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CASE STUDY

Youth awareness and commitment to global warming risks among university students

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ABSTRACT

BACKGROUND AND OBJECTIVES: Global Warming is expected to induce grave effects around the world. It is predicted that many communities, mostly in the third world, experience numerous consequences because of climate change. Therefore, effective action is needed and universities play a huge role in addressing Global Warming issues and their impacts through research and innovations. Hence, assessing the extent to which African university students understand climate change and its impacts shows the extent of hope in mitigating the climate related risks. This Case study assesses how deep is the knowledge of young educated Africans on Global Warming causes and risks, how committed they are on fighting the issue and applying solutions.
METHODS: A hypothesis testing and descriptive statistics models were employed to analyze a qualified data set collected through an online interview survey among young educated Africans taken from a sample of oversea students in Chinese state universities. After a consistency study, Out of 250 questionnaires received, 224 were useful data, and Cronbach's alpha was 0.75. Participants were taken from 34 different African nationalities. All analyses were conducted using SPSS24.
FINDINGS: The results have shown that 39% of the students are very familiar with the topic, and 33% consider it as a known issue and the participants mostly rely on social media to get information about Global Warming. Two hypotheses were tested at 95% level of confidence; the critical statistic was 41.3 against a 51.2 calculated chi square for H01: Young educated Africans don't have significant knowledge on Global Warming causes. Similarly, a critical value of 36.4 was compared to a calculated chi-square of 40.6 for H02: Young educated Africans don't have significant knowledge on Global Warming risks. Hence, both hypotheses were rejected. Consequently, it was deduced that young Africans students do have general knowledge on GW risks and causes, even if some deep aspects are still unclear for some. It was revealed that most of the students (81%) are ready to take actions against climate change, and some have even started to do so; besides, they mostly believe that the solutions should come from every human being at any age or background. Using these results, recommendations were given to different stakeholders.
CONCLUSION: In Africa, where education about climate change is generally low, the findings in this study may provide all stakeholders with crucial information for better understanding of Global Warming risks and effective response plans. This study has shown that Young educated Africans report a general sense that global warming can negatively impact people's lives, but relatively few are willing to personally get involved in the response. Therefore, there is need for practical climate change health and safety education leading to improve behaviors among the most remote communities.

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
32	6	5

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INTRODUCTION

On August 22, 2019, Brazil's Amazon rainforest was burning at a record rate, the Amazon is often referred to as the planet's lungs, producing 20% of the oxygen in the Earth's atmosphere (Yeung and Alvarado, 2019); losing it would be one of the biggest catastrophes the earth will ever face. In response to the fire, the World leaders collected fought together hand to hand providing financial, scientific and operational help to Brazil. In the other side of the planet, The Lake Chad which used to be the populations source of income is now one twentieth of its previous size. This has led to extreme poverty, lack of drinkable water, basic sanitation, and high insecurity with the increase of Boko Haram's surface area. Instead, this is not seen as a major problem by World leaders, yet both problems cited above are caused by Global Warming (GW). Many conferences are being held around the world and the United Nation itself has made Climate change as one of its sustainable development goals (Arora and Mishra, 2019). As some areas of the world are less affected than others, this issue is being neglected and even unknown. The hypothesis of GW since the mid- 20th century owing to the increase of CO_2 in the atmosphere is supported observationally by the spatial and seasonal characteristics of global temperatures variations (Jian-Bin et al., 2012).GW is one of the most important challenges currently facing the world. The adverse impacts of GW can be catastrophic and a potential threat to the humanity existence making sure that everyone is aware of this issue and personally involved in fighting it is absolutely crucial (Afnan et al., 2017). In Africa for example, with the huge poverty and demographic problems, people are less concerned with GW issues. Indeed African Governments are taking actions and local communities are much more involved than before, but the overall success of the fight against Global Warming depends also on youth awareness and engagement because young people are critical thinkers, change-makers, communicators and leaders. Besides, the information that young people receive about climate change can also benefit a much larger percentage of the population, which includes their families (Mugambiwa and Dzomonda, 2018). Causal knowledge on GW is also relevant, not only with respect to human health but also in global efforts to contain the GW phenomenon. This is because misconceptions surrounding factors responsible for GW exist which could have serious ramifications on people's health (Odonkor and Sallar, 2020). Some researchers have worked on youth awareness on GW causes and issues because before taking action against any problem, a deep understanding is necessary. In addition, educating the population on GW is the vital part of what all institutions should do in ensuring that the activities exacerbating GW are curbed and it is slowed down. Maibach et al. (2015), described young Americans awareness of the health effects of GW, levels of support for government funding and action on the issue, and trust in information sources; they found that 61% of attendees, before taking the survey, had given little or no thought to how GW might affect people's health. In their assessment on 733 respondents above 18 years in Pune city of Maharashtra state of India, Harshal et al. (2011) found that 547 (81.40%) respondents out of 733 opined that human activities are contributing to climate change. In Africa, instead, very few have worked on youth awareness on Global Warming. In their study, Gerryc and Kenneth (2020) analyzed the climatic trends and characterized the adaptation strategies in response to climatic change impacts to crop production, water resources and household economy of upland farmers in the Valley of La Trinidad, Benguet, Philippines, and these same methods could be applied in Africa, with the support of institutions. Adio-Moses and Aladejana (2015) focused on the assessment of knowledge and awareness of causes, effects and mitigating measures of GW among inhabitants of industrial areas of Ibadan southwestern Nigeria. Ugandans and Kenyans have also performed some studies on youth awareness; Oluoch et al. (2020) investigated the level of awareness, acceptance, and attitudes of the public towards renewable energy sources (wind, solar, geothermal and biomass) in Kenya as a case-study, whilst Lenzholzer et al. (2020) had an international overview with their study on the awareness levels regarding urban climate phenomena and the sense of urgency to act within four groups: citizens, local politicians, urban planners and designers, and urban climate experts. With the current situation of COVID-19, to effectively address climate change issues, it is essential to assess youth awareness regarding GW using samples that will represent different countries and backgrounds. Although there is no scientific evidence so far to show any direct link between global warming and the COVID-19

