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ASSESSMENT OF ELECTROMAGNETIC FIELDS (EMF) ON HUMAN HEALTH IN UYO METROPOLIS

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ABSTRACT
The society have been overwhelmed by the expanding sources of Electromagnetic Field (EMF) that come from communications, electricity, appliances, medical equipment, and many more things that we use in our everyday lives since the beginning of the twentieth century. Despite the fact that these new technologies have become unavoidable and vital, the electromagnetic fields they generate may pose health concerns and dangers to humans. Some studies have shown a relationship between EMF exposure and an increased risk of leukaemia, cancer, brain tumours, and other illnesses. Furthermore, there is substantial ambiguity about the exact processes causing these biological dangers, as well as whether types of magnetic, electric, or both fields are of major concern. It goes without saying that, regardless of whether the consequences of this EMF are minor or severe, the study recommends that we take all reasonable steps to keep our exposure to EMF to a minimum. To achieve this, all parties participating in or impacted by the exposure should adhere to the RF safety regulations and recommendations established by regulatory bodies such as the IEEE, WHO, ICNIRP, and other similar organisations. If the aforementioned instructions are not followed immediately, the population will be exposed to a high pandemic risk of possibly lethal illnesses in the future.

Keywords: Electromagnetic; Fields; Human; Health; Immune System

INTRODUCTION
Several scientific publications have raised concerns about the adverse non-ionizing radiation from electromagnetic field (EMF) exposure emitted by certain power, electrical, and wireless devices commonly found in the home, workplace, school, and community, as well as the impact on individual and public health Balmori Balmori Balmori Balmori Bal (2009). Despite the many problems in producing indisputable scientific evidence of damage and the different gaps in explaining the specific mechanisms of harm, epidemiological data continue to imply that non-ionizing radiation exposure poses a significant risk of injury and sickness Geniuses (2008). Because environmental health has not been emphasised in medical school, some doctors are unaware of probable EMF-related health concerns, according to Genuis and Lipp (2011), and as a consequence, non-ionizing radiation symptoms may be misdiagnosed and ineffectively addressed. While ionising radiation from X-rays is well known for the potential for cellular and tissue damage,

electromagnetic radiation (EMR) from power lines, mobile phones, ordinary electrical gadgets, and certain kinds of equipment has recently gained attention as a possible health danger. Ko and Hsieh (2008). The present paper's primary goal is to provide an overview of the probable effects of electromagnetic radiation (EMR) on human health in diverse situations Larrabee is a fictional character (2006).

OVERVIEW OF ELECTROMAGNETIC SPECTRUM

Non-ionizing radiation is a form of energy that is emitted or radiates away from its source. There are several types of energy, each with its own set of physical characteristics that may be measured and described in terms of frequency and wavelengths. Some waves have a high frequency, while others have a medium or low frequency. The electromagnetic spectrum is a term that refers to a collection of different energy types that come from diverse sources. Types of EMR are the types of energy that are emitted. Gamma rays, X-rays, and ultraviolet light have high frequencies, whereas microwaves and radio waves have lower frequencies. Raschke and Mann (2004).Normal eyesight and the light we sense are provided by light wave emission at medium frequencies; infrared energy enables us to detect heat. X-rays, ultraviolet radiation, and radio waves are examples of energy types that are unseen and undetectable to humans. Most frequencies cannot be recognized without specialist equipment, and as a consequence, individuals do not prefer being exposed to energy fields in these regions. Despite popular belief, high-frequency energy, such as X-rays, is known as ionising radiation and is potentially harmful to human cells. Ionizing radiation may cause DNA damage or mutation by changing the atomic composition of cell structures, disrupting chemical bonds, and triggering free radical production. This increases the chance of cancer or cell death.

NON-IONIZING RADIATION

Many experts believe that non-ionizing radiation, which refers to energy types with lower frequencies, is harmless and has no harmful consequences at ordinary exposure levels. However, recent data shows that certain non-ionizing radiation frequencies may have the potential to cause biological damage. The majority of research on the health effects of anthropogenic non-ionizing EMR has been done on the following three types of anthropogenic non-ionizing EMR. Mat, Kho, Joseph, Kipli, Sahrani, Lias, and Marzuki, for example, are very low frequency EMR from power lines, electrical appliances, and electronic equipment (2010).

The second source of pollution is electrical pollution, which occurs when certain electronic devices (such as plasma televisions, energy-efficient appliances, variable-speed motors, and so on) produce frequency signals in the 3–150 kHz range, which then flow along and radiate from wiring in affected homes and other buildings.

