Electromagnetic Radiation and Spatial Proximity of Mobile Communication Base Stations: Analysis of Compliance in Sagamu Metropolis

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Certification

This is to certify thatOlabisi Olayinka Onalaja with matriculation number LCU/PG/001077 carried out this research work titled “Electromagnetic Radiation and Spatial Proximity of Mobile Communication BaseStation**s**” in the Department of Computer and Physical Sciences, Faculty of Basic Medical and Applied Sciences, Lead City University, Ibadan, Oyo State for the award of Master of Science Degree (M.Sc.) in Computer Science, faculty of Basic Medical and Applied Sciences, Lead City University, Ibadan, Oyo State, for the award of Master of Science in Computer Science and that this has not been previously submitted.

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Dedication

This project is dedicated to Almighty God, for his infinite mercy, protection and unending grace that he bestowed upon me, throughout my stay in the institution

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Acknowledgement

Firstly, my sincere appreciation goes to my prestigious institution Lead City University for the opportunity given to me to complete my Master's Program and to the University library for the provision of the materials needed.

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"Though the above-mentioned institution and persons have assisted in the process of this research work, I alone stand responsible for errors, if any, found in the work"

Abstract

Electromagnetic radiation emanating from randomly selected 113 GSM Mobile Base Transceiver Stations (MBTSs) in different regions of Sagamu, Ogun State, Southwest, Nigeria, was assessed according to the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines, National Communication Commission (NCC), *National Environmental Standards and Regulations Enforcement Agency (NESREA).* This was to determine the exposure level at these MBTS and their compliance to setback distance in relation to the specification in the guidelines. Measurements of the maximum Power Density of radio signals were taken for sites operating in GSM 900MHz, GSM 1800MHz, WCDMA 2100MHz and correlated with the ICNIRP, NCC and NESREA specifications. The result indicated that only 23.9% (27) of the entire MBTSs complied with NCC regulations (5m) set back to the closest infrastructure, while majority 76.1% (86) of the MBTSs do not comply. 62.8% (71) of the MBTSs complied with the NESREA standard of 10 metres set back to the closest infrastructure while 37.2% (42) do not comply with the regulations as they do not observe 10 meters set back from the nearest infrastructure. Only 6.2% (7) of the total MBTSs in the study area, violated the recommended E(V/m) for 900MHz, GSM 1800MHz, WCDMA 2100MHz rates having a peak value of 85V/m. Also, 25.7% (29) of the total MBTS in the study area violated the recommended power density levels for 900MHz, GSM 1800MHz, WCDMA2100MHz rates having highest value for power density which is **($47.75 mW/m^2$)** while others also showed high values ranging from 9.966 to 29.73**mW/m^2.** These findings suggest that many MBST's complies with NESREA (10m) setback regulation but violated the NCC (5m) regulation. Radiations emanating from the accessed base stations in some vicinity are in safe range specified in the guidelines and as such they do not constitute health risk in the short run. Mobile base stations whose RF radiation intensity is significantly high once identified, the settlers should be advised to relocate away from such base stations.

Keywords: Electromagnetic waves, Mobile Phone, Base Stations, power density, radiation level.

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List of Abbreviations

Abbreviation	Meaning
BTS-	Base Transceiver Stations
CDMA-	*Code-Division Multiple Access*
EMR-	Electromagnetic Radiation
FCC-	Federal Communication Commission
GSM -	*Global System for Mobile*
ICNIRP-	International Commission on Non-Ionizing Radiation Protection
IEEE-	Institute of Electrical and Electronics Engineers
IHHP-	Invisible Health Hazard Pollution
IR-	Ionizing Radiation
NCC-	Nigerian Communications Commission
NESREA-	*National Environmental Standards and Regulations Enforcement Agency*
NIR-	Non Ionizing Radiation
NITEL-	Nigeria Telecommunications Limited
RF-EMF-	Radio frequency electromagnetic field
RMS-	Root Mean Square
WHO-	World Health Organization

Appendix

A: Case Summaries