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## Triple Nexus of Disaster Risk Management Knowledge, Attitude and Practice among Households in Fogera Woreda

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### Abstract

*The growing impact of disasters contrasts with advances in disaster risk reduction and management, highlighting persistent challenges in translating knowledge into action in Ethiopia. This reflects a gap that requires empirical research to explore factors influencing risk management practices and to suggest actionable explanations. This study assessed households' knowledge, attitudes, and practices related to disaster risk management in Fogera woreda, Ethiopia, and analyzed factors influencing these dimensions. A quantitative cross-sectional design was used to collect data from 144 purposively sampled households across three Kebeles and employed descriptive and inferential statistics analysis.*

*Results showed that 67% of households lacked basic disaster risk reduction and management knowledge. While 53% had constructive attitudes, only 28% engaged in risk management activities, with disaster preparedness being particularly inadequate. Seven key factors influenced household knowledge, attitude and practices. Significant differences in knowledge were found across age groups ( $p=0.03$ ), kebeles ( $p=0.02$ ), and economic status ( $p=0.007$ ). Attitudes varied by age ( $p=0.004$ ) and location ( $p=0.007$ ), and practices differed by kebele ( $p=0.05$ ).*

*Households in rural and disaster prevalent locations have low risk awareness, attitudes and risk management practices. These findings underscore the need for stakeholders, government agencies and academia to develop strategies that enhance households' knowledge of risk interpretation and active participation with a focus on rural and disaster affected areas. These efforts should aim not only providing foundational knowledge but also on implementing effective, long-term strategies that go beyond traditional training programs. Future studies are very important to explore beyond the seven factors and involve diversified research target groups.*

**Keywords:** Disaster Risk Reduction and Management; Disaster Knowledge; Disaster Attitude; Disaster Practice

## Background

The impact of disasters has significantly increased worldwide over time [1]. The growing consequences are evident in events like the 2013 Typhoon Haiyan in the Philippines, which resulted in over \$2.86 billion in losses, 6,340 fatalities, and affected 14 million people [2]. Similarly, the 2015 earthquake in Nepal claimed 8,964 lives, impacted over 8 million people, and caused \$10 billion in damages [3]. More recently, the COVID-19 pandemic has disrupted global systems, leading to 625 million cases, 6.5 million deaths (17% of which were in the U.S.), and an estimated \$13 trillion in economic losses over three years [4].

Disasters have also had a lasting impact in Africa, particularly in the Eastern Africa region and Ethiopia [5]. The World Bank highlights that Sub-Saharan Africa commonly faces droughts, floods, landslides, and earthquakes, with unique volcanic activity in countries like Uganda. The 2011/2012 Horn of Africa drought affected 13 million people, primarily in Kenya and Ethiopia, causing 10,000 deaths [6].

In Ethiopia, the 2021/22 drought impacted more than 2 million people, while inter-communal conflicts displaced 2 million and affected over 5 million [7]. The Amhara region, specifically South Gondar Zone and woredas like Fogera, is highly vulnerable to disasters, with food insecurity being a pressing issue. Emwodew and Menberu [8] reported that 2.5 million people in Amhara are chronically food insecure, and in 2021, over 12,000 people in Fogera were affected by flooding [9].

As disasters increasingly affect vulnerable populations, the knowledge and practice of disaster risk reduction and management (DRRM) have evolved significantly since systematic disaster research began in the 1950s [10]. However, Spiekermann et al. [11] aptly describe the current paradox as more is lost while more is known about disaster risk management (DRM). This reflects a gap between understanding disaster risks and translating that knowledge into actionable measures. Addressing this gap requires empirical research to explore factors influencing DRRM practices and suggest effective solutions.

Empirical studies on disaster risk management knowledge, attitudes, and practices (KAP) have been crucial for measuring understanding and identifying factors that influence KAP among various groups. For example, research in Myanmar found that despite awareness of natural hazards, communities lacked the resources to prepare and respond effectively [2]. In Europe, despite significant progress in disaster knowledge, challenges remain in integrating scientific expertise into disaster risk reduction policies and strategies [12]. In Rwanda, Kayiranga [13] found that 58.6% of Red Cross workers lacked disaster preparedness experience, and 51% held negative attitudes toward disasters.

In Ethiopia, DRRM knowledge and attitudes are critical yet insufficiently addressed. Many communities in rural areas attribute disasters to acts of divine power, hindering effective preparedness. Ashenafi, Adamu, and Aklilu [14] found that 50.8% of healthcare workers at Tikur Anbesa Specialized Hospital lacked basic knowledge of hospital disaster preparedness plans. While 65% had favorable attitudes, only 8.3% practiced disaster preparedness. Similarly, Sheganew et al. [7] reported that 58.9% of emergency room workers in South Gondar Zone's public hospitals were unaware of their hospital's disaster management plans, and over half had poor knowledge and negative attitudes toward disaster preparedness.

While these studies have highlighted knowledge and attitude gaps, they often fail to explore how knowledge translates into practice. Spiekermann et al. [11] argue that disaster losses are also influenced by risk perception, attitudes, power structures, values, worldviews, and resource constraints. Moreover, many studies have methodological limitations, focusing narrowly on specific groups such as COVID-19 responders, hospital staff, or students. Yet DRRM is most relevant at the household and community levels, where existing research is insufficient.

The conceptual framework of this research is rooted in understanding the paradox where disaster impacts are rising even as DRRM advances. This study emphasizes the importance of assessing household KAP and identifying the key factors influencing them. Knowledge includes awareness of disaster risks and vulnerabilities, which studies have linked to age, education, and occupation [15] [16]. Attitude encompasses perceptions of DRRM, influenced by age, gender, and education, as well as religion and prior disaster experiences [17]. Practice involves applying knowledge and attitudes, particularly in disaster preparedness, response, and mitigation [18]. This research tests these relationships and explores additional local factors, such as religion, economic status, and vulnerability.

This study aims to address these thematic and methodological gaps in KAP research for disaster risk reduction and management. Unlike previous studies that target specific groups or institutions, this research includes households within selected areas, providing a more comprehensive understanding of DRRM at the community level. It employs a descriptive and parametric quantitative design to assess household KAP and examine factors influencing these levels, such as age, economic status, religion, and prior disaster experience. By determining the levels of knowledge, attitudes, and practices and identifying the factors influencing them, this research contributes to a deeper understanding of DRRM at the household level. It provides insights necessary for developing effective strategies to improve disaster preparedness and resilience in Fogera Woreda<sup>1</sup> and similar contexts.

## Literature Review

Research on Knowledge, Attitudes, and Practices has become increasingly significant in the field of disaster risk reduction and management, as these elements play a crucial role in enhancing preparedness and resilience against disasters. Studies have examined KAP across different populations, revealing various gaps and challenges in disaster preparedness and response.

For instance, Eriwell [19] conducted a study among 159 students and eight teachers to assess their knowledge, attitudes, and practices related to disaster preparedness in schools. The results showed that both students and teachers had moderate to high levels of knowledge and positive attitudes towards disaster preparedness. However, despite these strengths, students demonstrated only moderate practice (68.55%) in disaster preparedness, while teachers exhibited high levels of practice but lacked confidence in managing actual disaster situations. The study recommended a more robust approach to integrate technical training for both students and teachers and called for further studies to explore the relationship between KAP and DRM more broadly.

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<sup>1</sup> Woreda is a major administrative unit, like County, that oversees Kebeles (the smallest unit) in Ethiopia

Similarly, Songlar et al. [20] examined the KAP of elderly people regarding earthquake preparedness in Chiang Rai, Thailand. The study found that while the elderly participants had strong knowledge and attitudes toward earthquake safety, their practices were inadequate, suggesting that knowledge and attitude do not always translate into effective preparedness behaviors. The authors recommended improved preparedness services and additional research to explore the underlying reasons for the discrepancy between knowledge and practice.

