**Information Communications Technology (ICT) as a factor enhancing Information Dissemination on Climate Change in Public Libraries in North – Central Nigeria**

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**ABSTRACT**

The study seeks to establish the indispensable role of ICT as a correlate to effective Information Dissemination on Climate Change in Public Libraries in North – Central Nigeria. The study was anchored on five objectives which are (1) To find out if they know about climate change; (2) to find out if they know about the associated problems of climate change; (3) to find out the ICT tools they can use in public libraries to disseminate information on climate change; (4) to find out how they can use the tools to disseminate information on climate change to their users; (5) to find out how disseminated information to their users with ICT tools can help in mitigating climate change problems. Total enumeration or census population technique was adopted, to use the total population of staff which were 242 according to retrieved copies of questionnaires. A hypothesis was tested at 0.5 level of significance and data was analysed using frequency tables and percentages and mean rankings. The hypothesis was analysed using Pearson product moment correlation coefficient to determine the relationship of the independent variable to the dependent variable. The findings from the objectives were that the ICTs were the only anchors on which Information on climate change, its problems and mitigations could be effectively disseminated. Based on all the findings of the study, it was concluded that the public libraries in North-Central Nigeria really need ICT tools to be able to disseminate climate change information to users.

Keywords: ICT, Information dissemination Climate Change, Public Libraries, North-Central Nigeria

**CHAPTER ONE**

**INTRODUCTION**

**1.1 Background to the study**

Climate change refers to long term changes in temperatures and weather patterns. The changes may be natural but since the 1800’s human activities have been the causative issue affecting climate change. Climate change is a general term that describes the changes in the Earth’s climates, at local, regional, or global scales, and can mean the results of these changes. In recent decades, climate change is most often used to describe changes in the Earth’s climate driven mostly by human activities, since the pre-Industrial era, which is caused by burning of fossil fuels like coal, oil, and natural gas, which produce heat trapping gases. There is depletion of forests, causing fast abundance of carbon dioxide concentration in the Earths’ atmosphere. Climate change is a general that describes changes in the Earth’s climates, at local, regional, or global measures. It can also mean the results of these changes. According to Lawrence and Hassnot (2017) ‘climate change’ describes changes in the Earth’s climate caused by human activity. Since the pre-Industrial period 1850 onwards, the burning of fossil fuels and removal of forests, caused fast increase in carbon dioxide concentration in the Earth’s atmosphere.

Climate change is one of the 17 targets of sustainable development goals (SDG) goals precisely SDG goal 13 called Climate Action. The SDG goals were the footprint to attain a better and more sustainable future for all. They targeted the global problems like poverty, inequality, climate change, environmental degradation, peace and justice. It is a collection of 17 interlinked global goals designed to be a shared blue print for peace and prosperity of people and the planet, now and into the future. SDG13 is one of the 17 sustainable development goals established by the United Nations Assembly in 2015 and are intended to be achieved in 2030. Their mission statement: Is a shared blue print for peace and prosperity for people and the planet now and into the future.

Climate change is increasing the frequency and intensity of extreme weather conditions like heat waves, droughts, floods and tropical cyclones, and increasing water management problems, and depleting agricultural production and food security. Health risks are increased, critical infrastructure is destroyed and the provision of basic services as water, sanitation, education, energy and transport are paused. The current period of warming is occurring more rapidly than any past events. It is clear that humanity has caused all of the global warming by releasing heat-trapping gases commonly referred to as greenhouse gases to power our modern lives. Zarin et.al (2016) This is being done by burning fossil fuels, agriculture and land-use and other activities that trigger climate change. Greenhouse gases are at the highest levels ever since the last 800,000 years. This rapid rise is a problem because it’s changing our climate at a rate that is too fast for living things to adapt to (Liu et.al. 2015)

Climate change involves not only rising temperatures, but also extreme weather events, rising sea levels, shifting wildlife populations and habitats, and other negative effects. There is an stunning scientific agreement that global warming is mostly man-made. Climate scientists have come to this agreement harmoniously. One of the biggest causes is by far the burning of fossil fuels – coal, gas and oil – which have increased the concentration of greenhouse gases such as carbon dioxide in the atmosphere. The use of fossil fuel results in production of massive quantity of carbon-dioxide. The carbon-dioxide increases the global warming resulting into climate change. It Increases size of arid areas and triggers dearth of food. Climate change affects the rainfall patterns, in addition to activities like clearing land for agriculture, which is resulting to increase in planet to temperature. Scientists are linking greenhouse gases and global warming like linking smoking and lung cancer.

Climate change is now altering every country in every continent. It is disturbing national economies and upsetting lives, costing people, communities and countries dearly today and even more tomorrow (Pecl, et.al, 2017). People are feeling the enormous effects of climate change, which includes changing weather patterns, rising sea level, and more intense weather activities. The greenhouse gas emissions from human activities triggering climate change and keeps rising and now at their highest levels in history. If care not taken, the world’s average surface temperature is estimated to increase over the 21st century and is likely to go more than 3 degrees Celsius in this century. Some parts of the world is expected to warm even more. The poor and defenceless individuals are more largely hit by this problem (Pecl, et.al, 2017).