pandemic, scientists are giving opinions that these two run parallel to each other (Lone and Aijaz, 2020). To accurately measure the value of reduced carbon dioxide emissions during the global lockdown, it is recommended that scientific studies be conducted to estimate the carbon emissions generated (Oluwatosin and Olarewaju, 2021).To study the impact of COVID-19 on environment, a paper published in May 2020 found that the daily global carbon emissions during the lockdown measures in early April fell by 17% and could lead to an annual carbon emissions decline of up to 7%, which would be the biggest drop since World War II (Mantur, 2020). Naderipour *et al.* (2020) also proved that the greenhouse gases (GHG) emission, which was 8 Mt CO2 eq. from January 2020 to March 2020, reduced to 1Mt CO2 eq. for April and May. Understanding the features of climate extremes at the regional to local scale as well is a key for designing response measures that enhance preparedness and early warning systems, and additionally in the long term, it helps in the formulation of effective adaptation planning measures to reduce the related risks (Teshome and Zhang, 2019). In response, the objective of this research is to assess the extent to which African university students understand climate change and its impacts how committed they are on fighting the issue and applying solutions. To achieve this objective, some research questions have risen.

1)   What is the level of awareness of Global Warming among young educated Africans? And how do they know about it?

2)   How committed are Young Africans on Global warming issues?

3)   What do young educated Africans think of who should bring the right solution to Global Warming?

Along with these three questions and using the literature review, two NULL hypotheses were stated and tested based on (a) contingency, (b) the extent to which participants provided information, (c) the extent to which the context offers choice and (d) the extent to which the context serves to enhance task engagement.

1)   *H01: Young educated Africans do not have significant knowledge on Global Warming causes.*

2)   *H02: Young educated Africans do not have significant knowledge on Global Warming risks.*

The current study has been carried out in China in October 2019.

