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ORIGINAL ARTICLE

Climate Change Awareness and related Tree Planting Practices in a Rural Community in North-Western Nigeria

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Keywords

Awareness; Climate change; Rural community; Tree planting; Nigeria

ABSTRACT

Background: Tree cutting is one of the causes of climate change and a common practice in Africa, a continent under significant threat from climate change. Therefore, climate change awareness and mitigation are vital to reducing its impacts in the region. Reforestation through planting of trees is an important carbon emission reduction strategy. This study assessed climate change awareness and related tree planting practices among household heads in a Nigerian rural community.

Methods: A community-based descriptive, cross-sectional study was conducted in April 2019 among all household heads in Nasarawan Buhari community. An interviewer-administered questionnaire was used to collect data from the 104 household heads (or their representatives). Data was analyzed using SPSS (version 21.0) and statistical significance was set at p value of < 0.05.

Results: The mean age of respondents was 40.6±12.6 years, and most of them (87.5%) were males. Half (50.0%) were aware of climate change, and their main source of information was radio (63.5%). Most (98.1%) used fire wood for cooking. Only a minority (27.9%) planted at least a tree in the year preceding the study. There was a statistically significant association between climate change awareness and occupation (p=0.038) but not with tree planting (p=0.827).

Conclusion: The results indicated that only half of respondents were aware of climate change. There was high use of wood as cooking fuel with low tree planting. Tree planting was not associated with climate change awareness. There is therefore a need for continuous climate change education and mitigation campaign in the community.

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INTRODUCTION

Climate change is one of the biggest threats to the world today and it is progressively emerging as one of the most serious global problems affecting many segments of economic growth in the world.[1, 2] Climate change effects have been experienced in many countries of the world in the form of widespread flooding, incessant drought, disruption of weather patterns, increased global temperature, devastating wind-storms, and forest fire devastations among others.[3] Climate change significantly affects

rural communities particularly in Africa who rely mainly on farming activities and natural resources for their livelihood.[4] The African continent is anticipated to be the most affected and susceptible to the effect of climate change.[5] Nigeria is classified as one of the 10 most vulnerable countries in the world, according to a 2015 climate change index.[6]

The causes of climate change can be classified into natural and anthropogenic causes. The natural causes include volcanic eruptions and ocean effects, and the anthropogenic causes include the use of fossil fuels, cutting of trees (deforestation), overgrazing, agricultural activities and discharges from aerosols among others.[3] The effects of climate change include drought, flooding, loss of bio- diversities and poor agricultural productivity among others.[3] Tree cutting for use as fire wood is a common practice in Africa, especially in rural communities where majority of the people live. When trees are cut down (deforestation) and burned or allowed to rot, their stored carbon is released into the air as carbon dioxide, thereby contributing to global warming. According to current estimate, deforestation is responsible for about 10 percent of all global warming emissions.[7] According to the United Nations' Food and Agriculture Organization, about 7.3 million hectares (18 million acres) of forest are lost every year, and roughly half of the earth's tropical forests have already been cleared.[8] Extensive planting of trees with large canopies will capture carbon dioxide from the atmosphere, thereby mitigating the rising atmospheric carbon dioxide levels.[3]

Globally, sub-Saharan Africa has the lowest climate change awareness level (44%) while Europe has the highest (88%).[9] In Mpumalanga province of South Africa, only 17.1% of farmers were aware of climate change.[10] In Nigeria, awareness level is higher in the urban areas (84.2%) than in the rural areas (66.6%) and it is poor especially among vulnerable groups such as women, children and rural dwellers.[11-12] The importance of trees includes carbon sequestration, wind breaking, role in hydrologic cycle, prevention of soil erosion, provision of natural shelter, maintenance of sustainable biodiversity among others.[3] Trees are also known as the "lungs" of the earth and serve in mitigation of climate change.[3,13] Climate change mitigation will require awareness, creating knowledge, understanding and values, attitudes, skills and abilities among individuals and social groups towards attaining a better quality environment.[14] This study was therefore conducted to assess climate change awareness and related tree planting practices among household heads in a Nigerian rural community.

METHODOLOGY

The study was conducted in Nasarawan Buhari, a rural community in Giwa Local Government Area of Kaduna State, North-Western Nigeria. The vegetation is guinea savannah, the hottest months are March-April while the coldest are December and January. The rainy season varies from

March to October. The Hausas and Fulani are in the majority; the people are mostly farmers with few traders and artisans. The community has a total population of 774 from the census conducted by the authors as at April, 2019. The population is distributed across 104 households.

A community-based cross-sectional, descriptive study was conducted from 24th - 25th April, 2019. It was a total population study involving all the 104 household heads (or their representative) in the community. The data was collected by trained final year medical students of Ahmadu Bello University, Zaria, using a pre-tested structured interviewer-administered questionnaire. The questionnaire (designed in English language, translated to Hausa language and back translated) had 20 elements organized into two sections A and B, with 9 and 11 elements, respectively. Section A sought information about respondent's socio-demographic characteristics, while Section B sought information on their climate change awareness and related tree planting practices. The questionnaire was administered by interviewers in Hausa language. Climate change is called "*canjin yanayi*" in Hausa language.

