

Non-Ionizing Radiation in Africa

Mohammed Idriss Ahmed Mohammed

Institutional Affiliation: Sudan university and Technology

Abstract

Radioactivity can be described as a natural phenomenon, and these sources of radiation are features of the environment. There are many advantages of radiation and radioactive substances. However, radiation may be a risk to human beings. Regulation of safety measures is a national responsibility. The government is supposed to enact laws to offer guidelines on matters of nuclear energy. IAEA is a global nuclear safety regime for all countries of the world. Every state is required to conform to the regulations provided by the body. The report provides a descriptive analysis of non-ionization in African countries and the state of the regulatory bodies. From the analysis of the table, the Eastern countries stand at 67%, having regulatory bodies and countries of Central Africa. The nations of the north seem to have constituted regulatory bodies as they stand at 83%, while countries to the west are 38%.

Key words: Non-ionizing Radiation, Africa,

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I. Introduction

The progress of countries is measured by taking care of human health and fighting all things that cause risks to them, with the rapid progress of the world in various fields and the entry of technology into human life in an instant, including the use of mobile phones in daily life, as the developed countries felt to put laws and legislations for them in each of the European Union(Council of the European Union), America and The International Organization for the Protection from Non-ionizing Radiation (ICNIRP)as a global organization As for the continent of Africa, it does not yet contain an organization to monitor work on non-ionizing radiation, In this research, we made statistics on African countries and the legislative authority for each country and the percentage of non-ionizing radiation to them

Angola joined the Ionization organization, IAEA, in September 1999, and since then, it has embarked on such activities of nuclear science and technology. The designation of the Ministry of Science and Technology was done in July 2000 to operate as the national response authority responsible for co-operation with IAEA ^{1}.

Mali has been involved in collecting already used sealed radioactive sources to keep in safe storage in its capital Bamako and away from criminals. The body mandated with the activity is called Radiation Protection Agency.

Guinea established the Gazi Non-Ionization Protection Centre in 2005 with the help of Dr.Seyhan. The organization has organized several activities across the country like seminars to educate residents about the need for safety ^{2}

Ghana is a member of the International Telecommunications Union, an inter-governmental body, and a UN agency. In 2018, the National Communication Authority set up a Laboratory to check all mobile phones, tablets, and imported electronics if they are up to standards ^{3}.

Togo did adopt a bill that ensured the safety of its citizens against nuclear energy. Togo aimed to conform to the International Atomic Energy Agency's recommendations by regulation of a well-structured legal framework to assist meet the international standards. Togo began the move on November 30th 2012 ^{4}

Mauritius launched an act that aimed at establishing a Radiation Safety and Nuclear Security Authority to regulate and control all radiation sources and practices against the harmful effects of ionizing radiation. The Act was legislated in 2018. The designated authority was established to look at the affairs of the Act. It was called the Radiation Safety and Nuclear Authority.

Algeria adopted their law of No.19-05 of July 17th, 2019, on nuclear activities related to research, the peaceful use of nuclear energy, and production. The law indicates human protection on the effects of radiation, ionization, the protection of the environment, and generations ^{5,6}.

Mozambique has a law that establishes a legal regime body governing nuclear energy's safety and peaceful use. It aims at protecting the lives of individuals, property, and the environment against emissions of radioactivity ^{4}.

Zimbabwe uses the equipment database of the Radiation Protection Authority to monitor nuclear energy. It is the body designated with the mandate to look at the issues concerning radiation in Zimbabwe. A

study was conducted in Zimbabwe from the Radiation Protection Authority database to look at a detailed analysis of licensed radiological equipment resources in Zimbabwe^{4}.

Burundi is a country found in the Eastern region of Africa. The Atomic Energy Council established in 2008 in Burundi was in co-ordination with the provision of Act mandated with the regulation of peaceful use of atomic energy. The structural body consists of a secretariat, which is the critical organ in managing the body^{4}

Nigeria established an authority in December 2013 called the Nigerian Authority for Atomic Energy. The aim was to supervise, coordinate, and promote peaceful nuclear applications.

Uganda has a body that regulates nuclear energy known as The Uganda National Radiation Protection Service, established in 1970 by an Act of parliament. It was established to oversee and enforce radiation sources' safety, protect the people, environment from emission of radiation and radioactive wastes. In Uganda, studies have been done to ascertain the current activities of NRPS in radiation protection. Uganda is one of the few countries in Africa that established radiation protection and safety in the 1970s.