MATERIALS AND METHODS

To answer the research questions and test the hypothesis, descriptive statistics was used with a representative set of N = 224 take from a population of the 80,000 African intentional students in China. With the belt and road initiative, China hosts thousands of international students coming from more than 150 countries, it was easier and cheaper to reach a high number of young educated Africans with different backgrounds and coming from different countries; this is why the population targeted students in China. The survey was conducted between September and October 2019. Young African students in China from 34 countries Fig. 1 were sent an e-mail requesting their help in the survey questionnaire, along with a simple, two-page format listing the questions presented with ordinal and dichotomous variables. An online questionnaire has also been established to gather all the data needed from targeted respondents. In-person interviews were conducted, with some respondents filling out and returning the survey formats. While looking for research participants, it was taken into account that some countries were more represented in china than others, but the selection of a participant in a given country was random as there was no preference on the subject and all of them had equal chances to be selected so the population and samples were both random. The selected sample size should be bigger than n = N/1+ (N*(e)^2),where e is the error and N the size of the population. We computed the probability of selection since we know the sample size (n) and the total population (N); *Probability of selection=(n ÷ N) x 100%.*The sampling error is computed using the formula *E=Z x (σ /√n),*where Z is the Z score value based on the confidence interval and *σ* is the population standard deviation. For this study, the questionnaire was made as a result of an analysis of previous studies and authors own work. It should also be noted that all the questions are grouped into 3 main indicators that could be used for testing (awareness of causes of GW, awareness of GW risks, and commitment level on fighting the issue). The questionnaire originally written in English was translated into French, and then checked by being translated back into English to ensure conceptual consistency. The designed questionnaire consisted of 7 questions. The first question gets the basic information about the respondent, the second one is a multiple choice question that assessed the
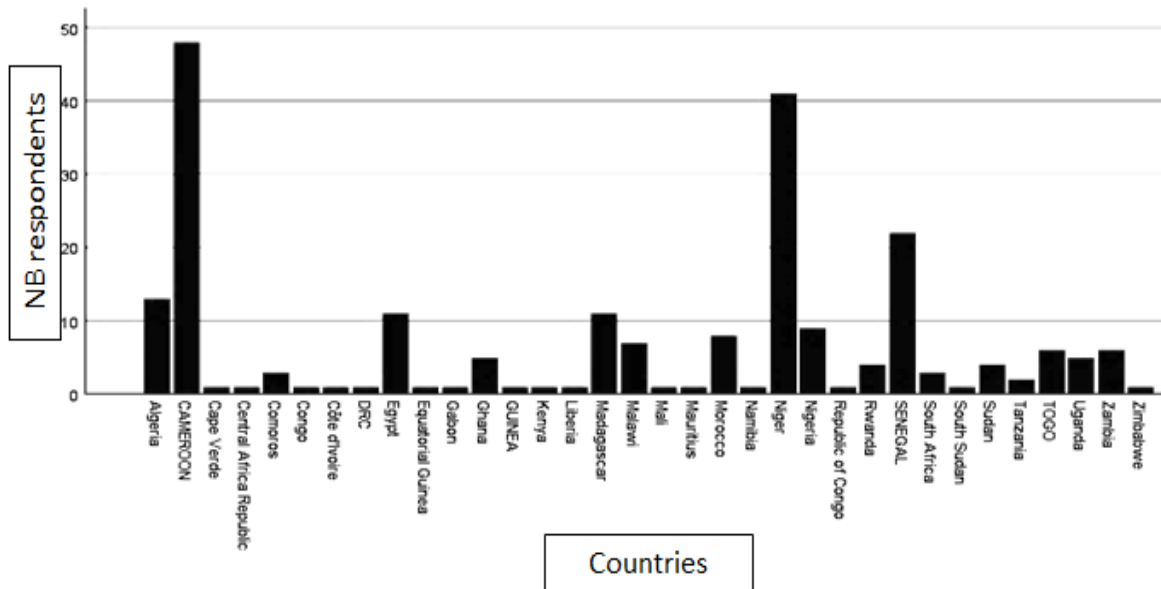
Fig. 1: The number of respondents in each country

awareness level on the words "GLOBAL WARMING" whereas the third question was getting the source of awareness. In Questions 4 and 5 respondents were asked to choose an appropriate number to indicate the level of agreement or disagreement with the following statements on GW (global warming) causes and risks respectively (Strongly agree=5, Agree=4, neither agree or disagree=3, Disagree=2, strongly Disagree=1). Question 6 was a YES/NO question to assess how the participant is committed to fight against GW, and the last question was an open question relating to the participant solution suggestion where the participants could share their thoughts. Six experts in social measurement and evaluation determined the face validity of the instrument. The average overall face validity was equal to 90%. The study used Cronbach's alpha test for reliability testing, which yield a reliability coefficient of 0.75 implying that the instrument was consistent and reliable in achieving the study objective. The data was analyzed by using statistical software SPSS 24 because the software package is easy to use, robust, affordable, and presents results with the fewest errors. For H01 and H02, the null hypothesis was tested using a chi-square goodness of fit, and a p value <0.05 was considered for the study.

RESULTS AND DISCUSSION

Participants were taken from 34 African nationalities (oversea students in 28 Chinese state universities) Fig. 1 which covers more than 60% of the African continent. Respondents were taken from Chinese universities and they were mostly from Cameroon (21.4%), Niger (18.3%), Senegal (9.8%), and Algeria (5.8%), Egypt (4.9%) and Madagascar (4.9%). These percentages were chosen accordingly with the countries proportions of international students in China. More than 95% of surveyed were between 20 and 40 years old (between 20 and 30 years (73.7%) between 30 and 40 years (24.6%), and 75% of them were men. As show on Table 1, all of the participants were well educated, mostly holding a master's degree (47.8%) and a PhD (19.2%) whereas (50.4%) of them were engineers and (22.8%) in management related field.

