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MORALITY BEFORE KNOWLEDGE

Climate change awareness and information utilisation and dissemination in rural areas of Nsanje District

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ABSTRACT

Background: Climate information communication is the heart of climate service delivery which provide knowledge to help guide individuals and other stakeholders to make climate smart decisions. Therefore, this study explored awareness, utilization and dissemination of climate information in rural areas of Nsanje district. **Methods**: The study used both quantitative and qualitative research design that does not involve the designing of an experiment. This focuses much on the descriptive research design. The advantage of using this research design in this study was that the participants' accuracy was clearly depicted. **Findings:** The results showed that 63% of the people in rural areas access climate information through radio and 33% do not use it at all. Multinomial logistic regression indicate that floods and crop pests are significant predictors of the location of an individual whether lives in flood prone area or not with p-values of 0.02 and 0.04 respectively, and this shows that people understand climate change based on the impacts felt. This also shows that crop pests are more prevalent in flood prone zones. **Conclusion**: The study concluded that there is a need to adopt climate communication channels that are more interactive and recruit more extension workers who are agents to promote the use of climate information. **Novelty/Originality of this article:** This study proposes developing a community-based interactive climate communication model that integrates mobile technology and local extension worker networks to improve the accessibility and understanding of climate information in rural areas.

KEYWORDS: climate change; climate communication; nsanje district.

1. Introduction

Climate change is one of the identified global challenges that need a concerted effort to mitigate its impact. Sustainable developments goals outlined and agreed by the 193 members of the United Nations to be achieved by 2030, identified climate action as a need to be considered and it falls on number 13 but not based on prioritization. Climate related hazards such as prolonged dry spells, droughts, erratic rains, and floods have become more frequent, intense, and unpredictable, thereby undermining food security and poverty eradication efforts (AFIDEP and PAI. 2012) and these poses a serious concern to developing countries like Malawi.

The climate is governed by natural influences, yet human activities have an impact on it as well (Lackner, M., Chen, W.-Y. & Suzuku, T., 2017). The Intergovernmental Panel on Climate Change (IPCC) assessment report of 2007 summarizes that most of the observed increase in global average temperature since the mid-twentieth century is very likely due to the observed increase in anthropogenic greenhouse gas (GHGs) concentration. Though, it is now apparent that the impacts of climate change such as storms, drought or floods are

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becoming the norm, Hager & Versteeg (2011), highlighted that, it cannot speak for itself: it is the interpretation of these storms, drought or floods that constitutes the societal phenomenon of climate change. Although, Malawi not heavily emitting GHGs due to fossil fuel usage as compared to developed countries, the initial communication to UNFCCC classified Malawi as a net emitter due to anthropogenic activities such as deforestation and degradation (Government of Malawi (GoM), 2015) due to various reasons.

Malawi as one of the developing countries is facing challenges in addressing the risks due to climate change. The key barrier in African continent at large, as pointed out by Singh et al. (2018) is that there is limited availability of accessible, reliable and relevant weather and Climate Information (CI). These CI are generated using computer models and at a relatively large scales, bigger than the neighborhood, city or district that concerns most individual and organizational decisional-makers (Dupar, M., McNamara, L. & Pacha, M., 2019, & Vincent, et al., 2017). Fortunately, the development of technology has contributed in the understanding and computational capacity that improved the skill of weather forecasts dramatically over recent decades (Lynch, 2008). Seasonal forecasts, however, are generally much less skillful than weather forecasts but they can still have value for guiding management decisions, particularly for agriculture (Troccoli, 2010) in which majority of people living in rural areas lean on.

1.1 Climate change definition

To understand climate change, it is important to bear in mind that climate is a system with the atmosphere as a core element. This system is comprised of the atmosphere, hydrosphere, biosphere, geosphere and the cryosphere. IPCC (2014) defines Climate change as a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extend period, typically decades or long. This definition puts to light that climate change is the gradual process and being the system one needs to know the interactions that happens between its elements.

Climate scientists know that recent climate change is largely caused by human activities from an understanding of basic physics, comparing observations with models, and fingerprinting the detailed patterns of climate change caused by different human and natural influences (the Royal Society & the National Academy of Sciences, 2017). The use of statistical tests indicates that data has to be available to be analyzed. These scientific procedures used to understand climate change, poses a big challenge to harmonize the perspective of scientists and the general public, a gap that can only be filled through effective communication on the topic and initiate appropriate action by utilizing climate information efficiently.

