

Drought in Afghanistan: Exploring the vulnerability and drought coping capacity of the farmers of Arabmazari village, Chamtal district, Balkh Province, Afghanistan

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Abstract. Drought is one of the impacts of climate change, which affects agriculture's productivity and, eventually, farmers in Afghanistan. Afghanistan has a typical inland continental climate with considerable temperature and precipitation variation between seasons. A considerable part of Arabmazari's village relies on irrigation for agriculture; however, with the low precipitation, temperature rise, and surface and groundwater depletion, farmers experience drought. The objective of the research is to explore the vulnerability and coping capacity of the farmers of Arabmazari village to drought. The research considers a non-probability purposive sampling method. The data was collected from 3 members of the Ministries through interviews and from around 30 farmers through FGD and questionnaires. The research adopts descriptive and correlational statistics to assist with the qualitative and quantitative nature of the study. The research finds that farmers are generally highly vulnerable to drought impacts. With the government's lack of facilities, financial capacity, and absence of mitigation and preparatory measures, farmers are forced to rely on their own, often ancient, methods to plan and survive drought. Some coping strategies for crops and livestock included cultivating drought-resistant crops, changing cropping patterns, practicing crop rotation, soil treatment, and providing supplementary feeds for animals. Non-farm coping strategies were selling/pledging assets, migration, seeking employment elsewhere, dropping out of school, and seeking humanitarian aid. The government intervention was only through drought relief, which was ineffective in the long run. It is recommended that the government intervention adopt more effective mitigation and preparatory measures. Moreover, a thorough research/survey is to be done to find out the responsibilities and contribution of the Water Association Committee of Chamtal district towards the farmers of Arabmazari village. Currently, a cost-effective and immediate adaptation is a practical option for the farmers, such as GIS, to create a localized map of the drought-prone areas.

Keywords: drought, vulnerability, coping capacity and strategies, farmers

1. Introduction

Climate disasters such as drought is considered a major risk to developing countries (World Bank Group, 2020). Donald A. Wilhite (2000), described drought as hazard that has a slow onset, which means it progresses over months to years and affects a large area of land. It occurs when various hydro-meteorological processes limit the precipitation and availability of groundwater/surface water and is characterized based on its severity, duration, timing, and location. However, the onset and end of the drought and its severity is often difficult to determine and its far more difficult to quantify the impacts and provision of disaster relief (D.A. Wilhite, 1996). Despite the considerable advances made in drought prediction technologies (National Drought Mitigation Center), there still exist challenges when it comes to the prediction of drought for the long lead time and under changing environment (Zengchao Hao, Singh, & Xia, 2018). This is because of the chaotic nature of the atmosphere, climate change, and human activities. For example, human activities

such as irrigation may result in hydrological drought. Hence, human activities are required to be modelled for an accurate prediction, which is often expensive and difficult to do so since the current drought prediction is more focused on natural aspect rather than human aspect (Z. Hao, 2018). Regardless, the early warning systems and monitoring tools have helped reduce, if not eliminate, the damaging impacts of drought.

These monitoring tools indicates that Afghanistan experiences increase in temperature and reduction in precipitation which results into moisture loss in soil, faster melting of snowpack, water scarcity, and very hot days (Government of Afghanistan, 2015). These factors contribute to the Severity of drought in Afghanistan which has greatly impacted the livelihood of various communities as a consequence of many factors such as poverty, wars, pandemic, groundwater exploitation, population growth, climate change and lack of proper water management, especially in rural areas. In the past four decades, the significant drought season experienced by Afghanistan was in the late 1990s and early 2000s, furthermore, according to a report by the Ministry of Agriculture Irrigation and Livestock, in 2018, Afghanistan went through a life-threatening drought with 22 out of 34 provinces which is more than two-third of the Afghan population, affected by drought which is ranked as the most extreme of the last four decades (FAO, 2020). However, according to Andrew Hoell, the current drought is unprecedented. Afghanistan have experienced two consecutive seasons of below-average precipitation over the last two years and a third such season with a 70% chance of below-average precipitation is expected between October of 2022 – May 2023 (wet seasons) across the country. Famine Early Warning Systems Network (FEWS NET) is warning of another extreme multi-season drought in Afghanistan because of La Niña events, which is due to climate change and rising temperature all of which, based on Andrew Hoell, the principal investigator in FEWS NET, results in the below average precipitation in Afghanistan (FEWS NET, 2020). Furthermore, it is predicted that by 2030 drought in Afghanistan will be the norm rather than a cyclical event (FAO, 2020). The latest observation of precipitation in Afghanistan is based on the CHIRPS (Climate Hazards Group InfraRed Precipitation with Station Data) datasets which shows the below an average cumulative precipitation for 2021/2022 across the country Figure 2, especially in northern, north-eastern and central areas of the country. This consecutive below-average rainy season have left no room for groundwater recovery and has led to poor vegetation, all of which severely impacted the livestock and agricultural livelihood (FEWS NET, 2022).

In Afghanistan people largely depends on agriculture for their source of food and income. About 70% of the Afghans lives and works in rural areas, mostly on farms, and 61% of all households earn their income from agriculture (The World Bank, 2018). However, due to lack of infrastructure only 10% of agriculture rely on formal irrigation structures and the remaining 90% of agriculture rely on informal or no structures. As such food security and agriculture is highly vulnerable to drought and according to a report by Mohammad Assem Mayar (2021), a water resource management expert, drought has caused wheat crops that were dependent on wheat to fail, resulting in the drop-in livestock prices, and drinking water shortage. This drought impact on agriculture is evident by an estimate that were made for Afghanistan's wheat demand and production in 2020 and 2021; in 2020 wheat demand was 6.4 million tonnes, of which 5 million tonnes were domestically produced and 1.4 million tonnes were imported. In contrast, because of drought in 2021, national wheat production experienced 25% deficiency and the country needed to import wheat of 2.65 million tonnes (Mohammad Assem Mayar, 2021). Agricultural and livestock sources is further threatened as the drought events are expected to result in low-average-harvest. This situation results in the instability of the communities and especially of farmers that are left with no investment in agriculture (World Bank Group, 2020).

