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Understanding of Connectivity and Interlinkages between Human Activities and Climate Change: Community Perspectives from Kenya

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Abstract

Purpose: This study was conducted in Nakuru County, Kenya and aimed at assessing the community knowledge of the complex interrelationship between individual and collective activities and climate change in Kenya. Specifically, we assessed the knowledge and perception of climate change, grassroot information flow on Greenhouse Gas (GHGs) and climate change, and local practices/activities taken towards mitigation/adaptation to climate change.

Methodology: The study involved both qualitative and quantitative research methods. Data was collected using literature reviews, questionnaires, focus group discussions, and key informant interviews. Descriptive analysis was used to summarize data that were then presented as frequencies and percentages. Index construction was undertaken by summing up the scores for all statements relating to knowledge and perceptions to obtain a single group of variables. Chi-square tests were used to test relationship between variables.

Findings: Eighty (80%)of the respondents indicated that climate change is real, 69% of which attributed it to human activities, majorly (52%), clearance of vegetation. Most of the respondents (63%) had no idea about any climate change policy in the county while barely half (48%) could identify at least 1 greenhouse gas. This points to a gap in knowledge transmission from the national/County to the community and perhaps lack of sufficient community involvement in policy making. It was further established that there was a disconnect in information flow from scientific sources to communities that most respondents (63%) obtained climate information from community groups while only 2% relied on scientific sources, which would provide accurate information. this implies that the respondents may not be employing climate change mitigation strategies in their everyday interventions. Gender and education had significant influence on awareness and attitude towards climate change.

Unique Contribution to Theory, Practice and Policy: These results suggest the need to shape community's attitudes/perceptions about climate change by sharing accurate information through flexible channels and community involvement in formulation and implementation of climate change policies.

Keywords: *Community Knowledge, Connectivity, Interlinkages, Human Activities, Climate Change, Kenya*

INTRODUCTION

Human induced climate change is progressing faster, and with more unexpected manifestations, than predicted by climate scientists (Gills & Morgan, 2022; IPCC, 2022; Romm, 2022).The major drivers are unsustainable energy use choices, land use and land-use change (LULUCF), lifestyles and patterns of consumption and production across regions, between and within countries, and between individuals (IPCC, 2022; Oliveira, Vidal, & Ferraz, 2020; Yiran, Ablo, & Asem, 2020). Climate change has been shown to have severe influence on weather patterns, food production, ecosystem health, species distributions and phenology, and human health (IPCC, 2022; Maja & Ayano, 2021; Ogidi & Akpan, 2022). It is now regarded as an existential issue for humanity since every homestead is affected and is generally agreed that far more extreme impacts are inevitable without solid collective actions (IPCC, 2022; Romm, 2022). The effects of climate change are dire, affecting livelihoods and cultures worldwide (Crate, 2009; Fountain, Cradock-Henry, Buelow, & Rennie, 2021).

Increase in human population has resulted in rapid urbanization and intensified agriculture. Consequently, these actions have placed substantial pressure on natural capital leading to severe degradation of terrestrial and aquatic resources and their associated biodiversity (Maja & Ayano, 2021; Ogidi & Akpan, 2022; X. Wang, 2022). This in turn has resulted in profound impacts on global food security (Mbow et al., 2020; Wiebe, Robinson, & Cattaneo, 2019). Moreover, in the drive to increase food production, the use of interventions such as irrigation, use of inorganic fertilizers and pesticides has escalated climate change directly and indirectly (Bibi & Rahman, 2023). Findings from studies e.g.(Maja & Ayano, 2021; X. Wang, 2022; Yiran et al., 2020) have indicated that population growth and land use change could have larger impact on future food security than is currently predicted. In the sub-sahara Africa, the effects are particularly severe, given the heavy reliance on natural capital for economic and social development by countries(Ackello-Ogutu, Okoruwa, & Bahal, 2019; Bedeke, 2023; Zougmoré, Partey, Ouédraogo, Torquebiau, & Campbell, 2018).

