Nigerian Journal of Health Promotion
ISSN: 0995-3895
Vol. 14, 2021

HEPRAN

Strategies for Enhancing Climate Change Knowledge, Attitude and Practices: Examining the Views of Experts

Ndubuisi Friday Ugwu
Department of Human Kinetics and Health Education, Federal University, Oye-Ekiti, Ekiti State, Nigeria
ndubuisi.ugwu@fuoye.edu.ng, +2348063586944

Ogechi Kate Onyekwere
Department of Physical and Health Education, Federal College of Education, Eha-Amufu, Enugu State, Nigeria
dronyekwerekate@gmail.com, +2348035387021

Adebolu Folajimi Adekoya
Department of Human Kinetics and Health Education, Federal University, Oye-Ekiti, Ekiti State, Nigeria
adebolu.adekoya@fuoye.edu.ng, +2348028281108

Anselm Uchenna Anibueze
Department of Guidance and Counseling, Federal University, Oye-Ekiti, Ekiti State, Nigeria
anselem.anibueze@fuoye.edu.ng, +2348069405995

Chinana Benedette Ibeneme
Department of Physical and Health Education, Federal College of Education, Eha-Amufu, Enugu State, Nigeria
cnasa8424@gmail.com, +2348066098864

Abstract
Unlike other public health challenges which humans depend on pharmaco-medical interventions as solutions, climate change (CC) is something different. Its solution requires that individuals and institutions should reduce their per capita emissions to the barest minimum, and plan to adapt to the unavoidable impacts of CC. Regrettably, studies have shown that most people have poor or lack of knowledge of the causes and health risks it portends, as well as what they need to do to mitigate it and/or adapt to its impacts. Hence, what is urgently needed is a robust capacity building programme which focuses on promoting CC knowledge, attitude and what are required to mitigate or adapt to its effects. The purpose of this study, therefore, is to examine the views of experts on the requisite strategies for building the capacities of the public on knowledge, attitude and practices relating to climate change mitigation and adaptation. Descriptive survey design was adopted for the study. Using convenience and voluntary sampling 84 experts (professors) were selected from the Departments of Geography, Geology, Science Education, Guidance and Counseling, Psychology and Human Kinetics and Health Education in public universities in South-Eastern Nigeria. A 24-item Climate Change Knowledge, Attitude and Practices Enhancement Strategies Questionnaire (CCKAPESQ) was the instrument used for data collection. The reliability of CCKAPESQ was established using Cronbach Alpha which yielded coefficient of .97. Mean and standard deviation were used for data analyses. The results show that all the outlined strategies were deemed appropriate by the experts (X >2.5). Among other things, the study recommended that the government and NGOs should quickly adopt these strategies for promoting CC knowledge, attitude, and practices among the public.
Keywords: Climate Change, Mitigation, Knowledge, Attitude, Practice, Enhancement Strategies, Public

Introduction

Climate Change (CC) stands out as the most urgent global environmental issue with widespread epidemiological implications for the earth's ecosystems. It poses alarming number of threats to public health and the stability of the ecosystems that sustain life on earth. For instance, Biello (2008) reported that bird flu, cholera, Ebola, plague and tuberculosis are just a few of the diseases likely to spread and get worse as a result of CC. The disease outbreaks are as a result of unusual downpours or droughts and rising global temperature caused by climate change (Biello, 2008; Ugwu, 2018). This change makes it easier for many infectious diseases to spread as parasites and bacteria find a more welcoming environment (Walsh, 2013). Furthermore, natural disasters, heat-related illnesses like meningitis, pest/water-borne diseases, air pollution, damage to crops and pollution of drinking water sources are all associated with CC (Physicians for Social Responsibility-PSR, 2014). Therefore, directly or indirectly, CC is already responsible for many deaths, injuries, displacements, food shortage, hunger, economic

losses, and rising cases of herders and farmers' conflict in various places across the globe (Ugwu, 2018). The World Health Organization (Weingart, Engels & Pansegrau, 2000; WHO, 2018) projected that CC will lead to about 250,000 extra deaths per year between 2030 and 2050.

Although, there are natural causes of CC, the current trend has been largely attributed to anthropogenic activities mainly the burning of fossil fuels, industrial pollution, deforestation, and land use changes (IPCC, 2007). Therefore, so long as humans continue to depend on burning of fossil, and engaging in various activities that generate greenhouse gases, CC will continue to increase in its intensity, and there is a great risk to public health, global food security, economic development, and to the natural world on which much of humans' prosperity depends (European Commission, 2014). In view of this, there have been calls for all people to, as much as possible, reduce their per capita emissions as a way of tackling the debacle (Ugwu, 2018).

The prominent setback in the fight against climate change is that majority of people across the world are still not knowledgeable of what climate change is all about (Mensa, 2019; Peters, 2020). For instance, in a study conducted to determine the knowledge, attitudes and practices on CC across different segments of the public in Antigua and Barbuda by Mings and Jeffery (2008), it was found that all the respondents (100%) of the media; 16 per cent of the schools and 24 per cent of community groups did not know the meaning of climate change or global warming, whereas 90.5 per cent of schools, 60 per cent of the media and 46.2 per cent of the financial respondents indicated that they had limited knowledge of CC. Similarly, Liarakou, Athanasiadis and Gavrilakis (2010) reported that the students gave fewer correct answers regarding causes of CC. The low knowledge level is even worse among people in sub-Saharan African countries who despite being described as the most vulnerable, are still poorly informed about it (Taderera, 2010; Oruonye, 2011; Ugwu, 2018).