A global study by REACH [12] on disaster preparedness in Myanmar revealed that while communities were aware of the risks associated with natural hazards, they lacked the necessary resources to effectively prepare and respond. The study highlighted significant gaps in education, evacuation planning, and community-level disaster management. It also emphasized the need for clearer roles and responsibilities among government and non-government actors to improve disaster resilience. The authors suggested that further research was needed to understand the diverse experiences and vulnerabilities of different community groups.

Suryadi et al. [21] conducted a study on community knowledge and attitudes towards disaster preparedness. They found that while the public had a moderate to good understanding of disaster preparedness, attitudes varied, with 69% of respondents displaying a moderate attitude toward disaster preparedness. The study concluded that there was a strong correlation between knowledge and attitude, highlighting the importance of enhancing public awareness to reduce disaster-related risks.

In Africa, research by Kusumasari et al. [22] underscored the severe impacts of disasters, despite their lower frequency compared to other regions. For example, Kayiranga [13] found that many Rwanda Red Cross employees had limited practical experience in disaster preparedness, even though they were familiar with disaster concepts in theory. The study highlighted the need for more comprehensive training to bridge the gap between theoretical knowledge and practical application.

In Ethiopia, Ashenafi et al. [14] investigated disaster preparedness among healthcare workers at Tikur Anbesa Hospital. The study revealed that while 51% of healthcare workers were knowledgeable about disaster preparedness, the hospital lacked a formal disaster management plan, and practice levels were alarmingly low (8.3%). This highlighted the insufficient attention given to disaster preparedness in the national health policy and the importance of improving preparedness frameworks within key institutions.

Yilebes and Abraham [23] assessed Ethiopia's early warning system (EWS) in Dera and Jabithenana, identifying significant challenges such as poor communication, political influence, and lack of local responsibility for disaster response. The study concluded that the country's EWS was underperforming, with issues related to staff capacity, inadequate risk indicators, and poor accessibility of information. The authors recommended reforms to strengthen the system, particularly in terms of risk knowledge, monitoring, and communication. Similarly, Sheganew et al. [7] found that many public hospital emergency workers in South Gondar Zone lacked knowledge and had negative attitudes toward disaster preparedness. Additionally, 67.5% of workers reported inadequate practical preparedness. This further emphasized the

need for systematic improvements in disaster preparedness training.

In conclusion, the reviewed studies highlight the critical role of knowledge, attitudes, and practices in disaster risk management. While there is a general awareness of disaster preparedness, significant gaps persist, particularly in translating knowledge into effective practices. Recommendations across these studies include targeted training, enhanced communication, and more comprehensive disaster management plans at the institutional and community levels. Future research should continue to explore the complex relationship between KAP and disaster risk reduction and management, particularly in diverse socio-political contexts, to strengthen resilience and reduce vulnerability to disasters.

## Materials and Methods

### Study design

This study employed quantitative method using cross-sectional design to collect, organize, analyze, and present households' knowledge, attitude and practices for disaster risk management. The design was aimed at assessing the DRM knowledge levels of households, and to identify, analyze and present the relevant factor influencing households' knowledge, attitudes and practices.

### Setting

As shown in **Figure 1** below, this study is conducted among households in the three Kebeles<sup>2</sup> of Fogera woreda, South Gondar Zone of the Amhara Regional State. The Amhara National Regional State is located in the northwestern Ethiopia between 9°20' and 14°20' North latitude and 36° 20' and 40° 20' East longitude. The Region has an estimated land area of about 170000km<sup>2</sup>. Amhara is divided into 10 major zones and one special administration zone known as North Gonder, South Gonder, West Gojjam, East Gojjam, Awie, Wag Hemra, North Wollo, South Wollo, Oromia Special Administrative Zone, North Shewa, and Bahir Dar City special zone. South Gondar Zone covers an area of 14,607km<sup>2</sup> in 11° 39' 59.99" N latitude and 38° 00' 0.00" E longitude. The Zone has 11 woredas and borders with East Gojjam from South, West Gojjam and Bahir Dar city in Southwest, Lake Tana on the west, North Gondar on the north, Wag Hemera Zone in the northeast, North Wollo on the East and Sout Wollo on the Southeast along the Abay River that separates South Gondar from the East and West Gojjam Zones.

Fogera is situated between the latitudes 11°57 and 11°59 and the longitudes 37°42 and 37°43 and altitudes ranging between 1793 to 1800 meters above sea level [24]. Woreta is the capital of the district, a town located 625 km from Addis Ababa and 55 km from the regional capital city, Bahir Dar [25]. Fogera is bordered by Libo Kemkem district in the North, Dera district in the South, Lake Tana in the West and Farta district in the East. The total population is estimated around 270243 and the number of agricultural households is approximately 44000 [26]. The woreda is dominantly known for rice production besides maize, finger millet, tef, onion, cattle rearing and others [27]. Farmers largely depend on the long rainy season for crop production and rice cultivation. Rice cultivation is followed by different crops such as onion, tef and other upland crops in the dry season [28]. Fogera involves both the resources and vulnerabilities together. While Lake Tana contributes to reserve the wet land leading to high-level

<sup>2</sup> The lowest administrative unit in Ethiopia, which is established among a group of villages and locations.

productivity of farming, communities and the livestock are affected by flooding, waterborne diseases, and malaria at large.

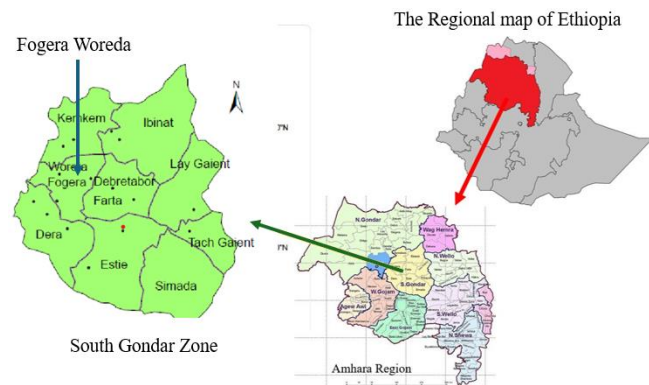


Figure 1: Study locations, by Country, Region, Zone and Woreda

### Study population and sampling strategy

This study employed both probability and nonprobability sampling techniques. Nonprobability purposive sampling technique was used to identify the Region, Zone, the Woreda and three specific Kebeles based on prior and existing experience of disaster risk management as main selection criteria. The major inclusion criteria for selection of the Region, Zone and Woreda include disaster prevalence to maximize study objectives, the socioeconomic characteristics of involving urban, peri-urban and rural areas along with disaster prevalence, accessibility amid the increasing conflict and armed war in the region, and the availability of previous empirical works to triangulate primary data. Employing the same purposive sampling technique, a total of three Kebeles were included through applying disaster prevalence, availability of other empirical works, accessibility and residential characteristics as major selection criterions. The major criterions used for the disaster prevalence and socioeconomic characteristics were identified as rural highly disaster affected, semiurban less disaster affected and urban with infrequent and normal context. As presented in **Table 1** below, three Kebeles were identified with a total population of 4391 household heads

Table 1: Study population

Woreda	Kebele	Inclusion Criteria	Total Population	Households
Fogera	Shena	Affected, and rural	2136	348
	Woreta Zuria	Mixed, both rural and urban	3599	587
	Woreta town	Less affected, urban	21222	3456
<b>Sub-total</b>	<b>3</b>		<b>26957</b>	<b>4391</b>

Following this, multistage cluster sampling technique was employed to determine the number of households on which the survey data collection was made. Using household head as a sampling frame, standard population survey formula [29] was used to determine number of households that were included in the study.

$$n = z^2 * p(1 - p) / d^2$$

Where:

- n was the sample size required, expressed in number of household heads for the key indicator,
- z was the value of 1.96 to achieve the level of confidence of 95%,
- p was the approximate proportion of people having the basic knowledge, attitude, and actual practice within DRM. Due to lack of most recent empirical data on the knowledge, attitude, and practice of communities in the Fogera or Region level this study considered 10% standard KAP level. This is also aligned to the available hazard specific studies that reported range of results between 10% - 40% of KAP levels including 8.3% [14] [13], 21% [19], and 33% [7].
- d was the tolerable error margin, as defined in 0.05 (i.e., 5% maximum discrepancy between the sample and the general population).
- Based on the formula, total sample was determined as 138.

$$\frac{1.96^2 * 0.1 (1 - 0.1)}{0.05^2}$$

- An additional 5% of the sample was added in order to address errors and considering possible non-respondents.

