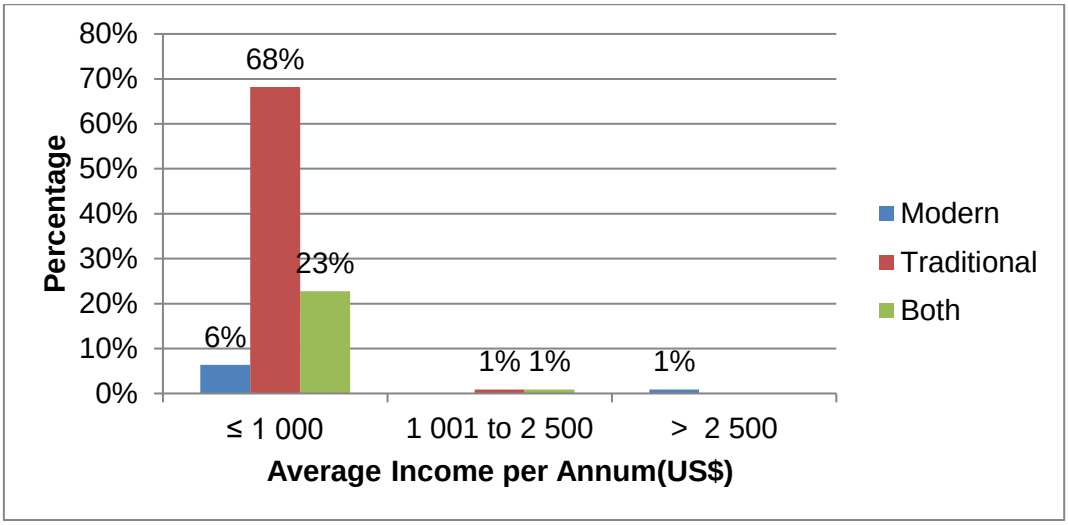


Fig 9: Farming methods in relation to average income per annum

Livestock owned

Livestock kept, and farming methods used by the community, may determine the degree of severity of drought impact on their livelihoods. Information collected shows that households keep different types of livestock. As indicated in Fig 10 below, 63% keep goats, 54% rear chickens, 14% have donkeys, 5% keep cattle and a further 5% also own sheep. An additional 3% indicated that they own other types of animals. Even though most people own livestock or other animals, 3% own non.Goats and donkeys (used for draught animal power) are known to be more resilient than cattle (21). So, this might be the reason why most families prefer rearing goats or donkeys as they hardly succumb to drought that easily.

This information shows that the larger part of the community ownstypes of livestock that have lower value. Only a small number of households own cattle, which have a higher value and it follows that cattle have a positive effect on family livelihoods. Maybe households which could afford to own cattle prefer not to keep them for fear of losing them if drought strikes. On the other hand, if a drought does not cause cattle to starve to death, they can be used to trade for other things needed in the household, since they have a higher valuecompared to goats or donkeys(FAO, 1997) in (22)

