

The Impact of Floods on Household Food Security Within uMzimkhulu and Kokstad Local Municipalities, KwaZulu-Natal Province (South Africa): A Comparative Study

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ABSTRACT

In the past three years (2021-2023), the KwaZulu-Natal Province has experienced unusually high rainfall, some of which was caused by Cyclone Idia. The province's geographical location along the coast makes it vulnerable to cyclones that form in the Indian Ocean, resulting in or triggering high rainfall and floods, such as those that occurred during the 2021-2023 floods, which led to flood disasters. Floods also occurred in other provinces, including the Eastern Cape and the Free State. In 2023, the KwaZulu-Natal Province continued to experience heavy rainfall, resulting in severe flooding that led to landslides and significant crop and livestock losses for many households. Floods directly impact access to food. The present study investigates the impact of floods on household food security within the uMzimkhulu and Kokstad Municipalities in KwaZulu-Natal. Data from the study have been analysed and presented using a quantitative survey approach using a structured questionnaire. The survey included 50 households, and purposive sampling was used to select the households or study participants. The study results reveal that more than 80% of respondents from both municipalities reported that their food supply was affected by the flood, as their crops, particularly the main food crops maize and dry beans, were destroyed or washed away. The study also reveals that floods negatively affected food availability and impacted households' income, as households usually sell excess produce to the market to raise extra money for other household needs. According to the findings, floods severely affected Kokstad Municipality, resulting in limited food availability in most households.

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1. INTRODUCTION

Floods, as diachronic and international phenomena, affect many people, as well as buildings and infrastructure. Throughout human history, floods have been considered more lethal and have caused greater economic losses than other natural disasters (Angelakis *et al.*, 2020).

Over the centuries, disasters have claimed lives, damaged infrastructure, caused diseases, and threatened food security worldwide, including in South Africa. In Africa, 66% of rural households rely on agriculture and land to support themselves or their livelihoods, while only 34% of households obtain significant incomes from non-farming activities (Kupika *et al.*, 2019). Food insecurity has been on the rise globally since 2015, largely due to increasing violence and climate-related shocks, according to experts (Drysdale, Moshabela, & Bob, 2019; Swanepoel, Van Niekerk, & Tirivanhu, 2021; Shushu *et al.*, 2024). By 2050, the world's population is estimated to reach 9.7 billion people. Africa is expected to account for more than half of this rise, making it an increasingly important driver of food demand (Gashu, Demment, & Stoecker, 2019; Shushu *et al.*, 2024). Obviously, there is a relationship between food production and the environment, as food production is highly dependent on the environment. The current disastrous conditions in South Africa can negatively impact household food security, as well as food prices and exports of maize and other crops.

According to the Food and Agriculture Organisation (2019), flooding can affect food security for over 5.6 million people across several African nations. Furthermore, floods can damage crops, cause soil erosion, and result in the loss of livestock, further reducing food availability (Parida & Prasad Dash, 2020).

The South African agricultural sector is of great importance to rural areas, as it is a significant source of livelihood and income. Ngcamu (2022) argues that the nature and magnitude of the impact of climate-related natural disasters depend on the nature and intensity of the disaster, as well as the vulnerability and preparedness of people in the affected community. Small-scale farmers will be disproportionately affected by climate change-related disasters, thereby increasing their vulnerability to food insecurity and poverty.

The indirect impacts of floods on smallholder farmers include changes in productivity and the quality of crops produced, as well as various agricultural costs aimed at eliminating or minimising these changes. Additionally, floods have direct impacts on weather conditions, which ultimately affect agricultural practices (Callaghan, 2021). However, Ajala (2020) emphasises that the effects of floods and other hazards, such as droughts and typhoons, have negative impacts on food security. For example, they can reduce agricultural productivity; damage the means of production, facilities, and infrastructure; and limit farm planting options, thereby threatening people's livelihoods. Mazibuko and Letsoko (2024) state that South Africa is one of the African countries naturally susceptible to natural hazards, which result in a negative impact on household food security levels.