Poor knowledge of CC influences people's attitude towards it as well as how they evaluate its risks. Unlike other social problems such as recession, war, terrorism, kidnapping or poverty that are more visible, easily understandable and evoke a strong emotional reaction, climate change is somewhat distant and imperceptible. The time-delayed, abstract, and often statistical nature of the risks of CC does not evoke strong visceral reactions (Weber, 2006). As a result, most people feel that CC solution are for the climate professionals (Ugwu, 2018). On the contrary, Backstrand (2003) had earlier noted that CC is no longer the exclusive domain of scientific experts, rather, it requires the actions of all people. However, until people understand the science behind climate change, they may not support political regulation or help to reduce GHG production (Conservation Media Group-CMG, 2013). Further, Sage (2014) averred that knowing what causes CC is the most powerful predictor for taking voluntary actions to reduce GHG emissions.

Therefore, as resources are being put together for CC mitigation and adaptation, there is the need for people to be educated about it (Ochieng, 2014). Hence, what is timely now is enhancing public's knowledge and attitude regarding climate change through evidence based capacity building programmes. Capacity building has been central in most international conventions on climate change as one of the strongest tools for fighting the debacle (Sanni, Adejuwon, Ologeh and Siyanbola, 2010). Furthermore, emerging studies (Ochieng 2014; Sulistyawati, Mulasari & Sukesi, 2018; Ugwu, 2018) have advocated for future studies to focus on developing capacity building programs channeled towards improving the knowledge and awareness of the whole community through and decision-makers.

Therefore, the purpose of this study was to examine the views of experts on the appropriate strategies for building the capacities of public on CC knowledge, attitude and practices relating to CC mitigation and adaptation. Specifically, the study was guided by the following research questions:

1. What are the appropriate strategies for enhancing public's knowledge of CC?
2. What are the appropriate strategies for enhancing public's attitude to CC?
3. What are the appropriate strategies for enhancing public's involvement in CC mitigation and adaptation?

Significance of the Study

This study, therefore, was designed to identify appropriate strategies for enhancing people's CC knowledge, attitude and their involvement in CC mitigation and adaptation in Nigeria. Data generated from the study will be of immense benefits to the Nigerian government and NGOs. The duo will be made to appreciate the appropriate strategies to employ in promoting CC knowledge, attitudes and practices among the public.

Literature Review

Promoting knowledge of CC among the public has been acknowledged as one of the most important ways of fighting it. In view of this, most of the previous studies on climate change awareness have concentrated on measuring people's CC knowledge, attitude, perception and environmental behaviours. Majority of the results of

these studies indicated that CC knowledge, attitude and practices among the general public were very poor. Yet, studies conducted to address these gaps remain very scanty. Therefore, in order to fill this gap as well as contribute to the body of literature, this current study seeks to identify appropriate strategies for enhancing public's CC knowledge, attitude and practice.

Strategies for enhancing CC knowledge

Strategy is human attempts to get to desirable ends with available means (McKeown, 2011). Strategy is applied in different field. For instance, in the military, strategy means tactics, maneuvering or plan employed to conquer the enemies (Julaka, 2012). For business use, strategy refers to those actions and decisions taken by a company in order to reach the goal of its business and become competitive in its industry (Indeed Career Guide, 2020). Specifically, in Health Education and Counseling, strategies are plans used to improve people's knowledge, attitude, behaviours, and practices relating to any health issue like CC. Therefore, the best way to define strategy is highly situational. In this study, we regard strategy as evidence-based educational plans, methods and activities used for enhancing public's knowledge, attitude and practice relating to climate change.

The revolution of information and communication has provided fundamental resources for enhancing knowledge and providing worthwhile experiences for all categories of learners. It has also established the foundations for a knowledge economy due to its ability to expedite the exchange of knowledge (Apagu & Wakili, 2015). Therefore, the modern day education relies heavily on electronic and digital resources like television, radio, social media (**like Zoom, Facebook, WhatsApp, twitter, e-mail, palm chat, Instagram among others)**, cinema, simulations and video materials for knowledge production and transfer. Utilization of these facilities involves different approaches including: systematized feedback system, computer-based operation/network, video conferencing, audio conferencing, internet and computer assisted instruction (Ajayi, 2008), and interactive educational programmes on social media platforms, radio and television. These strategies have been used to enhance public's knowledge on different issues. For instance, community radio has been used in Tolon-Kumbungu District of the Northern Ghana by agricultural extension agent for providing livelihood development to the community (Al-Hassan, 2011). It has also been used successfully for public enlightenment and rural development in Nepal, Bangladesh, Philippines, Canada, America, Australia and South Africa (Jo, 2003; Mannar, 2014). Furthermore, in another study by Asogwa and Oluwakemi (2018), the respondents indicated that they preferred social media, radio and television among other media for Hepatitis B awareness.

The most important ICT resource for knowledge enhancement is the internet. Internet seems to have answer to every educational and research questions. People may not have to travel to distances in order to get materials for their studies since they can have access to climate change information through Wikipedia, Google, Firefox, Internet Explorer and other search engines as well as websites of climate change international organizations like United Nations Environmental Programme (UNEP), Intergovernmental Panel on Climate Change (IPCC), United Nation Framework Convention on Climate Change (UNFCCC), World Meteorological Organization (WMO), and World Health Organization (WHO) among others. Therefore, appropriate use of information and communication technology (ICT) can be of tremendous assistance in enhancing climate change knowledge among the members of public.