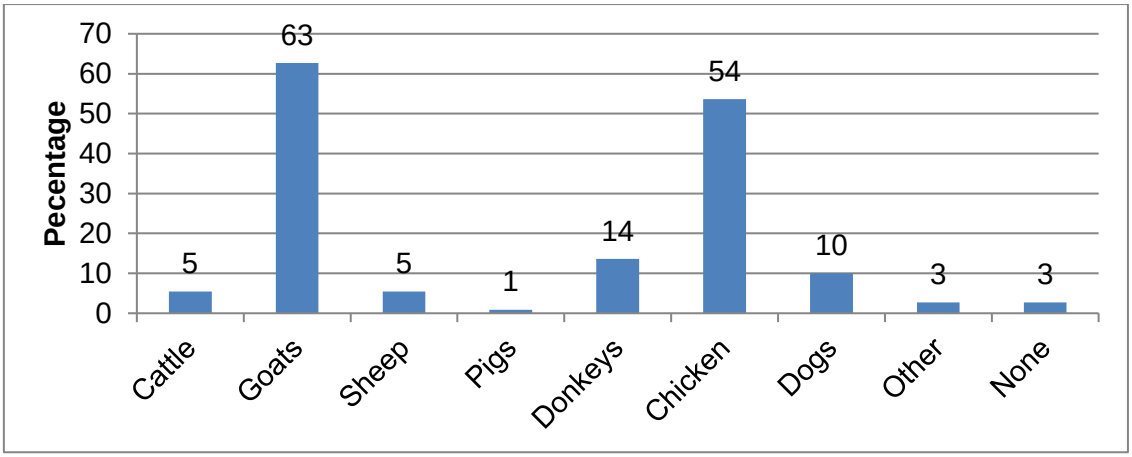


Fig 10: Livestock and animals owned.

3. Drought preparedness and mitigation measures

Food sources during drought

The study assessed the mitigation strategies of households within the community to gauge the level of preparedness to survive severe drought. Fig 11 below displaysthat, 78% of the households rely on food aid and 25% bank on drought resistant crops. In addition to that, 4% count on grain banks and water harvesting to improve their livelihoods whilst 3% be depend on other coping measures like selling livestock, gardening, and working in the community. Conversely, 8% do not use any drought-coping measures. This makes them the most at risk households in terms of drought preparedness since they have got nothing to fall back on if drought hits the area.

Besides 29% households that rely on grain banks, use of drought resistant crops and water harvesting, results show that majority of respondents depend on measures that are not sustainable. The problem with unsustainable drought measures is that they seldom make the community resilient against drought. The fact that 78% respondents depend on food aid is very risky. Food aid is distributed by Non-Governmental Organisations in Zimbabwe and oftentimes there is politicisation of their work. The government of Zimbabwe can halt its work at short notice, and without due consideration given to the affected and vulnerable community.

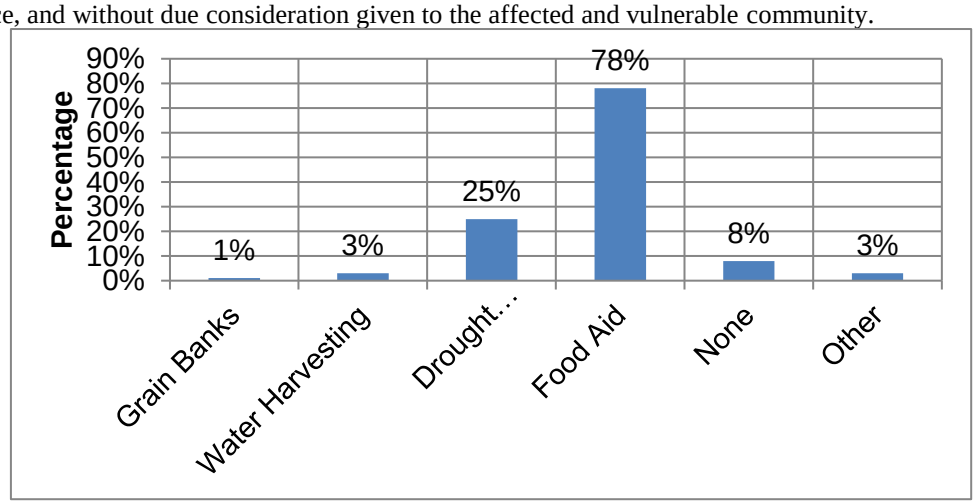


Fig 11: Drought mitigation adopted by community.

Early Warning Systems (EWS)

EWS is defined as, “The provision of timely and effective information, through identifying institutions, that allow individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response” (UN-ISDR,2003) in (23).An Early Warning System is an important drought-preparedness tool. It helps the communityto use their available food sparingly in anticipation of the drought as well as to plan for the future on what suitable crops to grow and when to grow them. It also allows them to timeously sell their livestock whilst they are still in good condition, or to destock.

