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Youth's Awareness of Climate Change in Nakuru Town, Kenya

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***Abstract*—** *The study investigated youth awareness of climate change in Nakuru, Kemya. Data was obtained through administering of structured questionnaires to 315 sampled youth and was analysed using Microsoft Excel and Statistical Package for Social Science (SPSS) software. The findings showed 83.3% of the respondents have experienced negative effects of climate change over the years such as drought, famine and extreme heat. Also, 85.6% view climate change as a serious problem. About 83.3% of the respondents are optimistic that climate change can be mitigated and abated. Conclusively youths in Nakuru are aware of climate change and many feel the government is not doing enough to inform people about climate change. Diversification of communication channels of climate change information, especially the use of social media; increasing collaboration between government and environmental organizations; and incorporating arts and entertainment into awareness campaign programmes were recommended*.

***Keywords*—** *Climate Change, global warming, awareness, youth and Kenya*.

I. INTRODUCTION

Climate change is one of the major global challenges of our time and adds considerable stress to our societies and to the environment. Economic and demographic growth over the past two centuries has increased the atmospheric presence of greenhouse gases, which trap outgoing terrestrial radiation, thus enhancing warming of the planetary surface. Climate change effects are being experienced differently at different scales, and the occurrence of climate change is increasingly becoming evident across the globe. For instance, the European Environment Agency (EEA), 2012, points out that there has been an increase in heat wave incidences, decreasing precipitation in southern regions, melting ice caps and rising sea levels. African countries are experiencing severe climate change effects such as more persistent drought, flooding in some areas and increased water stress. The agricultural sector of these countries highly affected mainly due to the reliance of rain fed agriculture. This in tandem affects the region's economy which depends largely on agricultural production (Asafu-Adjaye, 2014).

Kenya is experiencing climate change impacts at different scales across the country. Notable effects include increased water scarcity, drought, flooding and increased occurrence of water related diseases. The region of Nakuru is currently experiencing much of the climate change impacts. For instance, Lake Nakuru is receding at an alarming rate and an increase in migration of flamingos (Government of Kenya [GoK], 2013a) Climate change awareness is an important factor as far as achieving the sustainable development goals (SDG) is concerned. Goal 13 of the SDGs is "Take urgent action to combat climate change and its impacts" section 13.3 is to "improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning" (United Nations [UN], 2015). The government of Kenya also stresses that public awareness empowers the public to develop a strong sense of responsibility on environmental issues (GoK, 2013b). Despite a commitment by the Kenyan government towards enhancing climate change awareness, not much has been done and there is limited documented information about climate change awareness in Kenya. The number of youth taking action towards climate change is increasing in most parts of the world. A number of platforms such as Tunza by the United Nations Environment Programme (UNEP) give young people an opportunity to interact on environmental matters. They allow youth across the world to engage in climate change conferences which is a great way of nurturing a generation that will be committed to fighting climate change. Thus it was important to find out whether a similar trend exists in Nakuru and whether or not the youths are aware of climate change issues.

II. MATERIALS AND METHODS

Study area

The study was conducted in Nakuru Town East constituency, located approximately 165 kilometers to the north-west of the capital city, Nairobi. The area lies between latitudes 0° 18' S and 36° 4' E and at an altitude of about 1,850 meters above sea level and covering an area of about 74.3 square kilometers. Nakuru Town East constituency is made up of 5 wards (Biashara, Kivumbini, Langalanga, Menengai and Nakuru East). The region experiences the short rains between October and December while the long rains are experienced between March and May. Notable economic activities in the area include agriculture, tourism and a few manufacturing industries. According to the 2009 population census, the town's population was 156,167. This study was based on a descriptive study design. The target population of this study comprised the youths aged between 15 to 30 years of age. Simple random sampling was used to select the respondents aged between 15 and 30 years in the study area. Therefore, the sample size required for the study was 399 respondents. Self-completion questionnaires were used to obtain information from the respondents. The questionnaires

were sent to Nakuru via post and an assistant researcher distributed them to respondents. The questions were organized so as to meet the outlined objectives of the study and provide answers to the research questions. Each respondent was given one week to complete the questionnaire. Following the retrieval of the questionnaires from the respondents, the questionnaires were sent to Kampala via post by the assistant researcher. Data analysis was done using Microsoft Excel and the Statistical Package for Social Sciences (SPSS) version 24. The questionnaire results were coded to enable integration into SPSS for analysis. The results of the analyses are presented using tables. Chi square tests were carried out to establish if there exists a relationship between variables.