Third, wireless communications equipment such as wireless telephones, cell towers, and antennas, as well as broadcast transmission towers Bergstram, Hernell, Persson, and Vessby, emit microwave and radiofrequency emissions (1996). Ground current, also known as stray current, is energy that does not travel through electrical wire. Electrical current takes the route of least resistance, which might include ground, cables, and numerous things. As a consequence, electrical energy may travel through the ground and into building structures through devices like metal pipes or rods in plumbing equipment, dispersing non-ionizing radiation into the surrounding environment.

HUMAN HEALTH AND EMFS

While medical investigations linking EMF to negative health consequences have sometimes produced seemingly conflicting findings, studies looking at reproductive dysfunction and cancer potential tend to back up prior hypotheses that EMF exposure might be harmful. Maternal EMF exposure has been related to a

variety of negative pregnancy outcomes, including miscarriage, stillbirth, premature delivery, changed gender ratios, and congenital abnormalities. For example, peak EMF exposure in 1063 pregnant women in the San Francisco region was described in a large prospective research published in Epidemiology. Researchers discovered that rates of pregnancy loss increased dramatically with increasing levels of maximal magnetic field exposure in daily life when participants wore a magnetic field detector.

Several research have looked at the possibility that prolonged exposure to certain frequencies of EMR might cause cancer. A significant population-based case–control research on the relationship between juvenile leukaemia and magnetic fields in Japan, for example, was recently published in the International Journal of Cancer. The researchers established that high EMF exposure was linked to a considerably greater incidence of childhood leukaemia by measuring magnetic field levels in children's bedrooms.

IMPACT OF EMF ON PHYSICAL AND PSYCHOLOGICAL OF POPULACE

Debilitating symptoms may impact every bodily system, including the central nervous system, musculoskeletal system, gastrointestinal tract, and endocrine system, in people with EHS. Symptoms often result in persistent psychological tension and a strong dread of being attacked by EMR everywhere they go. Many people are rendered immobile by their dread of an unseen wireless signal inducing significant symptoms in their bodies at any moment and in any location. This unrelenting dread and obsession with health problems may have a significant influence on well-being to the point that people acquire a fear of electricity and a dislike for it, with others wishing to live in the wilderness.

EMF EFFECTS OF MOBILE PHONES AND TELECOMMUNICATION

Mobile phones employ electromagnetic fields (EMFs) to send and receive signals, which are partially absorbed by the MP user. Because MPs are often used in close proximity to the head, Matthews and Henshaw have expressed worry about potential negative health impacts (2009).

The frequency of maximal RF energy absorption varies depending on body size, shape, orientation, and composition, which makes it difficult to translate exposure sources for people to experimental research in rodents. In rats, maximum resonant absorption occurs in the microwave and mobile phone frequency ranges employed in studies (0.5 to 3 GHz), but would grow to roughly 100 MHz in humans. This element may theoretically be included in SAR calculations, but it poses a dilemma for studies that rely only on the external field strength to determine exposure levels. In laboratory rats, penetration depth is predicted to be larger than in humans, and their tissue characteristics, heat redistribution, and dissipation processes vary. The RF exposure cell is another possible cause of exposure level errors. Expose cells to the body's resonance signal.

EMFS AND NERVOUS SYSTEM (BLOOD–BRAIN BARRIER)

The blood–brain barrier in mammals is made up of endothelial cells connected by tight junctions as well as pericytes and extracellular matrix. It keeps the extracellular milieu constant, which is important for proper synaptic transmission, and it protects neural tissue from harm. Mukhopadhyay and Sanyal believe that an increase in its generally modest permeability for hydrophilic and charged compounds might be harmful (1997).

Environmental heat that exceeds a mammalian's thermoregulatory capability may make the blood–brain barrier more permeable to macromolecules. The absorption of neuronal albumin in several brain areas has recently been demonstrated to be dose-dependently linked to brain temperature, with effects appearing at 1°C or higher temperature rises. Given the capacity of sufficiently powerful RF fields to cause tissue

heating, it appears reasonable to speculate that this may be a mechanism resulting in enhanced blood–brain barrier permeability.

