Assessment of knowledge and awareness of global warming among inhabitants of industrial areas of an urban community in a developing country.

Ruth Ochanya Adio-Moses
Department of Human Kinetics and Health Education
University of Ibadan, Nigeria

Aladejana J. A.
Department of Geology
University of Ibadan, Nigeria

Key words:
Knowledge, global warming, environment, greenhouse effect, atmosphere,

Abstract

*Global warming with its attendant consequences such as extreme heat, natural disasters, poor air quality and **allergens** has increased health problems**.** The risk of injury, illness and resulting death among the inhabitants are expected to be frequent and intense especially in areas with heavy industrial presence. The current low level of literacy and the socio-economic situation of Nigerians could responsible for their low consciousness of this unpreventable changes in our climate in one hand and lack of willingness on the part of people to seek environmental health and safety information on the causes and effect of global warming on the other hand. This study focuses on assessment of knowledge and awareness of causes, effects and mitigating measures of global warming among inhabitants of industrial areas of Ibadan southwestern Nigeria. Descriptive survey research design was employed and purposive sampling technique was used to select 200 respondents from among the inhabitants of this area. A questionnaire with reliability co-efficient (r) of 0.78 was used as instrument for data collection. Two research questions were answered and three hypotheses tested at 0.05 level of significance. Statistical methods such as Chi-square, frequency count, simple percentage and pie chart were employed for data analysis. All the three hypotheses were rejected. Consequently, it was deduced that respondents have significant knowledge of global warming. In recommendation, people's environmental health seeking behaviour should be promoted through multidisciplinary and interdisciplinary research and the development of inclusive environmental health and safety intervention strategies.*

Introduction

Global Warming is the increase in the average temperature of the Earth's surface, air and oceans. It is a global phenomenon that has the potential to adversely affect human lives if corrective measures are not taken. Global Warming occurs when Green House Gases in the atmosphere like, carbon dioxide, methane, and nitrogen oxide are increased. Human activities such as exhaust from automobile and industrial combustion engine, gas flaring during hydrocarbon refinery and deforestation and overgrazing with resulting desertification are some of the main causes for increases in greenhouse gases (Oshuntokun, 2003).

When any of these happen it releases carbon dioxide into the atmosphere (Titus, 2000). In global warming, the increase in average temperature of the earth's atmosphere is especially sustained and great enough to cause changes in the global climate' (Peterson and Vose, 2007). The term global warming is also synonymous with enhanced greenhouse effect, leading to entrapment of more and more solar radiations, and thus increasing the overall temperature of the earth (Still, Foster & Schneider, 2009).

It is undisputed that the average temperature at the surface of the earth has increased over the past century by about 1°F (0.6°C), with both the air and the oceans warming up (National Climatic Data Center (NCDC), 2004). Since 1880, when people in many locations first began to keep temperature records, the 25 warmest years have all occurred within the last 28 years (Karl, 2008). While it has not yet been precisely determined how much of the recent warming was caused by human activities, the consensus among climate scientists is that most of the warming over the past 50

years was probably caused by human-produced greenhouse gases (IPCC. 2001). Indeed as the global temperature becomes hotter, heat waves will become regular, more severe, and persistent.

The Physicians for Social Responsibility (2015) warned that unless greenhouse gas emissions are reduced, temperatures are projected to increase by an additional 2 to 11.5 degrees Fahrenheit by 2100. They further explained that already, rising temperatures have disrupted climate patterns around the world, resulting in more frequent intense storms and more intense heat waves. They also asserted that though heat waves normally affect broad geographic regions and resident populations, certain groups are particularly vulnerable. The very old and the very young tend to have reduced heat-regulating mechanisms and are at increased risk. The poor, the socially isolated, and those already suffering from chronic illness also are likely to be disproportionately affected by an increase in heat wave frequency and severity." heat cramps, heat syncope (fainting), heat exhaustion heatstroke

In addition they also stressed that air pollution-related health impacts exacerbated by global warming are airborne allergens like pollen, higher occurrence and severity of asthma, aggravated chronic respiratory and cardiovascular disease, damaged lung tissue and premature death. Emergence of new diseases (30 previously unknown diseases since 1976), resurgence and/or redistribution of older diseases such as malaria, cholera, vectors and the disease-causing pathogens they transmit are impacted by higher temperatures.