The use of printed and duplicated materials can be helpful in promoting CC knowledge among the members of the public. For instance, textbooks house a great deal of information in one place and are logically organized and easy to learn from (**Carpenter, Bullock & Potter, 2006). Reading books** is an excellent way to promote knowledge and those that read have higher GPA, higher intelligence, and more general knowledge than those who do not (LifeDev, 2014). By reading **books**, learners can understand the past, present and future and can help in solving many human problems (The Asian School, 2020). Print media has an important role to play in stimulating the vulnerable communities, donor agencies and African governments in pulling resources that will help to reduce the effects of CC (Ugwu, 2018). Therefore, if climate change books, magazines, newsletters, periodicals among others are made available for the public at free or reduced price, their climate change knowledge would improve especially when it is combined with conferences, workshops or seminars.

Attending conferences, workshops or seminars are another way of improving knowledge and acquiring skills needed for fighting CC. They provide opportunity for participants to benefit from combined lectures of experts in addition to wide range networking with other participants. Specifically, c**onferences grow one's professional network, build one's knowledge base and expand one's resources (**Rahim, 2013). On the other hand, **workshop helps the** participants to gain hands-on experience and rapidly acquire knowledge in advanced research topics where curriculum-based education is yet to be developed (Fatumo, Shome & Macintyre, 2014). The authors further indicated that workshops provide insight into diverse topics and motivate participants to explore new areas. Therefore, workshop enhances understanding of how CC affects the biodiversity and the role

that biodiversity and ecosystem services can play in supporting climate change adaptation (Conservation Leadership Programme, 2021). Previous studies like Oruonye (2008), Ochieng (2014) and Ugwu (2018) have consistently recommended climate change workshops for people to improve their knowledge of CC. Seminars, on the other hand, can also be used to enhance public's knowledge on climate change. In addition, seminars are particularly effective for those who want to expand their knowledge or brush up on or learn new skills. Williams (1997) reported that seminars can be used to fill gaps in our knowledge allowing participants to focus only on the particular skills or knowledge needed. **Therefore, if people attend climate change seminars, their knowledge of the subject will increase.**

Climate change education (CCE) is another strategy for promoting CC knowledge among the public. CCE is an educational programme that helps learners to understand the causes and consequences of climate change, prepares them to live with the impacts of climate change and empowers learners to take appropriate actions to adopt more sustainable lifestyles (UNESCO, 2015).

Strategies for enhancing CC attitude and practices

The foregoing has dwelt on the knowledge-enhancing strategies. They may also play important roles in improving attitudes and practices relating to climate change. Historically, behaviour change interventions have relied on large-scale information campaigns (Bartram, 2009). These campaigns were based on the belief that people simply need to be educated about an issue in order to bring about behaviour change. However, Bartram noted that it became apparent that while educating people about an issue might improve knowledge, it was not sufficient to achieve actual changes in behaviour. This is not to suggest that information has no role to play, however, studies have shown that when used in combination with other behaviour change tools, information in itself becomes more effective (Cooper & Meiklejohn, 2003). As such, strategies for attitude and behaviour change have now turned towards the use of more targeted psychological tools which are classified as prompts, norm appeals, commitment, feedback or incentives. This classification system was based on previous studies of behaviour change strategies like McKenzie-Mohr (2008).

Prompts can be described as anything that serves as a reminder to perform or abstain from certain practices. They are visual or auditory aids which remind us to carry out an activity that we might otherwise forget (McKenzie-Mohr, 2008). Prompts can take a variety of forms including signs, posters, stickers, clock alarms or even flyers (Ugwu, 2018). Bartram (2009) noted that prompt is one of the simplest intervention strategies to enhance environmental behaviours (practices). This, according the author, is because unlike other strategies which aim to change attitudes or motivation, the purpose of the prompt is to remind a person to do something they were already disposed to do. The author further indicated that prompts attempt to overcome the barrier of habit of forgetfulness. For instance, people often simply forget to do a lot of environmentally sustainable things such as turning off lights when they are not in use thereby saving energy, turning off the car engine in the traffic or re-using material instead of burning them. But with prompts, such good environmental practices can be sustained in the individuals. Instance of this can been found in a study conducted by Austin, Hatfield, Grindle and Bailey (1993) on the effects of prompts placed above recycling bins on the recycling behaviour of staff and students in two academic departments at a US University. Result showed that respondents' recycling behaviour increased from 51 per cent at baseline to 84 per cent once the prompts were in place. However, for prompts to be more effective, they should be bright and noticeable and located as close as possible to where the relevant behaviour is carried out (Winefield, 2005). Ultimately, prompts are probably best used in combination with other strategies like norm appeal.

Norm appeal implies how individuals tend to conform to the majority, even when the practices of the majority are blatantly incorrect. More recently, this tendency to rely on social norms to determine behaviour has begun to be exploited in behaviour change interventions, either by modeling of the desired behaviour by research assistants, or by enlisting the aid of key community members to model the desired behaviours for their neighbours (Bartram, 2009). Gladwell (2000) suggests that to move an idea to the tipping point, the point where social norms change and social transformations occur, requires people who are well-connected ('connectors'), well-informed ('mavens'), and those who are good at communicating and persuading ('salesmen'). Therefore, this strategy means that a facilitator or teachers who are influential in their schools can be used to model positive environmental practices so that other teachers and students can copy them. This strategy was tested by Aronson (1990) who demonstrated the effectiveness of social modelling on encouraging university students to use less water when showering at the gymnasium. An undergraduate was used to model the appropriate behaviour. A second student was then found to comply.