1.2 The brief history of climate change communication

The history of climate change has its roots way back in the 1800. John Tyndall (1820-93) was an Irish physicist who found that while oxygen, nitrogen, and hydrogen are completely transparent to infrared radiation other gases, especially water vapor, carbon dioxide, and ozone, are opaque. This forms the basis from which Svante August Arrhenius (1859-1927), managed to quantified the heating potential of CO_2 and concluded that doubling the concentration of CO_2 would increase the mean annual temperature in the atmosphere Allaby, (2009).

Later in 1980s, anthropogenic climate change becomes the public agenda. Much of the early communication was relatively narrowly focused on scientific findings and synthesis reports (Moser, 2010) and had faced a lot of challenges as some were skeptical about climate change. As time keeps on unfolding, a lot of scientific understanding and consensus are now gaining the ground. This reduces the gap of understanding climate change between experts and the lay public hence opened up the nature of public discourse as communicators are now attempting to reach different audiences through diverse forums, channels, a wider

range of messengers and a number of different framings (Moser, 2010) that deeply penetrates the society.

1.3 The concept of awareness

The term awareness though commonly used in many circumstances; it has a strong meaning that majority of climate communicators need to understand. In neurobiology consciousness/awareness is considered to be a product of our cortex which is a seat of both innate and acquired (synthetic) concepts (Komorowska, 2014). As indicated, awareness is the inborn understanding of things that can also be acquired from the world around us. Alexander & Murphy (1998), outlined awareness as the amount of relevant past experience or stored information; ability to draw on past experiences and make connections. We can borrow this definition to understand people's knowledge about climate change, in which, the experience gained in the past years through climate related disasters raise their understanding of the changing climate.

There is a difference between awareness and taking appropriate action on something. numerous studies have been conducted on the gap between awareness and taking action by different fields of inquiry, including public health, psychology, sociology and in particular, the field of knowledge transfer. As earlier indicated, climate change is a complex topic hence requires transfer of knowledge from experts to lay audience. So, when experts tell lay audiences about the technical aspects of climate change, typically in one-way communication, there is little room for dialogue, building a shared understanding of the problem and possible solutions (Moser & Dilling, 2011), and this has a negative implication in the efforts against global climate change. Worse still the information deficit model which is built on the assumption that lack of information and understanding explains the lack of public concern and engagement, has been the main driving force for communicators to employ different mode of communication to expand the awareness of the people (Moser & Dilling, 2011) and this is contributing to the burgeoning of information that people fail to utilize.

A series of study on effective climate communication points out on the need to understand the audience and their frame of reference. Bakuwa (2015), finds out that Malawians draw on pre-existing local knowledge and beliefs to explain the causes of change in climate of which some of them include; deforestation, the will of God, apocalypse, overpopulation, air pollution and ozone depletion. So, majority of these are based on past experience and making connection to the current situation revealing that to a greater extent scientifically generated information has not played a big role. As such most people living in rural areas have relied on indigenous knowledge as a means of adapting to changing local circumstances (Nkomwa et al. 2014) that lacks scientific validation (chiotha et al., 2011).

1.4 Applications of climate information

Climate information has a wide range of applications across different sectors. Proper utilization of these information can help in reducing accidents, loss of lives and property, improve crop and animal productivity, increase profits, outbreaks and disease control etc. The Table 1 highlight some of the sectors that use climate information in various ways.

Table 1. Applications of climate information

User	Need	Decision
Energy Experts. Electric Power producers, grid operators, local utilities	• Air temperature • Wind speed and direction • Solar radiation • Precipitation data and forecast	• Assessing energy demands and related loads on the grid • Renewable energy yield forecast
Agriculture	• Precipitation data • Wind data • Temperature data	• when to plant • what to plant • heat stress of livestock