The fact is, many widely accepted, peer-reviewed scientific studies have also found evidence that global warming has already had major impacts on the ecosystems and societies across the world (union of concerned scientist, 2011; Odjugo, 2010; Folorunsho and Awosika, 2001). Likewise, a report by Onibukun (2015) shows that Nigerians are beginning to feel the realities caused by global warming while Lagos state has seen greater rainfall and experienced very heavy wind which caused lots of damage to public and private property. Severe drought is being felt in Kaduna state and other parts of Nigeria. Massive and destructive floods have also been reported in almost all parts of Nigeria (Okereke, 2011). Indeed during the 21st century, climatic disasters occurred five times as frequently and killed or affected seventy times as many people. The immense geological changes will continue their destruction unabated if steps to educate people on ways to mitigate global warming are not taken (Naurzbaev and Vaganov 2000).

Hastenrath, (2001) concluded that It may be too late to stop global warming altogether, but its effect can be controlled. There is a time lag between the addition of greenhouse gases and their effects. Also once these gasses have been added to the atmosphere it is not possible to easily remove them. In fact because the world's economy is built around the use of fossil fuels for energy, we cannot stop adding more carbon dioxide to the atmosphere (It will take a lot of efforts by every nation and many years to reduce the amount of extra carbon that is added into the atmosphere). Barnett, (2005) opined that humanity may have only a narrow window of time left, perhaps a decade or so, to begin the long process of stabilizing greenhouse gas concentrations at a level that can avert devastating and irreversible impacts from climate change.

In a developing country like Nigeria, the highest per capita greenhouse gas producers are seen in gas flaring in the oil producing states, fumes from power generating plants, automobiles and agricultural practices. Tunde, Adeleke andAdeniyi,(2012) explained that activities like urbanization, population explosion, deforestation and industrialization aid the release of greenhouse gases which contribute highly to the depletion of the ozone layer and its associated global warming. Chukwu and Asiegbu (2011) stated that bush-burning and hunting, dumping of toxic materials and man's insatiable desires also aids global warming.

The adverse outcome of global warming has increase environmental health problems and its attendant consequences. Disasters, violence and disease are expected to be more frequent and intense especially in areas with heavy industrial presence in Nigeria. Most environmental health education programmes targeted at people yield little or no result. The current low level of literacy and the socio-economic situation of Nigerians could be linked high level of poverty and lack of willingness on the part of people to seek environmental health and safety information on the causes and effect of global warming.

The study area, Ibadan known as one of the largest and fast growing cities in Sub-Sahara Africa houses a large number of industries and some of the industrial areas also houses residential estates. The inhabitants of these industrial areas are not only exposed to pollutions from the industries but may likely feel the effect of extreme heat.The governments of Oyo state in collaboration with the Federal government have begun taking steps to mitigate the effects of global warming in Oyo state, however members of the public need to be more aware of this problem and start finding mitigating strategy to combat this unstoppable changes. All effort towards reducing the effect of global warming has been towards mitigation and adaptation as a result, neglecting what might be the most effective strategy for reducing global warming in our lifetimes which is educating people about causes, effect and possible solution. It is therefore important to assess the level of knowledge and awareness of the causes, effect and attitude of inhabitant of industrial areas in Ibadan Southwest towards global warming and also to test the understanding on the need to adopt a mitigating strategy of global warming among inhabitant of industrial areas of Ibadan South-West Local Government Area of Oyo State. This is to enable an inclusive education method to be developed to better spread theawareness of this global menace for a sustainable environmental and health management.

In order to achieving this, answers will be sought for the following research questions;
1. What is the level of awareness of global warming among inhabitants of industrial area in Ibadan South-West Local Government Area of Oyo State?
2. What is the attitude of inhabitants of industrial area in Ibadan South-West Local Government Area of Oyo State towards global warming?