Another strategy for promoting positive practices relating to climate change is commitment. Commitment means pledges people make towards certain practices. Commitment can cause people to change their

attitudes to behaviours they are committed to (Winefield, 2005). For instance, joining the campaign opposing burning of materials tells the campaigner that he/she should support recycling or reuse of materials (Ugwu, 2018). As a result, this person would not want to engage in anti-environmental behaviours like installing incinerator. Bartram (2009) observed that commitments have the potential to influence both behavioural and attitudinal change, and seem to have long lasting effects. This, according to the author, is because people value consistency between what they say and what they do. When people do something which is inconsistent with their prior actions or beliefs, they may likely experience what Leon (1957) described as "cognitive dissonance", which is a state of discomfort. Therefore, they will take steps to reduce this either by changing their behaviour or their attitudes. This is most likely to happen if the commitment is elicited without much pressure, and the individual feels that he/she has freedom to act differently. They then feel responsible for the consequences of their behaviour and can become their own best persuader. Previous researchers have used this strategy to influence people's attitudes and practices. For instance, Commitments were also used successfully to encourage participation in a curbside recycling trial in New Zealand (Bryce, 2008). All households involved in the trial received a letter two weeks before the first collection explaining the trial. A week later, recycling bins were delivered as well as kits containing information and stickers. In addition, some of the households were asked for a verbal commitment to participate in the trial. Both of the commitment groups were found to recycle significantly more than the kit only group.

In addition to commitment, another consistently reported strategy for enhancing eco-friendly attitudes and practices is feedback. When one receives feedback about a particular behaviour, one will likely repeat or stop the behaviour depending on the nature of feedback one gets. Bartram (2009) noted that feedback about performance is a commonly used intervention tool, particularly in interventions focusing on energy conservation, where people find it difficult to monitor their own energy usage. However, it can easily be applied to a variety of settings where some sort of progress or behaviour can be reported on. It can simply be numeric data, or it can be more qualitative, such as a simple "Congratulations". Previous studies like Aitken, McMahon, Wearing and Finlayson (1994) have tested the efficacy of this strategy. The authors investigated whether feedback was able to help reduce residential water consumption. Households were divided into three treatment groups: (i) feedback only, (ii) feedback and dissonance (pointing out discrepancies in their stated attitude and their actual behaviour) and (iii) control group. Results indicated that both of the feedback conditions were effective in getting high consumers of water in particular to significantly reduce their water consumption during the treatment period.

Another way of promoting people's environmental attitudes and practices is through incentives. Incentives are financial or other inducements which are offered to motivate people to undertake an activity they would not have otherwise done, or to encourage them to undertake that activity more frequently. Incentives can be used to encourage people to engage in mitigation practices and other ecological behaviours. Bartram (2009) noted emphatically that incentives can be more effective than education campaigns to change behaviour. They can be successfully used to encourage one-off behaviours, such as agreeing to participate in a program, complete a survey (Roberts, Roberts, Sibbald & Torgerson, 2000), or even make a commitment to behaviour change (Boyce & Geller, 2001). Therefore, incentives can also be more valuable if they help to overcome specific barriers to performing a targeted behaviour (Cooper & Mieklejohn, 2003). While incentives may have some effect on behaviour change, overall they do not appear to be one of the better tools to use in behaviour change interventions. This is particularly because studies have repeatedly shown that incentives have little to no long-term positive effect on behaviour once they are removed (Sutherland Shire Council, 2004; Ashfield-Watt, 2005). Incentives need to be used very carefully as they may override intrinsic motivation if they are particularly large (Curry, Wagner & Grothaus, 1991), but may not actually motivate people sufficiently to complete a trial if too small (Sutherland Shire Council, 2004; Cooper & Meiklejohn, 2003). Care should also be taken to choose an incentive which will attract the correct group of people.

The above literature revealed different strategies for enhancing people's CC knowledge, attitude and practices. Although, these strategies have been deemed effective in other climes, the current study seeks to examine how appropriate it would be in Nigeria situation based on the judgement of the experts.

Methods

This study adopted descriptive research design. This design is concerned with the collection of data for the purpose of describing and interpreting existing conditions, prevailing practices, beliefs and attitudes (Akinsolu, 2010). Therefore, this design was adopted to enable the researchers ascertain the opinions of experts on the subject and to describe then accordingly.

The study population consisted of professors in the Departments of Geography, Geology, Science Education, Guidance and Counseling, Psychology and Human Kinetics and Health Education in public universities in South-Eastern Nigeria. Convenience and voluntary sampling techniques were used to select 84 professors as

the respondents for the study. It was the belief of the present researchers that given the professional backgrounds and years of experience of the respondents, they should be able to provide essential information on strategies for enhancing people's knowledge, attitude and practices relating to CC.

The instrument for data collection was a 24-item Climate Change Knowledge, Attitude and Practices Enhancement Strategies Questionnaire (CCKAPESQ) designed by the present researchers with a cue from extensive review of literature. The CCKAPESQ was meant to find out the level of appropriateness or inappropriateness of the listed strategies. The respondents were to tick "Very Appropriate (VA)", "Appropriate (A)", "Inappropriate (I)", or "Very Inappropriate (VI)" to indicate the level to which they were appropriate or inappropriate. The face validity of the CCKAPESQ was established by giving the draft copy of the instrument, the specific purposes, the research questions and the hypotheses of the study to one senior lecturer each from the Departments of Human Kinetics and Health Education, Geology, Statistics, Geography, and an expert in Science Education (Measurement and Evaluation Unit) of the University of Nigeria, Nsukka. The internal consistency of the CCKAPESQ was established using Cronbach Alpha which yielded reliability coefficient of .78.