III. Results and Discussion

Characteristics of Respondents

Table 1: Gender distribution

Gender	Frequency	Percentage
Male	175	56
Female	140	44
Total	315	100

About 56% (n=175) of the respondents were male and 44% (n=140) were female (Table 1). A Chi-squared test showed that there is no significant difference between the respondents' distribution by gender ($\chi^2_{0.01} = 3.89$, df=1, n=315, p= 0.049). The difference in sample size is attributed to the patriarchal nature of Kenya's society. Varying attitudes could have also influenced where women might have been hesitant to commit to answering the questionnaire.

Table 2: Age distribution

Age group	Frequency	Percentage
15-18	40	12.7
19-22	116	36.8
23-26	116	36.8
27-30	43	13.7
Total	**315**	**100**

A majority of the respondents were of the age 19-22 (36.8%) and 23-26 (36.8%), where as 13.7% were between 27-30 years and 12.7% between 15-18 years. A Chi-squared analysis shows there is a significant difference in the respondents' distribution by age ($\chi^2_{0.01}$= 70.54, df=3, n=315, p=0.000). The difference in sample size based on age group can be explained by the fact that the age group between 15-18 years are likely to be in upper primary (standard 8) or secondary school. Given that most schools were on-going during the period of data collection, gaining access to this age cohort was difficult. On the other hand, the age group between 27-30 years are mostly working class hence many were not willing to commit to answering questionnaires.

Table 3: Education level

Education level	Frequency	Percentage
Primary	24	7.6
Enrolled in primary	8	2.5
Completed high school	36	11.4
Attending high school	4	1.3
Attending university/ college	211	67
Other	32	10.2
Total	**315**	**100**

Many respondents were attending university/ college (67%), whereas 11.4% had completed high school and 10.1% in primary/ enrolled in primary. About 1.3% of the respondents were attending high school and those that indicated 'other' (working) accounted for 10.2%. The high percentage of respondents attending university/ college can be attributed to the high number of respondents being in the age groups 19-22 and 23-26, who are likely to be in tertiary level of education. Further, this can be attributed to a higher percentage of youth being college or university-going students. This concurs with the findings of a study by Singh and Singh (2011) which found that most of Indian youth comprises of college or university-going students.

Level of Climate Change Awareness

Table 4: Percentage of respondents that have heard about climate change

Heard of climate change	Frequency	Percentage
Yes	215	68.3
No	100	31.7
Total	315	100

From table 4 above, it is seen that majority of the respondents have heard of climate change as indicated by 68.3% (n=215), whereas 31.7% (n=100) have not heard about climate change. An open-ended question was asked in question 9 to find out if the respondents are aware of the causes of climate change as a follow up question for respondents who answered 'yes' to question 5. About 87% (n=187) out of the 215 answered the question whereas 28 did not. The most cited causes were deforestation and pollution, whereas a few mentioned anthropogenic activities. This shows there is a relative understanding of climate change by the youth.

Table 5: Sources of climate change information

Source of information	Frequency	Percentage
Environmental group	75	9.25
From a friend	48	6.17
Government information	88	10.57
School/College/University	103	12.78
Television	143	17.18
Internet	99	12.78
Local library	28	3.52
Newspaper	72	9.69
Publications/Journals	56	6.61
Radio	83	10.13
Other	8	1.32
Total	**803**	**100**

Collectively, media sources (television, internet, newspaper and radio) were the most common sources of climate change information (49.78%). Environmental groups (9.25%), friend (6.17%), government information (10.57%), school/college/university (12.78%), local library (3.52%), publications/journals (6.61%) and other (1.32%). Multiple responses to this question were allowed. These findings coincide with the findings in a study by Singh and Singh (2011) which found the media sources to be the most common information source. The popularity of media as sources of climate change information can be attributed to the growth of mass media in Kenya as well as increased ease of access to

media information. Further, reasons for television having a high percentage of the respondents could be due to the fact that many youths watch television and more presence of channels and programmes such as National Geographic and Animal Planet. The low number of the respondents selecting the library as a source of information can be attributed to a poor reading culture.