Results in Fig 12 below show that 50% of the households rely on community leaders for early warnings whilst 22% trust reports from the ZMET stations. Some households (14%)have faith in local media and only 2% depend on international media. However, 9% do not use EWS and 4% said they use other warning systems.

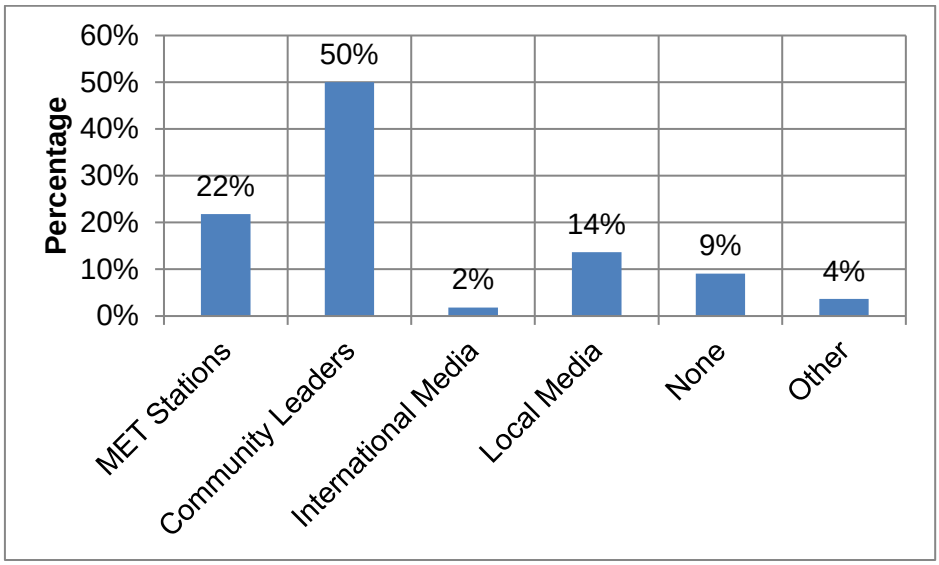


Fig 12: Drought EWS used by the community.

Those who rely on other warning systems indicated that they use Traditional Indigenous Knowledge (TIK), medium spirits and prophets. TIK includes the sounds that some birds make, and a circle like a pool of water around the moon. TIK is regarded by many communities as a reliable and dependable source of drought EWS (24).

Reliability of Early Warning Systems

Based on their past experience, 72% of the households believethatEWS are sometimes reliable. This means some of the times they are not accurate. Eighteen percent of the households hold the view that EWS are not reliable. Ten percent said the EWS are very reliable. Fig 13below shows the community's perception on EWS reliability.

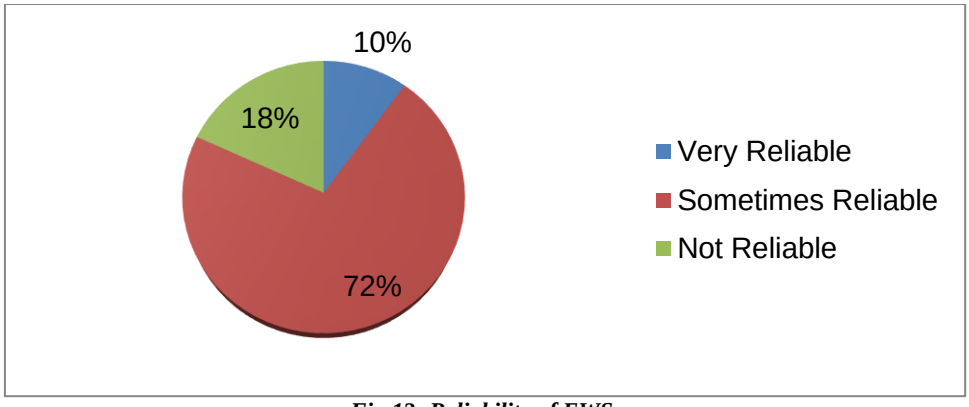


Fig 13: Reliability of EWS.