Other problems of climate change are that anthropogenic or green gas emissions as a result of environmental change triggered by people’s activities directly or indirectly have risen since the pre-industrial era driven largely by economic and population growth, and are now higher than ever. The world is warming at a dreadful rate negatively tampering with our ability to grow food. Storms, floods hurricanes and droughts are escalating, oceans are warming and becoming more acidic, ice is disappearing, and the seas are rising. All countries must take all reasonable steps to reduce emissions to the full extent of their abilities, wealthy countries must lead the way, by decarbonising their economies faster, than developing countries. States must also take all needed measures to help everyone within their territory to conform to the foreseeable and unavoidable effects of climate change, thereby decreasing the effect of climate change on their human rights. This should be done whether or not the state is responsible for those impacts. States have duties to protect people from evils caused by climate change. Climate change problems must be handled, quickly and as humanely as possible. Afforestation is one practice that can help humanity.

Afforestation could be used to mitigate the impact of climate change. It is the establishment of a forest or stand of trees where no trees previously were. Many governments and non- governments organisations join in afforestation programmes to build forests and boost carbon capture. Afforestation can fight the challenge of global warming, soil erosion, pollution and maintenance of biodiversity and ecological balances. It can reduce atmospheric carbon -dioxide, increase soil quality to avoid or retrograde desertification. It also produce habitats to local wildlife, creates wind brakes, support soil health, and may improve water quality.

Cutting down on consumption of diaries products, meats and eggs, and going vegan is a great mitigation alternative It would recreate the carbon footprint and lower the bad impacts of diet in the environment. It can greatly bring down the environmental effect, bringing plant-based foods which bring in fewer greenhouse gas emissions’. Using renewable energy sources like solar, wind, and small hydro-carbon, help cities create viable transport like rapid transit, and electric vehicles. Another advantage of using renewable sources of energy is the capacity of the source to protect the population from the negative impact of environmental pollution to the society. Solar and wind power shields the society through low carbon-dioxide production. Renewable energy comes from sources the Earth can naturally refresh like crops and biomatter. Other areas of mitigation are walking, cycling, or taking public transport because the world’s roads are filled with vehicles that are burning diesel or petrol. Walking or riding a bike instead of driving has the ability to reduce greenhouse emissions and also help health and fitness (Locateli. et.al 2015).

A lot have been discussed so far about climate change and some of its impacts, and mitigation measures, preliminary investigations from the researcher discovered that some individuals innocently do not know that a lot of the natural disasters like floods, heat waves, landslides global warming, desertification etcetera are as a result of climate change. They equally do not know that there is a phenomenal disaster called climate change in the World generally and then Nigeria and North-Central particularly. There is therefore dire need to disseminate climate change information to all and sundry in the whole country generally and in North-Central Nigeria particularly. This cannot be done without the use of the public library which is called the layman’s university because of its ability to accommodate all and sundry.

The public library is the local centre of information, making all kinds of knowledge and information readily available to its users. A public library is an organisation established, supported and funded by the community, either through local, regional or national government or through some other form of community organisation. It provides access to knowledge, information and works of the imagination through a variety of resources and services and is also available to all members of the community irrespective of race, nationality, age, gender, religion, language, disability, economic and employment status and educational inclination. Adebayo et.al (2018). The public library provides services based on equality of access for all, irrespective of age, race, sex, religion, nationality, language or social status. They also provide services and resources for users who cannot, for any reason, use the regular services and materials, for example, linguistic minorities, people with disabilities or people in hospital or prison. All age groups must find information resources pertinent to their needs. Resources and services have to include all necessary appropriate media and modern technologies as well as traditional materials. High quality and relevance to local needs and conditions are rudiments. Resources must reflect current trends and the growth of society, as well as the memory of human endeavor and imagination. Resources and services should not be subject to any form of ideological, political or religious censorship, nor commercial pressures. Gill et.al (2001) Dissemination of information especially climate information would not be very successful in the public library without the use of ICT tools. Adebayo et.al (2018).

The ICT tools are the latest technology or devices and concepts used in Information and Communication Technology in public libraries. Public library staff use many types of ICT tools to communicate, create, disseminate, store, and manage information. Information Communication Technology (ICT) continues to be a motivation in the issue of national advancement and development. Information, as power is effectively an infinite resource and a necessary tool needed for the evolution of all sectors in any country. It is therefore, imperative that use of ICT in libraries would go a long way in quenching the information needs of the citizens. It is worthy of note, that the emergence of ICT has impacted greatly on the quality of information provided through libraries. It also enables proper and adequate provision of library services to library users from all disciplines. In this 21st century, the drastic role of ICT in library operations cannot be over emphasized. Many library routines and operations that were initially performed manually are now being converted to computerised operations which means, applications of ICT techniques to providing better and faster services to the end users. Gill et.al (2001)

A nation without functional libraries and information centres may lack access to climate change information that would enable her sustainable development. In this era of globalization, in which the world is connected, information gains its power through permanent storage and wide distribution, which could be achieved through ICT. According to Janakiraman and Subramaniah (2015), the world now experiences a digital scenario in which ICT has changed the possibilities of the library job promotions and has brought changes to expected library performances. ICT is a generic term that refers to the technologies that are used to collect, store, edit and communicate information in various format (Raji, 2018). The use of ICT improves access to digital information, narrows down the digital divide and also improves standard of living.