East Africa has been identified as one of the global hotspots of high human vulnerability due to its considerable development constraints and climatic hazards (Bedeke, 2023; Gills & Morgan, 2022; IPCC, 2022). Climate change has become one of the most serious challenges to Kenya's achievement of its development goals as described under Vision 2030, the country's economic blueprint. Kenya is already extremely susceptible to climate-related events, and projections indicate that the impacts are likely to affect the country even more in the future (Kogo, Kumar, & Koech, 2021; Mumo, Yu, & Ayugi, 2019). Kenya is already experiencing episodes of climate change, manifested by seasonal changes in precipitation and temperature of varying severity and duration (Kogo et al., 2021; Mumo et al., 2019). Therefore, climate change will continue to negatively affect crop production and food security with severe consequences borne by the already vulnerable communities in the arid and semi-arid areas(Kogo et al., 2021). Future projections also indicate that climate variability will likely alter cropping patterns and yields in many Counties in the country. According to the climate risk profile report on Nakuru County, the County faces several climate change related risks. These include drought, intense rains, floods, and high temperatures. These risks already pose a challenge to productivity, incomes and food security in the County and are expected to pose even greater challenges in the future.

Climate information is crucial in understanding climate changes which in turn assist the decision makers to anticipate and manage climate related risks, which would otherwise result in far reaching consequences (Heeren & Asmundson, 2023; Kibue, Pan, Zheng, Zhengdong, & Mao, 2015; Shin, Kwak, Jo, Kim, & Huh, 2023). Moreover, opportunities to manage agricultural risk are dependent on climate information and are yet to be fully exploited partly across sectors and from local to policy levels (Leal Filho et al., 2022; Nhemachena et al., 2020). Traditionally, farmers in Africa have relied on indigenous knowledge through the use of some indicators from trees, birds, stars, and ants' movement. However, due to climate variability and change in traditional social structures, there are concerns that indigenous knowledge is becoming less reliable to predict weather accurately, which will jeopardize farmers' ability to secure their livelihoods (Amegnaglo, Mensah-Bonsu, & Anaman, 2022). Given the projected population by 2050 and the fact that more than 80% of African agriculture remains rainfed, Use of Climate Information Services (CIS) has become an integral input in farm decision-making because of its potential of reducing risks in agriculture that can threaten agricultural livelihoods (Alliagbor, Awolala, & Ajibefun, 2020). For Africa to deal with the climate variability, it requires accurate, adequate, and timely farm-level information on climate variability (Dinku et al., 2018).

Adaptation has become part of the discourse of climate change as a fundamental and necessary response to the threat posed by the climatic changes that are being experienced even at global levels. Many actions are taken to reduce greenhouse gas emissions, including enhancement of soil carbon through, for example, conservation tillage or management of crop residues(Kibue, 2018; Kibue et al., 2015; Wang et al., 2020), and to a lesser extent agroforestry (Handa, Sirohi, Arunachalam, & Chavan, 2020) or high productive grassland restoration (Dong, Shang, Gao, & Boone, 2020), have significant impacts on climate without compromising food production. Enhancing soil carbon also has important environmental benefits in terms of water storage, soil biodiversity, and soil aggregate stability (Bossio et al., 2020).

Therefore, there is urgent need to consider knowledge and actions/practices that can help the community to become more resilient with the aim of saving hundreds of thousands of lives and safeguarding natural systems. This study was conducted in Nakuru County, Kenya and aimed at assessing knowledge and perception of climate change, grassroot information flow on Greenhouse Gase (GHGs) and climate change, and local level practices/activities towards mitigation/adaptation to climate change.

METHODOLOGY

The study was conducted in Likia (-0.53857° or 0° 32' 19" south and 35.9718° or 35° 58' 19") in the Eastern Mau Forest in Nakuru County, Kenya. Mau Forest is situated in the south-western highlands of Kenya and spans over 400,000 hectares across seven blocks within several regions. The forest is an important water source for the region and its role as a primary catchment area for several rivers in Kenya. Additionally, the forest is a vital for its economic, social and environmental contribution in the country and is facing serious human-induced threats such as illegal logging and forest resource extraction, settlement and encroachment(Mwangi, Kirui, & Kibue, 2022).