Also, the following hypotheses will be tested among the inhabitants of the study area.
1. Inhabitants of industrial areas in Ibadan South-West Local Government Area of Oyo State do not have significant knowledge of the causes of global warming
2. Inhabitants of industrial areas in Ibadan South-West Local Government Area of Oyo State do not have significant knowledge of the effects of global warming
3. Inhabitants of industrial areas in Ibadan South-West Local Government Area of Oyo State do not have significant knowledge of the mitigating strategy and against the effect of global warming

Study Approach

The study employed the use of descriptive survey design. Two hundred (200) inhabitants of industrial areas within Ibadan South-West Local Government Area of Oyo State were purposively selected. Two self-developed instrument were used for data collection. The first is the global warming awareness and attitude questionnaire, while the second is the knowledge of causes, effects and mitigating strategy of global warming questionnaire. Copies of the instrument were sent to experts in the field and their contributions were integrated into the final copy to guarantee face and content validity. The instrument was also subjected to a test-retest method which yieldeda reliability coefficient (r) of 0.71 and 0.78 respectively. The descriptive statistics of frequency count, percentage and pie-chart were used in analysing the research questions, while inferential statistics of Chi-square was used in testing all the hypotheses at 0.05 level of significance.

Results and Discussions

Result of the research question (1) under three point scale (i.e, Adequate, Fair and Poor) on the level of awareness among the inhabitants of this area is presented in form of pie chart in figure 1. This revealed that 61 (30.5%) of the respondent had adequate awareness of global warming, 67 (33.5%) had fair knowledge while 72 (36.0%) had poor level of awareness. This shows that the awareness level of most of the respondents is generally poor as shown in figure 1below.
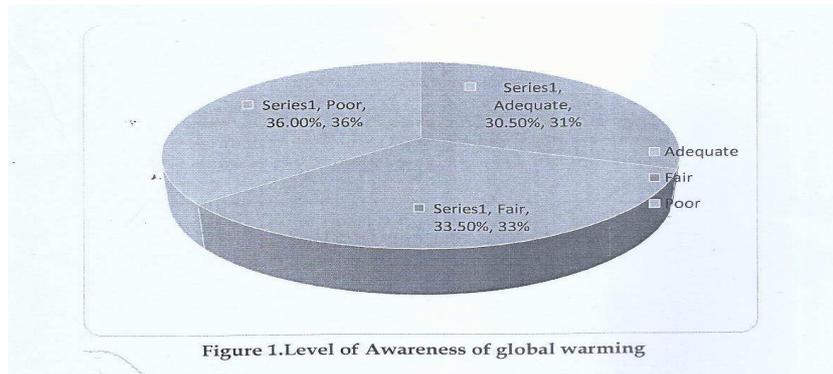
Figure 1.Level of Awareness of global warming

Result of the research question 2 under three point scale (i.e, Positive, Negative and Indifferent) on assessment of the respondents attitude towards global warming is also presented in form of pie chart as shown in figure 2. It also revealed that the attitude of inhabitant of industrial areas in Ibadan Southwest towards global warming shows that 51 (25.5%) had positive attitude, 68 (34.0%) had negative attitude while 81 (40.5%) were indifferent, see figure 2. This shows that majority of inhabitant of industrial areas in Ibadan Southwest are indifferent towards global warming.
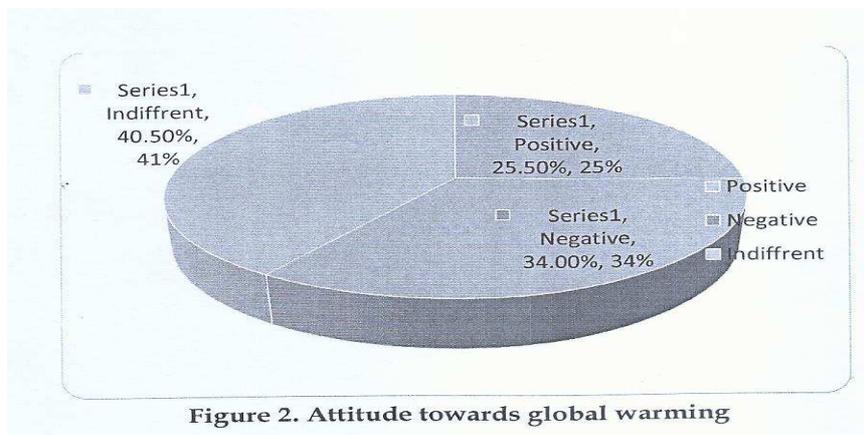