Considering the increasing population growth and the consequential loss of arable land in South Africa due to flood disasters, studies conducted in the country have shown that the level of food insecurity is currently high, with more than one million households being food insecure (Week & Wizer, 2020). Various studies have been conducted on the impact of floods in KwaZulu-Natal, but none of them have primarily focused on a comparative analysis between two municipalities (Udo & Naidu, 2023; Maziya *et al.*, 2024; Mazibuko & Letsoko, 2024; Amusan, Motswaledi, & Afolabi, 2024; Ndlovu & Zenda, 2024). An article by Udo *et al.* (2023) explores the experiences of local Black African women in adapting to flood impacts within the Durban metropolitan area, therefore the purpose of this study is to analyse the socio-economic characteristics of the families affected by floods within uMzimkhulu and Kokstad Municipalities in KwaZulu Natal (South Africa), and additionally to analyse the impact of floods on household food security within the two municipalities. The study aims to answer the following research questions:

- I. What are the socio-economic characteristics of the families affected by floods within uMzimkhulu and Kokstad Municipalities?
- II. What are the impacts of floods on household food security within uMzimkhulu and Kokstad Municipalities?
- III. What measures were taken by the government to address the impact of floods?

The article is structured as follows: Section 2 contains the literature review, which includes the theoretical framework, while Section 3 presents the methodology. Data collection, analysis,

measurement, discussion, and findings are all presented in Section 4, preceding the summary, conclusion, and implications in Section 5. Lastly, Section 6 outlines the recommendations.

2. LITERATURE REVIEW

2.1. Overview of Floods

According to Yan and Liu (2024), natural disasters are categorised into six groups: biological, geophysical, meteorological, hydrological, climatological, and extraterrestrial. Floods are in the hydrological group.

A flood can be defined as an event where the earth's surface cannot absorb all the rain that falls at a particular time, and when the excess water flows over the land (Zorn, 2019). Dube, Goldwell, and Chikodzi (2021) define a flood as an overflow of water onto the land that is referred to as normal dry land that has never been filled with water and then suddenly flooded after heavy rains, resulting in the inundation of areas, and potentially causing damage to infrastructure, agriculture, and communities. Floods can result from a multitude of factors, including climatic conditions, physical features, urbanisation, and human activities such as the use or application of more fertilisers and chemicals during crop planting, as well as vegetation clearing.

There are several different types of floods that an area can experience; only three major types of floods are experienced in the study area: River floods, Pluvial or Flash floods, and coastal floods (Abid *et al.*, 2020; Yan *et al.*, 2024). Pluvial flooding occurs in rural areas when the rate of precipitation falling on an area exceeds the infiltration rate into the ground, and in urbanised areas, when the floodwater exceeds the capacity of the built storm drain systems. Pluvial flooding can be defined as the rapid and extreme flow of water from high-lying areas into normally dry areas where the land cannot easily absorb large amounts of rainfall water (Falconer *et al.*, 2009; Yan *et al.*, 2024).

Fluvial flooding, which is like pluvial flooding, usually occurs when an excessive amount of rainfall exceeds the capacity of a river. In some areas, such as North America, fluvial flooding can also be caused by heavy snowmelt and ice jams (Lund, 2012; Changnon, 2008; Yan *et al.*, 2024). Lastly, Coastal flooding in low-lying areas is usually caused by wind waves and elevated water levels (Wolf, 2009). These floods are typically generated by large waves, storm surges, high tides, and anomalies in mean sea level.

2.2. Overview of Food Security

There is no single, universally agreed-upon definition of food security; however, the commonly used definition is provided by the World Bank (David & Grobler, 2022). Food security is defined as the secure access by all people in a community or an economy to enough food for a healthy life (Stevens *et al.*, 2000). Another definition of food security, closely related to the World Bank definition, is provided by FAO (2019). According to this definition, food security refers to the state of having access to sufficient, nutritious food that meets dietary needs and preferences, enabling an active and healthy lifestyle.

