



Assessment of Public Awareness of the Detrimental Effects of Ionizing Radiation in Kontagora, Niger State, Nigeria

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ABSTRACT

This study investigated the level of public awareness of detrimental effects of ionizing radiation in Nigeria, a case study of Federal College of Education Kontagora Niger State. A total of thirty-five (35) Lecturers and seventy-five students (75) were randomly selected from the five schools in the College. The instrument used for data collection was a questionnaire. Data obtained from the questionnaire was analysed using simple percentages. The result of the study revealed that 10 (28.6%) out of 35 lecturers and 32 (42.7%) out of 75 students of the sampled population were totally unaware of ionization radiation and its health detriments. Moreover, the remaining percentage of both Lecturers and Students had limited knowledge about ionizing radiation and its detrimental effects to humans. The research also shows that a significant percentage of both Lecturers and Students claimed that the topic 'Ionizing radiations and their health detriments' is not relevant to their field of academic inclination. Based on the findings of the research, it was therefore recommended that the government, NNRA, Physicist and concerned individuals should enlighten the general public on ionizing radiations, its health detriment and safety measures through seminars and the mass media.

Keywords: *Radiation, Ionizing radiation, Health detriment, Public awareness.*

1. INTRODUCTION

Radiation is the energy that comes from a source and travels through some materials or through space. This energy is in form of high speed particles and electromagnetic waves [5].

Particulate radiation is the energy propagated by travelling corpuscles that have a definite rest mass and within limits have a definite momentum and define position at any instant. These particles are protons, neutrons, electrons, and other subatomic particles. Subatomic particles travel with high speeds, depending on their kinetic energy, but can never attain exactly the speed of light (3×10^8 m/s). Some of these particles have charges (proton, electron, alpha particles, and cosmic rays) and others like Neutrons have no charge. Electromagnetic radiation is a travelling wave motion that results from changing electric and magnetic fields.

On the other hand, electromagnetic radiation constitute the mode of energy propagation for such phenomenon as light waves, infra-red rays, radio waves, microwaves, ultraviolet rays, x-rays and gamma rays.

Both particle and electromagnetic radiations brings about ionization in atoms. Ionization is a process by which a

neutral atom acquires a positive or negative charge. This usually occurs when there is removal of an orbital electron from an atom having positively charged resulting in an ion pair. All radiation, whether particle or electromagnetic that have this ability of ionizing the atom or matter either directly or indirectly are called ionizing radiations.

Ionizing radiations have received the attention of physicist in the present times worldwide, due to the health hazard they constitute when absorbed into the body [8].

The whole of the physical universe is made up of matter which is made of atoms. Most of these atomic processes involve the release of energy in form of ionizing radiation, such processes as radioactivity. Radioactive materials decay spontaneously producing ionizing radiation, which has sufficient energy to strip away electrons from atoms (creating two charged ions) or to break some chemical bonds.

Ionizing radiation is a form of radiation with sufficient energy to remove electrons from their atomic or Molecular orbital shells in the tissues they penetrate [4].

These ionization radiations, received in sufficient quantities over a period of time, can result in tissue damage and disruption of cellular function at the



molecular level. High doses of ionizing radiation can lead to various effects, such as skin burns, hair loss, birth defects, illness, cancer, and death [1,9].

Cancer is the major latent harmful effect produced by ionizing radiation and the one that most people exposed to radiation are concerned about. The development of cancer is not an immediate effect. It may take several years to develop (referred to as the latent period or latency), if it develops at all. Radiation-induced cancers are the same types that are normally found in an unexposed individual. However, after exposure to radiation, these cancer types may occur with some increasing frequency and therefore can be detected only by epidemiological means. Most of these cancers occur only when those individuals reach an age when these cancers would normally be expected to develop.

On the others hand, radiations of lower frequencies that cannot ionize the atom are referred to as Non-ionizing radiations. There have being concerns about the health detriment of Non-ionizing radiations of radiofrequency (GSM, ultrasound, microwave and others). Most people believe this type of radiations is capable of causing malignant growths and other fetal health detriments.