Table 1 shows that the selected sample = 224> 198 is representative of the population, and each selected student from the population had 2.8% chances of being selected from the population. As the sampling error (0.0392) is less than the probability of the confidence interval 5%, the sample selected can be used. For an answer to the first research question, it was found that young educated African have a very

Table 1: Sample demographics (N =224)

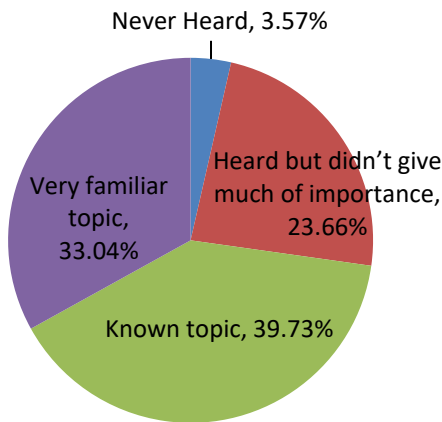|	frequency	Percentage (%)	
Representative sample : n = N/1+(N*(e)^2)=80000/1+(80000*(.05)^2= 218<224			
Probability of sampling :(n ÷ N) x 100%.= (224/80000)*100=2.8			
95% C.L. Sample Error: E=Z x (σ /√n)= 1.96*(0.3/√224)=0.0392<0.05			
Sex	frequency	Percentage (%)	
Male	168	75	
Female	56	25	
Age			
Less than 20	3	1.3	
Between 20 and 30 years	165	73.7	
Between 30 and 40 years	55	24.6	
More than 40 years	1	.4	
Level of education			
BSc	69	30.8	
MSc	107	47.8	
PhD	43	19.2	
PostDoc	5	2.2	
Area of specialization			
Medicine or health science	31	13.8	
Engineering	113	50.4	
Management	51	22.8	
Literature or Social sciences	29	12.9	

Fig. 2: Respondent's awareness level on GW

strong general awareness on the GW issue. On Fig. 2, it was recorded that (33.04%) of the respondents are very familiar with the topic, (39.73%) of them consider it as a known topic, (23%) heard of it and just (3.57%) are very unfamiliar with the topic. Respondents were allowed to choose one or more communication tools that they used to follow the GW issue. With the growth of social media in recent years, it has become an important research resource for people's ideas on specific issues. Sentiment analysis has been used to determine people's sensitivity and behavior in environmental issues (Kirelli and

Arslankaya, 2020). The results revealed that 148 used social media to follow activities or advertisement, 128 of them heard about it on TV and 68 attended some events on climate change, 60 heard about it from friends and family and 93 of them used other sources of information (Fig. 3).

When asked about their opinion on the causes of GW, around half of respondents strongly opposed that GW is a Natural non-Human-related phenomenon (44%) and that Africa is one of the biggest contributors to the problem (51%).This could be clearly seen in Fig. 4. About (30%) didn't have an opinion (Fig. 4) nor had a neutral position on water pollution causing GW. Even if the displacement of human population do not actually affect the planet heating phenomenon, (32%) of the respondents had a neutral position and a cumulated of (23%) even agreed or strongly agreed on this. Approximately more than the half at least agreed on human causes of GW such as the waste burnt, industries or cars. Fig. 4. Having this result, to get a final position on GW causes, hypothesis testing was performed on the sample. To test the two hypotheses a chi-square test at 95% confidence level was used.