According to these definitions, food security has four components: availability, accessibility, utilisation, and stability. However, David *et al.* (2022) state that there are three key elements related to food security, namely availability, access, and utilisation. The nutritional well-being of household members depends not only on food accessibility but also on its utilisation by them. The three dimensions mentioned above must remain stable over time to ensure sustainable food security. The FAO (2019) states that even if you now consume enough food, you are still considered to have food insecurity if you frequently lack access to food. According to Callaghan (2021), there has been a change in rainfall patterns, which has caused season variability, affecting and manipulating the accessibility of specific types of foods at precise times of the year. As a result, low-income communities are more reliant on market purchases, which causes households to spend a larger portion of their income on food.

2.3. Floods and Food Security

According to Tabari (2020), flooding is a prevalent and destructive natural disaster, with its intensity, frequency, and geographical scope increasing continuously over time. Dube, Godwell, and Chikodzi (2021) claim that the effects of floods at the household level disrupt daily activities, uproot families, destroy infrastructures, and disrupt social and community networks.

The effects of floods are predicted to worsen in the future due to climate change, which is causing sea levels to rise, raising significant concerns. The current levels of flood catastrophe risk in South Africa are anticipated to increase and lead to an increase in the number of flood events because of poor land (agricultural) use practices, an expanding population, and a rise in

the number of people residing in high flood-risk areas (Davis-Reddy, Vincent, & Mambo, 2017).

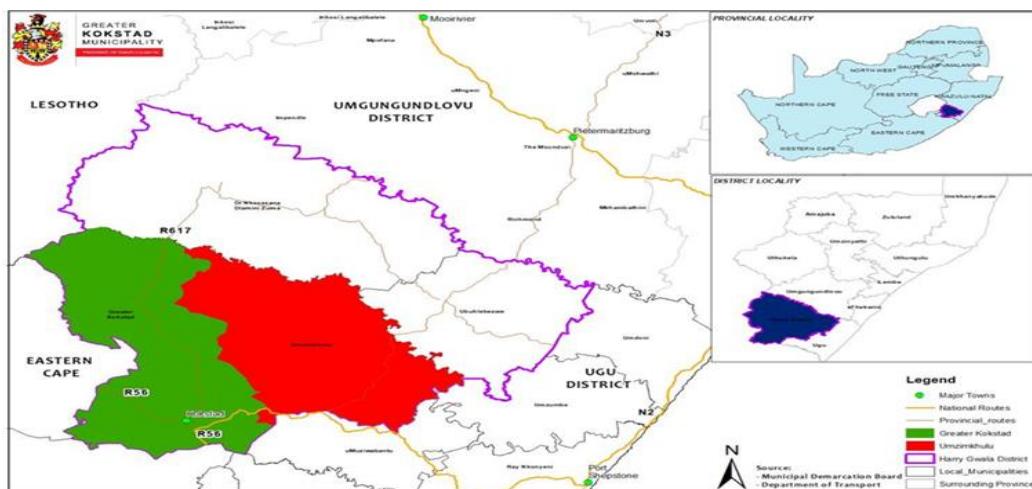
According to FAO (2019), grazing fields for livestock are the most affected by floods. Grazing land will be covered by water or eroded, resulting in livestock being without a place to feed or graze. Additionally, it contends that crop production is greatly impacted by flood damage, as the destruction of large areas of crops creates problems and challenges to food security.

3. RESEARCH METHODOLOGY

3.1. Study Area

uMzimkhulu and Kokstad municipalities are found in the southwest of KwaZulu-Natal Province. The two municipalities form part of the family of four (4) local municipalities of the Harry Gwala District Municipality (i.e., Ubuhlebezwe, Dr Nkosazana Dlamini-Zuma, Kokstad and uMzimkhulu). The uMzimkhulu municipality is approximately 115 km from Pietermaritzburg. Kokstad is 86 km from uMzimkhulu town. The Kokstad municipality is located on the border of the Eastern Cape and KwaZulu-Natal.