EMF EFFECTS ON SLEEP

High-frequency EMF exposure has certain sleep-related consequences. For a variety of reasons, this looks to be an important issue. Anecdotal accounts of persons who feel they are being impacted by radiofrequency EMF have included complaints about sleep problems, leading to suggestions that EMF may interfere with regular sleep patterns, perhaps mediating various health effects. The physiological backdrop of sleep as a highly complicated biological process mediated by the central nervous system must be considered when assessing the possible risk of sleep disorders. The regular sequences of waking and sleeping states are critical prerequisites for accurate information processing in the brain, metabolic equilibrium, and intact immunological function, despite the fact that the specific neurobiological processes are unknown in full.
Furthermore, since sleep is a well-defined biological state that reacts extremely sensitively to external stimuli, it seems to be a suitable physiological system to study with the goal of clarifying the interaction between high-frequency EMF and the human body. There is mounting evidence that weak high-frequency EMF, at values much below those required to create considerable heating, may potentially have biological consequences. The current effort to address the effects of non-ionizing high-frequency EMF is obviously centred on cancer risk, which might be explained by an adoption of the fear of ionising radiation's carcinogenic consequences.

RESEARCH METHODOLOGY

Research Design

Survey design was used for the study. The design can be described as an outline, a general arrangement or plan from which something may be made Nworgu (1991:136).

AREA OF STUDY

It is the geopolitical headquarters of Akwa Ibom State as well as Uyo Local Government Area. Uyo LGA is located on latitude 0532^{o}North and longitude 07 56^{0}East. It is bounded on the South by Nsit Atai and Nsit Ibom Local Government Area, on the East by Uruan Local Government Area while North is Itu and bounded on the West with Etinan local government Uyo is located within the low land coastal region of Nigeria.

SOURCE OF DATA

The data of the research are of two kinds; primary and secondary data. Graham (2009: 141) agrees that the primary data contains a direct or original account of event or phenomena given by someone who actually observed the event or phenomena. These are relevant information obtained from the works of others. The following sources provided the information which are: Textbooks, journals, magazine and unpublished articles; Research and project reports in a related field; Manuals containing policy statement of the selected companies.

POPULATION OF THE STUDY

The population of the study consisted of all the populace leaving in the commercial area of Uyo metropolis.

SAMPLING AND SAMPLE SIZE

The Sample sizes of 383 respondents were in the study area**.** The sample size was statistically determined using the sample fraction

DATA COLLECTION INSTRUMENT AND VALIDATION

The research instrument used for the study was the questionnaire. The questionnaire was used to obtain data on the independent and dependent variables presented in both sections A and B of the questionnaire. While section A measured the demographic data of the respondents such as name, gender, age, educational qualification and marital status, section B measured the independent variables. Likert (1932) scale was used in the study.

TECHNIQUES OF DATA ANALYSIS

The data obtained were analyzed using Pearson moment correlation analysis.

DATA PRESENTATION AND ANALYSES

Table1: Distribution of Respondents by sex

Sex	No. of Respondents	% of Respondents
MALE	194	50.65
FEMALE	183	47.78
Total	383	100

Table 2 shows that one hundred ninety four (194) respondents representing 50.65% of the sample population were male while one hundred and eighty three (183) respondents representing 47.78% of the population were female.

Table 2: Age Distribution

Age	No. of respondents	% of Percentage
20 – 25	106	27.67
26 – 30	77	20.10
31 – 35	56	14.62
36 – 40	88	22.97
41 – Above	56	14.62
Total	383	100

Table 2 shows that hundred and six (106) respondents representing 27.67% of the sample were between the age bracket of 20 – 25 years, seventy seven (77) respondents each representing 20.10% were between the age bracket of 26 – 30 years, fifty six of the respondents representing 14.62% were 17% were 31 – 35 years respectively, also eighty eight (88) respondents representing 22.97% of the sample were between the age limit of 36 – 40 years and fifty six (56) respondents representing 14.62% were within the age limit of 41 and above years.

Table 3: Marital Status Distribution

Status	No. of Respondents	% of Respondents
Single	158	41.25
Married	134	34.98
Divorced	55	14.36
Widow/Widowers	36	9.39
Total	383	100

Table 3 above shows that one hundred and fifty eight (158) respondents representing 41.25% of the sample were single, one hundred thirty four (134) respondents representing 34.98% of the sample were married, only fifty five (55) respondents representing 14.36% of the sample were divorced as well as only thirty six (36) respondents representing 9.39%

Table 4: Educational Qualification Distribution

Qualification respondents	No. of Respondents	% of Respondents
WAEC/NECO	162	42.29
OND	101	26.37
HND/BSC	53	13.83
MSC	21	5.48
PHD	46	12.01
Total	383	100

Table 4 shows that one hundred and sixty-two (162) respondents representing 42.29% of the sample were WAEC/NECO holders, one hundred and one (101) respondents representing 26.37% were OND/NCE certificate holders; fifty three (53) respondents representing 13.83% were holders of HND/BSC certificates holders, while twenty one (21) respondents representing 5.48% were MSC certificate holders and only forty six (46) respondents representing 12.01% of the population were PHD holders.