Adoption of ICT in libraries is a way of improving on information services provided in libraries. This is an era, when people need to access timely information with ease, and this can only be done through the application of ICT to library services. It is also a way of contributing to sustainable development of the nation, especially in the area of climate change information, since timely and effective provision of climate change information can assist in building up a society that is safer to live inside. ICT as an enabling tool, can assist libraries in provision of information on climate change which is very paramount to development of the various sectors in the nation concerning environmental factors and their implications for healthy living and safety in the nation.

ICTs help libraries to collect, process, retrieve and disseminate information that has to do with climate change. ICT equipment like CD-ROMs, E-mails could help in libraries to dissemination information on climate change. Digitization of information resources which includes converting print resources to electronic format is done , using ICT.

Other benefits of ICT in libraries as stated by Ashikuzzaman (2014) include:

• Giving fast and quick access to information.

• Giving access to users any time to lay hands on necessary information

• Enabling users access to bounty information from different sources like websites, internet, CD-Roms, and many others.

• ICTs help for easier, faster, cheaper and more effective library operations generally since Computers can be used for different activities like information generation, processing, storage, analysis and dissemination

Electronic Mail (E-mail) is largely used in theinternet for sending and receiving of messages called mails. The mails are sent are by electronic devices. This ensures faster and cheaper means of electronic communication. Therefore climate change information could be processed by public librarians and sent into the mail boxes of public library users who can be anybody. Since the public library is the lay-man’s university, such information would benefit the common man. The ordinary man does not know that cutting trees for firewood causes deforestation which is a causative negative impact of climate change.

World Wide Web (WWW) is an internet- based resource facility. Climate change information could be stored in Websites of the computers of the public libraries. Staff of the public libraries could send links of websites containing climate change information to their users This could assists individuals, organisations or institutions that are affiliated to public libraries find useful information on climate change especially as regards mitigation. Other important information on climate change could be given to users through the websites of other organisations or institutions that are climate change conscious. The web helps nations or organisations information retrieval to mitigate climate change.

Video Conferencing could be arranged to help people at different locations to hold conferences on issues that educate people on the dangers of climate change and possible mitigation means. Data communication network is convenient as it does not require much financial expenses for conducting and organising conferences between two participants situated at remote locations (Mishra

and Mishra, 2014).

Online Public Access Catalogue (OPAC): It is the computer form of library catalogue to access information materials in the library. It is an online database of materials held by a library or group of libraries. It is a computerised library catalogue made available to the public. Most OPACs are accessible over the internet to users all over the world (Mishra and Mishra, 2014). OPAC catalogues are available online and usually accessed freely. It is useful for finding books internationally for acquisition, and bibliographic data verification. The same applies to monographs and periodicals. OPAC could be very useful in locating information resources that would help deal with climate change and its mitigation.

Other ICT services a modern library uses for dissemination of climate change information are CD-ROM facilities, document supply services, CAS, SDI services, with the help of telecommunication technologies. Telephone, video text, facsimile or fax, library networks, online retrieval services could all be used in disseminating climate change information. information communication technology could assist in removing barrier of distance, time and boringness of manual efforts in library routines. The advancement in technology will continue to help libraries in assembling and disseminating information on climate change and possible mitigation. (Tekale, Veer & Rathod, 2010)

Libraries do well in helping to fasten access to global information and knowledge resources, ICTs are helpful tools used in giving of value- added information that help all the sustainable development programmes, and climate change specifically. Many institutions and organisations in addition to libraries meet many problems while trying to use ICTs to their services, but, giving information is important for the positive evolution of any country. It is therefore important that, efforts are made to enable usability of ICTs in all sectors of the nation especially as regards ICT and library services for information dissemination about climate change. It is based on the foregoing that the researcher decided to embark on this study to see how ICT in public libraries can enhance information dissemination on climate change in public libraries in North-Central Nigeria. Information and communication technology is the application of technologies consisting of hardware, software, network and media for collection, storage processing transmission and presentation of information in vocal, textual, pictorial and multimedia formats, (Igwe, 2011). ICT is a term used in the library to refer to application of computers and other technologies to library practices such as acquisition, storage, organization and dissemination of information. The world has become a global village and with ICT, many library users now have access to vast sea of information, without necessarily investing much time or energy. The process of generally and distributing information is now being facilitated through the use of ICT. This would help the dissemination of information about climate change.

Aina, Okunnu and Dapo-Asaju (2014) postulated that ICT is a term used to describe the ability to access information with the use of telecommunication -based Internet resources. ICT provides the ability to create, organize, manipulate and access information from remote locations across the globe, within a short time. ICT involves incorporation of a range of technologies that are used to support communication and information dissemination. Saidu, Tukur and Adamu (2014) described ICT as the use of computer-based technology and internet for making information and communication services available to a wide range of users. The term is broadly used to refer to a range of technologies including telephones, e-mail and so on. Central to the range of technologies is the internet, which provides the mechanism for transporting data in a number of formats such as text, images, sound and video. ICT is system that enables information to be collected, analysed, processed and disseminated. information communication technologies (ICTs) are new technologies that cannot be ignored in Africa. ICTs are tools that must be employed to achieve and sustain development. The advent of ICT is indeed a boost the library services as it now assists many librarians to use their ICT potentials to reach out to library users as it concerns information dissemination on climate change.