In KwaZulu-Natal, the uMzimkhulu and Kokstad Local Municipalities are among the areas where many households engage in subsistence agricultural activities to ensure survival. People work on farms, which is a great challenge since major farms and other communal gardens have been highly affected by floods in turn this likely contributes to money linked shortages in the household (Khowa, 2021), it has been confirmed that people of ward one at Kokstad Municipality are food insecure they cannot afford their living anymore as some of them still live in a community hall and being supported with food parcels. Food security remains a concern for households in the study area.



**FIGURE 1: Map Showing the Two Study Sites (uMzimkhulu and Kokstad Municipality)
(Source: Greater Kokstad Municipality, 2022)**

3.2. Research Design, Population, and Sampling

This study employed a quantitative design, which provides comprehensive coverage of the research objectives. It is particularly effective for analysing and understanding the socio-economic characteristics of households and measuring the effects of floods on household food security. A purposive sample of 50 households was selected from the total study population based on the impact of floods on their farming activities. A total of 30 households were from uMzimkhulu, and 20 households were from Kokstad municipality.

3.3. Data Collection and Analysis

A closed-ended questionnaire, available in both Xhosa and Zulu, was used to collect data from the households. This questionnaire served as the primary data collection instrument for the study. This type of interview is often used simply because it is easy to administer and may also be used to clarify whether certain questions are required or not. Data was collected during October 2023. The descriptive statistics analysis was used to obtain frequencies, percentages, mean, median, and mode to summarise statistical data and illustrate the results.

4. RESULTS AND DISCUSSION

4.1. Descriptive Results

The initial sample of this study consisted of 60 participants. However, due to challenges encountered by the researcher during data collection, including consultations with Ward Councillors, it was determined that 10 participants from Ward 1 at Kokstad Municipality could not participate in the study, as they were still residing in emergency shelters. Consequently, only 50 respondents participated in the study; however, the response rate was 100 percent. Mabuku (2019) states that flood disasters have increased, leading to direct and indirect impacts on societies, including agricultural productivity as well as food availability, accessibility, and stability in communities. Dube (2022) also reveals that households had low asset status and relied heavily on food parcels and social grants, particularly old-age pensions.