Therefore, total of 144 household heads (3.2%) of samples were planned participate under the KAP quantitative study. In terms of actual, the total 144 households participated. Due to lack of specific KAP survey existing data at Kebele levels, the total sample size was equally divided into the three Kebeles. Based on this, the sample was distributed along 48 households per Kebele and 15 households by village.

Building on the sample determination, this study applied simple random sampling technique to identify the household and collect the KAP survey. During this process, list of households in the selected villages were received from the Kebele administration offices and participant households were identified using a simple random sampling in an interval of seven from the first on the list until the sample size was met. In an event where the identified household was unavailable during the data collection, the immediate next household was selected to participate.

### Data collection

Data collection strategies were developed based on the two major research questions. The first question aimed to identify the level of disaster risk management knowledge, attitude, and practice among the households. A total of 101 structured and close-ended questions were prepared covering five sections that included participant demographics, disaster risk management knowledge, attitude to disaster risk management, disaster risk management practice, and KAP relational self-assessment survey. Except the demography, the questionnaire included multiple choice, yes/no responses, and Linkert scales. While the mid-three sections directly targeted to address the first research question, the final relational survey was primarily aimed at collecting information to answer the second question that was interested to identify major factors affecting households' knowledge, attitude, and practice for disaster risk management.

All the questionnaire was initially prepared in English consisting of nearly 130 items. This was mainly important to ensure the validity of data collection tools through adopting tools that were successfully tested in other similar research contexts [6], [11], [15], [30]. The questionnaire was then shared with the experts in

Amhara Region Food Security and Disaster Response Agency, and instructors in Bahir Dar University. Feedback was collected from these experts where the overall comment confirmed the validity of all the questions. Meanwhile, concerns were raised on duplicated questions and the contribution of some questions towards research objectives. Following this, around 29 questions were removed. After checking the revised questions with the same experts, the final questionnaire was translated into Amharic language with additional efforts made to avoid technical terms and in a way that the target households can understand. The Amharic data collection instrument was again shared with the same experts and got positive feedback. Prior to the actual data collection, the questionnaire was tested in the targeted Kebeles and only minor typos as well as list rearrangements have been made.

Data was collected in a face-to-face interview with every household. The author led the data collection process with a trained field facilitator who has the familiarity with the woreda and target kebeles. The research participants were asked each question along available options, and responses were recorded in a handwriting using color pen on the hardcopy of the questionnaire printed out in advance of the field work. The use of color pen and printout enabled to mitigate loss and mishandling of raw data. In urban areas and where the research participant was interested to self-administer the questionnaire, the printout was provided and then collected in a one-time visit. This was intentional to minimize preparation to answer questions through reference. Both techniques were effective in terms of addressing challenges facing the participants, which the most common issue has been a request for clarification of questions and response options.

Every filled questionnaire was validated for compliance immediately after the end of a session with a participant. With the preparation of instruments that was started on January 3, 2023, actual data collection activities were completed on June 15, 2023. The data collection process took place between February 15, 2023, to June 15, 2023, and this was affected by the repetitive conflict and armed violence across the target areas and the region in general.

#### **Data analysis**

Data was handled in the original printout as collected from participants, and responses were recorded in spreadsheets consisting of the different variables. The researcher validated the spreadsheet data and then migrated StataCorp LLC, 14.2. The data analysis typically followed three steps. In the first analysis, the households' knowledge, attitudes and practice levels were determined for the disaster risk management using descriptive analysis of responses to survey questions. Following this, the study identified factors that influence households' disaster knowledge, attitude and practices using similar descriptive analysis. Total of seven major factors have been identified including age, location, gender, education level, religion, economic status, and risk awareness. These independent variables have been stratified in different groups and analyzed in various ways based on their charters.

For binary indicators, two-independent sample test was employed with a  $H_0$  is that there is a statically significant difference of means between the different groups of independent variables for the households' level of KAP toward DRM at the 95% of confidence level at the value of  $Pr < 0.05$ . For the rest of categorical independent variables whose data normality assumption was checked, univariate analysis of variance and covariance was conducted using ANOVA. This analysis was also conducted for age as a continuous independent variable. The independent categorical variables tested using ANOVA and one-way ANOVA are age as a continuous independent variable, stratified age groups of households, religion, economic status of households, location of households by kebele and location of households by woreda. Following the individual level ANOVA, the multiple effects of independent variables with each dependent variable as well as the combined effect of all dependent variables has been tested using multivariate test.

#### **Ethical considerations**

This study was conducted among household leaders, who are all above the age of 18. Before starting data collection, a consent form was developed providing all the important information about the research and the data management procedures. The consent was presented in both a written as well as it was read word by word for each research participant. Data collection was started for those who only gave their consent to participate. This study is part of the author's PhD dissertation approved by Bahir Dar University Institute of Disaster Risk Management and Food Security Studies, department of Disaster Risk Management and Sustainable Development with a letter reference number 02/458/1.1.4 and issuance dated 28th December 2023.

## **Results**

### **Demographic characteristics of research participants**

#### **Age and Gender of the research participants**

A total of 144 households participated in this study, and 31% were female household heads. The mean age was 43; with 21 and 76 minimum and maximum age of research participants respectively. Skeness and Kutosis test was also conducted among the major demographic variables and significant level of normality was indicated with the P value below 0.05. Histogram was used to test the normality of continuous variables. Research participants' age was stratified in 4 groups for analysis purposes, and 6% and 5% were youths and elderly respectively, while the majority 57% and 32% were adults between the ages of 30-45, and 45-65 respectively.

#### **Education level of research participants**

As seen on the **Figure 2** below, 64% of research participants are illiterate with the majority of having basic literacy and numeracy skills from informal education. The number of research participants having university diploma, first degree and second degree increases from the rural (Shena) into the semirural (Woreta Zuria) and the urban (Woreta city) Kebeles.