**1.2 PROBLEM STATEMENT**

Climate change affects everything from geopolitics to economies to migration. Climate change has many problems, some of the problems specifically identified with climate change are that climate change is increasing the frequency and intensity of extreme weather events such as hotter temperature, heat waves, droughts, floods, more severe storms, desertification, and tropical cyclones, aggravating water management problems, and reducing agricultural production and food security. Health risks are increased, critical infrastructure is damaged and the provision of basic services as water, sanitation, education, energy and transport are interrupted. The current period of warming is occurring more rapidly than any past events.

A reference to preliminary investigations shows that some public library staff do not know that some of the afore-mentioned identified problems of climate change were problems that humanity has been facing as result of climate change . The bigger and more worrisome problem is that people do not know that the global warming, heat waves, floods, high temperatures, to mention but a few are all the consequences and impacts of climate change. People also do not know that there are things they can do to mitigate the effects of climate change. There is urgent need to sensitise the people and government on the need to use the public library which is a layman’s university to give the average Nigerian, information on climate change. Such information would be widely distributed to everybody if ICT tools of computer and all its accessories are used to distribute it globally over wires, wireless, and cables across networks, and all telecommunication devices. It is against this backdrop that the researcher decided to study Information Communications Technology (ICT) as a correlate to effective Information Dissemination on Climate Change in Public Libraries in North – Central Nigeria so that there would be good knowledge and information on climate change, mitigation and adequate preparedness in case of unforeseen future disaster so that humanity is not taken unawares.

**1.3 OBJECTIVES**

1. To find out if they know about climate change
2. To find out if they know about the associated problems of climate change
3. To find out the ICT tools they have in public libraries to disseminate information on climate change
4. To find out how they can use the tools to disseminate information on climate change to their users
5. To find out how disseminated information to their users with ICT tools can help in mitigating climate change problems

**1.4 Hypothesis**

One null hypothesis was tested in study at 0.05 level of significance

1. There is no significant relationship between ICT in public libraries of North- Central Nigeria and climate change with its associated problems.

**CHAPTER TWO**

**METHODOLOGY**

**2.1 RESEARCH DESIGN**

This study adopted descriptive survey correlation design which seeks to establish the

relationship that exists between two or more variables. Direction and magnitude of the relationship between the variables was indicated which was found to be strong and positive, that is the effect of the independent variable on the dependent variable.

**2.2 POPULATION OF THE STUDY**

The population of the study is the 251 public library staff in North-Central Nigeria

242 respondents returned their copies of questionnaire giving it a response rate of 96% there 96% representing the 242 represents 100% of the total population

Total enumeration technique or census technique was employed so as to use the total population of public library staff as respondents. This is because the researcher sees climate change problems impact and mitigation as an evil gospel that must be preached, so that humanity and biodiversity do not eventually go into extinction.

**2.3 DATA COLLECTION OR RESEARCH INSTRUMENTS**

The questionnaire was the main instrument for the study. It was designed under different research questions. The five point likert scale of Strongly Agree (SA), Agree (A), Strongly Disagree (SD) and Disagree(D) were used to determine the average responses of the respondents.

Validity and reliability of the instruments

In order to ensure face and content validity of the questionnaire two professors in the Department of Library and Information Science vetted the questionnaire even with the ASSU strike . It was pretested and corrected by administering some copies to library staff of National library Minna.

The Cronbach Alpha method was used to determine the reliability coefficients of each of the research questions. The values obtained were 0.84 for RQ 1, 0.81 for RQ 2, 0.75 FOR RQ 3, 0.72 for RQ 4 and 0.68 for RQ 5(RQ is Research questions.) Research questions were used to obtain the alpha values since the work had just two variables.

**2.5 Method of data analysis**

The data in the study with respect to the objectives were analysed using descriptive statistics of tables, percentages, frequency and mean, while inferential statistics of Pearson Product moment correlation coefficient was used to determine the relationship between the variables. The socio-demographic information and research questions were analysed using descriptive statistics of frequency, counts and percentages and means.

**CHAPTER THREE**

**3.1 ANALYSIS OF THE OBJECTIVES**

**3.2 RESULT AND DISCUSSION**

This section focuses on analysis and presentations of results, tables and graphs on the topic Information Communications Technology (ICT) as a correlate to effective Information Dissemination on Climate Change in Public Libraries in in north -centralNigeria”. SSPSS 23 Statistical Statistical package was utilisedin this research. A total of two and hundred twenty (251) copies of questionnaires were distributed to the seven public libraries in North Central Nigeria. Out of the two hundred and fifty- one (251) copies of the questionnaires distributed among the seven public libraries, two hundred and forty -two (242) copies were retrieved from the seven public libraries. They were valid for the purpose of the research, and this represent 96% returned rate; that is [(242/251)\*100 = 96%.] Table 2 shows the breakdown of the return rate.