With 28 degrees of freedom and 95% level of confidence, the critical statistic computed is X^2 crit =41.33. The table of statistics Table 2 gives a calculated X^2 calc=51.2.As X^2 calc > X^2 crit, the
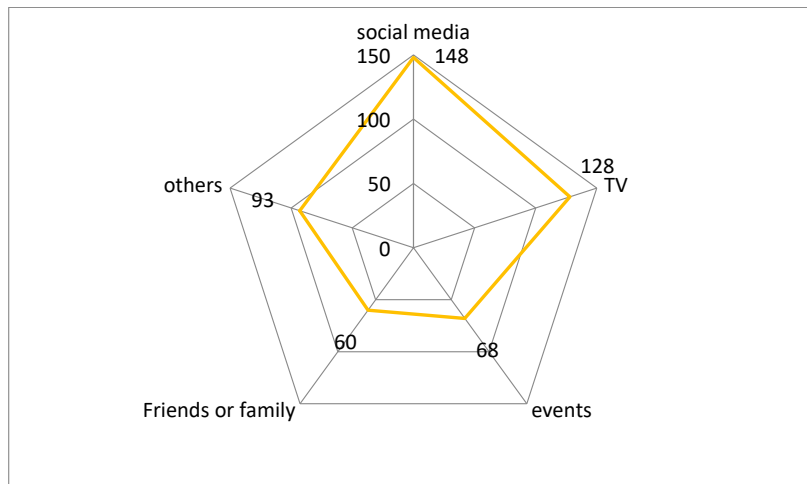
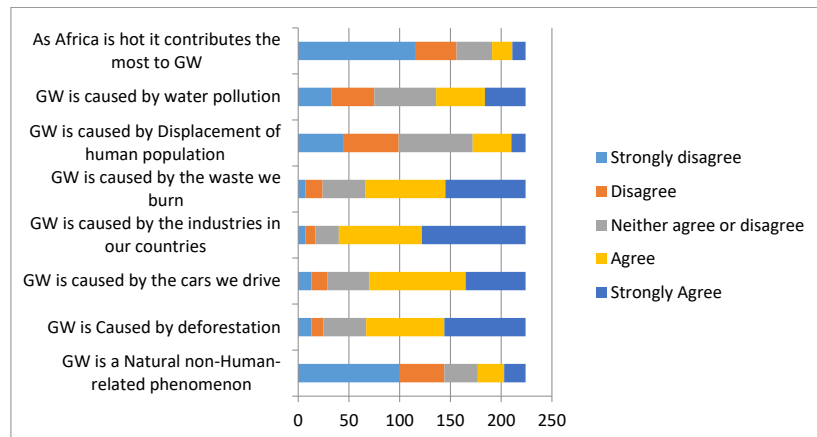Fig. 3: Tools used by respondent's for GW information

Fig. 4: Opinions on Global Warming causes

null hypothesis H01 is rejected and there is enough evidence to say that Young educated Africans do have significant knowledge on GW causes, according to the sample taken from youth studying in Chinese universities. The modal response for 3 of the questions was "strongly agree" when respondents were asked about their opinion on GW risks. Almost (60%) believe that GW can cause the extinction of some animals in African wildlife and have some serious effects on public health; nearly half (45%) agreed that the problem is as serious as HIV aids. Slightly more than half of the participants (51%) completely believe that GW can lead to poverty but, the biggest concern is that around half (49%) strongly disagreed and (19%) more disagreed that there is a

given relationship between GW and terrorism and insecurity in Africa whereas it is actually true Fig. 5.

As done previously, a chi-square goodness of fit was again performed.
With 24 DF and 95% level of confidence, the critical statistic computed is X^2 crit =36.41. The table of statistics Table 3 gives a calculated X^2 calc=40.6.As X^2 calc> X^2 crit ,the null hypothesis H02 is rejected and there is enough evidence to say that Young educated Africans do have significant knowledge on GW risks according to the sample taken from youth studying in Chinese universities. The answer to the second research question is as obvious as shown in Fig.6 that respondents answered YES to most of the commitment statements. Instead,

Table 2: Descriptive statistics results on GW causes

			Descriptive Statistics					
Cause	Strongly disagree 1	Disagree 2	Neither agree or disagree 3	Agree 4	Strongly Agree 5	Mean	*SD	Decision Null hyp
GW is a Natural non-Human-related phenomenon	100	44	33	26	21	2.21	1.365	Retain
	44.6%	19.6%	14.7%	11.6%	9.4%			
GW is Caused by deforestation	13	12	42	77	80	3.89	1.129	Reject
	5.8%	5.4%	18.8%	34.4%	35.7%			
GW is caused by the cars we drive	13	16	41	95	59	3.76	1.097	Reject
	5.8%	7.1%	18.3%	42.4%	26.3%			
GW is caused by the industries in different countries	7	10	23	82	102	4.17	.997	Reject
	3.1%	4.5%	10.3%	36.6%	45.5%			
GW is caused by the waste burnt	7	17	42	79	79	3.92	1.060	Reject
	3.1%	7.6%	18.8%	35.3%	35.3%			
GW is caused by displacement of human population	45	54	73	38	14	2.65	1.161	Retain
	20.1%	24.1%	32.6%	17%	6.3%			
GW is caused by water pollution	33	42	61	48	40	3.09	1.306	Reject
	14.7%	18.8%	27.2%	21.4%	17.9%			
As Africa is hot it contributes the most to GW	116	40	35	20	13	1.99	1.249	Retain
	51.8%	17.9%	15.6%	8.9%	5.8%			

*SD=standard deviation

there is approximately a 50/50 (the brown line in Fig. 6) distribution between YES and NO when the respondents were asked if they have contributed financially or willing to contribute for NGOs fighting GW. It is also noted that the choices were not mutually exclusive and the respondent could choose more than one answer.