The cyclic occurrence of droughts has greatly impacted the country at three different levels; the households and the community i.e. food security, water, sanitation, and livelihood security; the ecosystems i.e. land and water resources; and people's displacement, and conflict over water resources. Countries like Afghanistan, where the economic and social support systems have low endurance and people have few coping strategies, will have a great resource degradation (World Bank Group, 2020). Evident by the previous studies, drought may affect the different areas and people of the same affected area very differently (Olaleye, 2010). The response of each households and individuals differs based on their previous and current status of wealth, and access to aids and loans, this statement is proven by the following studies. The effects of drought on agriculture have attracted a number of studies recently.

There are three relevant researches that will be cited here and of which the author was inspired by. The first study, carried out by Meraj, Senthilnathan, Venkatachalam, Tamilarasu, and V.S. Manivasagamd (2021), discusses the vulnerability of the regions and the coping strategies of farmers under changing climate in the Provinces of Kabul, Bamiyan, Kapisa, Parwan, Panjshir, Wardak, and Ghazni. The result of the study shows that around >80% of farmers perceives a "high to very high" degree of impacts due to climate which has resulted in unemployment, scarcity of labour, disease and pest outbreak and reduction in groundwater level. In general, the coping strategies implemented is the drilling of new boreholes, farm diversification, and changing the patterns of crop. When it comes to the policies, the strategies

developed was to establish automatic weather stations, weather-based crop insurance, agricultural practices that are climate-smart, and providing agro advisory services. The second study by Aliyar, Zulfiqar, Datta, Kuwornu, and Shrestha (2022) revealed the perceptions and adaptation strategies of farmers in Bamiyan Province of Afghanistan. The findings of the study showed that farmers perception about drought is due to increase in average temperature and reduction in average precipitation from 1998 – 2017. Their perception was further proved corrected by the analysis of meteorological data and climate data where the rainfed areas have suffered greatly by drought frequency and severity compared to the irrigated areas. There were two main adaptation strategies implemented by farmers a) on-farm adaptations which is the early sowing, sowing of drought-tolerant crops, crop diversification, and leaving behind the uncultivable lands; b) off-farm adaptations strategies were the handicrafts, migration, labour wage, and the diversification of income (Aliyar et al., 2022). Lastly, the third study by M. W. Iqbal, Donjadee, Kwanyuen, and Liu (2018) evaluated the farmers perception and adaptations to drought in Herat province, Afghanistan. The result of this study indicated economic (i.e. loss of employment, production reduction in crop and livestock), social (i.e. includes migration, conflict over water, health issues, illiteracy among children, malnutrition, and limited food options), and environmental impacts (i.e. degradation of forests and grazing lands, water quality deterioration, groundwater depletion, temperature rise, and disruption of wildlife habitats). The study also reported the local techniques used by the farmers. For example, the most successful technique in solving conflicts was through local elders, formal courts, and water-user associations. The findings from both of these researches indicates the need for localized strategies as it showed the differences in the vulnerability and adaptation strategies of farmers across different environment (Aliyar et al., 2022). In short, the findings from these researches indicates the need for localized strategies as it showed the differences in the vulnerability and adaptation strategies of farmers across different environment. These studies indicate that drought perception, vulnerability and coping practices differs from place to place because of the interaction of the drought with diverse human factors.

Hence, there is a need for further literature on the vulnerability and coping capacity of farmers with regards to drought in different parts of Afghanistan, in order to inform tailored response. Therefore, this research conducted vulnerability and coping capacity analysis of the farmers of Arabmazari village, Balkh Province. Keeping in view the significance of agricultural economy in Afghanistan and its vulnerability to drought, the objective of the research is to i) determine the level of vulnerability of farmer's to drought, ii) explore the strategies and coping mechanisms followed by different farming – household before, after, and during drought and its effects on their families, iii) identify the challenges and limitations to practice a successful drought-risk management among the farmers iv) determine the impact of drought on different wealth groups, v) determine government's response and strategies for the farmers for Arabmazari village, Chamtal District of Balkh province. The information is gathered through group discussion and questionnaire in order to understand the coping capacity and vulnerability of the farmers. This research adds to the existing researches that were carried out in Afghanistan. It offers guidance for the researchers in Afghanistan and anywhere else to carry out more research on vulnerable communities impacted by natural disaster and study their coping capacity to realize the efficiency and inefficiency of the strategies. Lastly, the author has developed her own point of views and provide suggestions. Recommendations that is made at the end of this research paper will hopefully encourage readers and policy-makers to develop an effective implementation methods and strategies that are practical for the farmer's cultural, societal, economic and political situation.

2. Methodology

2.1. Study Area

The study is carried in Arabmazari village which is part of Chintal or Chamtal district located at the western part of Balkh Province. Balkh Province is one of Afghanistan's thirty-four provinces, located at the northern regions and bordering with Turkmenistan. The population is estimated about 1,509,183 (National Statistic and Information Authority (NSIA), 2021-22). Balkh Province is one of the most drought affected provinces and where people relies on agriculture. It is also one of the provinces which is affected by climate change, decrease in precipitation and snowfall Figure 1. Arabmazari village of Chintal district, of Balkh province was selected for the study, because the village was suggested by officials from the ministry of agriculture and of energy and water. The village is known for suffering extremely during the past 5 years and where people highly depends on agricultural activity.