The data obtained was checked manually for completeness, entered into electronic form, cleaned and analyzed using IBM Statistical Package for Social Sciences (SPSS) software, version 21.0. Results were summarized into means and proportions and presented in form of charts and tables. Bivariate analysis was done using Chi-square test to assess the association between socio-demographic variables and awareness of climate change. The level of statistical significance was set at a p-value of < 0.05 and the corresponding x^2 value and degrees of freedom (df) were presented.

Ethical clearance for the study (ABUTHZ/HREC/W42/2020) was obtained from the Health Research Ethics Committee of the Ahmadu Bello University Teaching Hospital, Zaria, Kaduna State, Nigeria. Appropriate entry permission to conduct the study was sought from Giwa Local Government Area, Kaduna State and appropriate entry permission was obtained from community leaders. A verbal informed consent to participate in the research was also obtained from the respondents.

RESULTS

A majority 61 (58.6%) of the respondents were within the age group of 30-49 years and mean age was 40.6 ± 12.6 years. Most 91 (87.5%) were males and 37 (35.6%) had tertiary education. Fire wood was the main cooking fuel for most respondents 102 (98.1%), while only 2 (1.9%) of the respondents use kerosene (Table 1). Half, 52 (50%) of the respondents had heard of climate change. Radio 66 (63.5%) was the major source of information on climate change followed by friends 28 (26.9%), family members 6 (5.8%) and health worker 4 (3.8%).

Table 1: Socio-demographic characteristics of the respondents

Variable	Frequency (n=104)	Percent
Age (in years)		
≤29	19	18.3
30-39	28	26.9
40-49	33	31.7
≥50	24	23.1
Sex		
Male	91	875
Female	13	12.5
Tribe		
Hausa	95	91.3
Fulani	9	8.7
Religion		
Islam	104	100.0
Marital status		
Married	100	96.2
Divorced	2	1.9
Single	2	1.9
Highest education		
Tertiary	37	35.6
Qur'anic	33	31.7
Secondary	26	25.0
Primary	6	5.8
No formal education	2	1.9
Occupation		
Petty trading	68	65.4
Artisan	8	7.7
Business	7	6.7
White collar job (Private)	7	6.7
Farming	3	2.9
Civil servants	2	1.9
Others	9	8.7
Household cooking fuel		
Wood	102	98.1
Kerosene	2	1.9

Table 2 shows that there is a statistically significant association between climate change awareness and sex (p =0.008) and also with occupation (p= 0.038) of respondent. Female respondents 11 (84.6%) were more aware of climate change than the male respondents 41 (45.1%) and this was statistically significant, p=0.008. Respondents that were businessmen and those in private sector 6 (85.7%) were more aware of climate change than artisans 6 (75.0%) and farmers 2 (66.7%). Petty traders 26(38.2%) were least aware of climate change than civil servants 1(50.0%) and this was statistically significant, p=0.038.

As shown in Table 3, only 29 (27.9%) of the respondents planted at least a tree a year preceding the study. There was no statistically significant association between tree planting and any socio-demographic characteristics of respondents.

DISCUSSION

Only half of the respondents in this study were aware of climate change. Radio was their main source of information on climate change while health care workers were the least. Studies in Lagos and Benue States revealed higher climate change awareness of 84.0% and 92%, respectively.[15,16] A possible explanation for these higher figures is that community channels (local health care workers, agricultural extension workers) were the main source of climate change information instead of mass media (radio). For example, in Benue, agricultural extension workers were the main source of information on climate change.[16] The lack of use of television, internet, newspapers and magazines as sources of information in our study area may be related to the problem of access to information in rural communities.[11, 17-19]

Table 2: Associations between socio-demographic characteristics and awareness of climate change

Variable	Awareness of Climate change			x^2	df	p-value
	Yes (n=52)	No (n=52)	Total (104)			
	n (%)	n (%)				
Age (years)						
≤29	8 (42.1)	11 (57.9)	19	2.041	3	0.564
30-39	15 (53.6)	13 (46.4)	28			
40-49	19 (57.6)	14 (42.4)	33			
≥50	10 (41.7)	14 (58.3)	24			
Sex						
Male	41 (45.1)	50 (54.9)	91	7.121	1	0.008
Female	11 (84.6)	2 (15.4)	13			
Education						
No formal education	0 (0.0)	2 (100.0)	2	2.300	4	0.681
Quranic	18 (54.5)	15 (45.5)	33			
Secondary	13 (50.0)	13 (50.0)	26			
Tertiary	18 (48.6)	19 (51.4)	37			
Primary	3 (50.0)	3 (50.0)	6			
Occupation						
Farming	2 (66.7)	1 (33.3)	3	13.352	6	0.038
Petty trading	26 (38.2)	42 (61.8)	68			
Artisans	6 (75.0)	2 (25.0)	8			
Businessman	6 (85.7)	1 (14.3)	7			
Civil servant	1 (50.0)	1 (50.0)	2			
White collar job (Private)	6 (85.7)	1 (14.3)	7			
Others	5 (55.6)	4 (44.4)	9			
Marital status						
Single	1 (50.0)	1 (50.0)	2	0.000	1	1.000
Married	50 (50.0)	50 (50.0)	100			
Divorced	1 (50.0)	1 (50.0)	2			
Tribe						
Hausa	46 (48.4)	49 (51.6)	95	1.095	1	0.295
Fulani	6 (66.7)	3 (33.3)	9			