Figure 2. Attitude towards global warming

Results of the three hypotheses testing 1 -3 are presented in table 1-3 respectively below

	SA	A	D	SD	X^2cal	X^2crit	df	P
Too much of smoke from exhaust pipe of industrial machines can lead to global warming	61 30.5	119 59.5	20 10.0	-	270		12	.000
Too much smoke from exhaust pipe of cars can lead to global warming	70 35.5	120 60.0	10 5.0	-				
Burning of industrial waste can lead to global warming	51 25.5	119 59.5	29 14.5	1 0.5				
Global warming is caused by the presence of too much carbon in the atmosphere	21 10.5	129 64.5	49 24.5	1 0.5				
Constant Burning of bush can lead to global warming	67 33.5	128 64.0	2 1.0	3 1.5				
When fossil fuels are burnt, it could lead to global warming	59 29.5	139 69.5	1 0.5	1 0.5				
One of the effects of too much industrial gases in the atmosphere is global warming	39 19.5	147 73.5	13 6.5	1 0.5				
Falling of trees without replanting can lead to global warming	20 10.0	101 50.5	78 39.0	1 0.5				

Table 1: knowledge of the causes of global warming

The result of hypothesis 1 revealed that inhabitant of industrial areas in Ibadan Southwest Local Government Area of Oyo State have significant knowledge of the causes of global warming (X^2 Cal = 270.0, X^2 critical = 31.64, df = 12, P = .000). This showed that X^2 calculated is greater than X^2

critical, therefore we reject the null hypothesis and consequently conclude that the respondents have significant of what causes global warming.

	SA	A	D	SD	X²cal	X²crit	df	P
Global warming can lead to extinction of some species of animals	49 24.5	79 39.5	71 35.5	1 0.5	59.84		13	.000
Global warming cause extreme heat	48 24.0	90 45.0	60 30.0	2 1.0				
Global warming is capable of causing genetic mutation in human being	78 39.0	88 44.0	32 16.0	1 1.0				
Global warming can also lead to prolonged droughts	40 20.0	97 48.5	60 30.0	3 1.5				
Global warming has resulted in the increase in rain fail in Nigeria and other parts of the world	83 41.5	87 43.5	30 15.0	-				
Global warming can lead to poor air quality	39 19.5	31 15.5	117 58.5	13 6.5				
Heavy floods is also one of the effect of global warming	29 14.5	71 35.5	87 43.5	13 6.5				
Global warming can lead to allergies	51 25.5	39 19.5	97 48.5	13 6.5				
Global warming can lead to extinction of some species of plants	52 26.0	88 44.0	57 28.5	3 1.5				
Global warming can lead to easy spread of disease	39 19.5	99 49.5	61 30.5	1 0.5				

Table 2: knowledge of the effect of global warming

The result of hypothesis 2 showed that X²cal = 59.84, X²crit = 31.64, df = 13, P = .000). This showed that X² calculated is greater than X² critical, therefore the null hypothesis was rejected. The result revealed that knowledge of the effects of global warming is significant among inhabitants of industrial areas in Ibadan Southwest Local Government Area of Oyo State

	SA	A	D	SD	X²cal	X²crit	df	P
Global warming can be controlled through planting of trees	69 34.5	91 45.5	40 20.0	-	173.49		12	.000
Human being must reduce the use of fossil fuels	31 15.5	149 74.5	20 10.0	-				
Indiscriminate burning of bush must stop	43 21.5	127 63.5	29 14.5	1 0.5				
Burning of industrial waste and industrial emission must be minimized	92 46.0	88 44.0	19 9.5	1 0.5				
Cars that are not fit for road should be removed	79 39.5	99 49.5	22 11.0	-				
Illegal falling of tress should be eradicated	49 24.5	131 65.5	19 9.5	1 0.5				
Helping to switch of lights when not in use will go a long way in reducing global warming	107 53.5	93 46.5	-	-				
Educating people on the causes	94 47.0	106 53.0	-	-				