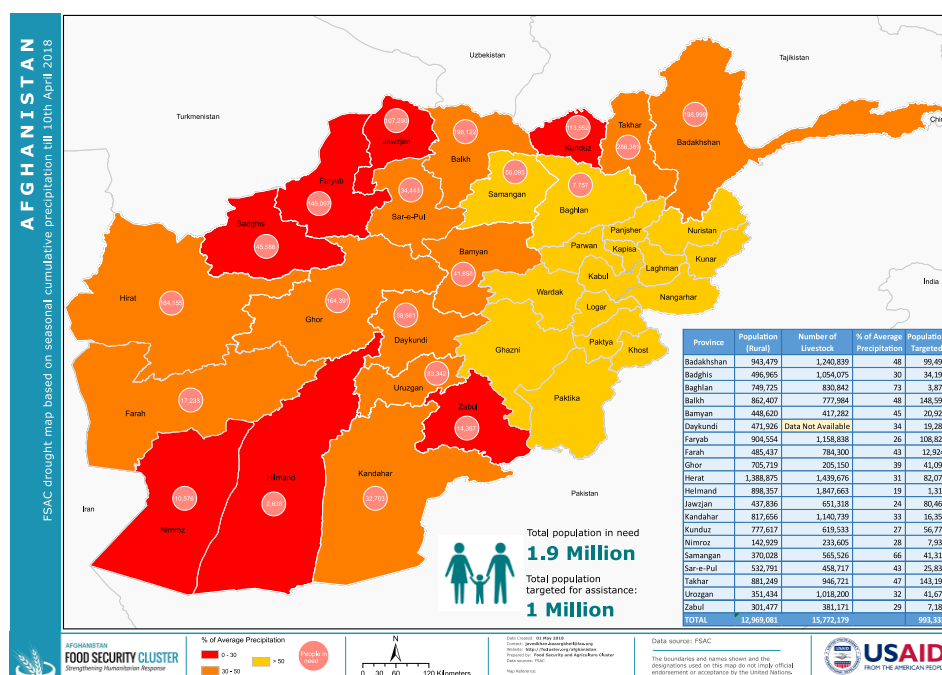


Figure 1. FSAC drought map based on seasonal cumulative precipitation till 2018 (FAO, 2018),

Seasonal Rainfall Accumulation Percent of Normal by pentad 2021-2022 season Oct - May (Oct pentad 1 2021 thru May pentad 6 2022) / Avg (1981-2010) * 100

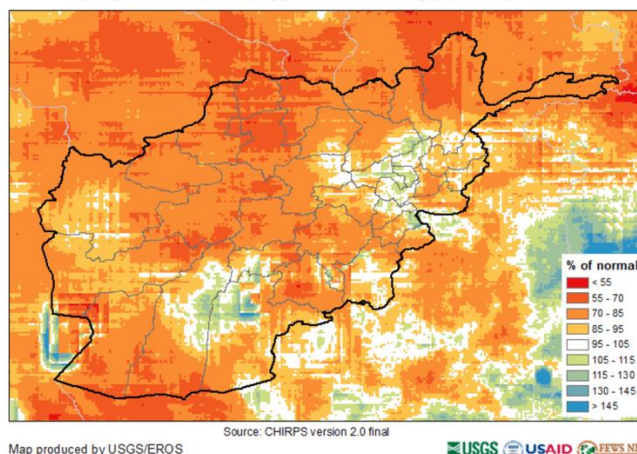


Figure 2. precipitation Observation indicating below cumulative precipitation for the wet season (FEWS NET, 2022)

2.2. Sampling method and sample size

This research targets small-scale farmers with the target on either livestock farmers, crop farmers or mixed of both. The study population consists of the farmers of Arabmazari village of Chamtal district, Balkh, Afghanistan. The study is only restricted to Arabmazari village. According to community leaders of the Arabmazari village, there are around 1000 families residing in the village, of which 200 of them owns a farming land while the rest of the population are busy working on those lands and or doing other activities. However, this number is only an estimation given by the community leaders for the population around 15 years ago. There are no definitive data on the population of the village or the ones that are busy farming.

This research considers the non-probability purposive sampling methods as the most suitable technique to be used because the researcher wants people who fits the research objective and criteria (Acharya, Prakash, Saxena, & Nigam, 2013). The sampling method is most suitable since the researcher is dealing with small sample size due to limitations of a) unknown population b) insufficient research c) limited time d) high cost. In purposive sampling, there is no specific rules for setting the sample size. Instead, a judgement is made by the researcher on the heterogeneity of the areas and population groups. Etikan (2016) argues that to avoid sampling errors and biases, samples should be enough

that a researcher could generalize from using random samples. Tabane (2016) states that to answer the research questions, the sample size should be large enough. Meanwhile data saturation is important in purposive sampling technique (Marshall, 1996; Vasileiou, Barnett, Thorpe, & Young, 2018). This suggests that sampling must continue until there no new information acquired and a comprehensive understanding is obtained (Etikan, 2016; Vasileiou et al., 2018). This means that the sampling can be stopped when no new information is recorded by further sampling.

The total number of samples chosen for the study is around 40 samples mainly involving farmers and officials from the Ministry of Energy and Water and Ministry of Agriculture, Irrigation and Livestock. This research uses 3 focus group discussion. The groups are divided based on their wealth, the selection of the members of the groups are made with the help of community leaders.