Data Collection

This study was conducted in Nakuru County between June and July 2023. The study involved use of both qualitative and quantitative methods. Household data were collected using

structured questionnaire. The questionnaires were administered face-to-face by trained enumerators. In addition, Focus Group Discussions (FGDs) and key informant interviews (KIIs) were conducted to give more insight to issues that were not well captured in the questionnaires and to guide and highlight the differences between participants (Van Eeuwijk & Angehrn, 2017). A checklist was used to moderate the discussions(Lloyd-Evans, 2006). Questions on climate change awareness, attitude and practices/actions taken to mitigate climate change were presented as a statement and put on a five-point Likert scale (Marshall, Park, Howden, Dowd, & Jakku, 2013), other questions were closed- and open-ended. The questionnaire was pretested to allow for restructuring of questions and solving all questionnaire-related problems before the actual data collection (Kibue et al., 2016; Simon, 2006). The questionnaires were administered to 139 households that were randomly sampled (Noor, Tajik, & Golzar, 2022). Before the commencement of interviews, respondents were briefed about the purpose of the study and asked if they were willing to participate. After giving consent, all interviews and discussions were recorded (Bordens & Abbott, 2008). Secondary data was collected throughout the research period from government sources, annual reports, journals, books and any other relevant literature.

Data Analysis

Descriptive analysis was used to show summary and distribution of the data. This included use of frequency tables and figures that were generated using Excel software. The analytical procedures were used to determine the relationships among variables to enable easy interpretation of data. In order to do this, data was organized according to variables (awareness/knowledge, willingness and attitude). Scores in each section were added and organized in ranges for each variable for ease of analysis. Chi-square was used to test the relationship between variables. Qualitative data from key informant interviews was analyzed using thematic analysis.

RESULTS AND DISCUSSION

Demographic Characteristics of the Respondents

Most respondents were farmers (63%), followed by businessmen (29%) and 8% were in employement . Majority of the respondents (37%) had attained high school education, followed by those with tertiaryeducation (28%), while 23% indicated having primary education and 12% indictaed having not gone to school. Most respondents (31%) were aged between 41-50 years, followed by less than 30 years (29%) both 31-40 years and more than 50 years categories scored 20% each. The male/female ratio is almost 1:1 (Table 1).

Table 1: Demographic Characteristics of the Respondents

Education	Freq. (%)	Age (Years)	Freq. (%)	Occupation	Freq. (%)	Gender	Freq. (%)
None	12	<30	29	Employed	8	Male	49
Primary	23	31-40	20	Business	29	Female	51
Secondary	37	41-50	31	Farmer	63		
Tertiary	28	>50	20				

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Levels of Climate Change Awareness

The results indicate a general agreement (80%) that climate change is real but 12 % were not sure and 8% disagreed. Sixty-nine percent (69%) agreed that climate change is anthropogenic, 22% were not sure while 9% disagreed. Majority (57%) were not sure whether electricity causes climate change, 36% agreed while 7% disagreed consumption. Sixty-two percent (62%) were not sure whether agriculture contributes to climate change, 27% agreed while the rest disagreed. Nearly 50% of the respondents were not sure whether industrial emissions cause climate change, 43% agreed while 10% disagreed. Most of the respondents were not sure whether waste management contributes to climate change, 32% disagreed while 24%% agreed. Seventy-seven percent agreed that clearing vegetation contributes to climate change, 21% were not sure while 9% disagreed (Table 2).

Table 2: Causes of Climate Change

Question	% Response				
	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
Climate change is real	3	5	12	61	19
Climate change is caused by human activities	2	7	22	62	7
Electricity consumption at home contributes to climate change	3	4	57	27	9
Agriculture contributes to climate change	0	11	62	23	4
Industrial emissions cause of climate change	1	9	47	39	4
Waste management contributes to GHGs	0	32	44	7	17
Clearing vegetation contributes to GHGs	0	9	21	46	31

Both focus group discussions and questionnaire results indicated that over time the participants had observed changes in climatic condition. They cited intensified floods and droughts; reduced agricultural production and reduced water quantity and quality and loss of vegetation cover. These findings are similar to other studies (Kogo et al., 2021; Mumo et al., 2019) that Kenya is already extremely susceptible to climate-related events and projections indicate that the impacts are likely to affect the country even more in the future. Discussants were concerned about how deforestation has led to disappearance of birds and mammals and change in water quality and quantity. They also expressed concern about smoke and dust from industries and transport sector that were visible in the atmosphere. The discussion mirrors other studies that humans have a detrimental impact on natural habitat due to various activities including deforestation, urbanization, construction, the energy sector(Ogidi & Akpan, 2022; Oliveira et al., 2020; Yiran et al., 2020)