Table 3: knowledge on the methods to control global warming

The result of hypothesis 2 revealed that X²cal = 173.49, X² critical = 31.64, df = 12, P = .000). This showed that X² calculated is greater than X² critical, therefore the null hypothesis was rejected. The result revealed that knowledge of the methods to control global warming is significant among inhabitants of industrial areas in Ibadan Southwest Local Government Area of Oyo State

Discussion

The first hypothesis was rejected, showing that people have significant knowledge of what causes global warming. The findings of this study are in-line with the findings and views of NCDC (2004). People who live in industrial countries are aware of the causes of global warming in their everyday lives but often put on a negative attitude towards controlling it. People knew what global warming is, but they are not taking action to address the issue. Indeed people are not taking action because they either do not wish to, or are not sure of what action they should take. While it is essential to raise awareness, other feasible solutions should also be considered.

The fact that the second hypothesis was rejected shows that people have significant knowledge of the effects of global warming. This suggested that people who live in industrial communities are aware of the effect of global warming on their everyday lives but often put on a negative attitude towards mitigating it. IPCC, (1999) was of the view that if a general attitude is maintained and more data is dutifully gathered and awareness is raised, good practices will be exhibited and this may help to reduce or solve the challenge of climate change. Parker, (2011) also stated that although not apparent at the moment, global warming will be ingrained into our daily lives and we will learn to live with it and the knowledge of its potential effects. Most importantly, we will learn to live in such a way that actively negates its effect.

The third hypothesis was also rejected, indicating that the respondents have significant knowledge of the methods to mitigating against the unstoppable menace of global warming. This agreed with the findings of King, (2004) who stated that studies have indicated substantial potential for future reductions in emissions by a combination of emission-reducing activities such as energy conservation, increased energy efficiency, and satisfying more of society's power demands with renewable energy and/or nuclear energy sources. Parker, (2011) explained that adaptation to climate change may be planned, either in reaction to or anticipation of climate change, or spontaneous, without government intervention. They stated that though many are aware of this and that planned adaptation is already occurring, but it is on a limited basis. The barriers, limits, and costs of future adaptation are however not fully understood.

Conclusion/ Recommendation

This study has revealed that awareness of global warming is poor and most people are indifferent in their attitude towards global warming. It also concludes that most people have knowledge of what global warming is and knew about the activities that could cause it as well as its effect and methods to control its effect and consequentially conclude that knowledge of global warming is significant and so not a problem. In spite of the significance in knowledge of global warning among the study population, the study has also established that knowledge is not the problem and the indifference in attitude may indicate that people have misconception about global warming and may see it as a distant threat, with consequences that will only be felt many decades from now. This can also be linked to high level of poverty and degree of illiteracy among the people of developing countries which has made it difficult to maintain a disciplined life style that will mitigate against the effect of global warming.

Therefore, there is need for practical environmental health and safety education with the intention of improving health seeking behaviour among the study group. Health practitioners should also have a paradigm shift from theoretical teaching to skill based environmental health education in order to improve their services to clients especially those in industrial areas. In addition to this, environmental health workers/teachers must have adequate training and knowledge of global warming for effective dissemination.

Finally, multidisciplinary and interdisciplinary research, which would inform the development of intervention strategies, is also required and the need for interdisciplinary collaboration to develop interactive models and new stage-specific perspectives on global warming regarding human behavior, health, and illness.

References

Barnett F. 2005. Penetration of human induced warming into the world's oceans. *Science, 309* 284–287.

Chukwu, G.U. &Asiegbu, A.D. 2011. Global warming and climate change: impactsand implications. International Journal of Current ResearchVol.33, Issue, 6, pp.112-115, Retrieved on 20/08/2015 from https://www.academia.edu/4879177/global_warming_and_climate_change_impac

Folorunsho, R. &Awosika, L.F., 2001. *Flood Mitigation in Lagos, Nigeria through Wise Management of Solid Waste: a case of Ikoyi and Victoria Islands; Nigerian*, Paper presented at the UNESCO-CSI workshop, Maputo 19-23 November 2001.