The statistically significant association between occupation of respondents and their awareness of climate change was also reported in neighboring Niger Republic.[20] Our study found higher awareness for those in business than farming. A possible explanation for this is that those in business were more exposed to climate change information. The commonest energy used for cooking by respondents was fuel wood. This is similar to the findings of other Nigerian researchers.[21,22] The implication of this is that trees will be felled in order to get woods for cooking by the respondents, which would lead to more deforestation. This is so because deforestation is already an environmental problem in Nigeria, a country ranked as having the highest rate of deforestation of primary forest in the world in 2005.[23] Furthermore, Nigeria is among countries with the highest deforestation rates globally, with about 450,000 to 600,000 hectares of forest lost annually.[24-25] Deforestation has both environmental and public health implications. Some of its environmental implications include desertification, soil erosion, fewer crops, flooding, increased greenhouse gases in the atmosphere, climate change, and loss of habitat by plant and animal species.[23]

Table 3: Associations between socio-demographic characteristics and tree planting practice in the last 1 year

Variable	Planted tree in last 1 year			x^2	df	p-value
	Yes (n=29)	No (n=75)	Total n=104			
	n (%)	n (%)				
Age (year)						
≤29	6 (31.6)	13 (68.4)	19	5.389	3	0.145
30-39	12 (42.9)	16 (57.1)	28			
40-49	6 (18.2)	27 (81.8)	33			
≥50	5 (29.8)	19 (79.2)	24			
Sex						
Male	24 (26.4)	67 (73.6)	91	0.827	1	0.363
Female	5 (38.5)	8 (61.5)	13			
Education						
No formal education	1 (50.0)	1 (50.0)	2	7.310	4	0.120
Qur'anic	6 (18.2)	27 (81.8)	33			
Secondary	7 (26.9)	19 (73.1)	26			
Tertiary	15 (40.5)	22 (59.5)	37			
Others	0 (0.0)	6 (100.0)	6			
Occupation						
Farming	1 (33.3)	2 (66.7)	3	5.986	6	0.425
Petty trading	22 (32.4)	46 (67.6)	68			
Artisans	3 (37.5)	5 (62.5)	8			
Businessman	2 (28.6)	5 (71.4)	7			
Civil servant	0 (0.0)	2 (100.0)	2			
White collar job (Private)	1 (14.3)	6 (85.7)	7			
Others	0 (0.0)	9 (100.0)	9			
Marital status						
Single	0 (0.0)	2 (100.0)	2	1.260	2	0.532
Married	28 (28.0)	72 (72.0)	100			
Divorced	1 (50.0)	1 (50.0)	2			
Tribe						
Hausa	28 (29.5)	67 (70.5)	95	1.379	1	0.240
Fulani	1 (11.1)	8 (88.9)	9			
Awareness of climate change						
Aware	14 (26.9)	38 (73.1)	52	0.048	1	0.827
Not Aware	15 (28.8)	37 (71.2)	52			

Its health effects on populations include increase incidence of malaria, schistosomiasis, leishmaniasis, West Nile Virus, Nipah virus, Lyme Disease. These diseases occur as a result of dispersion of disease-carrying hosts.[23, 26-27]

Although half of the respondents were aware of climate change, only about a quarter planted trees the year preceding our study. This is likely due to a poor understanding of climate change and its link with reforestation. This knowledge gap, coupled with high use of fuel-wood and poor practice of planting of trees in the community will have negative impacts on the environment and health of the population. One limitation of this study is that our results on climate change awareness may not necessarily reflect the actual situation amongst household heads because our data was not entirely collected from household heads. In households where the heads were not available to respond to our questionnaire, their wives or children responded on their behalf.

Conclusion: The results indicated that only half of respondents were aware of climate change. There was high use of wood as cooking fuel with low tree planting. Tree planting was not associated with climate change awareness. There is therefore the need for continuous climate change education and mitigation campaign in the study area by the Ministry of Environment and other relevant stakeholders in the state. The campaign should extensively use both mass media (radio) and community channels (local health care workers and agricultural extension workers) and it should stress the importance of planting trees as a mitigative measure against climate change. There is need to educate, encourage and support the community to use clean cooking energy such as liquefied petroleum gas (LPG), which is cleaner, portable, and convenient and has higher heating temperature among others.

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