*Table 1: Public libraries in North- Central Nigeria with their staff population*

|  |  |  |
| --- | --- | --- |
| S/NO | STATE | POPULATION |
| 1 | Benue State Library Board | 46 |
| 2 | Kwara | 47 |
| 3 | Nassarawa | 25 |
| 4 | Niger | 36 |
| 5 | Plateau | 41 |
| 6 | FCT | 31 |
| 7 | Kogi | 25 |
|  | TOTAL | 251 |

*Table 2: Sex of the Respondents*

|  |  |  |
| --- | --- | --- |
| Gender | Frequency | Percentage |
| Male | 158 | 65.3 |
| Female | 84 | 34.7 |
| Total | 242 | 100 |

**3.3 Objective one**

*Table 3: Do you know about Climate Change*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. There is hotter temperature globally as a result of global warming 2. As a result of human activities heat trapping gases or green- house gases to power our modern lives have been released 3. Since the past 800,000 years the green - house gases are at their highest levels | | | | | | | | |
| statement | Strongly disagreed | Disagreed | Undecided | Agreed | Strongly Agreed | Weighted Sum | Mean | Rank |
| Q1A | 0(0.00) | 0(0.00) | 8(3.3) | 73(30.2) | 161(66.5) | 1119 | 4.63 | 1st |
| Q1B | 0(0.00) | 0(0.00) | 10(4.1) | 118(48.8) | 114(47.1) | 1072 | 4.43 | 3rd |
| Q1C | 0(0.00) | 0(0.00) | 10(4.1) | 94(38.8) | 138(57.0) | 1096 | 4.53 | 2nd |
|  |  |  |  |  |  |  |  |  |

From the Table 3, values in the parenthesis are percentages of the frequency counts. Ranks are allocated to each climate change information awareness based on the greater mean.

The result from table 3 shows the Climate Change information awareness among public library staff in North Central Nigeria. From the Table3, it is observed that in each case, larger percentage of the sampled respondents agreed to the statements in the table. The responses are ranked based on the higher values, from the result in the table 3, it is observed that the respondents ranked the statement *there is hotter temperature globally as a result of global warming* as first information about Climate Change among library staff in North Central Nigeria that has the highest level of awareness because of its highest mean of 4.63. Secondly they ranked the statement s*ince the past 800,000 years the green - house gases are at their highest levels* as second information about Climate Change among library staff in North Central Nigeria that has the second highest level of awareness because of its 2nd higher mean of 4.53 and lastly, they ranked the statement *as a result of human activities, heat trapping gases or green- house gases to power our modern lives have been released* in the studied area *as the information with the same level of awareness with statement 2 because it has the same mean of 4.53.* Thus, from the results, which answered the research question 1, they know about climate change but probably what they did not know was that the public library with aggressive use of ICT can be used to disseminate information concerning it to its users. They were not conscious of the fact that some of the ICT tools like Computers and other telecommunications -based internet resources can be used to give online reader advisory services to users about climate change. *Flash drives, WWW, video conferencing and the printing technology can be employed to store and disseminate climate change information to users who visit the library or routed to their Email.* Computers, OPAC, CD-ROMS, DVD’S, Smart phones, Printers, Scanners, Internet, Websites, Mobile Apps can be used to disseminate information on climate change and its associated problems.

**3.4 Objective Two**

*Tab 4: What are the problems of climate change?*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. Nearly all land areas are seeing more than hot days and heat waves 2. Higher temperatures, extreme weather events, shifting wildlife population and habits are problems of climate- change. 3. Burning fossil fuels like coal natural gas and oil which has increased concentration of green- house gases like carbon-dioxide in our atmosphere are problems. | | | | | | | | |
| statement | Strongly disagreed | Disagreed | Undecided | Agreed | Strongly Agreed | Weighted Sum | Mean | Dec |
| Q2A | 0(0.00) | 0(0.00) | 10(4.1) | 70(28.9) | 162(66.9) | 1120 | 4.63 | 1st |
| Q2B | 0(0.00) | 0(0.00) | 10(4.1) | 70(28.9) | 162(66.9) | 1120 | 4.63 | 1st |
| Q2C | 0(0.00) | 0(0.00) | 10(4.1) | 94(38.8) | 138(57.0) | 1096 | 4.53 | 2nd |
|  |  |  |  |  |  |  |  |  |

From the table, values in the parenthesis are percentages of the frequency counts. Ranks are allocated to each climate change information awareness based on the greater mean.

The result from table 4 shows the problems of climate change in North Central Nigeria. From the table, it is observed that in each case, larger percentage of the sampled respondents agreed to the statements in the table. The responses are ranked based on their averages. From the result in the table, it is observed that the respondents ranked the statement *nearly all land areas are seeing more than hot days and heat waves statement A and* *higher temperatures, extreme weather events, shifting wildlife population and habits are problems of climate- change 4.63 highest mean* as first problems of climate change in North Central Nigeria. And lastly, they ranked the statement *Burning fossil fuels like coal natural gas and oil which has increased concentration of green- house gases like carbon-dioxide in our atmosphere are problems* as least problem in the studied area*.* Thus from the result, the research conclude based on the responses that Nearly all land areas are seeing more than hot days and heat waves, and higher temperatures, extreme weather events, shifting wildlife population and habits are bigger problems of climate- change in the study area because of their higher mean values of 4.63. These problems can be mitigated by dissemination of climate change information to users by the public library staff using ICT devices.