Out of the 69% who agreed that climate change is anthropogenic, 52 % said it happens through clearing vegetation, 23% said intensified use of agricultural chemicals, 17% said lifestyle, the others said it happens through urbanization and industrial activities. Out of the 36% who said electricity consumption at home contributes to climate change, 83% said it happens through heating and lighting while 17% said it happens through clearing vegetation to create dams. The respondents who said agriculture contributes to climate change (27%,) 46% stated clearing vegetation to pave way for agriculture, 39% stated use of chemical fertilizers and the others stated irrigation. All the respondents who said that industrial processes cause of climate change, said it happens through emissions of smoke, all respondents who said waste management contributes to climate change said it waste releases bad smelling gases during decomposition and finally those who said clearing vegetation contributes to climate change, 77% said

vegetation modifies temperatures and 23% said attracts rainfall. This study findings are in agreement with other studies that sources of ghgs emissions are both indoor and outdoor and include but not limited to livestock and agricultural production(Pandey, 2020), industrialization and urbanization (Oliveira et al., 2020; Qureshi & Jamil, 2021; Yiran et al., 2020) as well as lifestyles through diet and energy consumptions (González, Marquès, Nadal, & Domingo, 2020; Steenson & Buttriss, 2021). Consequently, individual and community activities have the potential to contribute to or mitigate climate change depending on what they know about climate change and their attitudes towards climate change.

Knowledge of GHGs and Climate Change

The knowledge of greenhouse gases was non-existent to 35 % of the respondents, 48 % could identify a single gas while 17 % identified multiple. Most respondents did not know any sources of source of GHGs, 36% knew one while 28% knew more than one sources. Majority of the respondents knew Carbon dioxide 48%, carbon dioxide and methane 11% and Carbon dioxide, methane and Nitrous Oxide 6%. When asked about sources of GHGs, 36% identified clearing of vegetation, 9% identified urbanization and agriculture, 15% clearing vegetation, agriculture and transportation while 4% identified waste management, electricity use, transportation and clearing vegetation. Lack of comprehensive knowledge about causes of climate change could be attributed to fact that majority of them had basic education levels and perhaps their sources of information did not address details of sources and names of GHGs. Consequently, efforts towards solving the problems of climate change might be not bear the expected outcomes because knowledge about the causes of climate change is important in influencing mitigation actions. Studies have established that knowledge of environmental problems is important in influencing pro-environmental actions taken towards building a climate resilient community (Abdelwahed, Soomro, & Shah, 2022; Bamberg, Rees, & Seebauer, 2015; Smith, Dupré, McEvoy, & Kenny, 2021).

Nearly all the respondents knew at least one impact of climate change. Majority, 64% cited changing rainfall patterns and increased temperature, 16 % cited disappearance of vegetation and animals, drying up of rivers and flooding while 10% stated livestock and human diseases, deteriorating water quality, flooding and increase in temperature. Sixty-three percent (63%) did not know any government policy on climate change while 44% did not know any international convention on climate change (Table 3).

Table 3: Knowledge of GHG and Climate Change

Statement	Responses				
	None	One	Two	Three	Four
Do you know the names of greenhouse gases	35	48	11	6	
Do you know the sources of greenhouse gases	36	36	9	15	4
Do you know the impacts of climate change	3	7	64	16	10
Do you know any government policy on climate change	63	27	10	0	0
Do you know international convention on climate change	73	25	2	0	0

During the FGDs, the discussants raised concerns about environmental and economic implications of climate change. Specifically, they mentioned crop failure due to unreliable rainfall and subsequent malnutrition, hunger, diseases and deaths of both human and livestock

as well as natural disasters will constrain economy as more money will be spent on disasters; evacuation and resettlement as well as drugs and research.