Burkina Faso is a country from West Africa which is a member of the IAEA since 1998. Its body that regulates nuclear energy is known as Burkina Faso nuclear safety regulatory body. Studies have been done in Burkina Faso to ascertain the state accounting system for and control of nuclear material. The body is alongside the Secretariat Technique Energy Nuclear, which also has the mandate to regulate nuclear energy^{9}

Kenya amended the 1982 Radiation Protection Act in 2018 to enhance the national legal and regulatory regime to conform to international standards. The body that regulates radiation and nuclear energy was established in 2018, known as the Radiation Protection Board. Its mandate is to regulate national-wide nuclear security and nuclear safeguards and secure the management of radioactive wastes^{4}

Tanzania established the Tanzania Atomic Energy Commission by an Act of parliament of 2003. It is designated at protecting the public and the environment against the effects of the use of both ionizing and non-ionizing radiation. Together with other institutions, the commission researched measurements of electric field strength around cell phone base stations in the country. The research aimed at observing the levels of EMF exposure that are exposed to the members of the public^{7}.

Rwanda has the Regulatory Authority that has done a lot since 2013. It is the body that regulates nuclear energy in Rwanda. It has embarked on its role, purchasing equipment to deal with radiation in the country.

Ethiopia. The nuclear techniques application in Ethiopia started in the 1960s in the medical field and later in other fields. The National Radiation Protection Authority is designated with the mandate to regulate nuclear energy in the country. It was established in 1993. It aimed to regulate the activities of nuclear energy as well as conform to international standards. There are several studies done in Ethiopia. Some aimed at describing the status of the safety of radiation sources and the security of radioactive materials^{5}

Chad has an authority that regulates nuclear energy known as The Chadian Agency Radiation Protection and Nuclear Security. The law created the authority in 2008 to ensure the physical protection of nuclear emissions and ionization radiation sources.

Democratic Republic of Congo (DRC) enacted an Act in 2002 of Regulatory Framework Nuclear of the DRC to regulate nuclear energy. Its mandate was to prepare, among other things, the regulations and set guidance on the need exercise protection and safety of nuclear emissions.

Lesotho passed the radiation Protection Agency Bill of 2018, which aimed at saving many patients of cancer.

Namibia has the National Radiation Protection Authority, which serves as the atomic energy and radiation protection act administrator. It is established as an independent regulatory body to regulate nuclear energy.

Senegal has a regulatory authority body that does inventory on sources of ionizing radiation and nuclear material. It was established in 2011.

Seychelles enacted an act of parliament that protects persons, society, and the environment against the harmful effects of ionizing radiation. It was established in 2014. It has a competent authority under the Ministry of Energy.

Comoros is a country found in the Eastern part of Africa. Comoros has not established an authority to regulate nuclear energy.

The Gambia is also found in the West part of Africa. An Atomic Energy Protection bill passed to offer protection to the members of the public and environment.

Sierra Leon is found in West Africa. No much on the nuclear program.

Guinea Bissau is a country in West Africa. The communication Authority of Guinea Bissau provides safety precautions on the use of electric objects.

Ivory Coast is found in the west part of Africa.

Cape Verde is a state found in West Africa. There is not yet an established authority to deal with the emissions of ionizing radiation.

Niger is found in West Africa. It has a comprehensive nuclear legal framework that provides for the establishment of an authority.

Benin is found in West Africa. No provision of energy reports in the country.

Madagascar is in the region of Eastern Africa. It does not have any authority to regulate nuclear energy.

Liberia is a country in West Africa. There are no established authority bodies for nuclear energy regulation.

Djibouti is found in the Eastern part of Africa. It has no regulatory body on nuclear energy.

Somali is located in the lower part of Eastern Africa. Researches have been conducted to ascertain the effect of mobile phones by radiation.

Southern Sudan is the newest country in Africa, located in the Eastern part. Little is known of its operations on nuclear energy.

Sudan **It has a separate legislation for the legislation on ionizing radiation and non-ionizing radiation**

Gabon is found in the Central part of Africa. It has not established the authority for nuclear energy regulation.

The Central Republic of Africa is part of countries found in Central Africa. No authorities for regulation of nuclear energy.

Mauritania is located in West Africa. The authority to regulate nuclear energy is not established.

Libya had put a lot of emphasis on nuclear energy since 1982 when an Act of law was enacted. A National Commission on Radiation was established according to Act number 2.

Sudan is a country in the northern part of Africa. Studies have been conducted to establish the effects of radiation on the use of cell phones—no established authority to deal with ionization ("Algeria - Health," n.d.).

Egypt started radiation protection in the early 1950s. It has embarked on Radiation protection Activities, which are the Atomic Energy Authority's duties by the Act of 288 (8).

Tunisia is located in the northern part of Africa. Little is known of its activities on nuclear energy.

Morocco has several nuclear-related institutions. The National Centre for Energy and Nuclear Science and Technology is a public organization established in 1986 to research energy and promote its application in different sectors of the economy and social well-being.