The picture painted in Fig 13 is that only 10% of respondents in the community are of the opinion that EWS are very reliable. The rest doubt it.

Government interventions

The study discovered that government plays an important role in providing services such as education and training, health programmes, projects, farming inputs and food aid to the community. Fig 14below shows that 68% of the households have benefited from government funded services, 27% did notbenefit, and 5% were not sure. Therefore, a majority of respondents benefited from the services provided by government. However, more needs to be done so that the services cover the 32% whose livelihoods might be at risk of drought.

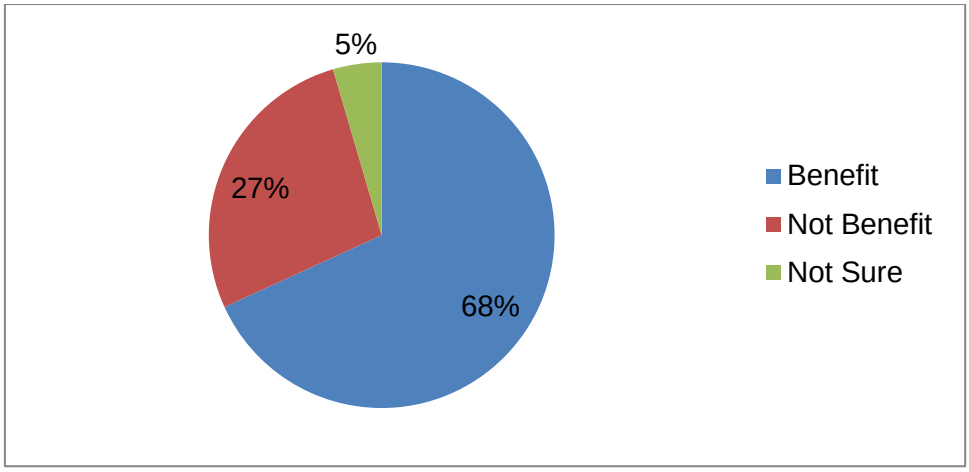


Fig 14: Households benefited from government services

Table 4 below indicates that 95% participants said Agritex officers are available in the communities, whilst 5% of the households said they aren't. Access to Agritex officers is important in improving community awareness of effective farming methods that circumvent drought impact. Agritex Officers educate the community and help them to plan timeously and effectively.

Table 4: Accessibility of Agritex officers in the Community

Agritex Officers & EHTs Presence in Community	Yes	NO	**Total**
Percentage	95%	5%	**100%**

Additionally, 78% of the households benefit from education and training; 43% of households get agricultural inputs; 41% of the households get food aid; 29% benefit from health programmes and community projects. Twenty-five percent of the households benefit from other programmes like food-for-work, where they help to renovate the roads and get 50kg of maize meal a month. Fig 15 below illustrates some of the services provided by government to the community.