2.3. Interview, Focused Group Discussion (FGD) and Questionnaire

One-to-one interview was first conducted with the Ministry of water followed by with the Ministry of Agriculture, Irrigation, and livestock of Balkh province. During the interview, the officials inputs their idea about the drought issue in Chimal district and meanwhile a specific village was chosen for us to carry our research with farmers. The interview for the Ministry of Water took place on 6th of February 2023. The interview with two members of Ministry of Agriculture, Irrigation and Livestock took place on the 18th of February 2023. After the interview, continued to with the community leaders who helped us with choosing farmers for the questionnaire and FGD part of the study. The objective of using the technique of FGD is to have an interactive discussion, gather an in-depth information, and provide an environment for farmers to voice their opinion. The groups of farmers in the village is divided into 3 based on their wealth degree i.e. rich, average, and poor. The selection of these participants was made with the help of community leaders who are also part of the survey. The FGD sessions consists of questionnaires, notes, and audios that were taken. The research assistance answered the questionnaire for each of the farmer and in the meantime a group discussion also took place. Towards the end of February and start of March was when the focused group discussion for three groups took place.

The questionnaire for farmers in this study is divided into five sections:

- i. The first section focuses on the information that helps understand the farmers background i.e. demographic information, that helps in the assessment of the socio-economic aspect of the participants and how it has affected their drought vulnerability and coping capacity.
- ii. The questions then focus on the farming for better understanding the dynamics and the operation of farmers under the pressure of drought. Moreover, this section demonstrate how lack of or access to resources may influence their coping capacity and vulnerability to drought.
- iii. In this section, the questions focus more on the drought impact and the interventions of the government in support of farmers, the effects of their support and the how's the support distribution. The answer to these questions will help understand whether the government's policies and support have helped built a resilient farmer.
- iv. The fourth section is focused on the drought-related issues. For example, is early warning systems active among the farmers, what reaction or attitude do farmers have towards early warning information and awareness campaigns.
- v. Lastly, the questions determines the vulnerability and coping strategies of the farmers and whether they are aware of this vulnerability. If yes, what methods they are implementing to cope with the impacts of drought.



Figure 3. Focus Group Discussion with the Farmers



Figure 4. Mir Salam Safi, the general directorate of Northern River Basin Afghanistan (Left); Muhammad Ishaq Alkozai, the director of the Plant Protection office of Chamtal district; and Muhammad Hassan, the director of the horticulture development unit of Chamtal district (Right);

2.3. Analyzing the collected data

To assist with the quantitative nature of the study, the research adopts descriptive and inferential statics test (Chi-squared test of independence). The chi-squared test of independence is used to assess the relationship between participants feedback to the questions for interlinked variables. Descriptive statistics includes the description of the results using the percentage and number of the responses accompanied by pie charts and bar charts for the better visualization of the results.

3. Result and Discussion

3.1. Demographic information

Some basic characteristics of our sample reveal that all of the respondents in the sample are male Arab married farmers with no variations in these variables. Furthermore, they are 37 years old on average, with the youngest farmer being 22 and oldest 55 years old. A majority of the farmers are uneducated (53%) followed by preschoolers (23%), the remaining three categories of primary school, high school, and bachelor's degree holders amount to a very small proportion of 7%, 7%, and 3% out of the whole sample, correspondingly **Figure 5**. On average 6 people reside in the household of each farmer.

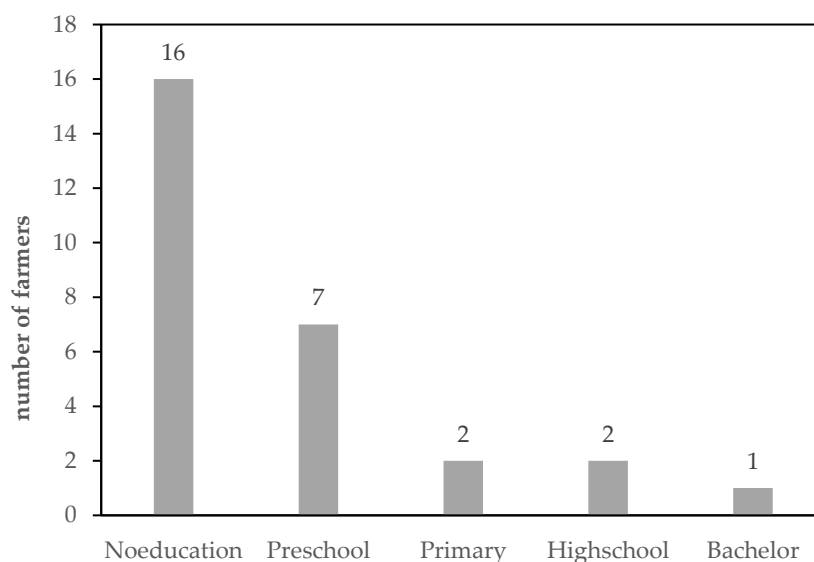


Figure 5. Education level amongst the farmers

3.2. Farming in the Study Area

Majority of the farmers which makes up about 90% of the farmers depend on farming for their livelihood, making them even more vulnerable to drought and face the risk of food insecurity. When it comes to the types of farming, about 80% of the farmers does both crop and animal farming, and 20% does only crop farming **Figure 7**. The crop farming type is 100% irrigated i.e., not rainfed. Furthermore, about half of the farmers own their own farms as a private land while farmers mainly coming from middle and poor background share farming lands i.e. communal lands and sharecropping **Figure 6**. These sharecropping or communal lands are either rented to farmers by the government or other private citizen who owns the land and often various farmers work on the same land and share resources. The type of crops farmed before drought was wheat, melon, watermelon, spinach, mung bean, sesame, cotton plant, peas and cumin. This is reduced to only wheat, barley, cumin and spinach during drought.