Table 6: Respondents' comparison of climate change and global warming

Response statement	Frequency	Percentage
They are the same	48	22.3
They are different	48	22.3
Related but not the same	111	51.6
Not sure	8	3.7
Total	**215**	**100**

About 51.6% of the respondents said that the two terms are related but not the same, 22.3% considered the terms to be different and the same respectively, whereas 3.7% were not sure. This result shows that majority of the youths are familiar with the terms "climate change" and "global warming" since most respondents were able to point out the terms as being related but not the same. Further, to assess the youths' level of awareness on climate change a set of Likert type questions about climate change was presented to the respondents. The results are shown in table 7.

Table 7: The youths' level of awareness on climate change

Statement	Agree	Disagree	Don't know/ Refused	Total
a	171	4	40	**215**
b	167	8	40	**215**
c	131	28	56	**215**
d	100	63	52	**215**
e	79	92	44	**215**
f	60	107	48	**215**
g	60	103	52	**215**
h	131	28	56	**215**
i	159	12	44	**215**
j	175	4	36	**215**
k	171	8	36	**215**
l	111	48	56	**215**
m	159	8	48	**215**
n	159	12	44	**215**
o	40	103	72	**215**

The statements were about the causes (statements a, d, e, i, j, k, l and o), effects (statements b, c, f and m) and mitigation measures (statements g, h, and n) against climate change. A median of 60.9% agree with the statements, while a median of 13% disagree with the statements. An incredibly high proportion of the respondents (79.5%) agreed to statement '**a**' (human beings are the main cause of climate change) whereas responses to statement '**e**' 36.7% agree that climate change is a natural process compared to 42.8% that disagreed. About 60.9 % of the respondents agreed that climate change will harm them personally as compared to 13% that disagree, while 26% were not sure or refused. On the other hand, there was a considerable divide in response to statement '**i**' (the use of fossil fuels is causing climate change) with 51.6% agreeing to the statement, 22.3% disagreeing while 26.1% were did not know. Further, a majority were uncertain with statement '**o**' (leaving the lights ON in my home adds to climate change) with only 18.6% agreeing, 47.9% disagree and 33.5% did not know. Based on these responses, it is clear that there is a considerable high level of awareness about climate change by the youth in Nakuru.

Table 8: Experience of climate change effects over the years

Response	Frequency	Percentage
Yes	179	83.3
No	16	7.4
Not sure	20	9.3
Total	**215**	**100**

A majority of the respondents said they have experienced the effects of climate change in recent years as indicated by 83.3%. About 7.4% said they have not experienced any effect whereas 9.3% were not sure. This can be attributed to the inability to detect climate change effects. Further, this can also be attributed to the fact that some respondents might have been born in a period when climate change effects are already being experienced, hence making it difficult to identify any changes in climate.

Table 9: Environmental changes experienced over time

Change experienced	Frequency	Percentage
Cold temperatures	11	5.1
Famine	16	7.4
Unpredictable/ Unreliable rainfall	44	20.5
Frequent floods	48	22.3
Higher temperatures/ drought	96	44.7
Total	**215**	**100**

Most of the respondents cite higher temperatures as the change they have experienced (44.7%). About 22.3% cited floods and 20.5% mentioned unpredictable and unreliable rainfall. This coincides with the findings of a study by BBC (2010) where most Kenyans cited drought as the change they have experienced in their climate.

Table 10: Perceived threat of climate change

	In your view, climate change is.			
Gender	**A serious problem**	**Not a problem**	**Not sure**	**Total $_{Row}$**
Male	88 (82.2%)	15 (14%)	4 (3.7%)	107 (100%)
Female	96 (88.9%)	12 (11.1%)	0 (0%)	108 (100%)
Total $_{Column}$	184 (85.6%)	27 (12.6%)	4 (1.9%)	215 (100%)

About 85.6% (n=184) of the youth view climate change as a very serious problem, whereas 12.6% (n=27) consider climate change as not being a problem (Table 10). This can be attributed to the mobilizing efforts of advocacy groups or the influence of values people have towards the environment. Similar findings were reported in a study by Pew Research Center (2015) where 89% of Kenyans considered climate change as a serious problem and 10% considered it as not being a problem. A Chi-square analysis to establish if the perceived threat is dependent on gender showed that the perceived threat of climate change is independent of the gender ($\chi^2_{0.01}$ =4.677, df= 2, n=215, p=0.096). This result dissents the findings by Pew Research Center (2015) that

found women more than men consider climate change as a threat.