A permission letter was obtained by the researchers from the Research and Ethics Committee of the Department of Human Kinetics and Health Education, Federal University, Oye-Ekiti, Ekiti State, (Reference: FUOYE/HKHE/REC/220). The letter was taken to the departments needed for the study to enable the researchers request for official contacts (e-mail and phone numbers) of the would-be participants. While doing this, extreme care was taken to observe COVID-19 prevention protocols. Participants selected were those who could effectively use e-mail, Telegram or WhatsApp. Of the 137 experts who met this criterion, only 84 were willing to participate. Therefore, the Google Forms link was transmitted to the consented respondents through e-mail, Telegram or WhatsApp.

There was 100% return rate as the respondents were followed up with text messages and calls. The raw data were extracted from Google Forms and entered in SPSS version 11.0. The mean was used to analyze the data. The higher the aggregate scores in the four-point Likert scale, the more the appropriateness of the strategy and vice versa. Values 4, 3, 2, 1, were assigned to "VA", "A", "I" and "VI" respectively for the items in the questionnaire. The Criterion Mean of 2.50 was the basis for decision making. Where the mean score was equal to or greater than the Criterion Mean value, it was concluded that the strategy was appropriate, and where the mean score was less than the Criterion Mean value, the strategy will be regarded inappropriate.

Results

This descriptive study examined the views of experts on the appropriateness of outlined strategies for building the capacity of householders in the era of climate change. The findings are presented and discussed below according to the research questions.

Table 1: Socio-demographic Characteristics of Participants (n=84)

S/N	Characteristics	F (%)
1	**GENDER**	
	Male	58 (52.9)
	Female	26 (47.1)
2	**UNIVERSITY TYPE**	
	State University	51 (58.7)
	Federal University	33 (41.3)

Table 1 presented the socio-demographic characteristics of the participants. A total of 84 participants met the stipulated criteria and participated in the study. There were 58 (52.9%) males and 26 (47.1%) females. 51 (58.7) participants were from State Universities whereas 33 (41.3%) were in Federal Universities.

Table 2: Responses of Experts on the Appropriateness of Strategies Outlined for Enhancing Climate Change Knowledge among the Public (n=84)

S/N	Items	$(\bar{X})$	SD	Dec
1	Provision of affordable or free climate change text books/ journals/ periodical/ posters/newsletters/magazine/ encyclopaedia/newspapers.	3.50	.83	A

2	Radio broadcasts, records, cinema, motion pictures, television, videotape, and public address system.	3.60	.51	A
3	Lectures, debates, discussions and essays on climate change.	3.70	.67	A
4	Organizing climate change conferences, workshops and seminar for the public.	3.60	.83	A
5	The use of social media like WhatsApp, Facebook group, You Tube, twitter, WeChat, Instagram and others	3.30	.79	A
6	The use of church, mosque tradition institutions, hospitals and other social centres.	3.40	.69	A
7	Making climate change part of curricular of all disciplines across all levels of education	3.70	.59	A
	Cluster $\bar{X}$	**3.54**	**.70**	**A**

Key: NA= Not Appropriate; A= Appropriate.

Data contained in table 2 show that all the suggested strategies for enhancement of climate change knowledge among the public were adjudged appropriate. The cluster mean (3.5) was above the Criterion Mean value of 2.50. This implies that the experts deemed the strategies appropriate for enhancing CC knowledge among the public.

Table 3: Responses of Experts on the Appropriateness of Strategies for Enhancing Climate Change Attitude among the Public (n=84)

S/N	Items	($\bar{X}$)	SD	Dec
8	The use horrible pictures and videos (like Doom's day) to display the real effects of climate change to the public.	3.00	1.03	A
9	The use of resource person(s) to enlighten the public on the realities, dynamics, and the effects of climate change.	3.6	.61	A
10	The use of bill board displaying damages already caused by climate change elsewhere.	3.40	.60	A
11	Video, cinema and TV broadcast to regularly show teachers what is happening in a climate change-torn areas.	3.50	.51	A
12	Constant sharing of tracts and hand bills that shows the horrible nature of climate change to the public.	3.40	.75	A
13	The use of INCENTIVES/REINFORCEMENT: punishing environmental offenders and praising or paying the compliants.	3.30	.72	A
14	The use of NORM APPEAL: Modeling of desired environmental behaviour by a key person in the society for teachers to emulate.	3.40	.70	A
15	The use of COMMITMENT: where a teacher or teachers is/are assigned task to preach about climate change mitigation. Because of such commitment, the teacher(s) will be forced to withdraw from anti-environmental practices as they try to do what they preach.	3.40	.70	A
16	The use of PROMPTS like sticker, alarm etc to continually remind the teachers of environmentally practices	3.40	.70	A
	Cluster $\bar{X}$	**3.40**	**.70**	**A**

Table 3 shows that overall, the value of the cluster mean ($\bar{X}$ = 3.40; SD =.70) was greater than the Criterion Mean value of 2.50 implying that all the strategies were adjudged appropriate for enhancing the public's attitude to climate change. Specifically, prompts ($\bar{X}$ = 3.40; SD =.70), Norm Appeal ($\bar{X}$ = 3.40; SD =.70), Commitment ($\bar{X}$ = 3.40; SD =.70), and Incentive ($\bar{X}$ = 3.30; SD =.70) were all adjudged appropriate for enhancing CC attitude of the public.