Sources of Information about Climate Change

We asked the repondents where they obtained their information on climate change. Figure 1 below shows the various sources as indicated by them. In a nutshell, about all respondents, (97 %) indicated that they received climate change related information. They stated they received information from Radio (100%), Television (61%), churches (19 %), Community groups (63 %) agriculture extension officers 4%, workshops and conferences (4%) and scientific reports (2%) (Figure 1). This means the media and social networks have an important role in informing, warning and reminding as well as shaping the public perceptions. Other studies have underscored the role of media in creating awareness about climate change (Grizzle et al., 2021; Machin-Mastromatteo, 2021; Stamm, Clark, & Eblacas, 2000). Discussants said that Television and Radios did not relay sufficient information on climate change as they focused more on business advertisements and politics. They felt that the government should sponsor and allocate more airtime to programs that promote agriculture, environment and social welfare. It is virtually impossible to achieve a more inclusive, just and sustainable society without timely and accurate information. Information creates awareness and keeps the masses updated and thereby empowering them to make informed decisions (Grizzle et al., 2021; Machin-Mastromatteo, 2021).

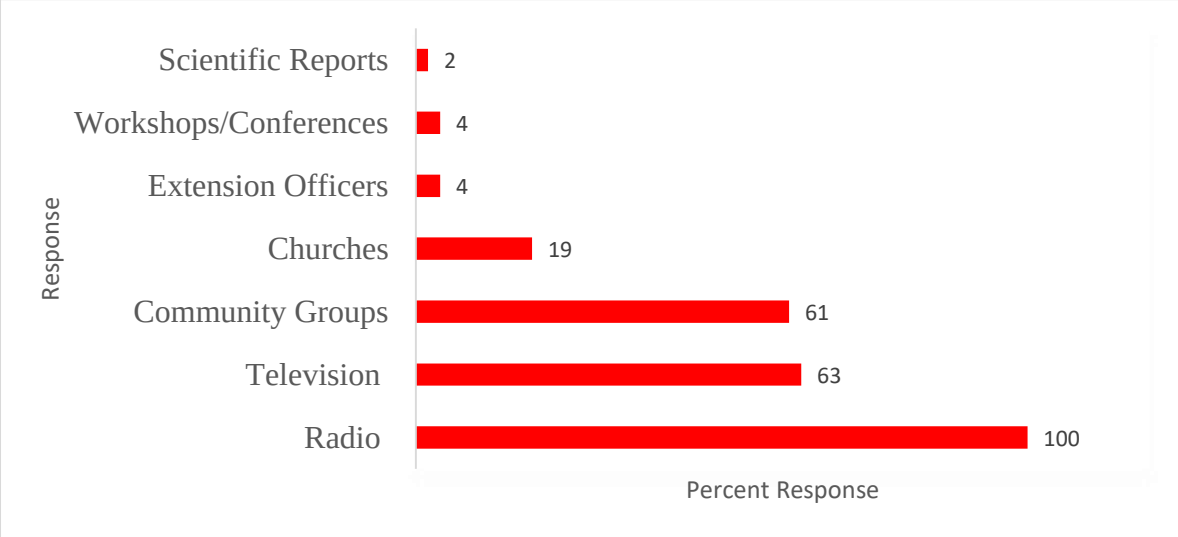

Figure 1: Sources of Information about Climate Change

Both the interviewees and discussants awareness of government policies on climate change was limited to stopping deforestation and promoting tree planting activities. Sixty-three percent (63%) of the interviewees had no knowledge of any policy while 27% and 10% had knowledge about 1 and 2 policies respectively. Discussants' understanding of "clearing vegetation" was limited to cutting down the trees. During an interview with the key informants, it was revealed that the county assembly had passed many climate legislations and has been implementing climate-smart agriculture innovations, green building technologies, climate information services etc. However, it also emerged that availability and access to these services remain low throughout the County because of limited finances, human resources, and technical capacity among institutions in charge of delivering these services. Therefore, the county

government's efforts to address climate change has not diffused among respondents although the information might be available.