Non-ionizing radiation produces thermal and non-thermal effects on the body. Current research has shown that exposure to this radiation are far below international exposure limit recommended by National Research Programme (NRP) and Institute of Electrical and Electronics Engineering (IEEE) [6,7].

Though, some group of scientists have debated about possible non-thermal effects of radiofrequency exposure below the level recommended by International Commission on Non-Ionizing Radiation protection (ICNIRP) and Institute of Electrical and Electronics Engineering (IEEE) exposure limit, but till today, it has not been established that non-thermal effects of Non-ionizing radiation are capable of detrimental health effect like cancer [3].

In recent years the health hazard due to ionizing radiation has become pronounced, it has been a topic of public discuss in the developed world. Radiation level is becoming increasingly distorted to the detriment of man and the environment. It has therefore become extremely necessary that every part of the world should engage in sustained public education on the facts about radiation [2].

In Nigeria, the level of awareness of the detrimental effects of these ionizing radiations is still a question even among learned circles. This by interpretation means that, the several researches carried out by Radiation Physicists

in Nigeria have not been brought to the understanding of the general population of the Nigerian people who are directly or indirectly affected by this ionizing radiation.

Exposure to ionizing radiation causes health detriments ranging from cancer, DNA damage (mutations) to several other health effects. The developed world had since organized awareness campaigns over the health detriment of ionizing radiations. In Nigeria, the level of public awareness of the detrimental effects of this ionizing radiation is still a concern, since a higher percentage of Nigerians are still not aware of these effects and those with little level enlightenment cannot appropriately differentiate between ionizing and non-ionizing radiation and their health detriments and many have no concern about safety measures.

The main aim of this research work is therefore to investigate the level of public awareness of the health detriment of ionizing radiation in Nigeria with the following objectives:

- (a) To assess the level of awareness of the general public on the detrimental effects of ionizing radiation in the FCE Kontagora College community.
- (b) To investigate the attitude of the general public to radiation safety and
- (c) To elicits the perception of people without scientific related background to the subject.

2. MATERIALS AND METHODS

2.1 Sample and Sampling Technique

To obtain data for this survey research the questionnaire was a strong tool used to obtain data from the respondents. A total of one hundred and ten (110) questionnaires were used to gather data, which involved both the Lecturers and the Students from each school in Federal College of Education Kontagora. The respondents comprising of both male and female were selected randomly from different states of Nigeria. A total number of Seventy five (75) Students, at least eleven (11) from each school in the college were selected while thirty five (35) Lecturers, atleast five (5) were selected randomly from each school in the college. The sample was taking considering that the faculty and students constitute a good representation of Nigeria since both Lecturers and students are from different states of the federation. Table 1 shows the list of the schools in the college and the number of lecturers and student sampled from each school. A representation of the data collected by state of the federation is shown in table 2.

**Table 1: Data collected from Schools**

SCHOOL	L	S
SCIENCES	5	13
LANGUAGES	5	14
VOCATION & TECHNICAL EDUCATION	14	25
ART & SOCIAL SCIENCES EDUCATION	6	11
EDUCATION	5	12
TOTAL	35	75

* L- Lecturers, S-Students

Table 2: Statistics by state of Data collected in FCE Kontagora

S/N	STATE	L	S	S/N	STATE	L	S
1	Abia	1	2	20	Katsina	1	2
2	Adamawa	2	3	21	Kebbi	1	4
3	Akwa- ibom	1	2	22	Kogi	-	1
4	Anambra	2	2	23	Kwara	1	2
5	Bauchi	-	3	24	Lagos	1	2
6	Bayelsa	-	1	25	Nasarawa	-	1
7	Benue	1	1	26	Niger	1	5
8	Borno	-	1	27	Ogun	1	4
9	Cross- river	1	1	28	Ondo	-	3
10	Delta	1	2	29	Osun	2	1
11	Ebonyi	-	2	30	Oyo	2	3
12	Edo	1	3	31	Plateau	1	2
13	Ekiti	2	-	32	Rivers	2	1
14	Enugu	-	3	33	Sokoto	2	2
15	Gombe	1	1	34	Taraba	1	1
16	Imo	-	2	35	Yobe	-	2
17	Jigawa	2	1	36	Zamfara	-	2
18	Kaduna	2	4	37	FCT Abuja	-	1
19	Kano	2	2		TOTAL	35	75

* L- Lecturers, S-Students

2.2 Research Instrument

The instrument used in this research to obtain data was a questionnaire (see Appendix) which contained items relating to the objectives of this research. The respondents were both Lecturers and Students.