Table 4: Responses of Experts on the Appropriateness of Strategies for Enhancing Involvement in Climate Change Mitigation and Adaptation among the Public (n=84)

S/N	Items	($\bar{X}$)	SD	Dec
17	The use of prompt: stickers, warning signs, fliers, posters, bill boards, clock alarms among others which remind the public what they need to know and/or do prevent or adapt to the effects climate change.	3.50	.69	A

18	The use of Norm Appeal: modeling of desired environmental behaviours by a key person in the society for them to emulate	3.0	.89	A
19	The use of Commitment: Promises or engagement people make towards certain environmental practices.	3.10	.79	A
20	The use of incentive where people will be rewarded for engaging in mitigation and adaptation practices.	3.0	.79	A
21	Institution of emission control task force and fines to enforce compliance to environmental laws.	3.60	.60	A
22	Placing tax on the use fume-producing machine like vehicles, motorcycles etc to discourage its constant use	3.40	.82	A
23	The use of discussion board/panel where experts discuss mitigation and adaptation to climate change and the members of the public become audience.	3.50	.83	A
24	The use of Cooperative Learning where people gather in group to learn together and ask each other questions about climate change.	3.50	.83	A
	Cluster $\bar{X}$	**3.33**	**.78**	**A**

Table 4 shows that overall, the value of the cluster mean ($\bar{X}$ = 3.40; SD =.70) was greater than the Criterion Mean value of 2.50 implying that all the strategies were adjudged appropriate for enhancing the public's involvement in climate change mitigation and adaptation. Specifically, the use of emission control task force (3.60; SD = .60) had the highest mean value. Prompts ($\bar{X}$ = 3.50; SD =.69), Norm Appeal ($\bar{X}$ = 3.0; SD =.89), Commitment ($\bar{X}$ = 3.40; SD =.70), and Incentives ($\bar{X}$ = 3.30; SD =.70) were all adjudged appropriate for enhancing public's Involvement

Discussion

Strategies for enhancing knowledge of climate change

Table 2 addressed the research question 1 which sought answer for strategies that can be used to enhance climate change knowledge. The overall mean response was 3.54 with standard deviation of .70 which is above the criterion mean of 2.5. This implies that all the enhancement strategies were adjudged appropriate for promoting CC knowledge. This finding falls in line with previous findings on the appropriateness of these enhancement tools. Carpenter, Bullock, and Potter (2006) found that textbooks are effective in enhancing knowledge in that they house a great deal of information in one place which are logically organized and easy to learn from. To LifeDev (2014), reading text books is an excellent way to improve knowledge and to get to where one wants to go. This implies that reading CC books is a way of promoting its knowledge. Findings also supported that ways of enhancing knowledge are through seminars, conferences and workshops. For instance, Williams (1997) reported that seminars can be used to fill gaps in our knowledge. Rahim (2013) found that conferences grow one's professional network, builds one's knowledge base and expand one's resources. Workshops are a great way for participants to gain hands-on experience and rapidly acquire knowledge in advanced research topics (like climate change) where curriculum-based education is yet to be developed (Fatumo, Shome & Macintyre, 2014). Newhouse (2009) reported that knowledge and understanding are better enhanced through the use of images (bill board, tracts, sign post among others). The use of audio/visual materials like radio, public address system, cinema, video record and simulations are very effective in enhancing knowledge (Edwin, 2013).

Strategies for enhancing positive attitude towards climate change

Table 3 presented responses of experts on the appropriate strategies for enhancing CC attitude among the public. The table shows that overall, the value of the cluster mean ($\bar{X}$ = 3.40; SD =.70) was greater than the Criterion Mean value of 2.50 implying that all the strategies were adjudged appropriate for enhancing the public's attitude to climate change. Specifically, prompts ($\bar{X}$ = 3.40; SD =.70), Norm Appeal ($\bar{X}$ = 3.40; SD =.70), Commitment ($\bar{X}$ = 3.40; SD =.70), Incentive ($\bar{X}$ = 3.30; SD =.70) among others were all adjudged appropriate for enhancing CC attitude of the public. This finding is in line with previous findings. For instance, studies have shown that prompts are very effective in enhancing positive attitude towards: recycling (Austin, Hatfield, Grindle & Bailey, 1993), littering (Houghton, 1993), energy conservation (Luyben, 2001). It then follows that these strategies if adopted, will enhance the public's attitude towards CC.

Strategies for promoting involvement in CC mitigation and adaptation

Table 4 answered the research question 3 which sought answer for strategies that can be used to enhance climate change knowledge. The overall mean response is 3.33 which is above the criterion mean of 2.5, implying that all the strategies were adjudged appropriate for promoting public's involvement in CC mitigation and adaptation. The use of task force and fines has the greatest mean value ($\overline{X}$ = 3.6). This particularly in line with Ugwu (2018) who asserted that in Nigeria, people would not voluntarily reduce their per capita emission until they are forced or fined. Other strategies have also been reported as appropriate for enhancing environmental behaviours. For instance, McKenzie-Mohr (2001) found that prompts and commitments were appropriate for reducing car engine idling at school and bus drop off/pick up zones in Toronto. In combination of commitment and feedback, Winefield (2005) found that they were very effective in promoting environmentally responsible behaviours. Norm appeal was also shown to be very appropriate in encouraging environmental behaviour like reusing of towel (Goldstein, Cialdini & Griskevicius, 2008). Bryce (2008), commitment as a tool was shown to be appropriate in enhancing recycling behaviour.