**3.5 Objective 3**

*Tab 5. What ICT tools could be used to disseminate information on climate change and its problems?*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A} Computers, OPAC, CD-ROMS, DVD’S, Smart phones, Printers, Scanners, Internet, Websites, Mobile Apps can be used to disseminate information on climate change and its associated problems SA| A| SD| D | U  (b) Scanners could be used to digitise information resources which involves converting print resources to electronic forms which is an ICT tool to send information concerning climate change across networks.  SA| A| SD| D | U  (c) flash drives, WWW, video conferencing and the printing technology can be employed to store and disseminate climate change information to users who visit the library or routed to their Emails. SA| A| SD| D | U | | | | | | | | |
| statement | Strongly disagreed | Disagreed | Undecided | Agreed | Strongly Agreed | Weighted Sum | Mean | Rank of statement |
| Q3A | 0(0.00) | 0(0.00) | 10(4.1) | 71(29.3) | 208(86.0) | 1119 | 4.62 | 2nd |
| Q3B | 0(0.00) | 0(0.00) | 7(2.9) | 27(11.2) | 208(86.0) | 1166 | 4.78 | 1st |
| Q3C | 0(0.00) | 0(0.00) | 10(4.1) | 71(29.3) | 161(66.5) | 1119 | 4.62 | 2nd |
|  |  |  |  |  |  |  | **4.68** |  |

From the table, values in the parenthesis are percentages of the frequency counts. Ranks are allocated to each climate change information awareness based on the greater mean.

The result from table 4 shows that all the afore-mentioned ICT tools can be used to disseminate information on climate change by public library staff of North Central Nigeria. From the Table,4 it is observed that in each case, larger percentage of the sampled respondents agreed to the statements in the table. The responses are ranked based on their averages or means. From the result in the table, it is observed that the respondents ranked the statement(B)highest mean of 4.78, statement (C)*Flash drives, WWW, video conferencing and the printing technology can be employed to store and disseminate climate change information to users who visit the library or routed to their Email* as 2nd with mean of 4.62 statement( C), and statement (A) 2nd with mean of 4.62 .This shows all are ICT tools that can be used to disseminate information on climate change. Thus from the result, the research concluded based on the respondents that ICT tools used to disseminate information on climate change and its problems are: Flash drives, www, video conferencing and the printing technology can be employed to store and disseminate climate change information to users who visit the library or routed to their Email in the study area.

**3.6 Objective 4**

*Tab 6: How further can these tools be used to disseminate information on climate change*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. Computers and other telecommunications -based internet resources can be used to give online reader advisory services on how to reduce the land clearing activities for agriculture, which causes deforestation and makes the average temperature of our climate to increase. 2. Provision of web access to OPAC makes it easier for climate information to be supplied to users about acidity and global mean sea level, when it continues to rise as to the devastation and impact it will have on human life, human health, food, water, housing and livelihood. 3. Provision of web access to OPAC makes it easier for climate information to be supplied to users about acidity and global mean sea level, when it continues to rise as to the devastation and impact it will have on human life, human health, food, water, housing and livelihood | | | | | | | | |
|  | Strongly disagreed | Disagreed | Undecided | Agreed | Strongly Agreed | Weighted Sum | Mean | Rank of Decision |
| Q4A | 0(0.00) | 0(0.00) | 10(4.1) | 24(9.9) | 208(86.0) | 1166 | 4.82 | 1st |
| Q4B | 0(0.00) | 0(0.00) | 10(4.1) | 71(29.3) | 161(66.5) | 1119 | 4.62 | 2nd |
| Q4C | 0(0.00) | 0(0.00) | 34(14.0) | 24(9.9) | 184(76.0) | 1118 | 4.62 | 2nd |
|  |  |  |  |  |  |  | **4.687** |  |

From the table, values in the parenthesis are percentages of the frequency counts. Ranks are allocated to each climate change information awareness based on the greater mean.

The result from table 5 shows how further the listed tools can be used to disseminate information on climate change. The responses are ranked based on their averages. From the result in the table, it is observed that the respondents ranked the statement (A)highest with mean of 4.82 *Computers and other telecommunications -based internet resources can be used to give online reader advisory services on how to reduce the land clearing activities for agriculture, which causes deforestation and makes the average temperature of our climate to increase* as first tool that can be further used to disseminate information on climate change in North Central Nigeria. And lastly, they ranked the statements( B and C)2nd highest with means of 4.62 respectively, *Provision of web access to OPAC makes it easier for climate information to be supplied to users about acidity and global mean sea level, when it continues to rise as to the devastation and impact it will have on human life, human health, food, water, housing and livelihood.* As least tool that can be further used to disseminate information on climate change in the studied area*.* Thus from the result, the research conclude based on the respondents that computers and other telecommunications -based internet resources can be used to give online reader advisory services on how to reduce the land clearing activities for agriculture, which causes deforestation and makes the average temperature of our climate to increase in the study area.