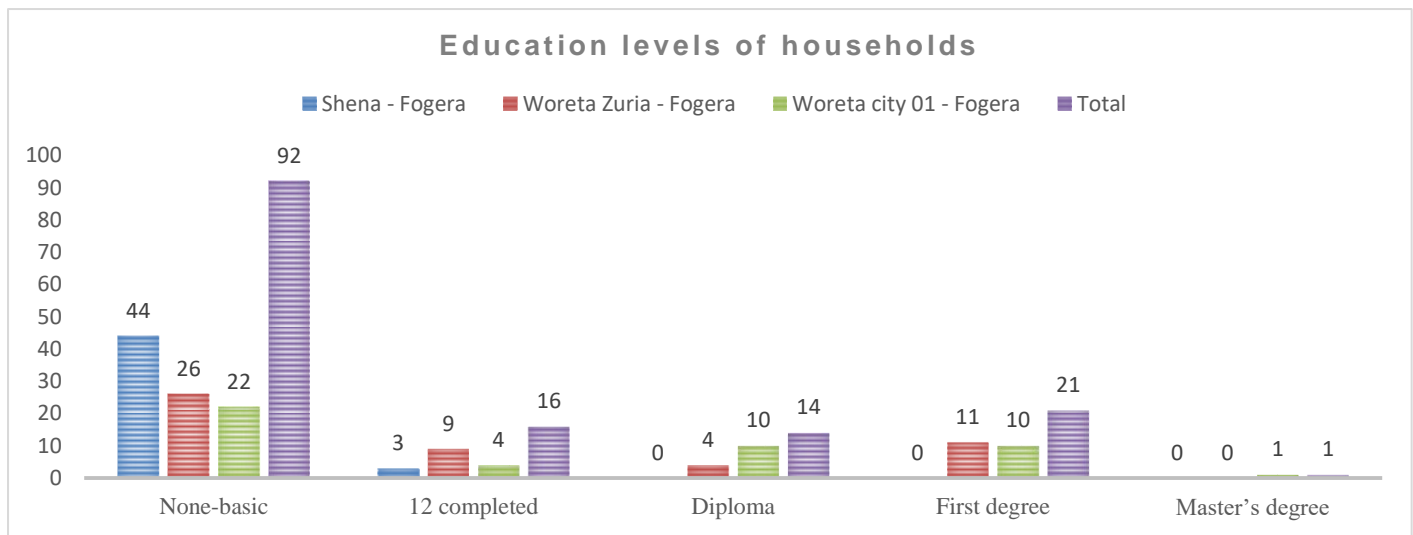


Figure 2: Education levels, by Kebele Religion of the research participants

#### Religion

Among the total 144 research participants, 89% are Orthodox Christians and most of the remaining Muslims are in the urban (Woreta city) and the semiurban (Worera Zuria) kebeles.

#### Economic Status of research participants

Research participants were asked to self-disclose their economic status through local comparison among the other households. Accordingly, 66.5% reported mid-economic status or regular with the other households in the Kebele while 19.5% reported rich and nearly 14% as poor or below the normal economic status of the majority households in their kebeles. Another question was asked to determine their daily household expenditure to support the self-economic assessment. According to the responses and based on the World Bank Group poverty and equity category brief [31], 33% are below the international poverty line or below US1.90 income per day, 41% are lower middle with less than US3.20, 17% are upper middle economic status with more than US3.20 per day, while the remaining 9% are in the upper midlevel economic status affording more than US5.50 per day. Due to significant level of variation between households' self-economic assessment and the finding through daily income/expense assessment, this study stratified households' economic status using the international poverty line definitions as set by the World Bank Group for consecutive analysis.

#### Vulnerability to hazards

Research participants were asked if they are aware of risks to any hazards at their locality. According to their responses, 46.5% believe they are vulnerable or that they understand local risks while the 7% don't know and the remaining 46.5% feel that their household is not vulnerable to any hazard. The number of research participants reporting vulnerable to hazards increased in the rural and disaster affected Kebele (Shena) than the rest semiurban and urban kebeles.

#### Household knowledge, attitude, and practice levels for disaster risk management

Among the total research questions, 40 structured questionnaires were designed involving locally customized themes about disaster risk management knowledge (11 items), attitude (12 items) and practice (17 items). From the 40, 21 were KAP survey questions that involved specific measurement scales. Within the 21 KAP survey questions, 15 were selected and categorized under knowledge, attitude, and practice equally, which were very important to measure research participants' understanding of each variable. Every question within each variable had equal weight of "one" with the maximum score of five and the minimum zero for each of the knowledge, attitude, and practice topic.

The survey provided three options for response, "Yes", "No" and "I don't know", where the correct answer was either "Yes" or "No" depending on the question. The response of research participants was manually and carefully collected from the raw data collection tools and encoded by the researcher. Before the start of structures KAP survey, each section started with a question for a self-assessment of the participants' perceived level of knowledge, attitude, and practice levels for disaster risk management. The findings are summarized below.

#### Knowledge

In a self-assessment whether the research participant has appropriate level of disaster risk management knowledge or not, 29% reported yes, meaning that 29% of the research participants perceive having some knowledge about disaster risk management. The descriptive analysis of KAP survey indicates that 46.15% of the research participants scored "0" or extremely low making the total low-level of knowledge 67%. In contrary, 3.5% had excellent level of knowledge followed by 8.39%, 5.59% and 15.38% with very-good, good, and middle level of knowledge. In a comparison between the findings of the KAP survey and self-assessment, research participants' self-assessment of knowledge (29.17%) closely correlated with the KAP survey (32.86% including those who scored 2).

As summarized in **Table 2**, the finding of the KAP survey was stratified in kebele and the result indicated that the household knowledge level increased when moving from rural or disaster affected to semiurban and urban kebeles.

Table 2: DRM knowledge level of research participants, by Kebele

Households DRM knowledge levels, by Kebele							
Location - Kebele	The level of DRM knowledge 0 – 5 scale (Nil to Maximum)						Total
	0	1	2	3	4	5	
Shena - Fogera	20	14	8	1	3	0	46
Woreta Zuria - Fogera	28	11	3	4	2	2	50
Woreta City 01 - Fogera	18	5	11	3	7	3	47
Total	66	30	22	8	12	5	143

**Attitude**

Based on the participant self-assessment, it was found that 39.44% of the households believe that they have positive attitude for disaster risk management while 29.58% do not have the positive perception and 30.99% responded indifferently. Based on the descriptive analysis of attitude-based survey questions, 3.5% of respondents have a very high level of positive attitude followed by 19.58% and 30.07% of highly positive and fairly-positive attitudes respectively. Among the research participants, 20.98% are indifferent and 25.87 have negative attitudes, which indicated that nearly 47% (including those scoring below 3) of the research participants have negative attitude towards disaster and disaster risk management.

In terms of negative attitudes for instance, nearly 49% of the research participants believe that hazards and a certain disaster as an act of God or Devine power and 57% support that prayers are better than preparedness education to mitigate disasters. Despite these findings, the personal willingness (62%), the concern level (70%) about handling disasters and readiness (59%) to participate in disaster prevention activities were all found positive individually. Based on **Table 3**, the attitude level scores were stratified in kebeles and the number of research participants having positive attitude increases from rural into semiurban and urban kebeles.

Table 3: Attitude level of research participants, by Kebele

Households attitude for DRM, by Kebele							
Location - kebele	Respondents' Attitude for DRM 0 – 5 scale (Negative to Very Positive)						Total
	0	1	2	3	4	5	
Shena - Fogera	2	5	17	16	5	1	46
Woreta Zuria - Fogera	6	16	7	10	9	2	50
Woreta City 01 - Fogera	0	8	6	17	14	2	47
Total	8	29	30	43	28	5	143

**Practice**

Disaster risk management practice survey questions were answered by 143 research participants. The survey included items related with disaster preparedness, mitigation, and preventive response. Based on the households' responses, 23.08% of research participants have not been involved in any of disaster risk management activities at the community level followed by 30.77% who reported a very-low level of practice.

In the other hand, 28% of the households have reported disaster practices including those who reported high-level disaster risk management practice at 17.5%. Among the total research participants, 72% have low and very-low levels of disaster risk management practice. Looking at the three steps of practice, majority of households are involved in disaster mitigation (40%), followed by prevention response (39.86%) and then disaster preparedness (16%).