Incentives have also been reported to be effective in promoting environmental behaviours (Roberts, Roberts, Sibbald & Torgerson, 2000; Cooper & Mieklejohn, 2003). On the contrary, other researchers argue that incentives need to be used very carefully as they may override intrinsic motivation if they are particularly large (Curry, Wagner & Grothaus, 1991), but may not actually motivate people sufficiently to complete a trial if too small (Sutherland Shire Council, 2004; Cooper & Meiklejohn, 2003). Finally, Ugwu (2018) reported that discussion panel and cooperative learning are good ways of encouraging people to get involved in CC mitigation and adaptation.

Conclusion

The world is already experiencing the effects of CC, and if humans fail to take a massive action against it, the consequences will be worse in the near future. Regrettably, the major setback in the fight against climate change is lack of its knowledge by the members of the public. Until people are made to understand what CC is and its health consequences, they may not be prompted to reduce their per capita emission nor support regulation against it. In this study, we tried to examine the thoughts of the experts on the appropriate strategies for enhancing climate change knowledge, attitude and involvement in its mitigation and adaptation. Norm appeal, feedback, incentives, prompts, cooperative learning, panel discussion, radio/television broadcast, making CC books free or cheap, as well as organizing climate change conferences and seminars were the major appropriate strategies identified.

Recommendations

Based on the findings made and conclusion drawn, the researchers recommend that the policy makers should adopt and implement these strategies. It is our hope that these strategies, when adopted and implemented, would awaken the communities on the looming dangers of CC, thereby, enabling them to consider possible ways of getting involved towards addressing the debacle. We do not claim that these strategies are the only solution to CC but we are certain that enhancing people' knowledge of how the global climate is changing and how those changes may affect human health can build people's attitude in wanting to get involved in CC mitigation and adaptation.

References

Al-Hassan, O. (2011). The Role of Community Radio in Livelihood Improvement: The Case of Simli Radio. *The Journal of Field Actions Science Reports 5.*

Apagu, V. V., & Wakili, B. A. (2015). Availability and utilization of ICT facilities for teaching and Learning of Vocational and Technical Education in Yobe State Technical Colleges. *American Journal of Engineering Research, 4*(2), 113-118.

Asogwa, C. E., & Oluwakemi, S. (2018). Media public enlightenment campaign and awareness of Hepatitis B in Lokoja Metropolis of Kogi State; Nigeria. *The Social Sciences,* 13, 948-955. DOI: 10.36478/sscience.2018.948.955.

Backstrand, K. (2003). Civic science for sustainability: Reframing the role of experts, policy-makers and citizens in environmental governance. *Global Environmental Politics 3*, 24–41.

Biello, D. (2008). *Deadly by the dozen: 12 diseases climate change may worsen*. Retrieved from http://www.scientificamerican.com/article/twelve-diseases-climate-change-may-make-worse/.

Burke-Garcia, A., & Scally, G. (2014). Trending now: Future directions in digital media for the public health sector. *Journal of public health (Oxford, England)*, *36*(4), 527–534.

Cho, R. (2018). *How climate change will alter our food.* Retrieved from https://blogs.ei.columbia.edu /2018/07/25/climate-change-food-agriculture/.

Conservation Leadership Programme (2021). *Climate change workshop*. Retrieved from https://www.conservationleadershipprogramme.org/training/local-training-courses/climate-change-workshop/#:~:text=The%20climate%20change% 20workshop%20aims,in%20supporting%20climate%20change%20adaptation.

Ebi, K. L., Kovats, R. S., Menne, B. (2006). An approach for assessing human health vulnerability and public health interventions to adapt to climate change. *Environmental Health Perspective, 114*(12),1930-1934.

European Commission (2014). *Adaptation to climate change.* Retrieved from ec.europa.eu/clima/policies/adaptation.

Indeed Career Guide (2020). *10 Business strategy examples*. Retrieved from https://www.indeed.com/career-advice/career-development/business-strategy-examples.

IPCC (2007). *Summary for policymakers: Mitigation in the short and medium term (until 2030).* The IPCC 4th Assessment Report of Working Group 3.

Jo, T. (2003). Promise of Citizens Media-Lessons from Community Media in Australia and South Africa. *Economic and Political Weekly*, xxxviii: 2183-2187.

Koomson, E. (2013). *Using radio and television media to fight climate change: Echoes from Ghana.* Retrieved from http://oasis.col.org/handle/11599/1990.

Liarakou, G., Athanasiadis, I., & Gavrilakis, C. (2010). *What Greek secondary school students believe about climate change?* Retrieved from http://files.eric.ed.gov/fulltext/EJ930283.pdf.

Luber, G., Knowlton, K., Balbus, J., Frumkin, H., Hayden, M., Hess, J., McGeehin, M., Sheats, N., Backer, L., Beard, C. B., Ebi, K. L., Maibach, E., Ostfeld, R. S., Wiedinmyer, C., Zielinski-Gutiérrez, E., & Ziska, L. (2014). *Ch. 9: Human Health. Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 220-256. doi:10.7930/J0PN93H5.

Mannar, I. S. (2014). Communicating climate change using community radios. *Journal of Biodiversity, Bioprospecting and Development, 1*(1), 114, DOI: 10.4172/2376- 0214.1000114

McGeehin, M. A., & Mirabelli, M. (2001). The potential impacts of climate variability and change on temperature-related morbidity and mortality in the United States. *Environmental Health Perspectives, 109*(2), 185-189.

Menne, B., & Ebi, K. (2006). *Climate change and adaptation strategies for human health.* Darmstadt, Germany: Steinkopff Verlag.