Sao Tome Principe, it's a country in Central Africa. It has several missed in international forums for the resolution of nuclear radiation threats.

Cameroon passed the bill, which allowed for the general framework for radiological and nuclear safety, security, civil liability. An authority in charge of regulation and regulatory control was created.

Swaziland's workplace health and safety laws are contained mostly in industries, the Machinery and Construction Works Act of 1972, and the occupational safety and health of 2001.

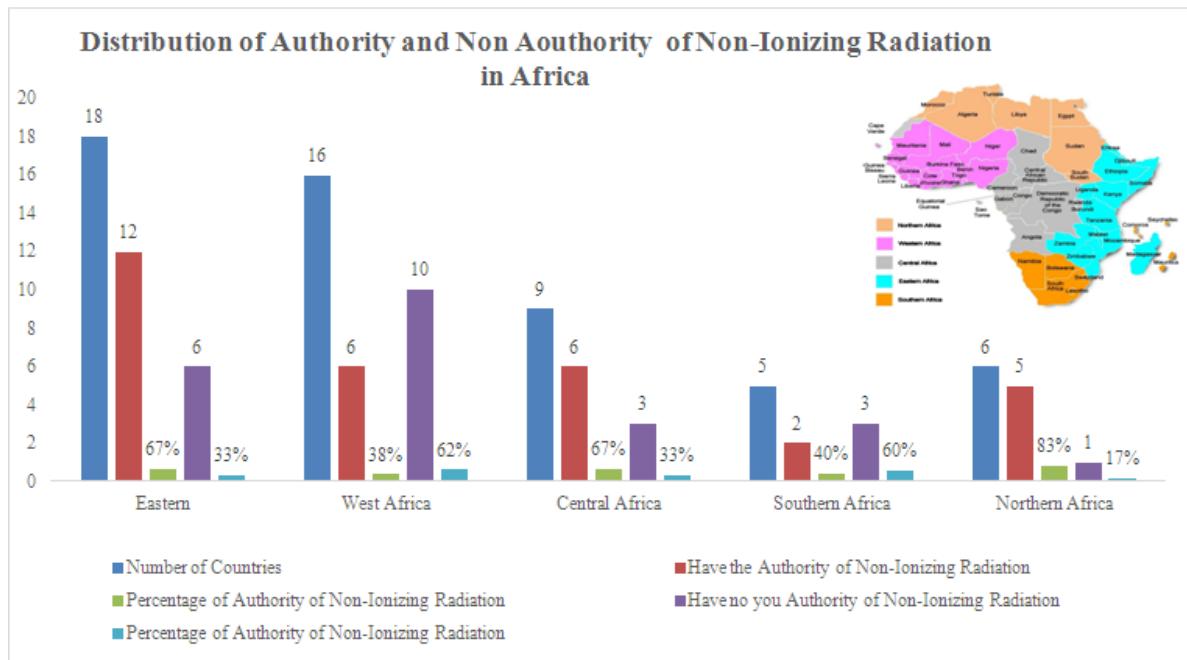
Eritrea is located in the Eastern part of Africa. Little is known of its operation on nuclear energy.

Malawi government has enacted an Act of parliament to provide adequate protection of the public and the environment now and shortly against the effects of ionization. The Atomic Energy Regulatory Authority was established to provide governance and management on matters of nuclear energy.

II. Result and discussion

We have distributed the African countries according to geographical regions, and each country has been studied in terms of the authorities concerned with non-ionizing radiation, according to the table shown below.

Region in Africa	Number of Countries	Have the Authority of Non-Ionizing Radiation	%	Have no you Authority of Non-Ionizing Radiation	%
Eastern	18	12	67%	6	33%
West Africa	16	6	38%	10	62%
Central Africa	9	6	67%	3	33%
Southern Africa	5	2	40%	3	60%
Northern Africa	6	5	83%	1	17%



With a general view of the African continent From the analysis of the table, we see that in the northern region of the continent there are the number of countries that having regulatory bodies, the largest countries by 83%, while in the southern and western regions of the continent the percentages are 40% and 38% respectively in terms of legislation for them on the other hand, the percentage is in the eastern regions The mean is equal at 67%. The difference between the largest and the smallest is 45%.

III. Recommendations

1. The work of a conference of specialists and experts in the African continent in the field of non-ionizing radiation in Africa, with coordination with ICNIRP, they have annual or semi-annual
2. The work of a union of African countries for non-ionizing radiation and taking a decision for it in one of the countries and referring to it to ICNIRP and defining the roles of the African Union and a proposal in the name of
3. Conducting research and seminars in this field for countries that still have any authority in this field

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