The questionnaire is divided into two sections (section A and section B). section A deals with personal information

of the respondent, and section B contains twenty two (22) items which required the respondents to tick his or her desired choice, either strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD).

2.3 Procedure for Data Collection

Data was collected by distributing the questionnaire to the selected respondents from different schools in the college. Answered questionnaire were collected back by the researchers

2.4 Data Analysis Technique

The technique used in analyzing the data collected is simple percentages. In analyzing the data, Strongly Agree and Agree were taken as the same response (Agree). In a similar vein, Strongly Disagree and Disagree were taken as the same response (Disagree).

3. RESULTS AND DISCUSSION

In order to achieve the first objective “(a) to assess the level of awareness of the general public on the detrimental effects of ionizing radiation in the FCE Kontagora College community ” of this research the responses in items 1, 2,3,11,13,14,19 and 20 of the questionnaire were used.

In table 3.1, about 67%, 65%, 60% and 56% of the Students and in table 3.2, about 80%, 72%, 72% and 80% of the Lecturers agreed to the items 1, 2, 3 and 19 respectively. Whereas, the radiation emitted by cell phones, GSM base stations, Microwaves and Ultrasound are Non-ionizing radiations hence, cannot emit ionizing radiation as stated in item 3 or have been proven by recent researches to cause any form of malignant growth (cancer) as in item 1, 2 and 19. This shows that the respondents have low level of awareness or are ill- informed about ionizing radiation and its health detriments.

Most Students in table 3.1, items 11 and 20 claimed that ionizing radiation do not exist or are too low to cause any health detriment in their environment. Whereas, ionizing radiation exist in every environment in Nigeria and some areas have high background radiations which are capable of health detriment. A higher percentage of Lecturers disagreed with the item 11, but had mix feelings in item 20 since about 44% agreed that ionizing radiations in their environment are too low to cause health detriment when they cannot ascertain the level of radiation in their environment unless when measured.

It is worth noting that a higher percentage of about 74% and 88% students and Lecturers respectively in table 3.1



and table 3.2, agreed to item 13 and about 74% and 84% of students and Lecturers respectively agreed to item 14. This is evident because much awareness has been given to people in their early education in Basic Science, Biology or Physics about Ultraviolet and X-rays radiations.

Table 3.1: Student's responses

ITEM	STATEMENT	A	D
1	radiation from cell phone has the potential of causing cancer	29 (67.44%)	14 (32.56%)
2	G.S.M base station emits ionizing radiation	28 (65.12%)	15 (34.88%)
3	micro wave ovens can cause cancer when man is expose to it	26 (60.47%)	17 (39.53%)
11	ionizing radiation does not exist in my environment	26 (60.47%)	17 (39.53%)
13	exposures of human eyes to light causes light cause damage to retina	32 (74.42%)	11 (25.58%)
14	too much expose to x-ray machine cause cancer	32 (74.42%)	11 (25.58%)
19	too much expose to ultra sound scanning during pregnancy may cause cancer	24 (55.81%)	19 (44.19%)
20	ionizing radiation in my locality are too low to cause damage of tissue or DNA	22 (51.16%)	21 (48.84%)

*A-Agree, D-Disagree

Table 3.2: Lecturer's responses

ITEMS	STATEMENT	A	D
1	radiation from cell phone has the potential of causing cancer	20(80.00%)	5(20.00%)
2	G.S.M base station emits ionizing radiation	18(72.00%)	7(28.00%)
3	micro wave ovens can cause cancer when man	18 (72.00%)	7(28.00%)

is expose to it

11	ionizing radiation does not exist in my environment	6 (24.00%)	19(76.00%)
13	exposures of human eyes to light causes light cause damage to retina	22(88.00%)	3(12.00%)
14	too much expose to x-ray machine cause cancer	21(8.00%)	4(16.00%)
19	too much expose to ultra sound scanning during pregnancy may cause cancer	20(80.00%)	5(20.00%)
20	ionizing radiation in my locality are too low to cause damage of tissue or DNA	11(44.00%)	14(56.00%)

Responses to these two items clearly show the role education can play in public awareness of the people.