Mings, L., & Jeffery, H. (2008). *Determination of public knowledge, attitudes and practices on climate change issues in Antigua and Barbuda*. Retrieved from http://gefantigua.org/wp-content/uploads/2010/Determination-of-Knowledge-Attitudes-and-Practices-on-Climate-Change-Issues-in-Antigua-and-Barbuda..pdf.

Ochieng, M. A. (2014). *Climate change awareness and policy implications among primary school teachers in Kisumu City*, Kenya. A thesis submitted in partial fulfilment of requirements for the Degree of Master of Environmental Studies (climate change and sustainability) in the school of environmental studies of Kenyatta University.

Oruonye, E. D. (2011). *An assessment of the level of awareness of the effects of climate change among students of tertiary institutions in Jalingo Metropolis, Taraba State Nigeria.* Retrieved from http://www.academicjournals.org/jgrp/PDF/pdf2011/4th%20Sep/Oruonye .pdf.

Pandve, H. T., Chawla, P. S., Fernandez, K., Singru, S. A., Khismatrao, D., & Pawar, S. (2011). Assessment of awareness regarding climate change in an urban community. *Indian Journal of Occupational and Environmental Medicine*, *15*(3), 109–112.

Pew Research Centre (2006). *No global warming alarm in the U.S., China*. Washington, D.C.: The Pew Research Centre for the People & the Press.

Physicians for Social Responsibility-PSR (2014). *Climate change is a threat to health.* Retrieved from http://www.psr.org/environment-and-health/climate-change/.

Sage Publications (2014). *In what sense does the public need to understand global climate change?* Retrieved from m.pus.sagepub.com/content/93/205.abstract.

Saina, C. K., Murgor, D. K., & Murgor, F, A. C. (2013). *Climate change and food security.* Retrieved from https://www.intechopen.com/books/environmental-change-and-sustainability/climate-change-and-food-security.

Sanni, M., Adejuwon, J. O., Ologeh, I., & Siyanbola, W. O. (2010). Path to the future from climate change education. In W.L. Filho (ed.), *Universities and Climate Change,* 21-30. Verlag Berlin Heidelberg: Springer.

Schäfer, M. S., Ivanova, A., & Schmidt, A. (2014). What drives media attention for climate change? Explaining issue attention in Australian, German and Indian print media from 1996 to 2010. *International Communication Gazette*, *76*(2), 152–176. Doi: https://doi.org/10.1177/1748048513504169.

Storch, H. (2009). Climate research and policy advice: Scientific and cultural constructions of knowledge. *Environmental Science & Policy ,12*(7), 741–747. DOI: https://doi.org/ 10.1016/j.envsci.2009.04.008.

Sulistyawati, S., Mulasari, A. S., & Sukesi, T. W. (2018). Assessment of knowledge regarding climate change and health among adolescents in Yogyakarta, Indonesia. *Journal of Environmental and Public Health.* Doi: https://doi.org/10.1155/2018/9716831

Taderera, D. (2010). South African's Awareness of Climate Change. *Briefing Paper No. 235.* Cape Town, S.A: The Catholic Parliamentary Liason Office.

Tairo, A. (2020). *Print media awareness campaign on impacts of climate change in Africa.* Retrieved from http://www.iipt.org/IIPT%20Book/articles/updated_articles/Apolinary% 20Pius%20Tairo.Media%20Awareness%20Campaign2.pdf.

Ugwu, N. F. (2018). Climate change knowledge, attitudes, mitigation practices and enhancement strategies among secondary school teachers in Enugu state. An unpublished PhD thesis, University of Nigeria Nsukka.

UNESCO (2015). *Not Just Hot Air: Putting Climate Change Education into Practice (PDF).* Paris: UNESCO

United Nations Development Programme (2007). *Fighting climate change: Human solidarity in a divided world.* New York: UNDP.

United States Environmental Protection Agency [USEPA] (2017). Climate impacts on human health. Retrieved from https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-human-health_.html#ref2.

USGCRP (2009). Global Climate Change Impacts in the United States. Karl, T.R., J.M. Melillo, and T.C. Peterson (eds.). *United States Global Change Research Program.* New York: Cambridge University Press.

USGCRP (2016). *Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. Crimmins, A., J. Balbus, J. L. Gamble, C. B. Beard, J. E. Bell, D. Dodgen, R. J. Eisen, N. Fann, M. D. Hawkins, S. C. Herring, L. Jantarasami, D. M. Mills, S. Saha, M. C. Sarofim, J. Trtanj, & L. Ziska, (Eds), 312 pp. Washington, DC.: U.S. Global Change Research Program. Doi: dx.doi.org/10.7930/J0R49NQX.

Walsh, B. (2013). *Infectious disease could become more common in a warmer world -especially for plants and animals.* Retrieved from http://science.time.com/2013/08/02/infectious-disease-could-be-more-common-in-a-warmer-world-especially-for-plants-and-animals/.

Weingart, P., Engels, A., & Pansegrau, P. (2000). Risks of communication: discourses on climate change in science, politics and the mass media. *Public Understanding of Science, 9*(3), 261–283. DOI: https://doi.org/10.1088/0963-6625/9/3/304.

Westerling, A. L., Hidalgo, H. G., Cayan, D. R., & Swetnam, T. W. (2006). Warming and earlier spring increase western U.S. forest wildfire activity. *Science, 313*(5789), 940-943

WHO (2018). *Climate change and health.* Retrieved from https://www.who.int/news-room/fact-sheets/detail/climate-change-and health#:~:text=Nevertheless%2C%20a%20WHO%20a ssessme nt%2C%20taking,to%20heat%20exposure%20in%20elderly.