	• Forecasts	• possible outbreak
Transport(land, water, and air)and public safety	• High spatial resolution forecasts • Surface temperatures • Precipitation • Visibility • Wind speed and direction	• Atmospheric conditions for safe travel (when to travel or not) • Route plans • Mechanical and instrument settings/ adjustments for efficiency • Search and Rescue plan
Insurance	• Accurate and timely forecasting of extreme events • Historical data • Wind speeds and precipitation data	• Premium calculations • Expected business expenses in claim payments. • Claim forensic investigations
Public health	• Wind, humidity, and air temperature • Precipitation	• Matching the scale of health for example heat indices • When to expect increases flue, asthma, and other outbreaks.
Disaster management	• Precipitation data • Wind data	• Type of assistance required. • Damage estimation and recovery plans
Researchers	• Higher temporal, vertical, and horizontal spatial resolution data	• Recommendations
Structural engineers	• High spatial and temporal resolution wind, temperature, and precipitation data	• Structural strength
The general public	• Temperature, wind, precipitation and forecasts.	• What to wear, to wash or sun dry things, to carry an umbrella or not

1.5 Dissemination of climate information

Communicating about climate requires a proper understanding of the potential users, skilled and knowledgeable personnel on the subject and proper structures of disseminating the information. Reaching this far much effort has been done in informing the people on climate related issues. A wide coverage in distributing CI such as radios, television, newspapers, school syllabus and other social media platforms are now the sources that are being used in disseminating CI for potential users to access. But the feedback is still minimal despite the availability of information on these different platforms. Singh, et al., (2018) suggested that climate information must be locally relevant to be useful in guiding decisions at the local level which is not the case in Malawi where most of the accessible channels of weather forecasts in rural areas are too general confirming what FARA-Africa (Gakuru et al. 2008) showed, that the provision of weather forecast on daily basis is just information.

Different authors also acknowledge the need to understanding the mental models and the frames of reference of the audience. climate change being a difficult topic to perceive and understood by most lay audiences, this demand communicators to find clearer, simpler metaphors, imagery, and mental models as well as compelling framing to lay the foundation for more appropriate cognitive processing (Moser, 2010). Carey, S. (1986), defines a mental model as a person's thought process for how something works (i.e., a person's understanding of the surrounding world). These are based on often- incomplete facts, past experiences, and even intuitive perceptions, that help shape actions and behavior and influence what people pay attention to in complicated situations and define how people approach and solve problems. Perhaps, most important to climate change communicators, mental models serve as the framework into which people fit new information (Center for Research on Environmental Decisions, 2009). This study aims to assess the awareness of rural communities in Nsanje District regarding climate information, how they utilize this information, and the extent of their accessibility to climate information.

2. Methods

The study used both quantitative and qualitative research design that does not involve the designing of an experiment. This focuses much on the descriptive research design. The advantage of using this research design in this study was that the participants' accuracy was clearly depicted. This also provide a researcher an opportunity of using different means of data collection such as observation, case studies or survey. In this study, survey was the core centre of data collection in which observation and case studies were used to supplement the data obtained through survey especially using a questionnaire.

The study established the understanding of climate change awareness and information utilization and dissemination in rural areas of Nsanje district. As pointed out by Zikmund (2003) that descriptive studies are usually based on the previous understanding of the research problem. This helped the researcher to be able to consult other sources such as authoritative articles written by reputable experts to support the understanding of the research problem.

3. Results and Discussion

3.1 Response rate and respondent's general information

Results The survey targeted 80 respondents from four (4) villages namely Mtema, Zavedo, Chitomeni and Dzambukira where 20 respondents were required from each village. It also targeted three (3) project coordinators from different NGOs working in the area of study. The overall response was as shown in the Table 2.

Table 1. Response rate

	Mtema	Zavedo	Chitomeni	Dzambukira	NGOs Project Coordinators
Target	20	20	20	20	3
Actual respondents	20	20	20	20	3
Percentage (%)	100	100	100	100	100

The general information about the respondents were summarized in the Table 3. The impact of climate change affect men and women differently with women at high risk. Despite this being the case, the population of women are more compared to men. On Gender, the study had 46.25 % (37) of the respondents were males and 53.75 % (43) of the respondents were females. The representation was in line with the percentage of 46.36 % and 53.64 % respectively of Nsanje district for the population of 18 years and above (NSO, 2018). On Age, 18.75 % (15) of the respondents were between the age of (18-24), 30 % (24) of the respondents were between the age of (25-34), 25 % (20) of the respondents were between the age of (35-44), 21.25 % (17) of the respondents were between the age of (45-54) and 5 % (4) of the respondents were at the age of (55 and above). On Religion, the results from the sample showed that the majority of the respondents (66) were Christians representing 82.5 % of the total sample. 2.5 % (2) of the respondents were Muslims while 15 % (12) does not belong to any religion.