**3.7 Objective 5**

*Tab 7: How can Information disseminated to users with ICT tools help in mitigating climate change problems*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. It will lower the use of fossil fuel of oil, natural gas and coal that cause global emission and concentrate more on wind, solar and other renewable sources 2. Communities will become conscious of increasing afforestation to create forests since forests absorb carbon- dioxide which causes global warming 3. Save energy at home by using LED bulbs and energy efficient electric appliances, hanging clothes to dry instead of using a dryer, walking or cycling instead of driving that would greenhouse gas emissions. | | | | | | | | |
|  | Strongly disagreed | Disagreed | Undecided | Agreed | Strongly Agreed | Weighted Sum | Mean | Dec |
| Q5A | 0(0.00) | 0(0.00) | 9(3.7) | 48(19.83) | 185(76.0) | 1143 | 4.71 | 1st |
| Q5B | 0(0.00) | 0(0.00) | 10(4.1) | 94(38.8) | 138(57.0) | 1096 | 4.53 | 2nd |
| Q5C | 0(0.00) | 0(0.00) | 10(4.1) | 94(38.8) | 138(57.0) | 1096 | 4.53 | 2nd |
|  |  |  |  |  |  |  |  |  |

From the table, values in the parenthesis are percentages of the frequency counts. Ranks are allocated to each climate change information awareness based on the greater mean.

The result from table 6 shows how Information disseminated to users with ICT tools help in mitigating climate change problems in North Central Nigeria. From the table 6, it is observed that in each case, larger percentage of the sampled respondents agreed to the statements in the table. The responses are ranked based on their means. From the result in the table, it is observed that the respondents ranked the statements in (A) highest with mean of 4.71 *it will lower the use of fossil fuel of oil, natural gas and coal that cause global emission and concentrate more on wind, solar and other renewable sources.* As first, on how Information disseminated to users with ICT tools help in mitigating climate change problems in North Central Nigeria. Statements in B and C with lower mean 4.53, Statements that *Communities will become conscious of increasing afforestation to create forests since forests absorb carbon- dioxide which causes global warming,* and *Save energy at home by using LED bulbs and energy efficient electric appliances, hanging clothes to dry instead of using a dryer, walking or cycling instead of driving that would greenhouse gas emissions* as least means on how Information disseminated to users with ICT tools help in mitigating climate change problems in the studied area*.* The result of the research concluded based on the responses that, Information disseminated to users with ICT tools help in mitigating climate change problems in North Central Nigeria : it will lower the use of fossil fuel of oil, natural gas and coal that cause global emission and concentrate more on wind, solar and other renewable source*s* in the study area.

*Tab 8 Correlation Analysis Showing relationship between ICT and climate change with its associated problems*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Q5A | Q5B | Q5C |
| Q5A | Pearson Correlation | 1 | .408\*\* | .748\*\* |
|  | Sig. (2-tailed) |  | 0.000 | 0.000 |
| Q5B | Pearson Correlation | .408\*\* | 1 | .805\*\* |
|  | Sig. (2-tailed) | 0.000 |  | 0.000 |
| Q5C | Pearson Correlation | .748\*\* | .805\*\* | 1 |
|  | Sig. (2-tailed) | 0.000 | 0.000 |  |
| From the table Q5A, Q5B and Q5C are used to represent the following statements  A. It will lower the use of fossil fuel of oil, natural gas and coal that cause global emission and concentrate more on wind, solar and other renewable sources  B. Communities will become conscious of increasing afforestation to create forests since forests absorb carbon- dioxide which causes global warming  C. Save energy at home by using LED bulbs and energy efficient electric appliances, hanging clothes to dry instead of using a dryer, walking or cycling instead of driving that would greenhouse gas emissions. | | | | |

\*\* Correlation is significant at the 0.05 level (2-tailed).

The result from table 7 shows the correlation analysis of relationship between ICT use in libraries for disseminating information on climate change with its associated problems. From the table 7 it is observed that there is significant positive correlation between ICT use in information dissemination on climate change with its associated problems in public libraries since their P-Values are all less than 0.05 level of significance, shows there is a strong positive relationship between use of ICT tools for information dissemination on climate change and its associated problems in public libraries in North-Central Nigeria, therefore the null hypothesis that says there is no significant relationship between Use of ICT for dissemination of information on climate change in public libraries is hereby rejected

**3.8 DISCUSSION OF FINDINGS BASED ON THE OBJECTIVES**

Objectivequestion 1: sought to find out If the staff of public library in North -Central Nigeria know about Climate change