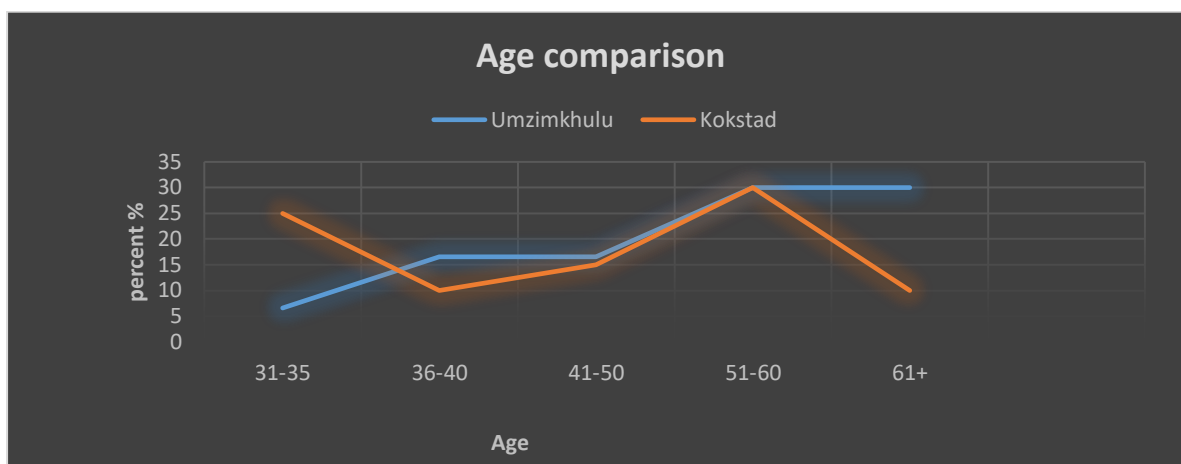


FIGURE 2: Comparative Analysis of the Age Groups of Households

All respondents were adults; children were excluded because they were unable to provide much information related to the study topic. The graph shows that 30% of the respondents were aged between 50 and 60 years in both Municipalities. Ajala (2020) explains that youth do not see farming as a profitable profession. They prefer to be hired by commercial farmers rather than starting their own businesses, and many also relocate to large cities. The graph also shows that 30% of respondents were aged 61 years and above at uMzimkhulu, whereas at Kokstad, only 10% fell within this age range. Additionally, Ibrahim, Ayinde, and Arowolo (2015) believe that older farmers are considered more experienced, which has a positive impact on their productivity.

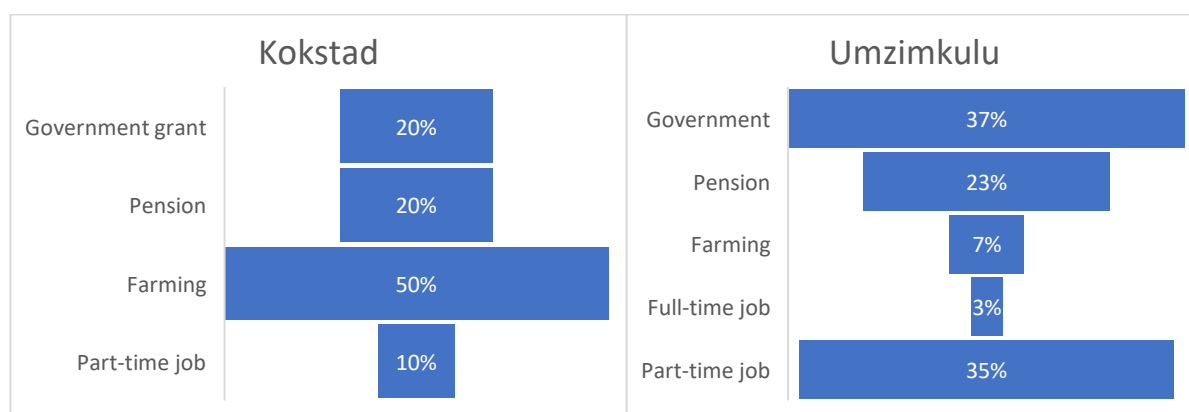


FIGURE 3: Major Source of Income

The study further investigated the participants' major source of income in both municipalities. Figure 3 shows that in Kokstad 10% of respondents said their source of income is from part-time jobs, 20% from pension, 20% government grants and 50% from farming, many

respondents need to supplement their income either from a pension or part time job since most of them participate in Expanded Public Works Programme (EPWP) and their salaries are not enough. According to Ajala (2017), most rural households rely on agricultural production for a significant share of their household income, and they also sell to street vendors/hawkers. Figure 3 shows that in uMzimkhulu, 37% of participants rely on government grants, 35% of participants stated they at times get part-time jobs (seasonal jobs) in the nearest commercial farmers, only 3% have a full-time job, and 7% practice farming, 23% said their primary source of income is a pension (from previous employers), but that is not enough since they have to support their grandchildren.