Nsanje district is the second district in Malawi with the lowest literacy rate of 56 percent (NSO, 2018). This reflect on the results obtained which indicates 53.5 % (42) of the respondents were literate in which 32.5 % (26) attain primary education and only 20% (16) attain a secondary education. Majority of the people living in rural areas rely on farming as their main source of living. This is evidently shown from the results obtained, in which 72.5 % (58) of the respondents indicated that they solely rely on farming as the source of their livelihood. 3.75 % (3) of the respondents indicated that they rely on fishing along Shire river to earn a living, 2.5 % (2) of the respondents were civil servants, 10 % (8) of the respondents were business people and 11.25 % (9) rely on piece works to earn a living. These other

livelihood activities are being conducted to supplement their small-holder subsistence farming.

Table 3. Summary statistics of the respondents

Variable	Frequency	Percent
Gender		
Male	37	46.25
Female	43	53.75
Total	80	100
Age		
18-24	15	18.75
25-34	24	30
35-44	20	25
45-54	17	21.25
55 and above	4	5
Total	80	100
Religion		
Christian	66	82.5
Muslims	2	2.5
No religion	12	15
Total	80	100
Education Level		
Illiterate	38	47.5
Primary	26	32.5
Secondary	16	20
Total	80	100
Means of living		
Farmer	58	72.5
Fishermen	3	3.75
Civil Servant	2	2.5
Entrepreneur	8	10
Piece work	9	11.25
Total	80	100
Experience		
≤ 5 years	8	10
5 > years ≤10	18	22.5
10 and above	54	67.5
Total	80	100

The study also established that 10 % (8) of the respondents had an experience of less than 5 years of their livelihood, 22.5 % (18) of the respondents had an experience of between 5 to 10 years while 67.5 % (54) of the respondents had an experience of more than ten (10) years. This indicate that the majority of the people have an experience and enough background knowledge of the trending climate in the last decades.

3.3 Climate change awareness

The study established that 95 % of the rural resident are aware of the change in climate which is in line with what Bakuwa (2015) found, that majority of the people living in rural areas are likely to agree that climate is really changing as compared to those living in urban, as they have noted changes in climate in which some of the noted changes were: increase in flood intensities which widen the prone area, extreme high temperatures that exacerbate health conditions of those having an underlying health implications such as hypertension

and also cause crops to wilt, strong winds that destroy houses and crop pests and disease are among the noted changes that have increased the cost of agricultural production and the change in rainfall amount and patterns whereby rain season were expected to start around October and end in April but now it starts in late - November and end early March. These rains are not normally distributed which affect the crop yield. Figure 1 indicates the variability of the rainfall since 2012/13 rain season using rainfall data obtained from Nyachilenda Extension Planning Area (EPA) weather station that is in the study area.