On whether they knew about any international convention on climate change, majority were not aware of any convention, 25% knew about the Kyoto Protocol while 2% knew about the United Nations Framework Convention on Climate Change (UNFCCC). Lack of comprehensive understanding of climate change may point to a problem in the way information is packaged and perhaps the content. Moreover, most participants rarely attended workshops and conferences nor read scientific reports. Furthermore, even though media sources can be relied, the timing of airing the program might not consistent with the consumer's schedule. Studies have emphasized the importance of clarity and emotionally appealing messages in determining people's attitudes and responses to issues (Grizzle et al., 2021; Palm, Lewis, & Feng, 2017; Weber & Stern, 2011). They suggest that visual media offer many advantages for communicating motivating messages including providing a basis for personal thoughts and conversations thus contributing to people's memory(Nicholson-Cole, 2005; Singer, 2014).

Actions Taken Towards Mitigation of Climate Change

Through FGDs and questionnaires, the respondents had taken diverse action to reduce impacts of climate change. As an adaptation measure, majority of respondents had planted trees 83%, changed crop variety 77%, intensified rainwater harvesting 65%, irrigation 53% planting traditional foods 31% while 25% were sorting waste before disposal (Table 4). From FGDs, it emerged that clearing of forests had denied them sources of firewood and they had to buy firewood from vendors or buy petroleum gas, which was more expensive. Discussants said they had taken or were willing to take measures that ranged from change of behavior and attitude from personal level to conserving nature through afforestation, protection of vegetation, soil and water conservation for personal benefits and communities good. At a personal level the discussant said that they started walking or cycling to places where they can avoid vehicles, turning off lights when not in use and use of energy saving bulbs, use bioenergy and sort wastes for reduction, reuse or recycling. These findings compare to other studies (Gao et al., 2018; Lewis, Zako, Biddle, & Isbell, 2018; Prada et al., 2020) that many actions are taken to reduce greenhouse gas emissions, including changes to energy sources, urban design and transport modes, and to increase carbon bio-sequestration, some in the effort to enhance population health.

Table 4: Action Taken to mitigate Climate Change

Action Taken to mitigate Climate Change	%
Tree planting	83
Crop variety grown varied	77
Rainwater harvesting intensified	65
Irrigation intensified	53
Traditional foods planted	31
Agroforestry practices enhanced	30
Planting dates adjusted	28
Use of energy saving bulbs and cocking methods intensified	27
Wastes sorted before disposal	25

In order to realize significant reductions of greenhouse gas (GHG), individuals must take responsibility at personal level because they contribute to the total greenhouse gas (GHG) emission. For instance, personal comfort eg air-conditioning for homes, offices or cars as well as heating and cooling appliances at homes contributes to increase greenhouse gas emissions and thus potentially exacerbate the impacts of climate change on others (Oliveira et al., 2020; Ozarisoy, 2022; Qureshi & Jamil, 2021). The actions taken by respondents such as afforestation and reforestation will increase sinks for carbon dioxide and enhance biodiversity conservation besides providing timber and non-timber benefits while cycling and walking will increase physical activity and improve health condition. Other studies have (González et al., 2020; Steenson & Buttriss, 2021) indicate that such actions confer several health benefits besides the environmental gains.

The individuals who have taken no effort might be in denial that climate change is a serious threat or they believe it is not their responsibility to mitigate the change. It could also be argued that they are opposed to the fact that climate change is highly anthropogenic. Surveys of environmental attitudes and behaviours (Whitmarsh, Seyfang, & O'Neill, 2011) recorded respondents who believed their everyday behaviour and lifestyle did not contribute to climate change and others suggesting that the government must take the lead on emissions reductions, although everyone is responsible.