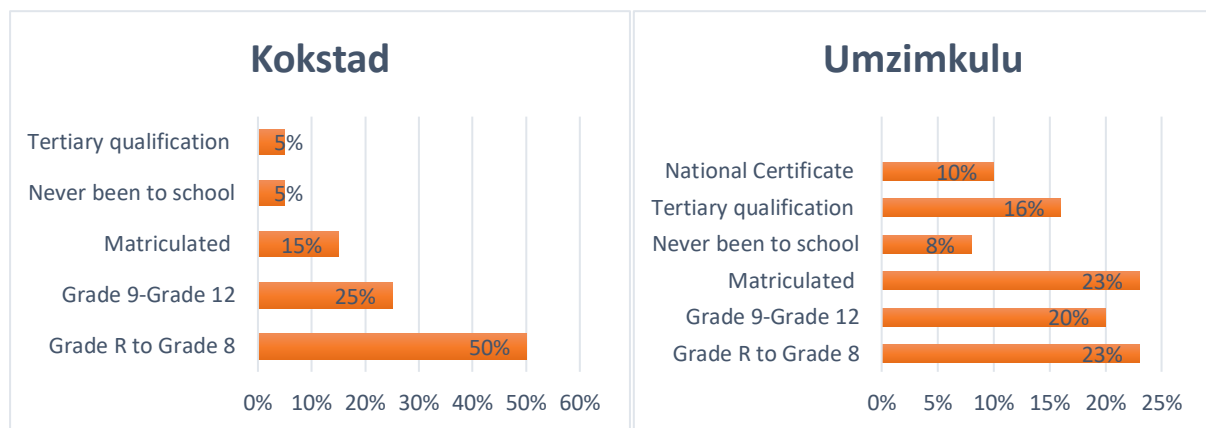


FIGURE 4: Highest Level of Qualification of Participant

In both municipalities, it was observed that most respondents had limited education, as indicated in Figure 4. Only 5% of respondents from Kokstad held a tertiary qualification, whereas 16% of respondents from uMzimkhulu had a tertiary qualification.

4.2. Comparative Analysis of the Impact of Floods at Kokstad and uMzimkhulu



FIGURE 5: Floods Affected Bridges and Roads in 2022 (Source: HGD Disaster Management, 2022)

All of the respondents in both municipalities agreed that they were affected by floods in different ways. As shown in Figure 5 above, bridges and access roads were also affected. Participants mentioned that it was difficult for them to reach home using their motor vehicles, as access roads and bridges had been washed away. At uMzimkhulu, 3.3% of respondents (1 household) indicated that they lost a family member when their house collapsed. Sixty-three percent of the respondents from uMzimkhulu further explained that they experienced a burst of spring water in their houses, which resulted in damage to furniture and walls, or houses collapsing.

Almost 20% further indicated that floods caused electricity cuts in their area for a period of over a month, which resulted in most of their green groceries rotting as fridges stopped functioning. Musyoki, Thifhufhelwi, and Murungweni (2016) state that floods cause tremendous damage to roads, telephone lines, workplaces, schools, and health facilities. At Kokstad municipality, 59% of the respondents reported that they lost all their agricultural produce in their yard or garden, and their livestock was also affected.

TABLE 1: Comparative Analysis of How Floods Affected Households in the Study

How Floods Affected Households in The Past Two Years (2021-2022)	Kokstad Municipality		uMzimkhulu Municipality	
	Frequency	Percent	Frequency	Percent
Crops and Livestock Destroyed	12	50	23	76.6
Poultry Structures and Birds Destroyed	3	15	2	6.7
Irrigation System and Fencing Damaged	0	0	02	6.7
Other	5	25	3	10
Total	20	100	30	100

As shown above, 50% of respondents from the Kokstad Municipality stated that floods destroyed and washed away their crops and livestock, while 76% of respondents were recorded in the uMzimkhulu Municipality. According to Ajala (2020), the destruction of agricultural land and livestock has the biggest impact, resulting in a significant impact on households' welfare and their socio-economic conditions. A further 15% of participants from Kokstad and 6.7% from uMzimkhulu reported that their poultry structures and birds were also washed away by the floods. At the uMzimkhulu municipality, 6.7% of participants stated that floods destroyed their irrigation systems and garden fences. Twenty-five percent of participants from Kokstad and 10% from uMzimkhulu did not attempt to answer the questions posed to them. This was possibly because floods had affected them very badly. Pictures below show how floods impacted some of the households in the study area.