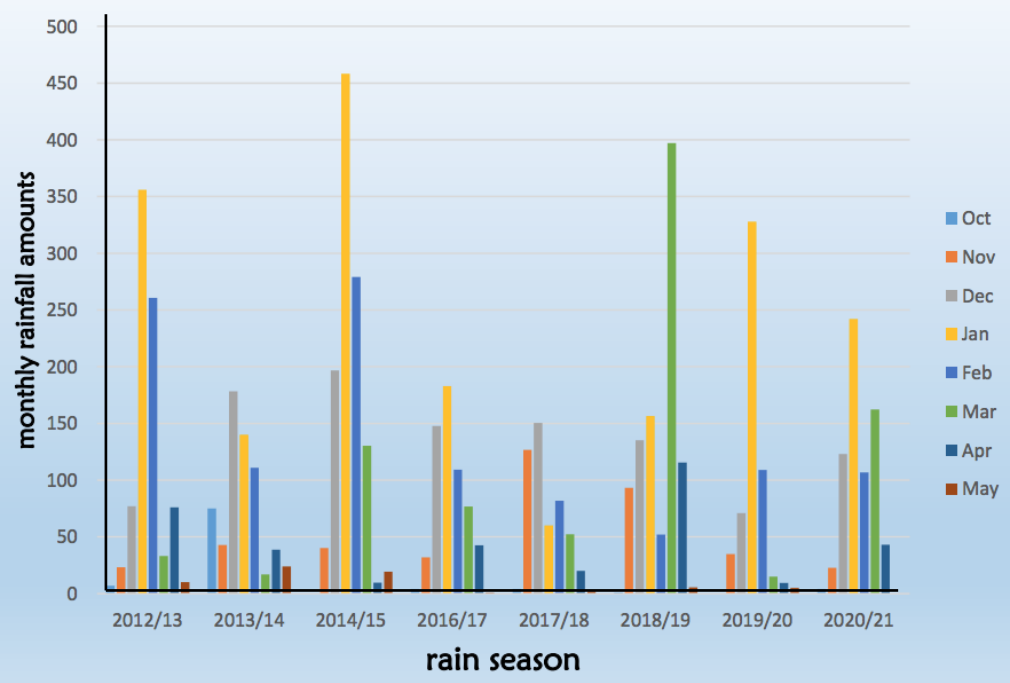

Figure 1. Graph showing variability of rainfall

From the graph, there is an agreement in the people's response and the observed rainfall data in the past 10 years. As shown in the graph, 2014/15 rain season, the area received a high amount of rainfall causing floods and it was followed by low rainfall that lead into crop failure leaving rural households' food insecure. This was attributed as the effect of El Nino Southern Oscillations (ENSO) phenomenon. The 2018/19 rain season was as a result of cyclone Idai which influence the high amount of rainfall in the month of March.

Table 3. Access to climate information

Status	Acknowledges Climate Change	CI Access
Yes	76	59
No	4	21
Total	80	80

As indicated in literature review section that awareness can be viewed as the amount of relevant past experience or stored information; ability to draw on past experiences and make connections. The study indicated that 95 % (76) of the respondents acknowledge that there is a change in weather and climate. Taking the difference within the row, it shows that 21 % (17) solely acknowledge the existence of climate change based on past experience that is the impacts faced such as floods, droughts due to variability of rainfall amounts and strong winds (Table 3).

3.4 Information dissemination

Reaching this far much effort has been done in informing the people on climate related issues. Radio, television, newspapers, extension services, school syllabus and other social

media platforms are the sources that are being used in disseminating climate information for potential users to access. But the response is still minimal despite the availability of information on these different platforms. The results indicate that 32.5 percent do not use climate information which is a considerable percentage that need to be reduced.

It also shows that the communication channels used in Nsanje are not really effective since some are yet to be reached with CI. One of the Project Coordinator commented that "Communication channels as not effective as some structures are not knowledgeable on weather and climate" while the other two are of the view that the channels are effective. Nevertheless, 26.25 % of the people area not yet reached with climate information which indicate that more has to be done.

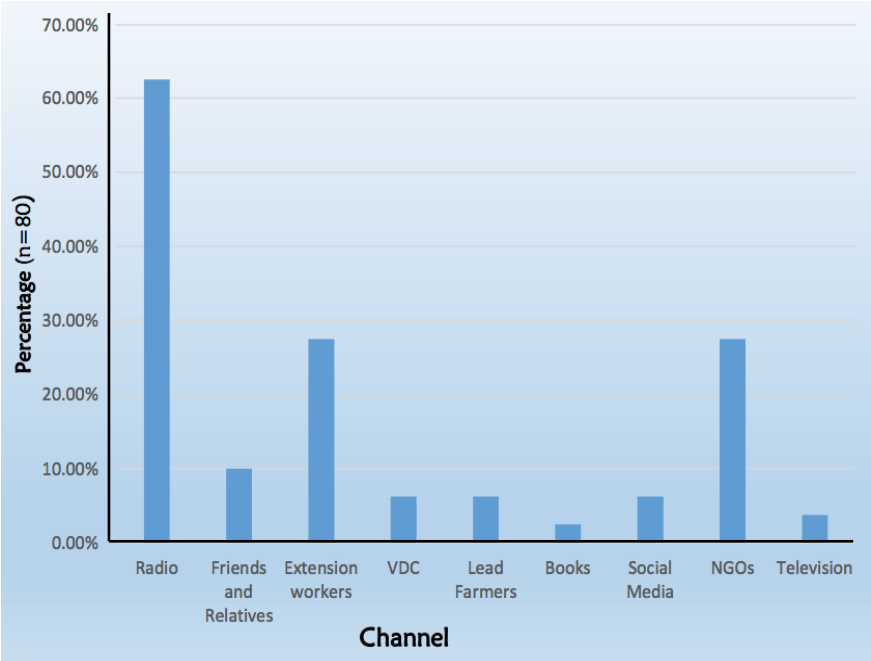

Figure 2 Showing percentages of people accessing climate

The graph below indicates various channels through which people access climate information. 62.5 % use radio as a source through which they get information about weather and climate and is the most channel accessed by majority of rural residents in the study area, this is seconded by extension officers and NGOs with 27.5 % concurrently. On third, trails friends and relatives with 10 % followed by Village Development Committees (VDC), lead farmers and the social media with 6.25 % concurrently whereas television and books are the least channels through which rural resident access climate information with 3.75 % and 2.5 % respectivel.