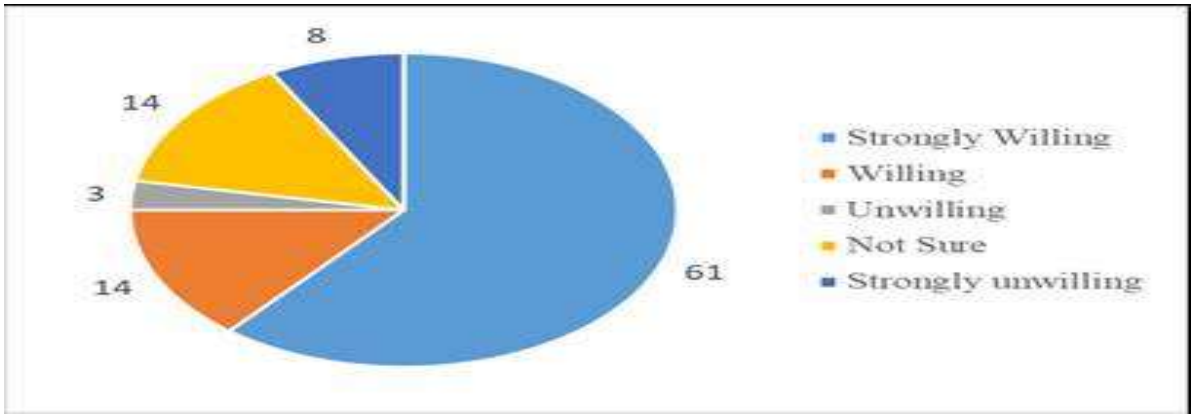

Figure 2: Willingness to Pay for Climate Change Insurance

On wether financial institutions carried out climate change damage insurance, sixty-one percent were strongly willing to pay for insurance, 14 % were willing, 3 % were unwilling, 8 % were strongly unwilling while 14% were not sure.

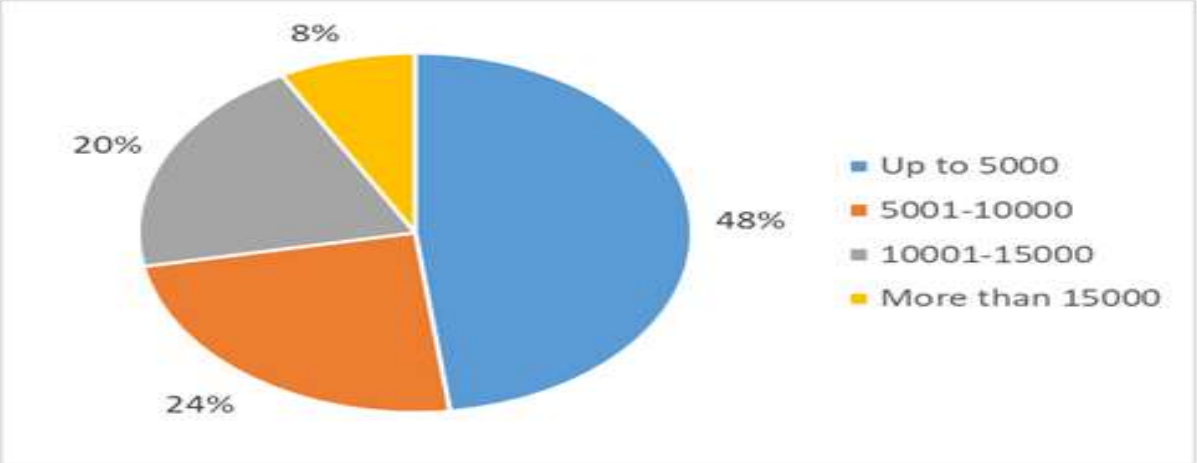

Figure 3: Payment(Kes) for Climate Change Insurance

To that effect majority of respondents who expressed willingness, (48 %) were willing to pay up to Kes 5000 followed by 24 %, 5001-10000, 20 % 10001-15000 and 8% were willing to pay more than 15000 (Fig 3). Though the relationship between the amount they were willing to pay and willingness to by insurance appear to be weak, strong commitment can be seen because every respondent would set aside some money for the same. The variation may be explained in terms of incomes and perhaps awareness. Individuals with more awareness of climate change might be willing to pay more as they understand the implication.