Hastenrath, 2001. *Climate dynamics of the tropics*. Kluwer Academic Publishers, Dordrecht, Netherlands, 488 p

IPCC, 2001. *Climate Change 2001: The Scientific Basis.* Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change. Edited by J.T. Houghton, Y. Ding,D.J. Griggs, M. Noguer, P.J. Van der Linden, X. Dai, K. Maskell, and C.A. Johnson. Cambridge and New York: Cambridge University Press. Retrieved on 20/04/2013 from (http://www.grida.no/climate/ipcc_tar/wg1/index.htm)

Karl, T.R. 2008. Annexed A "Regional Trends and Variations of Temperature and Precipitation" *The Regional Impacts of Climate Change.* IPCC WGII, Cambridge University Press.

Kattenberg, K.Maskell) Cambridge University Press

King, D.A. 2004. Climate change science: Adapt, mitigate, or ignore? *Science, 303*, 176–177.

National Climatic Data Center (NCDC), (2004). *Climate of 2003 in Historical Perspective.*http://www.ncdc.noaa.gov/oa/climate/research/2003/ann/ann 03.html#Major%2

Naurzbaev, M. M. &Vaganov, E. A. 2000. Extraordinary Warmth in the 20thCentury? *J. Geophys Res* 105:7315-7326

Odemerho, F.O. 2004. Benin City: A Case Study of Urban Flood Problems" In SadaP.O &Odemerho F. O (eds) *Environmental Issues and Management in Nigeria development.* Evans Brothers Nig. Publishers Ltd.

Odjugo, P. A.O. 2010. Regional evidence of climate change in Nigeria. Journal of Geography and Regional Planning, 3(6), 142-150. Retrieved on 20/08/2015 from http://www.academicjournals.org/journal/JGRP/article-abstract/6B7E2F539670

Okereke, R. A. 2011. Incidence of Flooding in Southern Nigeria, *International Journalof Environmental Issues* 5 (1 &2).

Onibokun, A. 2015. Global warming and Nigeria . Retrieved on 20/08/2015 fromhttp://www.informationng.com/2012/02/global-warming-and-nigeria.html

Oshuntokun, A.2003. Environmental Problems of Nigeria. Lagos: Friedrich EbertFoundation.

Parker, C. 2011. Dying for growth: industrialization, climate change, and health effects. Retrieved 20/08/2015 from http://www.psr.org/chapters/student-chapters/rx-for-survival-2011/dying-for-growth.html

Peterson, T.C. &Vose, R.S. 2007. An Overview of the Global Historical Climatology Network Temperature Database *Bull Amer Meteor Soc*78:2837-2849

Physicians for Social Responsibility, (2015). Global warming thermometer. Retrievedon 20/08/2015 from http://www.climate-change-emergency-medical-response.org/physicians-for-social responsibility.html

Physicians for Social Responsibility, 2015. Climate change is a treat to health 2015. Retrieved on 20/08/2015 from http://www.psr.org/environment-and-health/climate-change.html

Still, C.J., Foster, P.N. & Schneider, S.H. (2009). Simulating the effects of climate change on tropical montane cloud forests. *Nature, 398*, 608–610.

Titus, J.G. 2000. Greenhouse effect, sea level rise, and barrier islands: Case study of Long Beach Island, New Jersey. *Coastal Management, 18*, 65-90.

Tunde, A. M., Adeleke, E. A. &Adeniyi, E. E. 2012. Impact of Climate Variability on Human Health in Ilorin, Nigeria Environment and Natural Resources Research vol 3 no1 Retrieved on 20/08/2015 from http://www.ccsenet.org/journal/index.php/enrr/article/view/22404

Union of concerned scientist, 2011.climate hot map: global warming effects aroundthe world. Retrieved on 20/08/2015 Retrieved on 20/08/2015 from http://www.climatehotmap.org/global warming-effects/health.html