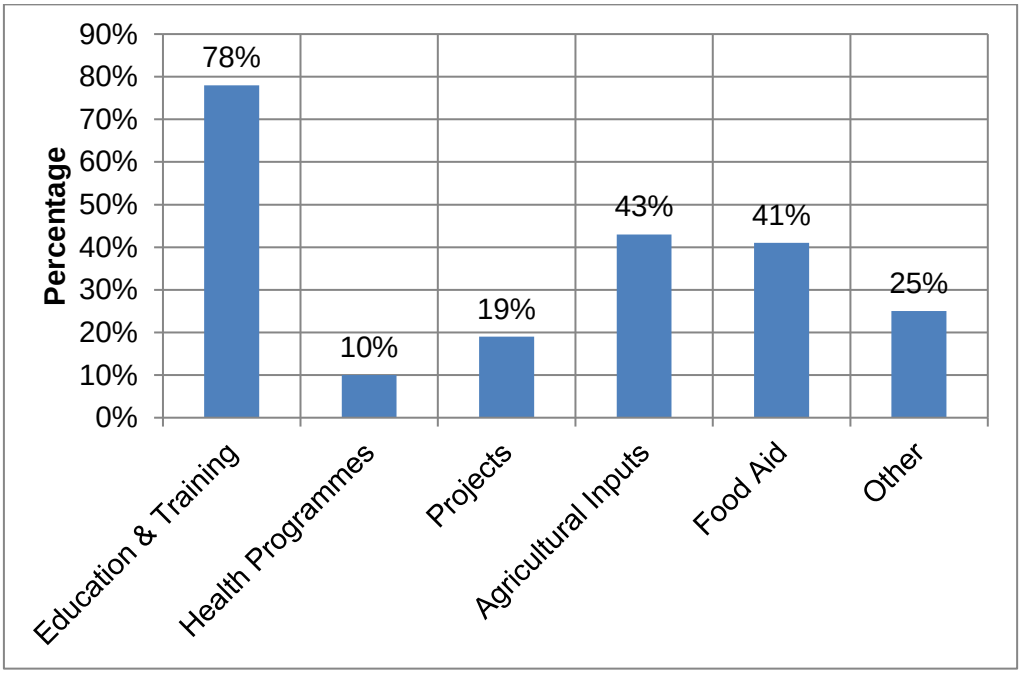


Fig 15: Services provided in the community and percentages of beneficiaries.

4. Involvement in Decision Making

In order for one's concerns to be addressed, participation in decision making is vital. Results in Fig 16below indicate that 64% of the households take part at village level; 18% at ward level; 1% at national level, and 16% do not take part at any level. No one is involved in decision making at district and provincial levels, where

policy decisions are made. Active participation by community members in decision making at village and ward levels may help their 1% national representative to take up their problems at national level for consideration. That may benefit the community.

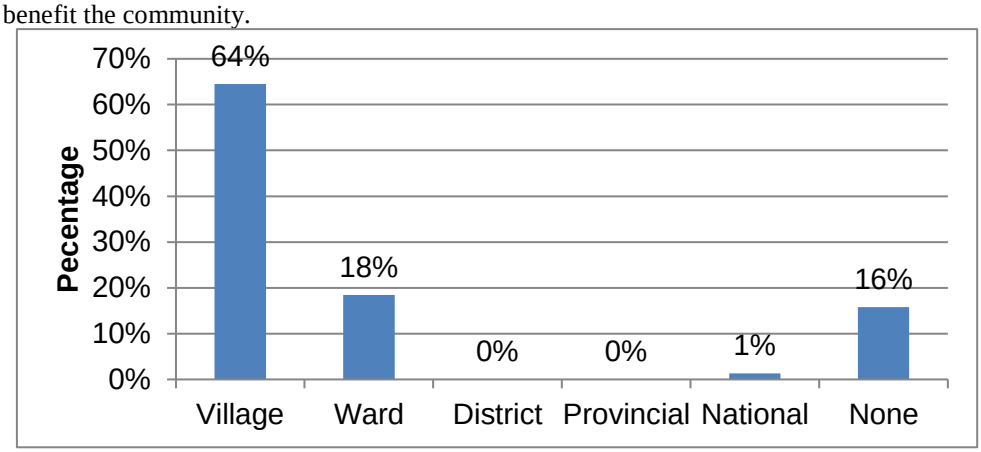


Fig 16: Levels of decision making and percentage of households.

5. Quantity Harvested in the past ten years

The quantities harvested by the households in the past ten years were also analysed. Results in Fig 17 belowreflect that 93% of the households did not harvest enough; only 5% of the households said they harvested enough; 2% said they did not harvest anything, whilst no household harvested surplus for sale.