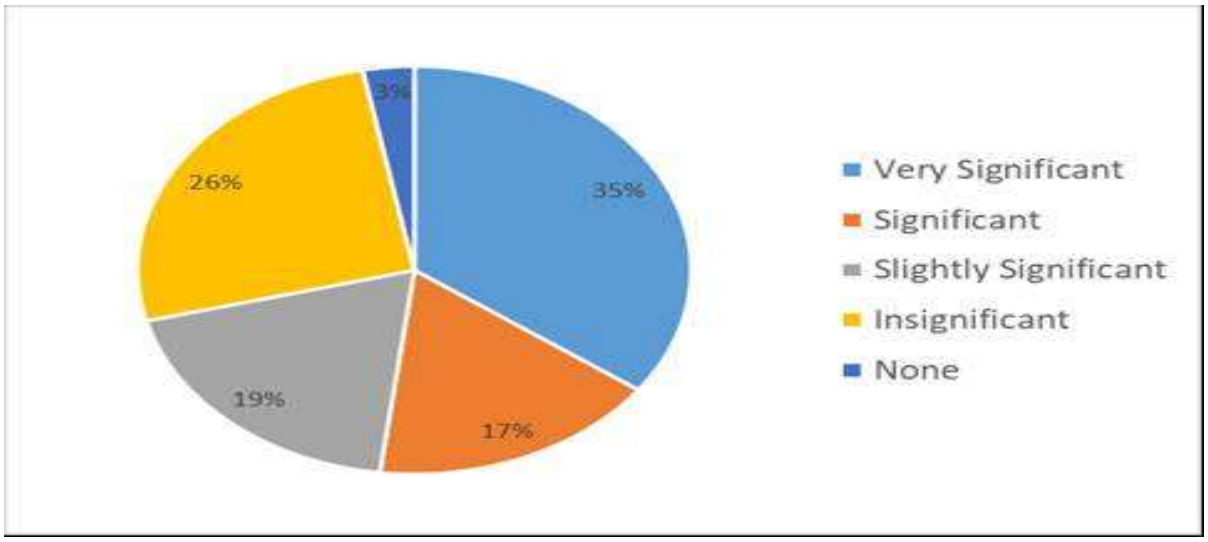

Figure 4: Magnitude of Mitigation Efforts at Personal Level

When asked to rate the magnitude of efforts taken at personal level, 35% considered their efforts very significant, 17% significant, 19% slightly significant, 26% insignificant and 3% had no idea. Effort by individuals is a major step towards climate change mitigation because they lead to reduction of individual carbon footprint and by extension global warming.

There was significant difference between gender and willingness (0.031) and awareness (0.040) at 0.05 but no significant difference between gender and attitude (0.352) at 0.05. Higher levels of awareness about and willingness to mitigate climate change among women might be attributed to the fact that when there are climate related problems such as crop failure, shortage of water, firewood and their subsequent impacts, women are worst affected because of their roles as care givers. Other studies have reported higher level of pro-environmental values and attitudes for women (vs. men) and attributed it to the fact that globally, majority of women are more vulnerable to the effects of climate change because they are not economically empowered and are faced with many cultural constraints (Daoud, 2021). These findings are also in agreement with (Sundblad, Biel, & Gärling, 2007) who found that although women in Sweden did not differ from men in cognitive risk judgments related to climate change, they tended to worry more about the environment.

There was significant difference (0.045) between education and attitude, willingness (0.011) and awareness (0.307) at 0.05. Those who had attained the highest level of education were more willing to mitigate climate change, were more aware of climate change and had a positive attitude towards climate change mitigation. Studies have documented that access to information is of paramount importance in modern society because it is based on modern technology and aims at maximum productivity (Grizzle et al., 2021; Machin-Mastromatteo, 2021). A study by (Piao & Managi, 2023) found that higher educational levels were associated with an increase in specific environmentally friendly behaviors and sustainable energy consumption. Accordingly, individuals in the higher educational level group tended to consume recycled goods, purchase energy-saving household products, conserve electricity, and separate their waste. This means that for climate change mitigation and adaptation, individuals with higher levels of education are more likely to have the advantage.

CONCLUSION AND RECOMMENDATION

Conclusion

The respondents are aware about climate change and its impacts. However, their sources of climate information may not be accurate enough to enable them take the right interventions. Given their sources of information, it is importance for the policy makers to acknowledge and harness community channels of communication in order to address the complex challenges of climate change. Besides, the respondents' valuable insights on adaptation and mitigation of climate change is important for building climate resilient community. Consequently, there is a need for continued collaboration and dialogue between different knowledge systems to co-create innovative solutions that promote environmental sustainability, social equity, and resilience to climate change.

Recommendation

There is clear need for the County and National Government together with all stakeholders to empower communities to better understand and adapt impacts of climate change, and thereby build more sustainable and resilient future. This can be realized by promoting training programs and resources aimed at increasing awareness about the connections between human activities and climate change. for the programs to be successful, the communities should be involved at all stages and processes.

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