HYPOTHESIS ONE

There is no effect of electromagnetic radiation on human immune system. In-order to test the hypothesis, Independent t-test analysis was used in comparing the mean score of the two groups. (See table 5).

TABLE 5 Independent t-test analysis of effect of electromagnetic radiation on human immune system

Variable	N	X	SD	t
High	234	12.01	1.30	
		21.45*		
Low	149	15.15	0.71	

Significant at 0.05 level; df= 381; N= 383; critical t-value = 1.96

The above table 5 presents the obtained t-value as (21.45). This value was tested for significance by comparing it with the critical t-value (1.96) at 0.05 level with 381 degree of freedom. The obtained t-value

(21.45) was greater than the critical t-value (1.96). Hence, the result was significant. The result therefore means that there is There is no effects of electromagnetic radiation on human immune system

HYPOTHESIS TWO

There is no effects of effects electromagnetic radiation on human skin infection. In-order to test the hypothesis independent t-test analysis was used in comparing the mean score of the two groups. (See table 6).

TABLE 6

Independent t-test analysis of effects electromagnetic radiation on human skin infection

Variable	N	X	SD	t
High	201	12.07	1.34	
		18.31*		
Low	191	15.00	1.09	

==========*

Significant at 0.05 level; df= 381; N= 383; critical t-value = 1.96

The above table 6 presents the obtained t-value as (18.31). This value was tested for significance by comparing it with the critical t-value (1.96) at 0.05 level with 381 degree of freedom. The obtained t-value (18.31) was greater than the critical t-value (1.96). Hence, the result was significant. The result therefore means that there is effects electromagnetic radiation on human skin infection

DISCUSSION OF THE FINDINGS

The result of the data analysis in table 5 is significant due to the fact that the obtained t-value (21.45) was greater than the critical t-value (1.96) at 0.05 level with 381 degree of freedom. This result implies that there are significant effects of electromagnetic radiation on human immune system. The significance of the result caused the null hypothesis to be rejected while the alternative one was accepted.

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CONCLUSION

Given the pervasiveness of EMFs, their wide range of applications, and their potential for harm, thorough examinations of the health risks are essential.is currently not possible to establish a solid judgement. However, the likelihood of unfavourable outcomes cannot be ruled out. Several studies using suitable methodology have shown that EMFs may have negative health impacts. The lack of a well-established biointeraction mechanism, however, does not invalidate this research since there are other plausible mechanisms, such as OS, that might explain the reported results.

As a result, the urgent need is to limit the growing number of scientific investigations and to put in place comprehensive, well-coordinated blind scientific investigations, particularly long-term studies that overcome all limitations and flaws in previous findings with appropriate replication studies and follow-up. Standardized study methods, as well as the inclusion of proper exposure assessment techniques, are required for the discovery of dosage response relationships, if any, and the explanation of biological interaction mechanisms. We may stay far from any clear conclusion if we do not work on the flaws of past discoveries.

Simultaneously, it is vital to analyse EMF experiments by focusing on the parallels and differences rather than the endpoints attained.

RECOMMENDATIONS

One of the most important findings of this report is that we recognise whole radiation ways that may be mentioned, such as microwave radiation, that can produce effects on the nervous, cardiovascular, immune, and reproductive systems, including damage to the nervous system by altering electroencephalogram, changes in neural response or changes in the blood–brain barrier, disruption of circadian rhythms (sleep–wake) by interfering with the pineal gland, and disruption of circadian rhythms (sleep–wake) by inter-heart rate and blood pressure fluctuations, Health and immunity to infections are harmed, as are fatigue, weariness, plumage degeneration, growth issues, DNA damage, cancer, and the impact on pregnant ladies.

All required safeguards are taken to keep our EMF exposure as low as possible. To achieve this, all parties participating in or impacted by the exposure should adhere to the RF safety regulations and recommendations established by regulatory bodies such as the IEEE, WHO, ICNIRP, and other similar organisations. If the aforementioned instructions are not followed immediately, the population will be exposed to a high pandemic risk of possibly lethal illnesses in the future.

Finally, all structures constructed from radiation defined are encouraged, as is the use of excellent protection for all high voltage transmission cables. When electrical and communications companies want to mount their radiation devices, they must pay attention to all of the above outlines that have been mentioned. In urban areas, most transmission lines must be installed underground because the high voltage radiation impacts will be reduced. There is also some equipment that neutralises radiation effects and prevents the scattering of harmful electromagnetic radiation effects.

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