In general, this research shows that people in the college community have a low level of awareness about ionizing radiation. In fact, about 10 out of 35 lecturers and 32 out of 75 Students that responded to the questionnaire ticked the first item which says 'kindly tick the box if you are not aware of ionizing radiation'. These figures represent about 29% of lecturers and 43% of student's population that were sampled for this research and were completely unaware of the research topic. Some Lecturers interviewed the researchers briefly before responding to the items of the questionnaire this affected the responses they gave to some items in the questionnaire.

The result of this research shows that most people in the college community have little or no awareness about ionizing radiation and its detrimental health effects. It also suffices to say that most Nigerians have low level of awareness of the detrimental effects of ionizing radiation since FCE Kontagora is a representation of Nigeria as shown in table 2.



The second objective “(b) to investigate the attitude of the general public to radiation safety” of the research was achieved by analyzing items 16, 17 and 20.

In table 4.1, about 65%, 67% and 51%, of the Students disagreed to the statement on item 16, 17, and 20 respectively. This result shows that the level of students’ awareness is very low since most of the students denied having been intimated about ionizing radiation or their effects.

show that a significant percentage (about 40%) of the lecturers had no awareness from any person or have been conscious of the safety precaution taking to avoid any of the health detriments of ionizing radiation.

Table 4.1: Student’s responses

ITEM	STATEMENT	A	D
16	I have attended a seminar on exposure to ionizing radiation before	15(34.88%)	28(65.12%)
17	A colleague or friend has intimated me about ionizing radiation before	14(32.56%)	29(67.12%)
20	I have been taking safety precaution against ionizing radiation	21(48.84%)	22(67.44%)
21	I am not aware of any safety measure against ionizing radiation	18(41.86%)	25(58.14%)

Table 4.2: Lecturer’s responses

ITEM	STATEMENT	A	D
16	I have attended a seminar on exposure to ionizing radiation before	7(28.00%)	18(72.00%)
17	a colleague or friend has	17(68.00%)	8(32.00%)

Lecturers on the other hand had their views; in table 4.2 item16 about 72% have not attended any awareness

seminars on radiation. A higher percentage in item17 however argued that they have been intimated by their colleagues in the college. A closer look at the entire results we desire to look at the entire result of the research in this items.

20	intimated me about ionizing radiation before I have been taking safety precaution against ionizing radiation	16(64.00%)	9(36.00%)
21	I am not aware of any safety measure against ionizing radiation	10(40.00%)	15(60.00%)

In general, this research has shown that most students and a considerable number of Lecturers have had any awareness campaign about the health detriment of ionizing radiation and have not been taking any precaution.

The perception of people without scientific related background about ionizing radiation was gathered using Item 18 of the questionnaire. In table 5.1 the percentage of students that agreed to the statement (about 47%) is approximately equal to the number of students that disagree to the statement. In table 5.2, 32% of the Lecturers agree that this environmental topic of international discuss is not relevant to their field of study. About 32% of people who should educate others on these public issues that affect every human being irrespective of their academic inclination are significant.

Table 5.1: Student’s responses

ITEM	STATEMENT	A	D
18	Awareness about ionizing radiation is not important to my field of study	20(46.52%)	23(52.4%)

**Table 5.2: Lecturer's responses**

ITEM	STATEMENT	A	D
18	Awareness about ionizing radiation is not important to my field of study	8(32.00%)	17(68.00%)

The issue of ionizing radiation has become a public issue even on every child's mouth in Europe and America. Hence we have to change our perception to environmental issues in Nigeria especially in the education setting where the public are expected to be enlightened irrespective of our fields of human endeavours.