Despite the availability of agricultural extension officers as agents in the transformation of subsistence farming to commercial, the survey realized that only 27 percent of rural households access extension services. The study also finds that the current ration of extension officers to the farmer is 1: 2,200 which is very high compared to the recommended ratio of 1: 400 by the Food and Agricultural Organization (FAO), which is compromising effective access and use of agrometeorological information and other agricultural technologies.

3.5 Frequency on accessing climate information

Climate communication is done using different platforms with different temporal and spatial coverage. The major problem experienced is that the spatial resolution of available information accessed is not suitably downscaled (Vincent et al., 2017) in order to ensure that weather and climate information is not generalized over a number of different agricultural zones. This can be in form of daily weather updates, Early Warning (EW)

messages and seasonal outlook. In Malawian context, the easily accessed climate information obtained are weather updates that are issued everyday through different media platforms either electronic (i.e., radio, television and the social media) or print media such as newspapers.

Despite the efforts of sensitizing the subject of climate change, the response is still far behind the desired level. The NGO coordinators agrees on the attitude of the people in which there is little uptake of scientific climate information as some are still relying on indigenous knowledge. As narrated by one of the coordinators that "climate related matters are not taken seriously instead they live life as usual and some are eager to receive and accept weather related information and advice but it is not trickled down to the rural masses". The Figure 3 below indicates the results obtained on how often rural residents access climate information. 5 % access climate information more than once a day, 8.75 % access it once a day, 12.5 % access CI once a week, 18.75 % access fortnightly and 55 % (44) access climate information monthly.