The disaster risk management practice findings were stratified along the target kebeles. **Table 4** indicates the descriptive analysis that a greater number of research participants in urban and semirural/semiurban kebeles scored below the average cut-point where the two kebeles contributed to the 79% and 73% of the two lowest score levels.

Table 4: DRM practice levels of research households, by Kebele

Households DRM practice levels, by Kebele							
Location - kebele	Respondent's practice level for DRM 0 – 5 scale (Nil to Very high)						Total
	0	1	2	3	4	5	
Shena - Fogera	7	12	19	3	4	1	46
Woreta Zuria - Fogera	15	22	1	6	4	2	50
Woreta City 01 - Fogera	11	10	6	6	12	2	47
Total	33	44	26	15	20	5	143

Preparedness

As part of the disaster preparedness, research participants were asked if there is early warning system and disaster preparedness plan in their community. Based on the responses, 26.43% and 16% indicated that they have early warning and disaster preparedness plan respectively. Assessing if the households have disaster preparedness structures, 12% indicated the existence of disaster prevention review system while 32 reported the existence of disaster preparedness committees.

#### Prevention response

Even though the majority (82.64%) of respondents are willing to participate in disaster preventive response, not more than 29% have the experience with roles and responsibilities in disaster prevention related activities.

#### Mitigation

Alike the disaster prevention, 82% of the research participants indicated their willingness to participate in disaster mitigation activities within their community. But the actual level of household participation in disaster mitigation activities is 40% along 31% of the households indicating the existence of defined roles and responsibilities to mitigate disaster in their communities.

#### Knowledge, Attitude and Practice

In a descriptive summary of the research participants' knowledge, attitude and practice levels for disaster risk management, the mean of households' knowledge has been found the lowest followed by practice, both being below the average cut-point point that is two from the five scale. The mean score of research participants' attitude level is nearly the mid-cut point of the scale. This indicates that research participants have very low level of disaster risk management knowledge, some level of engagement in disaster mitigation and response, and fairly-positive attitude towards disaster risk management. **Figure 3** below presents the household's mean of their disaster knowledge, attitudes and practice levels.

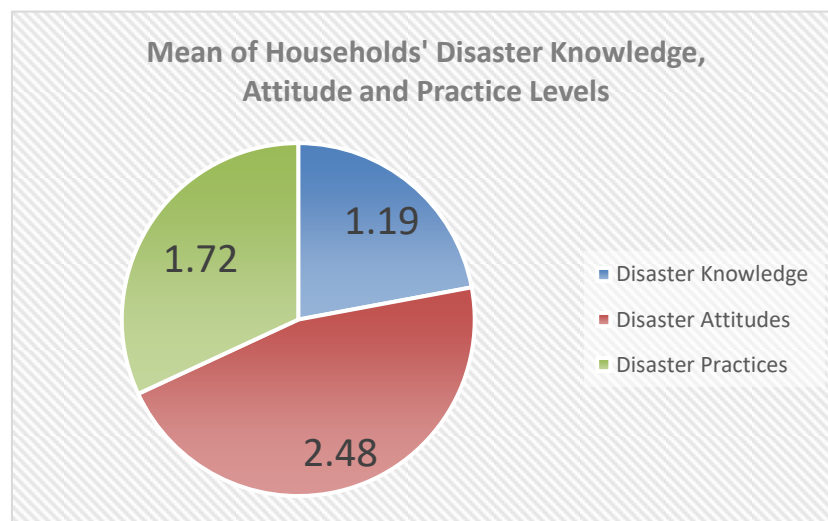


Figure 3: Households' Knowledge, Attitudes and Practices for DRM, by Mean

#### Factors influencing household knowledge, attitude and practice for disaster risk management

This study identified the factors influencing households' disaster knowledge, attitude and practices using two techniques. Initially, the study hypothesized that age, gender, religion, economic status and education levels have the effect on the disaster risk management knowledge, attitudes and practice of research participants. These factors were identified from existing empirical works. These factors were customized into the local context and shared with the research participants for validation. The descriptive analysis of research participants indicated that almost all the households believe that these factors influence their knowledge, attitude and practices. The second technique provided additional opportunity for the research participants to mention any other factor that could influence disaster KAP. The similar descriptive analysis revealed that the households believe location and risk awareness affect the disaster risk management knowledge, attitude and practice levels.

Using both techniques, a total of seven factors or independent variables have been identified. These include age, gender, religion, economic status, education levels, location and risk information or

vulnerability awareness. Each of the independent variable has been defined and used for analysis in a most appropriate way. In this regard, age was analyzed as a continuous variable and stratified in categorical variable using four groups. Gender has been analyzed as binary variable. The remaining independent variables were categorical and analyzed through the different techniques as summarized below.

Three-layers of quantitative data analysis was conducted to report maor results. The first involved t-test of hypothesis for binary independent variables, and univariate analysis of variance and covariance using ANOVA for categorical independent variables. The second layer of analysis used Bonferroni post-hoc one-way ANNOVA and identified the exact level of significance for each variable that showed strong association during the standard ANOVA. The last analysis applied multiple-ANOVA tests to determine the interaction between independent variables with significant value towards the independent variable.

#### The relationship between factors influencing household knowledge, attitude and practices

##### Knowledge



The relationship between binary categorical independent variables including sex/gender, and stratified household perception towards vulnerability, and knowledge have been tested using descriptive statistics t-test at the 95% of confidence level with the Ho that there is a relationship between the gender and perception of vulnerability for knowledge at  $Pr(<0.05)$ . The analysis indicated no significant relationship among sex and knowledge ( $Pr(|T| > |t|) = 0.1177$ ), and perception of vulnerability and knowledge ( $Pr(|T| > |t|) = 0.4760$ ). Therefore, the H1 was accepted.

For the remaining factors, univariate analysis of variance and covariance was conducted using ANOVA at 95% of confidence level and significance point of  $P<0.05$ . Research participants have been classified in the different categories based on their response to the scale of knowledge and demographics. Assumptions were checked and no violations have been reported. Based on this analysis that was conducted separately for each of the independent variable, there was a statistically significant difference in knowledge and location/kebeles ( $F(4.04) = 18.20, p = .0197$ ), knowledge and age ( $F(1.1) = 21, p = .0296$ ) and knowledge and economic status using the average daily expenditure households can afford ( $F(3.71) = 7.34, p = 0.0067$ ). A post-hoc test using Bonferroni revealed that disaster risk management knowledge was higher in semirural (Woreta Zuria (.74,  $p = 0.035$ )) and rural (Shena (.70,  $p = 0.057$ )) compared to urban kebel of the Woreta city. The same test indicated that disaster risk knowledge is different among lowest-expense affording households (1-50ETB per day (.129,  $p = 0.003$ ) compared with the mid-level households and the higher economic status respondents. The three-way relationship was also significant at  $p=0.0096$  between households' age, economic status and location/kebele.

Based on the three-layer of analysis, it was found that households' disaster risk management knowledge is significantly affected by their age, economic status and location but not strongly associated with sex, religion, education status, and family perception of vulnerability. In addition, households with low average daily expense and those in semiurban areas are significantly associated with disaster knowledge than households affording more amount of the average daily expense and those households in urban areas. There is also a significant level of relationship among households' age, economic status, and location for disaster risk management knowledge.

#### **Attitude**

The relationship of attitude for disaster risk management among sex/gender and household perception for vulnerability was analyzed using independent t-test at the 95% of confidence level, and with the Ho that there is a relationship at  $Pr<0.05$ . This test indicated no significant relationship among sex/gender and attitude as well as household perception of vulnerability and attitude at  $Pr(|T| > |t|) = 0.1876$  and  $Pr(|T| > |t|) = 0.7250$  respectively.