The size of the land differs however the size of the land where plants and seeds are cultivated on differs based on weather and availability of water.

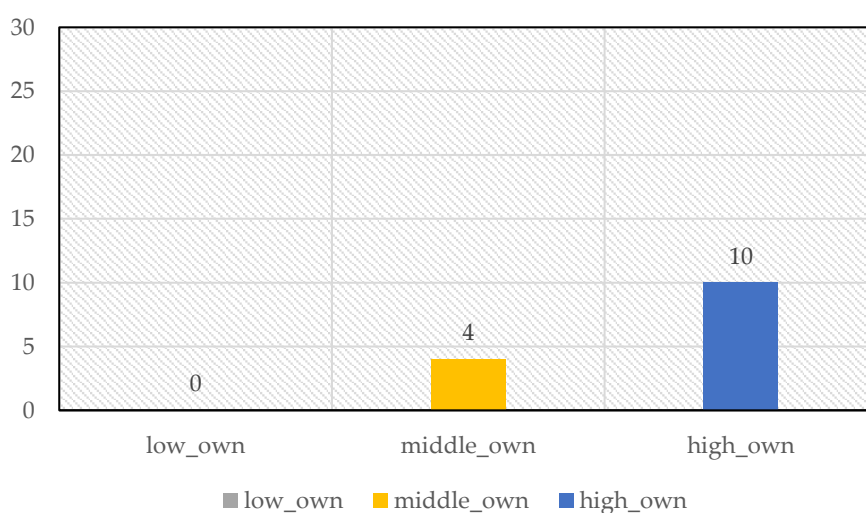


Figure 6. land owned by Low, Middle and high wealth group.

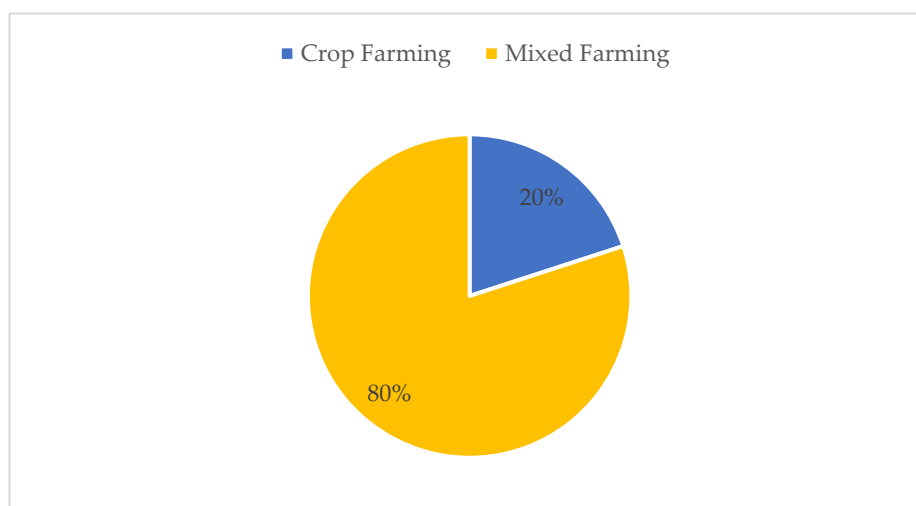


Figure 7. Farmers practicing crop and animal farming

The following sections (3.3. to 3.6.) answers the objectives of this research paper:

3.3. Farmer's vulnerability level to drought

Some main obstacles and consequences of drought are: access to drinking water (among 43%), access to good quality food (33%), dispersion of the family (90%), illness (90%), malnutrition/water-borne diseases (53%), and lack of access to health (33%). All the farmers had access to 3 water sources. However, this access was drastically lower in the summer season, when only half the farmers had access to water, whereas in the winter season all the farmers could access water. Access to water during the drought dropped by less than 1 water source (from 3 water sources before drought to an average of 2.37 water sources during the drought). All farmers reported loss of land during the drought and the reduction in the size of land amounted to 1.66 acres (dropping from 3.03 acres before drought to an average of 2.38 acres during the drought). It is noteworthy that this drop is highest in the summer where the land size is only 1.6 acres on average, which is about half of the land size before the drought. Another interesting finding is that land ownership is negatively correlated with the rating of both the impact of drought on crops and livestock. This means that landowners suffer lesser from the impact of droughts in both cases. This is sensible as the burden of renting or working on unowned land comes with additional costs that may exaggerate the impact of droughts on this sub-sample.

With the average farmer that have faced about 7.9 extreme droughts in 3 decades, we notice that the number of crops farmed during the drought fell by an average of 1.77 (from 5.37 before drought to 3.6 during droughts). The drought also caused a reduction of 63 (from 78.67 to 15.67) animals on average across the farms. A similar pattern is observed for milk production, which dropped from about 7 litres per day before drought to 2.7 litres per day during drought. Furthermore, half of the farmers started supplementary feeding during drought. While sheep and goat were owned by all farmers, only 67% owned cows. At the same time, all farmers had access to 2 sites for grazing. According to the correlation analysis (Bonferroni Corrected), the number of droughts significantly associated with the rating of the impact of droughts on crops. It can be imagined that the greater the number of droughts, the more crops would suffer. Additionally, we see a significant negative correlation between the number of crops dropped and the drop in the number of livestock and amount of milk produced. This simply hints at the fact that these three productions are mostly substitutes, i.e., farmers reallocate resources in a way that if one of the produces drops, the other is sustained and vice versa.