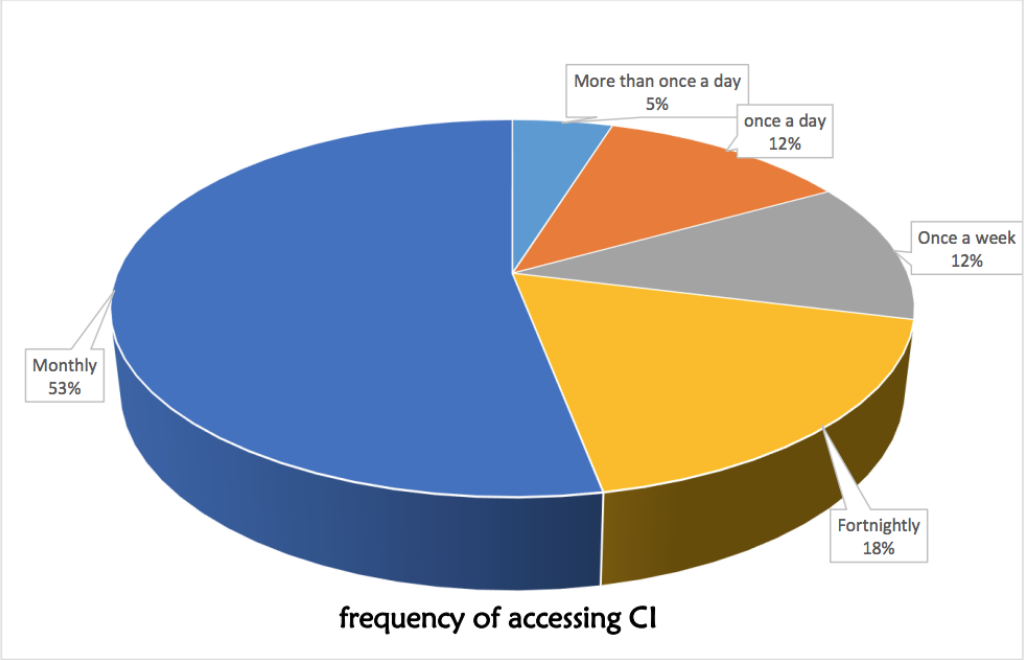

Figure 3 Showing the frequency of accessing CI

3.6 Knowledge of where to get climate information

The main source of climate information in Malawi is the DCCMS that gather data from different meteorological stations across the country and generate weather forecasts which are disseminated to the general public through the media and different Ministries/Department/Agencies (MDA). But for communication to be effective it must be interactive which is not the case in our scenario where most rural residents access most CI through the radio. Therefore, knowledge of where to get the information and for clarification can improve the use of CI and positively support the efforts of mitigating and adapting to the impacts of climate change. In this study, it was realized that 57.5 percent of the rural residents do not know where they can get information about weather and climate for clarification and only 42.5 percent of them are aware of the sources of CI which is less than half of the rural residents.

3.7 Weather and climate information utilisation

By definition weather is defined as the atmospheric condition of a particular area at a particular time. Weather is highly variable in which it may be calm or be chaotic as time

unfolds. The average of weather for over 30 years is what constitute climate. Therefore, keeping truck of the trending weather can be useful as it provides an effective action plan to deal with expected condition and implementation of mitigation and adaptation measures. It was realized from the results obtained that rural residents are using climate information in environmental conservation, adopting hybrid seeds, early land preparation, adopting agricultural irrigation systems and EW. The results are still not appetizing since the majority are not utilizing CI. The Figure 4 indicates the representation of the utilized information.

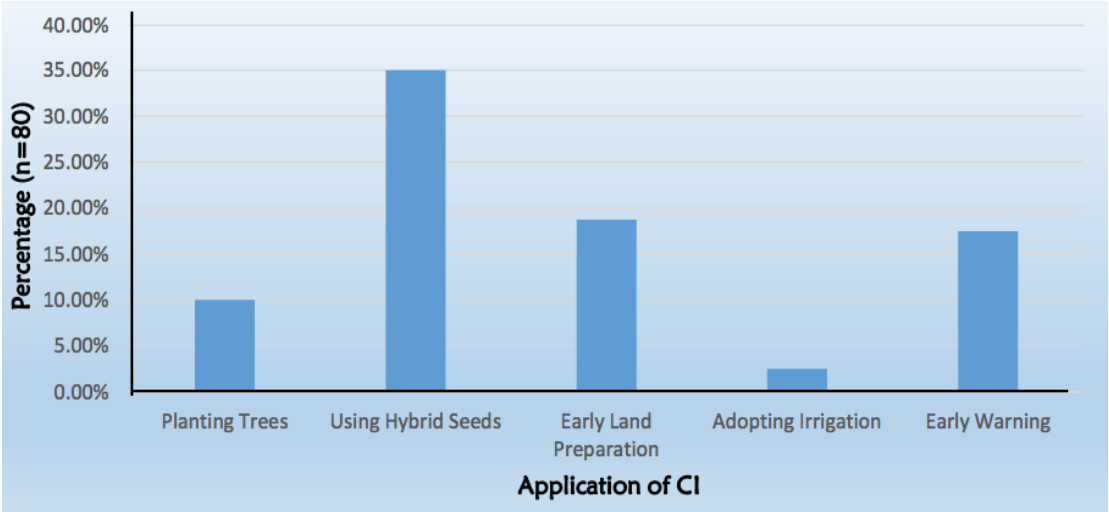

Figure 4 Showing how CI is being applied

3.8 Multinomial logistic regression analysis

Floods was a significant predictor (b=2.657, Std. Error = 0.856, $p < 0.02$) in the model, and this means that the person who noted floods as change in climate is likely to be the person who lives in the flood prone zone with the expected value of 14.260. Crop pests is another significant predictor (b=1.773, Std. Error = 0.617, $p < 0.04$) which indicates there is high prevalence of crop pests in the flood prone zones and for every person who noted this change is likely to be the one living in a flood prone zone or rely on these areas for agricultural activities.

Upon the analysis of likelihood ratio test, education emerges as the major contributor to the failure of other respondents to understand climate change concepts. This was revealed in the process of administering the questionnaire where majority of those who were illiterate were not able to define their experience in reference to climate change. The analysis also indicates that majority of the people in flood prone areas finds Village Headmen as the more convenient channel for getting climate information. The analysis tables were made available in the appendices.