Univariate analysis of variance and covariance using ANOVA at 95% of confidence level and significance point of  $P<0.05$  indicated a statistically significant difference in attitude and location/kebeles ( $F(5.10) = 15.46, p = .0073$ ), and attitude and age ( $F(8.69) = 12, p = .0038$ ). Research participants have been classified in the 0-5 scales of attitude categories based on their response to the KAP survey and their demographics. Assumptions were checked and no violations have been reported.

A post-hoc test using Bonferroni revealed that attitude for disaster risk management was higher in semirural (Woreta Zuria (.79,  $p =$

0.005)) compared to rural and urban kebeles. The same test indicated that disaster risk attitude is significant among the age groups of 18-29 (2.07,  $p = 0.007$ ) compared with the adults above the ages of 30. The two-way interaction ANOVA test further found significantly strong relation among households' age and kebeles/location for disaster risk management attitude at  $P$  vale of 0.000.

The three-layer analysis found that households' attitude for disaster risk management is significantly strong with their age and location/kebeles but not statistically different with sex, religion, education level, economic status, and family perception of vulnerability. In addition, youth-led households and households in semiurban areas have significantly strong relation with disaster risk attitude compared with adults, and households in urban areas respectively. There is also a significant level of relationship among households' age and location for disaster risk management attitude.

#### **Practice**

Likewise, the household practice for disaster risk management and its relationship with the categorical binary variables of sex/gender and perception of vulnerability was tested using independent t-test at the 95% of confidence level, and with the Ho that there is a relationship at  $Pr<0.05$ . This test indicated no significant relationship among sex/gender and practice as well as household perception of vulnerability and practice at ( $Pr(|T| > |t|) = 0.5636$ ), and ( $Pr(|T| > |t|) = 0.4760$ ) respectively.

Univariate analysis of variance and covariance using ANOVA at 95% of confidence level and significance point of  $P<0.05$  indicated some level of difference in practice and location/kebeles ( $F(3.06) = 12.76, p = .0501$ ). Research participants have been classified in the 0-5 scales of practice based on their response to the KAP survey and their demography. Assumptions were checked and no violations have been reported. The post-hoc test using Bonferroni pointed that disaster risk management practice was different in semirural (Woreta Zuria (.79,  $p = 0.044$ )) compared to rural and urban kebeles. Based on the independent t-test and ANOVA, households' practice for disaster risk management is different for locations/kebeles but not strongly associated with the rest factors. Comparing the three kebeles/locations, practice is significantly related with the semiurban areas compared to urban kebeles.

#### **Discussion**

The key findings of this study included three major areas. While the first determined household level of knowledge, attitude, and practice for disaster risk management, the second identified factors influencing household knowledge, attitude, and practice and the third construed the relationship between the identified factors and knowledge, attitude, and practice.

In terms of knowledge, 67% of households have low level of understanding about the basics of disaster risk management. Among the same households, 47% have negative and unconstructive attitude towards disaster risk management. In addition, 72% of the households have very low level of involvement in any of the core disaster risk management practices including preparedness, mitigation, and preventive response.

Using descriptive analysis of factors influencing households' knowledge, attitude and practice for disaster risk management, a total of seven factors have been identified including age, sex/gender, religion, economic status/affordable average daily expense, education level, location/kebele and perception of vulnerability. The relationship between these factors and

knowledge, attitude and practice were tested, and the finding indicated statically strong difference within knowledge and age, location/kebele and economic status of the households. Likewise, attitude for disaster risk management among the households showed significant relation with age and location/kebeles, while disaster risk management practice is statically different within kebeles. The interaction between the factors and each dependent variable was also statistically significant.

#### **Households' disaster risk management knowledge and factors influencing risk awareness**

Knowledge is one of the most important aspects in disaster risk management. According to Fatmah [15], knowledge is a key factor that can influence the attitude and awareness of communities about disasters. However, knowledge is subject to different issues directly affecting the overall performance of disaster risk management. The level of disaster risk management knowledge among the communities and issues associated with translating available knowledge into effective disaster risk management are the two widely identified situations posing increasing challenges on the disaster risk studies school of thought. In support of the later situation, Kristoffer et.al., [10] reported three major issues that countries in Europe face on disaster knowledge mainly barriers to the transfer of knowledge, lack of disaster expertise, and persistent issues related to raising risk awareness.

However, the most serious challenge with disaster risk management knowledge is the situation where communities' level of knowledge is either unknown or very low in most cases. For instance, Suryadi et al. [21] reported that communities in Lambung village, India, have a range of knowledge level for disaster preparedness measured between 63% to 37% as good and low respectively. Eriwell [19] employed quantitative research through survey questionnaire among 159 high-school students and eight Science and reported that students and teachers have moderate to a high level of knowledge in disaster preparedness. Since households are the central aspect of disaster risk management, identifying their knowledge plays vital role to inform appropriate level of measures among the different actors particularly for developing countries.

The finding of this study on households' knowledge (67% low) for disaster risk management share common features with other works in Ethiopia and the South Gondar Zone in particular. In this regard, Ashenafi, Adamu, and Akililu [14] indicated that 50.8% of health care workers in Tikur Anbesa Specialized Hospital do not have the basic knowledge about disaster preparedness and its plan. Likewise, Sheganew et.al [7] indicated that 58.9% of emergency room workers in public hospitals of South Gondar Zone do not know whether their hospital had a disaster management plan or not, while 51.7% of emergency workers had poor knowledge towards disaster and emergency preparedness.

Several other studies associated different factors with the disaster risk management knowledge at different levels. The finding of this study with statistically significant difference between age and knowledge level of research participants has similar implications with other empirical works. In this regard, Shanableh et.al., [32] studied knowledge, attitude, and readiness for disaster management in United Arab Emirates, and found that disaster knowledge among the different group of professionals has no statistically significant difference between gender and profession, but within knowledge and age. A study on the effects of training on knowledge identified marital status, gender, age, education background, employment status and training as factors influencing disaster, but the analysis

indicated no correlation between increased knowledge and the identified factors [15]. Likewise, Mostafizur et.al., [33] reported significant level of association between knowledge about COVID-19, and age group, gender, marital status, having vulnerable people in home, location, educational attainment, monthly income, previous COVID-19 symptoms, and challenging to work during COVID-19.

#### **Attitude for disaster risk management and factors influencing households' attitude**

The attitudes of different groups within the disaster risk management involves a range of characteristics that reflects the perception towards disaster. Several studies reported disaster attitudes using descriptive definitions that are founded on quantitative results as negative, moderate, and positive. This research found that nearly half (47%) of the households have negative attitude and unfavorable perceptions toward risk interpretation, hazards, and the disaster risk management activities.

This attitude level was measured using their responses for structured survey questionnaire that included the basics of disaster such as disaster is an act of God, hazards and disaster are not preventable, prayers are more useful than disaster prevention activities and the like. This means nearly half of the research participants support or accept these types of negative attitudes towards disaster risk management. These findings have been supported by other studies including Kayiranga [13] who indicated that the average respondents (54.3% and 51%) working in Rwanda Red Cross have identified indicators for positive attitude towards disaster. The study on South Gondar zone hospitals reported that 55% of the hospital workers have negative attitudes for disaster and disaster preparedness plan [7].

This research also found age and location/kebeles strongly associated with attitude of households. In addition, youth-age groups and semiurban areas are statistically different for disaster risk management attitude compared with adults and urban areas respectively. In related with factors influencing attitudes for disaster risk management, Fatmah [15] found that age group, gender, having vulnerable people in the home, educational attainment, and experience as significant factors for attitude among COVID-19 social workers in Bangladesh. According to Bhandari and Takahashi [1], sex and source of information are strongly associated with the attitude of Nepalese immigrants residing in Japan towards natural disaster preparedness.