Table 11: Youths' concern about climate change

Concern about climate change	Frequency	Percentage
Very concerned	139	64.7
Somewhat concerned	40	18.6
Not too concerned	28	13
Not concerned at all	8	3.7
Total	**215**	**100**

About 83.3% of the youth in Nakuru town east are very/somewhat concerned that climate change will harm them at some point in their life time whereas 16.7% are not/ not too concerned (Table 11). Studies by Pew Research Center (2015) and British Science Association (2013) as cited by Roberts *et al.* (2015) also found that young people exhibit relatively high levels of concern at 52% and 63% respectively. The high levels of concerns about climate change can be attributed to increased accessibility to climate change information and life experiences of climate change, increased media coverage of climate change information.

Table 12**:** Concerns about consequences of climate change

	Climate change consequence			
Concern	Drought	Severe weather	Extreme heat	Rising sea levels
Very concerned	74	72.1	64.7	36.7
Somewhat concerned	16.7	13	20.5	24.2
Not too concerned	3.7	7.4	9.3	16.7
Not concerned at all	0	1.9	0	11.2
Not sure/ Refused	5.6	5.6	5.6	11.2
Total	100	100	100	100

The youths are concerned about the consequences of climate change, where drought topped the list with 159 respondents (74%) saying they are very concerned. This result is similar to findings by Pew Research Center (2015) which found drought to be the most pressing climate change worry, as indicated by 62% in Kenya and a global median of 44%. Close to this result was the concern about severe weather such as floods or intense storms, accounting for 72.1% (Table 12). On the other hand, concerns about rising sea levels were not quiet high as drought and extreme weather. This can be attributed to the geographical location of Nakuru, which is relatively far from the coastal region hence the perceived threat towards rising sea levels is low. High concerns about drought can be attributed to the current drought being experienced in the country as well as the declaration of drought as a national disaster on February 10th 2017 by President Uhuru Kenyatta (Cherono, 2017).

Table 13: Is the government doing enough to inform about climate change?

Response	Frequency	Percentage
Yes	48	15.2
No	195	61.9
Not sure	72	22.9
Total	**315**	**100**

An incredibly high percentage of the respondents (61.9%) said the government is not doing enough to inform people about climate change in their area (table 13). Similar findings were reported in a study by Brechin and Bhandari (2011) where 69% of the respondents felt the Kenyan government was not doing enough to deal with the problem of climate change.

Table 14: Can anything be done to solve climate change?

Response	Frequency	Percentage
Yes	179	83.3
No	36	16.7
Not sure	0	0
Total	**215**	**100**

On the issue of combating climate change, the youths are optimistic that something can be done to solve climate change. About 83.3% said something can be done to solve climate change compared to 16.7% who said no. The most cited mitigation measure against climate change was afforestation/ reducing deforestation, pollution reduction, and environmental conservation. Similar sentiments were reported in a study by Jolli *et al.* (2015), where 75% of the surveyed students (aged 18-25 years) in India were optimistic about tackling climate change. These findings show that there is a potential to foster positive change towards climate change action given that majority of the youth display some optimism in combating climate change. Hence tapping on this potential can provide a promising future in the efforts to tackle climate change.

Table 15: Trusted sources of climate change information

Source of information	Very much	Not much	Unsure	Total
Friend/ Family member	41.9	43.2	14.9	100
Environmental group	84.8	8.9	6.3	100
Media	64.4	22.9	12.7	100
Government	73.3	17.8	8.9	100
Scientist	60.6	24.2	15.2	100

Environmental groups have the most trusted information about climate change, with 84.8% (Table15). About 41.9% trust information from a friend or family member, while 58.1% were unsure or would not have much trust. This can be attributed to the fact that people would view information from a friend or family member to be unproven and hence less reliable. The high trust of environmental groups can be as a result of them being viewed as advocacies of the environment. That is, due to the involvement of environmental organizations in environmental conservation efforts, their information can be considered reliable.

Use of public transport is mainly to save costs or for convenience. This can be attributed to the fact that most of the respondents were of university-going age thus they would seek to save and/ or reduce costs. On the other hand, from table 16 above it can seen that apart from recycling and taking part in a campaign about climate change, protecting the environment was quite an unpopular motivation for undertaking the actions. Buying energy saving bulbs and turning off lights is mostly to save costs and for convenience.

This could be attributed to energy saving measures that are recommended by the electricity provider, Kenya Power and Lighting Company (KPLC). The reasons for walking or cycling to work and eating locally produced food are for health, saving money and convenience.