3.9 Challenges faced in weather and climate

Communication Communicating about climate change is not as simple as other topics. It requires an understanding of the topic, audience, coordination among stakeholders, funding, political will and proper policies to support the implementation of measures to positively reap the desired outcome. Communicating climate information in rural areas was found to be more challenging as compared to urban. One of the challenges that was noted is illiteracy. The results indicate that 47.5 % of rural residents above the age of 18 were not able to read and write. This poses a serious concern to climate communicators when developing the messages for these end users to comprehend. It also limits the channels of communication to be effective such as social media platforms that are more interactive as compared to mass communication like radio.

Cultural belief is also another hindrance to the uptake of climate information as some communities are still relying on indigenous knowledge. The results show that 35 % rely on indigenous knowledge to monitor the impending disaster or season which result in disregarding the scientific weather and climate messages. To get to the rural masses to advocate about climate change requires financial resources which is a limiting factor faced by stakeholders such as NGOs. Still, it was also noted that majority of the staff lack enough knowledge on climate issues which is another drawback to the interpretation of climate messages to the rural people. The effort of disseminating climate information and or services also faces challenges of packaging as narrated by one of the staff members at the DCCMS due to a differences of the end user which are supposed to be tailor-made. Among other challenges noted, were that of lack of training on Disaster Risk Reduction (DRR), dependency syndrome by communities and lack of EW equipment'.

4. Conclusions

This Climate change awareness, information utilization and dissemination in rural areas is one of crucial area to pay much of our attention alongside decision makers. Due to the widespread of the impacts of climate change experienced in the past years and variability of rainfall, it is inevitable for the need to improve the use of climate information to reduce these impacts. Much of the impact of climate change deeply affect those living in rural area as majority of them rely on agriculture which is very sensitive to weather. Therefore, widening the coverage of climate service helps individuals and organizations to make climate smart decisions.

As shown in the results and discussions, the majority of the people living in rural areas access climate services though the radio which is passive in nature, cannot produce the desired change of adapting to climate change but rather interactive communication that facilitate inquiry can be the alternative to adopt which are more effective at developing understanding and informing actions (Lee, Lee, & Scnumann, 2020, cited in Guido, Z., Knudson, C., Campbell D. & Tomlinson, J., 2019). In this digital world, better and fast information communication technologies are available to facilitate remote engagement with end users in this case rural areas. Some areas are hard to reach, like in this study, Dzambukira village which is in prone to floods is very difficult to get there so these technologies like phones or social media can facilitate effective communication and save time and resources.

Out of the study, it is also recommended that proper coordination must be emphasized to ensure a coherent and smooth delivery of climate services to the communities. As observed in this study that there are different views on the effectiveness of communication channels in Nsanje which can have the effect of jeopardizing the effort to reduce the impacts of climate change. There is a need to recruit more support staff to improve climate service delivery in rural areas. In this case, staff in EPAs (Agricultural Extension Workers) are very crucial since these are the people that are directly in touch with the end user (rural farmers). In line with this, the producer (DCCMS) is also not spared as they also suffer the same. It is clear that enough staff members can be able to share duties by interpreting weather and climate forecast that are tailor-made. This can surely solve the problem of packaging of information in which different literatures also articulate.

Community structures need to be strengthened in order to improve the awareness and utilization of climate information. Certain messengers like respected community leaders can provide the psychological signals that instill confidence in the information (Moser, 2010). This is in line with what was found during the study where 42.5% believe on their village headmen in relation to climate change. On top of that, majority of those in flood prone areas emphasized that the village headmen are the most convenient source of information. Therefore, proper engagement of these local leaders can have a great impact in the accessibility and utilization of climate information mostly in disaster prone areas.

In conclusion, the study suggest that more have to be done in ensuring that climate communication is effective by strengthening the set structures to enable easy access of information and that it must be interactive so as to ensure that the people are able to utilize it by having the access to experts for some clarifications. This study emphasizes the importance of using interactive climate information to reduce the negative impacts of climate change in rural areas. Digital communication technology facilitates easier access to information, even in remote areas. Good coordination, additional extension staff, and involvement of local leaders are necessary to enhance the utilization of climate information. These measures will help rural communities make informed climate-related decisions.

Author Contribution

F. B. conceived and designed the study, performed the experiments, analyzed and interpreted the data, contributed reagents/materials/analysis tools, wrote the paper, prepared figures and/or tables, reviewed drafts of the paper and approved the final draft.

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Not available.

Conflicts of Interest

The authors declare no conflict of interest.

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