4. CONCLUSION

In this study, public awareness of the detrimental effect of ionizing radiations was carried out in Federal College of Education, Kontagora, Niger State, Nigeria. The following were evident in the study.

From the results obtained in this study it was found that 10(28.6%) out of 35 lecturers and 32(42.7%) out of 75 students of the sampled population were totally unaware of ionizing radiation and their health detriment. Moreover, the remaining percentage that responded to the questionnaire for both Lecturers and students also had low level or no awareness about ionizing radiations and their health detriments to the environment.

Result of the research also show that; most students and a considerable number of lecturers have had any awareness campaign about the health detriment of ionizing radiation and have not been taking any safety precaution against the menace of this radiations.

A significant percentage of both Lecturers and Students claim that the topic 'Ionizing radiations and their health detriments' is not relevant to their field of academic inclination. Whereas, ionizing radiation and their health detriment has become a topical issue in the world environmental challenges in Europe, America and some Asian countries. In Nigeria today many people are affected by the emissions of the background or acute radiation of this ionizing radiation. It is imperative for every concern Nigerian to rise and join the Physicists, Nigerian Nuclear Regulatory Authority (NNRA) and the mass media in campaigning about the health detriment and safety measures to avoid the fatal effects of these ionizing radiations.

5. RECOMMENDATION

Based on the findings of this study, the following recommendations were made by the researchers.

- More empirical researches should be conducted by physicist in Nigeria to ascertain levels of environmental exposures to ionizing radiations in all states of the federation.
- The government, NNRA, Physicist and concerned individuals should enlighten the general public on ionizing radiations, its health detriment and safety measures through seminars and programmes on the mass media.
- Nigerians should take seriously any environmental issues (Ionizing radiations, global warming, Tremors, earthquakes, lead poisoning and others) as it affects not only the people in those fields of study but every individual in the society.

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APPENDIX

Questionnaire

Dear Sir/Ma,

This questionnaire is designed to elicit information that will be useful to the researcher.

The success of this research is dependent of your responses. Thus the researcher solicits for your sincere and honest responses to the items contained in this questionnaire. The questionnaire consists of two sections. Section A- personal data and section B, which contains, if strongly agreed (SA), agreed (A), disagreed (D) and strongly disagreed (SD). Note that all information given will be dealt with as confidential and will be used for this research purpose only. Thank you.

SECTION A: PERSONAL DATA

1. Lecturer Student
2. Sex: Male Female
- 3.State of Origin:.....
4. School:.....
5. Department:.....
6. Age: 18-25 26-30 36-49 50 above

SECTION B

Kindly tick the box if you are not aware of ionizing radiation

S/N	QUESTIONS	SA	A	SD	D
1.	Radiations from cell phone have the potential of causing cancer				
2.	G.S.M Base Station emits ionization radiation.				
3.	Microwave Ovens can cause cancer when a man is exposed to it				
4.	Exposure to ionizing radiations results in DNA damages				
5.	Our bodies absorb ionizing radiations in our offices and lecture rooms				



6.	Ionizing radiations are not present in my home				
7.	Our bodies absorb ionizing radiations in our environment				
8.	Acute exposure to ionizing radiation causes necrosis and nausea				
9.	Placing a laptop on the laps may cause cancer				
10.	Radiation exposes tissue inside the body when inhaled or ingested				
11.	Ionizing radiation do not exist in my environment				
12.	Only atomic weapons and atomic reactors emit ionizing radiation				
13.	The exposure of human eyes to light causes damage to retina				
14.	Too much exposure to x-rays may cause cancer				
15.	When individual is exposed to ionizing radiation, some symptoms don't show till after 10 to 15 years of exposure				
16.	I have attended a Seminar on exposure to ionizing radiation before				
17.	A colleague or friend has intimated me about ionizing radiation before				
18.	Awareness about exposure to radiation is not important to my field of study				
19.	Too much exposure to ultra sound scanning during pregnancy may cause cancer				
20.	I have been taking safety measures against ionizing radiation exposure				
21.	I am not aware of any safety measure against radiation				
22.	Ionizing radiations in may locality are too low to cause damage of tissue or DNA				