For the third question, the participants could select more than one choice and it can be seen from Table 4 that most of them believe that the solution should come from a personal involvement in the issue, with 183 choices out of 224. Most of them (151 out of 224) think that National Governments should also contribute trough strengthening policies and taking the matter as serious. This shows how young Africans actually think that the solutions might come with everyone's involvement and commitment, hence a widely education and information about the issue is crucial.

As the results show, an absolute majority of young educated African students taken from 34 countries acquire information about GW in the social media and television. Using these information tools, it was recorded that 33.04% of the respondents are very familiar with the topic, 39.73% of them consider it as a known topic, 23% heard of it and just 3.57% are very unfamiliar with the topic as shown in Fig. 2. A cumulated 72% frequency of respondents consider GW topic as known or familiar, thus it can be claimed that the "GLOBAL WARMING" issue is actually known by young educated Africans. Even if the 72% rate of awareness found in this study is higher than the 63% in Nigeria found by Adio-Moses and Aladejana (2015) and the 59% in china, it is still lower than the 75% in Brazil, 91% in India or the 95% in the USA, as presented by Maibach *et al.* (2015) in their research paper. There was enough evidence to reject the two Null hypotheses at 95% level of confidence, and it can be claimed that young educated Africans do have significant knowledge on GW causes and risks, according to the sample taken from youth studying in Chinese universities. This result is actually similar to the result Adio-Moses and Aladejana (2015) got in Oyo state, Danladi *et al.* (2020) found with university students in Adamawa state Nigeria, the hypothesis discussed by Mugambiwa and Dzomonda (2018) while assessing climate change and vulnerability discourse by students at a South African University
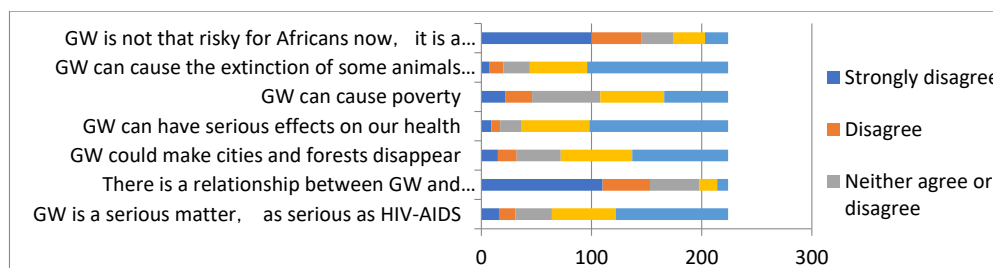
Fig. 5: Global Warming risks opinion

Table 3: Descriptive statistics results on GW risks

	Strongly disagree 1	Disagree2	Neither agree or disagree 3	Agree 4	Strongly Agree 5	Mean of agreement	*SD of agreement
Descriptive Statistics							
GW is a serious matter as serious as HIV-AIDS	16	15	33	58	102	3.96	1.232
	7.1%	6.7%	14.7%	25.9%	45.5%		
There is a relationship between GW and terrorism and insecurity in Africa	110	43	45	16	10	1.99	1.177
	49.1%	19.2%	20.1%	7.1%	4.5%		
GW could make cities and forests disappear	15	17	40	65	87	3.86	1.208
	6.7%	7.6%	17.9%	29%	38%		
GW can have serious effects on public health	9	8	19	62	126	4.29	1.037
	4%	3.6%	8.5%	27.7%	56.3%		
GW can cause poverty	22	24	62	58	58	3.47	1.256
	9.8%	10.7%	27.7%	25.9%	25.9%		
GW can cause the extinction of some animals we have in Africa	7	13	24	52	128	4.25	1.064
	3.1%	5.8%	10.7%	23.2%	57.1%		
GW is not that risky for Africans now, it is a problem to deal with later	100	45	29	29	21	2.22	1.377
	44.6%	20.1%	12.9%	12.9%	9.4%		