#### **Disaster risk management practices levels of households and the influence of key factors**

The practice for disaster risk management comprises the efforts or activities carried out in the context of disaster prevention, mitigation, preparedness, emergency response and recovery, which are performed before, during and after a disaster [34]. In spite of the fact that some specific groups are particularly vulnerable for disaster and thereby could assume limited role in disaster practices such as older people, adolescent girls, pregnant women, breastfeeding women, children and people with disabilities [35]. The active involvement of all the community members is crucial for disaster risk management [36].

Since households are both the key actors as well as the victims of any disaster, the level of their practice plays important position over the key phases of disaster management mainly preparedness, mitigation, and preventive response [37]. However, this is not true in most cases as indicated by this study where over 72% of the

research participant households are not practicing disaster risk management activities. This study also found that disaster risk management practices statistically associate with locations or kebeles where households reside.

The extent to which communities practice disaster management activities is associated with different factors including age, gender, education level, economic status, and religion. This finding shares the results of other research such as the REACH report [12] that indicated people in Myanmar have low level of preparation and response to hazards even though they have the awareness and positive attitude for disaster risk management. Bhandari and Takahashi [1] reported that Nepalese immigrants residing in Japan had a very low practice regarding disaster preparedness and associated language barrier and insufficient information as major factors influencing the research participants practice level. According to Songlar et.al, [20] the earthquake preparedness of elders at Chiang Rai, Thailand, involves good level of knowledge and attitude toward earthquake safety but their practices toward earthquake readiness were insufficient.

### **Strengths and limitations**

One of the major strengths of this study was the extra effort made to collect primary data from diverse groups of community members, followed by the direct engagement of the author in encoding and analyzing quantitative data. In this regard, the level of household knowledge, attitude and practice have been one-by-one computed and encoded in STATA based on the actual response of research participants.

### **Limitations**

The researcher believes that education level, religion and economic status among the households will have a significant level of different for disaster risk management knowledge, attitude, and practices. However, this was not clearly found by this study, and this could be due to two major reasons.

The first one is about the measurement of households' knowledge, attitude, and practice where the researcher adopted survey questions in a way to fit the research participants' understanding capacity. Even though majority of the research participants did not score above the satisfactory level, most of the questions were basic that one step higher complicated questions could significantly contributed to differentiate respondents across the different factors. The second limitation is about sample size. Despite the reasonable sample size that this study considered, the more the sample size in another study the more the factors could statically differ for disaster risk management knowledge, attitude, and practice.

Another limitation is the gap from analyzing the nexus between knowledge, attitude, and practice. In this regard, this study did not cover the interaction effect of these major themes, which the author believes the existence of the need for this kind of research.

### **Conclusion**

This study concludes that 33% of households possessed a basic understanding of disaster risk management. Although 53% had a positive attitude, just 28% are actively engaged in disaster and risk management activities, with mitigation being the primary focus. Disaster preparedness was notably the weakest area of engagement, highlighting a significant concern in disaster management practices. Knowledge and attitudes were generally higher in semi-urban and urban areas, while risk management practices were less prevalent there compared to rural kebeles.

There are seven key factors that influence households' knowledge, attitude and practices for disaster management. Households' age, location (kebele), and economic status have a statistically significant level of impact on disaster and risk knowledge. Households' attitude was also significantly affected by age and location, while risk management practices varied considerably across different kebeles. Linear analyses confirmed that the relationships between all the factors and households' overall disaster knowledge, attitude and practices were strong and statistically significant.

This research enhances the understanding of household-level disaster knowledge, attitude and practice and the key influencing factors, providing valuable insights for academia, government agencies, and DRM professionals. The results underscore the need for evidence-based actions to improve DRM practices and offer a foundation for future research. Academics and DRM researchers can build on these findings to further explore the intricate relationships between knowledge, attitudes, and practices in disaster risk management.

### **Implications**

This study offers valuable insights into the levels and factors influencing household knowledge, attitudes, and practices regarding disaster risk management in Fogera woreda. The findings provide key implications for various stakeholders, including academia, government bodies, and DRM professionals, enabling evidence-based decision-making and the formulation of targeted strategies. Academia and DRM researchers can build upon these findings to explore further areas of study, particularly the complex relationships between knowledge, attitudes, and practices in the context of DRM.

Local stakeholders, including government agencies and academic institutions, should develop strategies to enhance household knowledge of risk interpretation, hazards, and DRM. These efforts should focus not only on providing foundational knowledge but also on implementing effective, long-term strategies that go beyond traditional short-term training programs. In contexts like Ethiopia, where changing household attitudes and perceptions may require more time, it is recommended that local actors prioritize influencing attitudes through practice. This could involve fostering active household engagement across key DRM phases.

While further research is needed to address the limitations of this study, there is clear evidence that factors such as age, economic status, and location significantly affect household DRM knowledge, attitudes, and practices. To improve disaster risk management knowledge, interventions should prioritize adults over 30 years of age, as well as households living below the poverty line or in lower-middle-income brackets, as they are likely to benefit the most from DRM education.

In terms of practice, rural communities, especially those affected by disasters, show greater engagement in DRM activities compared to urban and semi-urban areas. As such, it is crucial to focus efforts on urban kebeles to increase community participation in DRM. A major area of focus should be disaster preparedness, as nearly 84% of households in the study sample lack experience in this aspect. Additionally, rural and disaster-affected kebeles exhibit lower knowledge and attitudes compared to their semi-urban and urban counterparts, highlighting the need to allocate resources efficiently based on these priorities.

This study identified several areas that require future research. One of the major areas is the need to study how knowledge, attitude and practice form a meaning for disaster risk reduction and management separately as well as in a combination. This triple nexus could be better understood through a survey that involves a greater number of samples. A second area is a need to explore beyond the seven factors identified by this study. The different socioeconomic, political and technological factors can be key elements for future study. Third, additional research could contribute to enhance the understanding of KAP for disaster management through involving diversified research target groups. This implies the need to involve beyond households including governmental actors, community-based organizations, academia and the private sector. Such studies could be effective using a mixed design that generates a comprehensive and reliable information.

In conclusion, this study underscores the importance of targeting key demographic groups and geographic areas to enhance household DRM knowledge, attitudes, and practices, ensuring a more resilient and informed community response to disasters.

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#### Data availability

This research is open access and data availability is managed by the authors upon a specific request made from the corresponding author.

#### Disclaimer

The views expressed in this research reflect the author's own work and not an official position of the Bahir Dar University or any other institution.