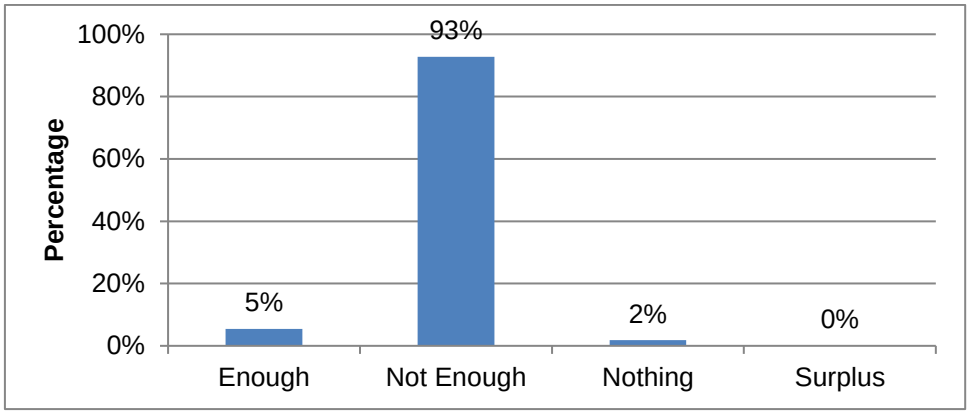


Fig 17: Quantity harvested in the past ten years by households.

Results in Fig 17 demonstrate that the community hardly harvested enough to keep hunger at bay. Therefore, the community end up having to buy food to feed their families. This shows why 78% respondents in Fig 11 said they rely on food aid. It is because they don't harvest enough to feed their families hence the need to supplement their food reserves with food aid.

6. Conclusion and recommendation

The study shows that Chipinge South is a drought prone and ravaged area. What exacerbates the problem is that the livelihood of the community is anchored on farming. Sufficient and regular rainfall would improve the livelihoods of the members of the community. However, the research findings are that perennial rain shortage is the root cause of food scarcity in the area.

Furthermore, lack of diversification in types of farming, lack of irrigation water, and a generally low level of education expose community members to high drought risk. In addition, the community's overdependence on maize, which is very susceptible to drought, also increase the level of drought risk. Level of poverty is also high, as evidenced by the low-value type of livestock ownership in the area. Although NGOs provide food aid, the community's reliance on food handouts is risky.

On the other hand, food handouts can alleviate hunger in the short term, but they can never eradicate poverty. Although government-sponsored Agritex officials are available to help, more needs to be done so that the community can be uplifted from the widespread poverty that has been caused bydrought.

Instead of focusing on food handouts, NGOs in conjunction with government should put resources together and build dams and irrigation. This will allow utilisation of irrigation when there is little rain. Moreover, the

scientific development of drought-resistant maize seed suitable for the area, made available at an affordable price, must be prioritised. Agricultural input programmes run by the government and NGOs should supply households with the small grains, and other cash crops which are drought resistant, like cotton and sunflower, to ease the problem of low harvests. Also, the development of a drought plan that encompasses input from local people must be prioritised, and it must be implemented and constantly monitored by Agritex officers, traditional leaders and local politicians. This will ensure that the community is not only be prepared for the drought, but can bounce forward after a drought.

Furthermore, communities need to be exposed to other forms of livelihood, which can provide them with an income to buy food, in the event that yields from the fields are not sufficient. This can be promoted through art and culture at school so that children graduating into adults will have skills to generate an income by using their talents. Crafts, weaving and fruit harvesting are among the forms of livelihood which are carried out in other areas.

Additionally, infrastructure development which will lure investors, especially projects such as rural electrification initiated in the 1990's, should be resuscitated and financially supported. This will avail more chances of diversifying livelihoods and stop rural-to-urban migration which reduces the number of men in rural communities. With electricity people can engage in welding or metal work, carpentry, and other forms of livelihood which need power to support them. Electricity will also assist in pumping water from deep wells and boreholes, or for irrigation.

Therefore, the only way Chipinge South community can reduce drought risk is by all stakeholders putting hands and resources together, and purposively and constructively utilising them

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