Table 16: Reasons for environmentally friendly actions

	Reason for action								
Action regularly taken	**Convenience**	**To save money**	**To protect the environment**	**For my health**	**Habit**	**Moral obligation**	**Another reason**	**Refused**	**Total** (%)
Use public transport	35.19	37.04	7.41	1.85	5.56	1.85	0	11.11	100
Turn off lights I'm not using	16.67	35.19	3.7	5.56	18.52	9.26	1.85	9.26	100
Buy energy saving bulbs	27.78	42.59	11.11	1.85	3.7	3.7	0	9.26	100
Recycle/Re-use items	20.37	18.52	24.07	11.11	5.56	7.41	3.7	9.26	100
Take part in a campaign about climate change	20.37	18.52	27.78	1.85	1.85	14.81	5.56	9.26	100
Walk or cycle to work	18.52	27.78	9.26	22.22	9.26	0	3.7	9.26	100
Eat locally produced food	24.07	16.67	11.11	25.93	7.41	0	3.7	11.11	100

Key

Most popular reason
Second most popular reason

Table 17: Motivation to attend climate change awareness programme

	I would attend a climate change awareness programme if?			
Response	I will get a reward	Social media is the platform used	Celebrity or artist is part of the programme	Organized by an environmental organization
Much	77.1	63.2	65.7	86
Not much	20.3	30.5	29.2	8.9
Not sure	2.5	6.3	5.1	5.1
Total	**100**	**100**	**100**	**100**

Collapsing the response statements (‘very much’ and ‘somewhat much’ to ‘much’ and ‘not too much’ and ‘not much at all’, to ‘not much’), the results show that 86 % of the respondents are willing to attend an awareness programme if it is organized by an environmental organization. This result corresponds with the findings with the ones in table 17) where environmental group was seen as the most trusted source of information about climate change. This shows that environmental organizations/ groups are considered reliable sources of climate change information. This result shows that environmental groups can be able to spearhead climate change action amongst the young population due to the high level of trust and motivational influence they have upon the youth. Anticipation of receiving some form of reward after attending an awareness programme is also seen to be a major influencing factor of motivation, with 77.1% saying it would motivate them. The use of social media accounted for 63.2%. More than half of the respondents as indicated by 65.7% said a celebrity’s involvement in a climate change programme would motivate them to attend. This can be attributed to the high influence celebrities have upon society, which means the youth are likely to be willing to emulate a path that the celebrity sets. The potential role of celebrities as messengers of climate change is seen with Leonardo DiCaprio where in his 2016 Oscar’s award acceptance speech in which he referred to climate change as “the most urgent threat facing our species” which sparred discussion about climate change across all major social media platforms (Snorradottir, 2017). Further, celebrities are likely to convey the message in a less complicated manner which will be easier for many youths to comprehend.

Table 18: Preferred platform for communicating climate change information

Platform	**Frequency**	**Percentage**
Newspapers/ Magazines	24	7.6
Local radio stations	51	16.2
Television	68	21.6
Social media	112	35.6
Seminars	16	5.1
Music concerts	44	14
Total	**315**	**100**

Social media was the most popular selection with 112 respondents (35.6%) selecting the option. The second preferred option was television, accounting for 21.6% of the respondents. Seminars on the other hand scored very low, representing 5.1% of the overall selections. Reasons cited for social media preference were ease of accessibility and usage frequency. The popularity of social media as the most preferred choice reflects upon the current digital age. These findings are important because they provide guidance for selecting communication platforms of climate change information. Having the right platform can guarantee some level of success of a given programme.

IV. Conclusion

The study established that most of the respondents were able to identify causes and effects of climate change relatively. They were also able to distinguish between the terms climate change and global warming which are often used interchangeably in normal daily communications. Majority of the respondents have experienced climate change effects over the years, notably drought, famine and extreme heat. Many also view climate change as a very serious problem and do believe it will harm them at some point in their lifetime. There is optimism amongst the youth that climate change can be

solved. Much scepticism however does exist in relation to the government's efforts to raise awareness about climate change, with many feeling the government is not doing enough.

Recommendations

Diversifying communication channels of climate change information, especially social media and mass media (television, newspapers, and radios) which offer an excellent platform to reach out to many young people in this digital era. Increasing collaboration between government agencies and environmental organizations in the designing and launching of awareness programmes which will increase the trust by the young people in the content being offered. Incorporate arts and entertainment in the awareness or extension programmes, due to the high potential of celebrities or public figures to persuade change in society. Using competitions and issuing some form of reward to participants to be able to foster change amongst peers.

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