Farmers rated (from 1 lowest to 5 highest) their yield in the year 2023 to be 1.93, which is a below moderate level of yield. Moreover, when asked to rate the impact of drought (from 1-little to 5-severe), farmers rated the impact on crop and livestock to be equally high at 4.33 and 4.67, respectively. Relating to the correlation between farm characteristics and the impact of drought, an intuitive finding is that the higher ratings of the impact of drought on crops is positively associated with crop farming and negatively with mixed farming. This indicates that people who are solely crop-farmers suffer from the impact of droughts on crops than those who follow mixed farming (both crop and livestock farming).

Moreover, the other factor that contributed to the vulnerability of farmers was their lack of knowledge about the infiltration well and other means of surface water infiltration to Groundwater. During our interview with Mir Salam Safi, the general directorate of Northern River Basin approved that farmers are unaware of the infiltration wells and other ways of recharging the groundwater as the groundwater is one of the primary sources for irrigation. Furthermore, farmers stated that there is no early warning system or that they weren't made aware of the onset of drought; this was approved during our interview with Muhammad Ishaq Alkozai, the director of the Plant Protection office of Chamtal district and Muhammad Hassan, director of horticulture development unit of Chamtal district.

Based on the discussion with the farmers, they all agreed that drought is a huge problem in the country, in their community and on their agriculture. All of the farmers are exposed to drought and are aware of its impact and hence they agree on their vulnerability towards drought. This conclusion was drawn as farmers indicated that because of drought, they have been suffering. Since this is the case, government's intervention is to be considered for the farmers of Arabmazari village. Drought is a global issue with the majority of countries experiencing the impacts of drought one way or the other. The common factor in all of these countries, including Afghanistan, is the reactive nature of the drought management indicated in section 3.6. where majority of the projects are response measure rather than mitigation or preparedness. With the evidence showing farmers vulnerability to drought, its time for the government to bring changes to its drought-risk management implementation policies that are more effective.

3.4. Coping mechanisms followed by different farming – household during drought and its effects on their families. And to identify the challenges and limitations to practice a successful drought-risk management among the farmers

With no governmental intervention, farmers are forced to implement their own measures. However, the coping mechanisms employed are limited and is not a long-term solution. Some universal features of preparations and coping practices that were prevalent among all the farmers included: Majority of the farmers opted for drought resistant crops. The main factors that determined what crops to be harvested, from most prevalent to least, included economic value (80%), field size (13%), and information on rainfall (7%).

The other coping measures were to dig a deep borehole/well to reach deep groundwater. Farmers from rich and middle wealth group have the ability to dig these wells, however according to our FGD, farmers from poor wealth group are forced to rely on the wells of other farmers and/or buy water. It is also common to dig ditches around the farming lands where they reroute water from a river or other water sources, these ditches are not sustainable either since the infrastructure is not stable and the soils erode easily. Moreover, there is no limit or control to how much water goes through these ditches. For example, if there's water during winter, it goes to waste and does not store.

Moreover, farmers started to cultivate drought resistance crops such as peas, wheat, barley, and cumin. They also employed crop diversification and crop rotation strategy. The crop rotation strategy is when farmers increase the amount of organic matter in soil to improve soil structure, so that the soil could hold water for a long period of time. This way the water is used efficiently. The other ways they coped with drought was through humanitarian assistance (explained in section 3.6.), migration (77% reported), remittances, sale of assets, sale of livestock, taking employment elsewhere (87% reported) and other casual labors (83% reported). These strategies helped them to some extent to prevent hunger, but it did not fully help or stabilize their situation. For example, when selling their assets, only 67% of the farmers stated that the asset sale/pledge helped them with their problems. School change and dropping out were also prevalent among most the 67% and 57%, of the family members of the farmers. Most of these droughts coping mechanisms are passed to them by older generation, hence it's not a systematic strategy suggested by the government. Farmers believe that none of the coping strategy has helped them have a stable life.

3.5. The impact of drought on different wealth groups and how they are dealing with drought

The distribution of drought impact indicates that farmers coming from low wealth class are more vulnerable to drought. According to the correlation analysis (Bonferroni Corrected), the distribution of the impact of droughts is significantly positively associated with low wealth. The less wealthy also report substantially higher impact of droughts on crops. Despite that, the drop-in livestock and milk production is negatively correlated with the low class. In contrast, the high-class membership is positively linked to the drop in the number of livestock kept. This could hint at the livestock in high class suffering more from drought than the low class. However, it is possible that the low class own lesser livestock to begin with, thus we do not observe a great drop in the number of livestock during drought. While the opposite could be true for the high class.

When it comes to wealthy people who owns land, they suffer less from the drought impact since they do not have the burden of renting or working on an unowned land which in this case required additional costs hence increasing

drought's impact. In the meantime, when it comes to governmental or NGO assistance, landowners seems to receive lower drought support. This is due to the fact that wealthy people may have other resources to use to help them cope with drought while poor people do not have any other asset except for the rented farmlands.

3.6. Government's and NGOs response and strategies for the farmers of Balkh province

Farmers responded that majority of them have requested help from the government but has not received it to the extent they wanted it and only 67% said they received the drought support.

Although Muhammad Ishaq Alkozai, the director of Plant Protection office of Chamtal district and Muhammad Hassan, the director of horticulture development unit of Chamtal district reported the following respond programs for Chamtal district.

1. In Chamtal district, in 2022, ACTED organization donated animal feeds for 333 farmers.
2. In Chamtal district, in 2022, ACTED organization has given 333 women vegetable seeds, wheelbarrows and small storages for grains.
3. In Chamtal district, in 2022, the DACAAR organization has given animal feed (Kanjara) to 750 people.
4. In Chamtal district, in 2022, DACAAR organization has given fertilizer and eggs to 750 women for home gardens.
5. In Chamtal district, in 2022, the PRB organization, whose sponsor was BHH, provided cash and work for money to 1030 people.
6. In Chamtal district, in 2022, 58 people were given cashew wheat and chemical fertilizers by ORD organization.
7. In Chamtal district, in 2022, the government provided (work for wheat) to the people of the district.
8. In Chamtal district, in 2022, by the ACTION AID organization, whose sponsor is FOA, wheat seeds have been distributed to 4000 people, and each person has been given 50 kilos of DP fertilizer, 50 kilos of urea fertilizer and 50 kilos of wheat seeds.