*SD=standard deviation

and the interviews of Afnan *et al.* (2017) with biology students in the University of Bahrain. The validation of the model and advices with more calibration and improvement can be done by validating the model using additional industrial and public data sets (HongXia and Bouba, 2020). In this survey according to cumulated frequencies on Table 2, the respondents agreed that the Carbone dioxide emitted by the industries contribute the most 82.1% to GW, whereas almost 70% of the respondents rejected the fact that Africa contributes the most to climate change. According to 83% of respondents, Climate change can have serious effects on public health and 71% of them agreed that the issue as a serious matter, even as serious as HIV-AIDS. Similarly, using cumulated frequencies on Table 3, it was found that among the

respondents, 66% disagreed that GW is not that risky for Africans now it is a problem to deal with later, which means that a number of them actually believe that as Africans, they are really concerned about the issue. Slightly more than half of the participants (51%) completely believe that GW can lead to poverty but, the biggest concern is that more than the half (68%) disagreed that there is a given relationship between GW and terrorism and insecurity in Africa whereas it is actually true. Although there are still many unknowns related to climate change, it is widely accepted that it greatly affects the cultivation of agricultural plants as well as the insect pests associated with them (Skendži´c *et al.*, 2021). The example of the tarnishing lake Chad Basin is a perfect one. As the lake has lost one twentieth of its original
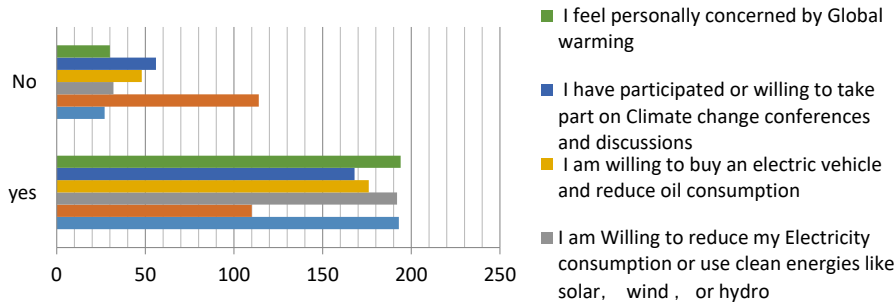
Fig. 6: Opinion on solutions to Global Warming issues

Table 4: Opinions on Global Warming Solutions (N=224)

Protagonists on GW issue	Frequency of respondents
National governments trough policies	151
International organizations controlling governments	123
NGOs through information and motivation	105
Every human being at a personal level	183

size, surrounding population is encountered with extreme poverty because they relied on fishing, agriculture and small trade around the lake, which today is nearly impossible with the space gained by the terrorist sect BOKO HARAM because of the same reasons (Yeung and Alvarado, 2019). The result on Table 5 shows that respondents feel really involved on solving the issue and are mostly committed (86%) to fight the issues through personal involvement from home. Instead, there is approximately a 50/50 distribution between YES and NO when the respondents were asked if they have contributed financially or willing to contribute for NGOs fighting GW. Here we notice that the young Africans are committed and ready to take actions, but not financially, and this might be due to the political aspects in their countries and the economies led down by corruption. This might let them think that financial support is useless. It can be also noticed that at least 85% of them have planted or willing to plant a tree and are willing to reduce their fossil energy consumption and opened to renewable energy solutions and reduce Carbone dioxide emission. Finally, participants (81%) believe that actions should be taken and 67% believe that mostly Governments at a national level should strengthen the policies on environment and bring solutions to the GW issue. To achieve this, Governments structure need actual data from surveys like as of the current research on

different levels of the society, such that a good basis will be drawn to educate the people from primary school to universities, from farms to even uneducated groups, smartly use the funds allowed by International organizations, especially give the financial operation and technical needs to NGOs that go deep in the countries, actually apply the laws directly with local communities. Global Warming and attendant climate change have been controversial for at least a decade. This is largely because of its societal implications (Keller, 2003; Shcherbak *et al.*, 2022).Today, people are aware of climate change and its impacts it has on private and working life. People see the climate change as a threat and, therefore, actions must be taken to reduce the impacts of climate change (Dombrowski *et al.*, 2016). Based on the research conducted on young Africans studying in china on GW and the author's personal observation, the following remarks can be drawn. Global Warming is a known and familiar topic for young educated Africans but other studies should be conducted in other groups of the society such as primary schools, elderly people, and even non educated farmers as not everyone has access to social media and television which are found to be the most used information tool. Young educated Africans actually have general knowledge on the causes of climate change but believe that Africa does not contribute much to it. Young educated Africans have sufficient knowledge