## References

1. Bhandari K.C., and Osamu T., (2022). Knowledge, attitude, practice, and perceived barriers of natural disaster preparedness among Nepalese immigrants residing in Japan. Graduate School of Public Health, St. Luke's International University, Tokyo, Japan.
2. Yogesh. K. Singhal, Rekha B., Bhanwar L., and Bharti P. (2016). Knowledge, attitudes, and practices of medical internship students regarding disaster preparedness at a tertiary-care hospital of Udaipur, Rajasthan, India. *International Journal of Medical Science and Public Health Online* 2016.
3. Mohanty S., Pourebrahim, S. Sultana, J. Edwards, A. Gochanour (2019). Understanding communication dynamics on Twitter during natural disasters: a case study of Hurricane Sandy, *Int. J. Disaster Risk Reduct.* 37 (2019).
4. The United Nations World Health Organization, (2022). COVID-19 briefing update. [www.unwho.org](http://www.unwho.org)
5. Beletech K., Birhan A. and Shegaw Y., (2019). Smallholder Farmer's Adaptation Strategy to Climate Change in The Case of Este Woreda, South Gondar Zone, Amhara Region, Ethiopia. *World Journal of Agriculture and Soil Science*.
6. The World Bank (2019). Disaster Risk Profile Ethiopia. Africa Disaster Risk Financing Initiative. Office of the Publisher, The World Bank.
7. Sheganew F., Ermias S., Tekalign A., Abraham T., Gashaw K., Tadila D., Yeshiambaw E., Dejen G., Gebrie K., Endalkachew S. and Dejen G., (2021). Knowledge, attitude, and practice of health professionals working in emergency units towards disaster and emergency preparedness in South Gondar Zone hospitals, Ethiopia. *Pan Afr Med J.* 2022.
8. Emwodew M., and Menberu T., (2017). Beneficiaries' Attitude Towards Productive Safety Net Program in Selected Rural Kebeles of Ebinat woreda, Northwest Ethiopia. *ERJSSH* 4(2).
9. UN OCHA (2022). ETHIOPIA Situation Overview. Last updated: 5 Aug 2022.
10. Kristoffer A., Kristian C., and Emmanuel R., (2020) Disaster Knowledge Gaps: Exploring the Interface Between Science and Policy for Disaster Risk Reduction in Europe. *International Journal of Disaster Risk Science*.
11. Spiekermann a, n, Stefan Kienberger a, John Norton b, Fernando Briones c, Juergen Weichselgartner (2015). *International Journal of Disaster Risk Reduction*. Published by Elsevier Ltd.
12. REACH (2015). A Study on Knowledge, Attitudes and Practices for Disaster Risk Reduction in Northern Rakhine State, Myanmar. Assessment Report. [www.reach-initiative.org](http://www.reach-initiative.org)
13. Kayiranga. P. (2019). Assessment of Knowledge, Attitude and Practice (KAP) of disaster preparedness among Rwanda Red Cross employees. Unpublished work submitted in partial fulfilment of the requirements for the degree of master's in international Cooperation and Humanitarian Aid. KALU Institute - Humanitarian Aid Studies Centre.
14. Ashenafi H., Adamu A., and Aklilu A., (2018) Assessment of Knowledge, Attitude and Practice of Disaster Preparedness among Tikur Anbessa Specialized Hospital Health Care Workers, Addis Ababa, Ethiopia. *American Journal of Nursing Science*. Vol. 7, No. 1, 2018, pp. 39-48.
15. Fatmah, F., 2022, 'Effect of disaster training on knowledge regarding flood risk management amongst families with older people', *Jambá: Journal of Disaster Risk Studies* 14(1), a1262. <https://doi.org/10.4102/jamba.v14i1.1262>
16. Gaillard, J., and Mercer, J. (2013). From knowledge to action: Bridging gaps in disaster risk reduction. *Progress in Human Geography*.
17. Yogesh. K. Singhal, Rekha B., Bhanwar L., and Bharti P. (2016). Knowledge, attitudes, and practices of medical internship students regarding disaster preparedness at a tertiary-care hospital of Udaipur, Rajasthan, India.

- International Journal of Medical Science and Public Health Online 2016.
18. Allotey, K., Arku, G. and Amponsah, P. (2010). Earthquake-Disaster Preparedness: The Case of Accra. *International Journal of Disaster Resilience in the Built Environment*.
  19. Eriwell R. (2021). Knowledge, Attitude, and Practices of Students and Science Teachers in Disaster Preparedness. *Universe International Journal of Interdisciplinary Research*. Vol. 2 Issue 3.
  20. Songlar, T., La-or, N. P. P., Chomchoe, C., & Khunthason, S. (2019). Knowledge, attitude and practice (KAP) of earthquake preparedness amongst the elderly in risk areas. *Journal of Health Research*, 33(1), 2–13. <https://doi.org/10.1108/JHR-12-2018-0167>
  21. Suryadi, T., Zulfan, Z., and Kulsum, K., (2021). The Relationship between Knowledge and Attitudes about Community Disaster Preparedness in Lambung Village, Banda Aceh. *International Journal of Disaster Management*. 4:1, pp 1-10. DOI: <https://doi.org/10.24815/ijdm.v4i1.19993>
  22. Kusumasari, B., Alam, Q. and Siddiqui, K. (2010). Resource Capability for Local Government in Managing Disasters. *Disaster Prevention and Management*.
  23. Yilebes A., and Abraham A., (2020). Evaluation of Ethiopian early warning system: the case of Dera and Jabithenana Zuria Districts. Springer Nature Switzerland.
  24. Mare A., Gete Z., William A., Teshome S., and Yihun D., (2019). The impacts of rice cultivation on an indigenous Fogera cattle population at the eastern shore of Lake Tana, Ethiopia. *Ecological Processes*.
  25. Gebrekidan W., (2014). Assessment on the Shrinkage and Ecological Importance of Wetlands of Fogera Plain, North West Ethiopia. *Journal of Environment and Earth Science*.
  26. Hagos, Z., (2015). Improved Rice Seed Production and Marketing: Challenges and Opportunities in the Case of Fogera District of Ethiopia, *Journal of Agriculture and Environmental Sciences (JAES)* 1(2)
  27. Tsega A. (2017). Characterizing and tailoring climate change adaptation practices into a diversified agroecosystem. Research Square.
  28. Tegegne M., and Mathias B., (2019). Assessment of Socio-Economic and Agronomic Characteristics Influencing Variety Choice in Rice Based Farming System in Fogera- Ethiopia. *International Journal of Research Studies in Agricultural Sciences (IJSAS)*
  29. Cochran, W.G (1977) *Sampling Techniques*. 3<sup>rd</sup> Edition, Jhon Wiley and Sons, New York.
  30. Rony M. Zeenny, Elsy Ramia, Youssef Akiki, Souheil Hallit, and Pascale Salameh 2020, 'Assessing knowledge, attitude, practice, and preparedness of hospital pharmacists in Lebanon towards COVID-19 pandemic: a cross-sectional study'. Zeenny et al. *Journal of Pharmaceutical Policy and Practice* (2020) 13:54 <https://doi.org/10.1186/s40545-020-00266-8>
  31. World Bank Group (2020). Poverty and Equity Bried, Sub-Saharan Africa, Ethiopia. <https://databankfiles.worldbank.org/public/ddpext>
  32. Shanableh S, Alomar MJ, Palaian S, Al-Ahmad MM, Ibrahim MIM (2023) Knowledge, attitude, and readiness towards disaster management: A nationwide survey among healthcare practitioners in United Arab Emirates. *PLoS ONE* 18(2): e0278056. <https://doi.org/10.1371/journal.pone.0278056>
  33. Mostafizur R., Mohammed S., Afra R., Iftekharul H., Tanvir H., and Robiul I, 2022, 'Knowledge, Attitude, and Practices Towards COVID-19 Among Social Workers of Bangladesh', *Public Organization Review* (2023) 23:493–514 <https://doi.org/10.1007/s11115-022-00679-w>
  34. Kyoo-Man, H., (2020). Disaster management: From a one sided approach to an inclusive system, *Environment Systems and Decisions* 40(1), 403–412.
  35. Hildayanto, A., (2020). Knowledge and preparedness of the community against flood disasters. *Higeia Journal of Public Health Research and Development* 4(4), 77–586.
  36. Gill, J.C., Ekbal, H. & Bruce, D.M., (2020). Workshop report: Multi-hazard risk scenarios for tomorrow's cities tomorrow's cities urban risk in transition, UK Research and Innovation GRCF, London.
  37. Kar, N., (2016). Care of older persons during and after disasters: Meeting the challenge, *Journal of Geriatric Care and Research* 3(1), 7–12.