The program that is under review and under the plan is by ACTION AID, which will provide animal feed for 900 livestock farmers, and 140,000 dollars cash for 1000 people (140 dollars per person). However, these are only temporary solution to fight the impacts of drought that does not cover all the vulnerable people. For instance, while some farmers reported that they did receive financial aid, others reported not receiving any aid. So, although some assistance was given to middle and low-class wealth groups, but there has been no long-term plan to implement drought mitigation measures in the region. Hence, farmers are left to come up with solutions on their own which may temporarily help them but not really stabilize their living situation. The farmers do believe that the lack of attention or effective implementation of the drought related policies is due to government's low budget. According to Mir Salam Safi the general directorate of Northern River Basin and Muhammad Hassan director of horticulture development unit of Chamtal district, besides low budget, the other factor that has made the implementation of the mitigation and preparedness measure difficult is the lack of communication between different governmental bodies and responsible ministries.

Moreover, farmers reported of no Early Warning System, no awareness campaign, and no strategy by the government implemented in the area. Muhammad Hassan approved this report by stating that no early warning system or news is given to farmers in regards to drought.

Mir Salam Safi indicated that the main reason people are vulnerable to drought is their lack of awareness of the issue which eventually results into their inability to help the government with the implementation of the mitigation measures. He states that the vulnerability of farmers and people in general has been made worse with the inability of the government to prevent the exploitation of groundwater. The first step to solve this issue is for the ministry of agriculture to organize seminars and trainings for the farmers. He stated that the District's Agriculture Department is responsible to give the information about the availability and amount of water for farmers and irrigation for the next year cropping season. However, the Agriculture department of Chamtal District reported that no such information is given to them. This indicates the lack of communication between the responsible bodies. An absence of a proper localized and comprehensive drought risk management GIS data is one of the contributing factor to the misunderstandings and data loss among the responsible bodies.

When asked whether people are included during any of the decision-making process at the local level. Mir Salam Safi indicated that at a district level there is a Water Association Committee that gives authority to people choose the head and members of the committee through which they voice their concerns and meet their needs. However, this contradicts to what the farmers of Arabmazari village responded in regards to having no part in the decision-making process. The reason for this contradiction is not covered in this research and so it is important to interview and explore

the responsibilities of Water Association Committee and their coverage and communication with the farmers of the villages.

Similar studies by Meraj et al. (2021), Aliyar et al. (2022), and M. Iqbal (2018) on drought vulnerability and coping strategies implemented by the farmers in different part of the country proves that although all the regions faces drought, however, the impact and strategies implemented differs from one region to another region. Farmers perceive and understand drought in all the studied regions as a phenomenon that is caused by climate change, increase in average temperature, reduction in average precipitation, and reduction in groundwater level.

The coping strategies implemented in the regions that were reported by Meraj et al. (2021) are to drill boreholes, diversified farming, and changing of crop pattern. In most of the provinces i.e. Kabul, Bamiyan, Kapisa, Parwan, Panjshir, Wardak, and Ghazni, strategies were developed to establish automatic weather stations, weather-based crop insurance, agricultural practices that are climate-smart, and providing agro advisory services. Meanwhile, a study performed by Aliyar et al. (2022) on the farmers of Bamiyan province revealed that the farmers besides implementing on-farm strategies, they were also busy with an off-farm activity such as handicrafts. These studies prove that people in different regions of the country cope with the impacts of drought differently. This is further proven by this research paper where with the lack of governmental intervention and policies, the farmers of Chamtal village is forced to rely on their own, often unsustainable, techniques to cope with the impacts of drought.

3.7. Limitations of the study

The main limitation this research came across is the study sample size that may not represent the whole of the population, hence limiting the generalizability of the study. There is no online factual information about the population of the village chosen for this research, the only information about the population is just an estimation given by the community leaders. In-fact this research may be the first research performed on Arabmazari village since there are no relevant online data in regards to this village. This information may make the current research as much important to provide insight about the struggles of farmers against drought, however, due to time restriction and high cost, the researcher is unable to carry out an extensive research.

Nevertheless, the research does not aim to generalize its finding to the general population but it is hoped that this study serves as a stepping stone for future researchers of Arabmazari's village. To ease with the process of collecting data, the researcher decides to use non-probability purposive sampling method where it does not necessarily require a large sample data as long as the present data answers all of the objective.

4. Conclusion and Recommendations

The study was carried out in the Arabmazari village of Chamtal district, Balkh Province, Afghanistan. The location was recommended by the Ministry of Agriculture, Irrigation and Livestock of Balkh Province as the impact of drought in this village is severe but there are no data in-regards to drought and how people, specifically farmers, deals with drought. Around 30 farmers were selected using the non-probability purposive sampling method. Some coping strategies for crops and livestock included cultivating drought-resistant crops, changing cropping patterns, practicing crop rotation, soil treatment, and providing supplementary feeds for animals. Non-farm coping strategies were selling/pledging assets, migration, seeking employment elsewhere, dropping out of school, and seeking humanitarian aid.