Table 5: Willingness and involvement on GW issue

Respondents answers	I have planted or willing to plant a tree	I have contributed financially or willing to contribute for NGOs fighting GW	I am Willing to reduce my electricity consumption or use clean energies like solar，wind or hydro	I am willing to buy an electric vehicle and reduce oil consumption	I have participated or willing to take part on Climate change conferences and discussions	I feel personally concerned by Global Warming
yes	193(86%)	110(49%)	192(85%)	176(78%)	168(75%)	194(87%)
No	31(14%)	114(51%)	32(15%)	48(22%)	56(25%)	30(13%)

on Global Warming consequences though they believe that there is not a single relationship between Global Warming and the rough poverty we have in Africa. This might be due to the wrong information advertised about eternal poverty but not about GW. Thus there is a need for education in this area to attain consciousness of all parts of the society through positive and permanent changes of behaviors and active involvement. Environment education should be a lifelong education, starting from the preschool stage to all the formal and public education stages (Sah *et al.*, 2015). Young educated Africans consider GW as a serious matter, and they are actually ready to take actions to fight it, but not willing to get in financially because of the strong belief in corruption's consequences in African countries. Young educated Africans mostly agreed that the solutions should come from all the people at a personal level, but supported by Governments through education. As per recommendations, serious, well-planned, and science-based actions are needed. Participatory adaptation is very crucial regardless of gender, race, and age. There is a need to improve site-based programs execution as an adaptation strategy, raising people's awareness and sense of responsibility as an adaptation strategy (Coracero, 2021). To reduce excessive nocturnal heat loads and increase nocturnal cooling, built environment should have adequate open and green spaces, which will enhance air circulation and less radiation absorption during the day (Makokha and Shisanya, 2010). Regional climate change prediction is more relevant for assessing impact-related temperature-controlled goals. To limit GW to well below 2°C in accord with the Paris Agreement, countries throughout the world have submitted their Intended Nationally Determined Contributions (INDCs) outlining their greenhouse gas

(GHG) mitigation actions in the next few decades (Wang *et al.*, 2018).In order to improve public health services and protect the health of population's immediate action is required to identify the crucial relation between environment and COVID-19 (Debraj and Dattatreya, 2020). Some questions are risen for reflection for academics but also for practitioners, as the problem is a global problem that should be faced by all the community (Niñerola *et al.*, 2018) ; the Kyoto Protocol and Paris agreements can succeed if and only if everyone in every country knows about the issue, how it is risky at a personal level and ready to take personal actions; and this can be done only by education, especially in Africa where the education rate is really low, so Innovative solutions must be brought forward to end this hazard once and forever (Shahzad , 2015).

CONCLUSION

Improving Africans awareness and commitment of Global Warming causes and impacts is imperative so that as individuals, families, communities, and as a developing continent, they become able to make efficient policies and preparedness for response plans that will protect their safety and security. Therefore this research attempts to assess African youth awareness and commitment to Global Warming risks using a university student's sample. As the results of this study revealed, almost all the young educated Africans were aware about Global Warming causes, risks and consequences. Though the students are actually aware of climate change issues, their attitude and commitment is still average and they believe solutions might come from everyone's involvement, from uneducated communities to government and NGOs. Therefore, there is need for practical climate change health and safety education with the

intention of improving behaviors among the most remote communities. Environment stakeholders should also have a paradigm shift from theoretical to practical education in order to improve awareness and implication for effective dissemination. Finally, multidisciplinary research, which would advertise the response plans strategies, is also needed and collaboration with developed countries that have clear paths would be imperative for a most effective action.

AUTHOR CONTRIBUTIONS

A. Bouba Oumarou performed the literature review, questionnaire design, analyzed and interpreted the data, prepared the manuscript text, and manuscript edition. HongXia Li performed the corrections, results explanations and software tutoring.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

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ABBREVIATIONS

%	Percentage
1mt eq	1 million metric tons equivalent
σ	Standard deviation
CL	Confidence Level
CO2	Carbone Dioxide
COVID-19	New coronavirus
DF	Degrees of freedom
GW	Global Warming
HIV	Human immunodeficiency virus
N	Population size
n	Sample size
NGO	Non-Governmental Organization
p-value	Probability value
X^2 calc	Calculated value of statistic in chi-square goodness of fit test
X^2 crit	Critical value of statistic in chi-square goodness of fit test
Z	Value of the statistic

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