The study revealed that they know about climate change having agreed to all the questions that indicate the existence of climate change like there is hotter temperature globally as a result of global warming, As a result of human activities heat trapping gases or green- house gases to power our modern lives have been released, Since the past 800,000 years the green - house gases are at their highest levels and these statements are in consonance with the views of Lawrence and Hassnot (2017) about some characteristics of climate change. These characteristics of climate change can be publicised or disseminated with the use of ICT tools on climate change like CD-ROM’s, OPAC catalogues, DVD’S, Smart phones, Printers, Scanners, Internet Websites etcetera. Mobile Apps can be used to disseminate information on climate change and its associated problems. Scanners could be used to digitise information resources on climate change which involves converting print resources to electronic forms which are ICT tools to send information concerning climate change across networks. flash drives, WWW, video conferencing and the printing technology can be employed to store and disseminate climate change information to users who visit the library or by it routing to their Emails. These statements are in consonance with the views of Janakirame and Subra(2015), Aina and Dapo 2014 which are major contributions of the study to show that ICT tools could genuinely be used to disseminate climate change information

Objective 2: sought to find out If the staff of public library in North -Central Nigeria know the problems associated with climate change

The study revealed that that major problems includes but not limited to the fact that nearly all land areas are seeing more than hot days and heat waves, higher temperatures, extreme weather events, shifting wildlife population and habits are problems of climate change, burning fossil fuels like coal natural gas and oil which increased concentration of green- house gases like carbon-dioxide in our atmosphere are problems. These statements are in consonance with the views of Zarin et.al ( 2016 ) and Liu et.al 2015 as to what constitute some major problems of climate change. DVD’S, Smart phones, Printers, Scanners, Internet, Websites. mobile Apps can be used to disseminate information on climate change and its associated problems. Scanners could be used to digitise information resources which involves converting print resources to electronic forms which is an ICT tool to send information concerning climate change across networks. flash drives, WWW, video conferencing and the printing technology can be employed to store and disseminate climate change information and its problems to users who visit the library or by it routing to their Emails. These statements are in consonance with the views of Janakirame and Subra(2015), Aina and Dapo 2014 .The contribution to the study is that the aforementioned ICT tools could be used to disseminate information on climate change problems

Objective 3: sought to find out What ICT tools that could be used to disseminate information on climate change from the public libraries.

The study revealed that to disseminate information on climate change and its problems, the public library can use Computers, OPAC, CD-ROMS, DVD’S, Smart phones, Printers, Scanners, Internet, Websites. Mobile Apps can be used to disseminate information on climate change and its associated problems. Scanners could be used to digitise information resources which involves converting print resources to electronic forms which is an ICT tool to send information concerning climate change across networks. flash drives, WWW, video conferencing and the printing technology can be employed to store and disseminate climate change information to users who visit the library or by it routing to their Emails. These statements are in consonance with the views of Janakirame and Subra (2015), Aina and Dapo 2014 and the contribution to the study is that the ICT tools could genuinely disseminate information on climate change. The contribution to the study is that ICT tools can have a positive effect on climate change information dissemination.

Objective 4: sought to find out, how further the ICT tools can be used to disseminate information on climate change, The study revealed that;

Computers and other telecommunications -based internet resources can be used to give online reader advisory services on how to reduce the land clearing activities for agriculture, which causes deforestation and makes the average temperature of our climate to increase. Provision of web access to OPAC makes it easier for climate information to be supplied to users about acidity and global mean sea level, when it continues to rise as to the devastation and impact it will have on human life, human health, food, water, housing and livelihood. These statements agree with the views of Saidu Tukur and Adamu (2014) The contribution to the study is that ICT tools can have a positive effect on climate change information dissemination thereby corroborating the title that ICT can be a major factor at enhancing climate change information dissemination.

Objective 5: sought to find out how Information disseminated to users with ICT tools help in mitigating climate change problems

The study revealed that;

It will lower the use of fossil fuel of oil, natural gas and coal that cause global emission and concentrate more on wind, solar and other renewable sources, Communities will become conscious of increasing afforestation to create forests since forests absorb carbon- dioxide which causes global warming , Save energy at home by using LED bulbs and energy efficient electric appliances, hanging clothes to dry instead of using a dryer, walking or cycling instead of driving that would greenhouse gas emissions. These statements agree with the views Adebayo et.al 2018 and Igwe 2011. The contribution to the study is that ICT tools can have a positive effect on climate change information dissemination as regards mitigation especially with incorporation of ICT tools like computers, OPAC, CD-ROMS, DVD’S, Smart phones, Printers, Scanners, Internet, Websites. Mobile Apps can be used to disseminate information on climate change and its associated problems and strategies for mitigation.

**CHAPTER FOUR**

**CONCLUSION AND RECOMMENDATION**

**4.1 Conclusion**

Based on all the findings of the study the public libraries in North-Central Nigeria really need ICT tools to be able to disseminate climate change information to users so that every body would know about climate change and its problems, so as to plan on how to mitigate them

**4.2 Recommendations**

Based on the findings of this research, the author makes the following recommendations

The funding authorities of all the public the North- Central Nigeria should as a matter of deliberate policy flood all the public libraries with all manners of ICT equipment that will expedite information dissemination of climate change Information,2 sensitise people on the problems they cause which is plaquing humanity, and (3) sensitise people on how to go about mitigating these problems (4) The public library staff should also add the usage of mass media for adequate information dissemination on climate change and its mitigation.

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