The following hypothesis were proven a) The farmers coping mechanism and strategies towards drought is ineffective: Although farmers coping mechanism towards drought has not stabilized their living situation, however it has temporarily helped them to deal with drought. b) The second hypotheses are that, in periods of drought, Subsistence or small-scale farmers requires governmental and non-governmental assistance to cope with drought: as mentioned previously, the coping mechanisms implemented by farmers is only a temporary solution. To have a prosperous and resilient community towards future drought events, the government needs to implement strong and appropriate policies and provide farmers with the tools and facilities to fight drought. c) The third hypotheses are that, the government has failed to provide an effective drought-risk management policy to help farmers in need: based on farmers response, they have not received any guidance, Early Warning System, or awareness campaigns by the government. Some of the farmers only received drought relief in form of money and food which temporarily has helped with their situation but has not stabilized their living condition. There has been no involvement or intervention of the government to Arab-

mazari's village when it comes to mitigation and preparatory measures. The lack of communication between the responsible ministries and an absence of proper localized and comprehensive drought risk management GIS data is some of the contributing factors to the misunderstandings and data loss among the responsible bodies that are needed for a successful implementation of long-term projects. The government intervention and inclusion of farmers in the awareness program and decision-making process is necessary to build a farmer's community with a strong resistance against drought.

It is recommended that the government intervention adopt more effective mitigation and preparatory measures. Moreover, a thorough research/survey is to be done to find out the responsibilities and contribution of the Water Association Committee of Chamtal district towards the farmers of Arabmazari village. Currently, a cost-effective and immediate adaption is a practical option for the farmers, such as GIS, to create a localized map of the drought-prone areas.

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References

- Acharya, A., Prakash, A., Saxena, P., & Nigam, A. (2013). Sampling: Why and How of it? Anita S Acharya, Anupam Prakash, Pikee Saxena, Aruna Nigam. *Indian Journal of Medical Specilaities*. doi:10.7713/ijms.2013.0032
- Aliyar, Q., Zulfiqar, F., Datta, A., Kuwornu, J. K. M., & Shrestha, S. (2022). Drought perception and field-level adaptation strategies of farming households in drought-prone areas of Afghanistan. *International Journal of Disaster Risk Reduction*, 72, 102862. doi:<https://doi.org/10.1016/j.ijdrr.2022.102862>
- Etikan, I. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, 5, 1. doi:10.11648/j.ajtas.20160501.11
- FAO. (2020). *Afghanistan Drought Risk Management Strategy (2019-2030)*. Retrieved from Food and Agriculture Organization of the United Nations Website: <https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1366257/>
- FEWS NET. (2020). La Niña and Precipitation, Agroclimatology Fact Sheet Series. 2, 1-2.
- FEWS NET. (2022). Afghanistan Key Message Update: Rainfed crops and pasture significantly impacted by drought in north and northeast.
- Government of Afghanistan. (2015). Climate Change And Governance In Afghanistan. *NEPA & UNEP*.
- Hao, Z. (2018). The challenges of drought prediction. *Eos*, 99.
- Hao, Z., Singh, V. P., & Xia, Y. (2018). Seasonal Drought Prediction: Advances, Challenges, and Future Prospects. *Reviews of Geophysics*, 56(1), 108-141. doi:<https://doi.org/10.1002/2016RG000549>
- Iqbal, M. (2018). Farmers' perceptions of and adaptations to drought in Herat Province, Afghanistan. *Journal of Mountain Science*, 15, 1741–1756. doi:10.1007/s11629-017-4750-z
- Iqbal, M. W., Donjadee, S., Kwanyuen, B., & Liu, S. Y. (2018). Farmers' perceptions of and adaptations to drought in Herat Province, Afghanistan. *Journal of Mountain Science* 15(8). Retrieved from <https://link.springer.com/content/pdf/10.1007%2Fs11629-017-4750-z.pdf>

- Marshall, M. N. (1996). Sampling for qualitative research. *Family Practice*, 13(6), 522-526. doi:10.1093/fampra/13.6.522
- Meraj, S., Senthilnathan, S., Venkatachalam, S., Tamilarasu, A., & V.S. Manivasagamd. (2021). Climate Risks, Farmers Perception and Adaptation Strategies to Climate Variability in Afghanistan. *Emirates Journal of Food and Agriculture*, 33(12), 1038-1046.
- Mohammad Assem Mayar. (2021). Global Warming and Afghanistan: Drought, hunger and thirst expected to worsen. *Afghanistan Analyst Network*.
- National Statistic and Information Authority (NSIA). (2021-22). Estimated Population of Afghanistan 2021-22.
- Olaleye, O. L. (2010). *Drought Coping Mechanisms: A Case Study of Small Scale Farmers in Motheo District of the Free State Province*: University of South Africa.
- Tabane, L. (2016). The Effects of Water Scarcity on Rural livelihoods: a Case Study of Borakalalo Village in Lehurutshe (North West Province).
- The World Bank. (2018). Unlocking the Potential of Agriculture for Afghanistan's Growth.
- Vasileiou, K., Barnett, J., Thorpe, S., & Young, T. (2018). Characterising and justifying sample size sufficiency in interview-based studies: Systematic analysis of qualitative health research over a 15-year period. *BMC Medical Research Methodology*, 18. doi:10.1186/s12874-018-0594-7
- Wilhite, D. A. (1996). *A methodology for drought preparedness*, *Natural Hazards* (Vol. 13).
- Wilhite, D. A. (2000). Drought Preparedness and Response in the Context of Sub-Saharan Africa. *Journal of Contingencies and Crisis Management*, 8(2), 81-92. doi:<https://doi.org/10.1111/1468-5973.00127>
- World Bank Group. (2020). *Climate Risk Country Profile - Afghanistan*. Retrieved from <https://reliefweb.int/report/afghanistan/climate-risk-country-profile-afghanistan>