FIGURE 6: Crops and Fence Damaged by Floods (Source: M. Ngubo)



FIGURE 7: Maize Damaged by Floods (Source: M. Ngubo)

The study also sought to determine the amount of money respondents spent on preparing the land and planting their crops, which had been affected or damaged by floods. Thirty-five percent of respondents from Kokstad and 46.6% from uMzimkhulu, who explained that they grow crops on 0.25 - 1/2 a hectare, used between R500 and R1500. Participants who grow crops on one to three hectares (1-3 hectares) reported using between R2000 and R15000, which includes hiring tractors and purchasing inputs such as fertiliser and seeds. Households that grow crops on more than four (4) hectares explained that they spent between R15 000 and R50 000, which also includes hiring a tractor, purchasing inputs and hiring temporary farm workers to assist in the transplanting of seedlings and weeding. Khowa (2021) found that households

allocate a substantial amount of money to preparing or growing crops. However, when floods destroy all their produce, they lose the money they have invested in their fields.

Floods affected food availability in the households. Participants were asked whether the loss of crops due to floods had a significant impact on food availability in their household. A majority of respondents from both municipalities, 90% and 83.33%, respectively, confirmed that the floods certainly affected the availability of food in their households. This agrees with Henderson *et al.* (2020), who state that when flooding destroys crops and livestock, food security is threatened in most households. The study also aimed to investigate how food security was affected in households. The participants explained that low crop yields due to floods had a negative impact on households, affecting the availability of food, as households typically sell excess produce to the market as an income source. Thus, these floods resulted in a significant food shortage. Households now had to dig deep into their pockets to buy basic food (such as vegetables), which they had not previously purchased because they could harvest them from their gardens to feed their families.

4.3. Measures and Interventions Taken by the Government to Mitigate the Impact

Although Government and non-government organisations are trying to assist the flood victims, the support given to them is not enough, resulting in help going unnoticed by most households in the area. This is demonstrated in this study, where the majority of households (40% and 56% from both municipalities) reported not receiving any government assistance. Furthermore, 60% and 44% of respondents were not satisfied with the support or assistance they received. Some were given blankets or groceries, whereas others lost crops; they feel that it might have been better if they had been given agricultural inputs so that they could replant their gardens or plots.

4.4. Measures to Reduce the Impact of Floods

Forty-five percent of respondents from Kokstad and 33.33% from uMzimkhulu agree that the municipality should build strong access roads and bridges, which will direct running water/floods to the nearby streams. Participants (30% and 26.67%) also suggested that municipalities should provide early warnings and offer workshops to increase their knowledge of floods. Immediately after Weather services announce that heavy rains are to be expected, government employees should loudly disseminate this information to the communities, alerting them rather than keeping the information to themselves. From the results, 15% and 16.67% of

participants from Kokstad and uMzimkhulu, respectively, stated that they had no idea about what to do during a flood incident. Therefore, it is crucial to educate communities about the risks of flooding.

TABLE 2: Measures to Mitigate the Impact of Floods

	Kokstad		uMzimkhulu	
	Frequency	Percentage	Frequency	Percentage
Municipality educates and provides early warning about floods	6	30	8	26.67
The municipality builds strong roads and bridges	9	45	10	33.33
Communities reduce deforestation	2	10	7	23.33
No idea	3	15	5	16.67

5. CONCLUSION AND RECOMMENDATIONS

Floods have a significant negative impact on most sectoral economic activities, resulting in reduced food availability for households. Reduced harvests impact the next planting season, ultimately leading to a food shortage crisis. The study suggests that both government and stakeholders should provide immediate assistance to the flood victims, and that sufficient financial resources should be allocated to the district municipalities. Additionally, the study suggests that programmes designed to raise households' awareness of floods, natural disasters, and risk reduction strategies should be implemented on an ongoing basis. The study concludes that households should diversify their holdings to include livestock and fruit trees, rather than relying on a single commodity, so that when crops are affected by floods, the produce that survives will help maintain food security in the household.

The study recommends that both the government and stakeholders provide immediate assistance to the flood victims, and that sufficient financial resources be allocated to the district municipalities. Municipalities should build strong access roads and bridges that direct running water/floods to nearby streams. Additionally, the study suggests that programmes designed to

raise households' awareness of floods, natural disasters, and risk reduction strategies should be implemented on an ongoing basis.

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