

ANALYSIS OF TELECOMMUNICATION LAWS AND POLICIES IN THE CONTEXT OF HUMAN HEALTH

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I. INTRODUCTION

Information technology¹ has brought tremendous change in the social, economic, and political systems in India. India has emerged as one of the growing markets on the global platform due to the enormous growth of information technology and its positive impact on the Indian economy. Cell phone use has become inevitable because of economic necessity. Increased use of cell phones and wireless devices gives the expansion of the mobile mast and base station. The mass radiation from these towers has the potential of causing health hazards.² There is no doubt that cell phone and base station has become inevitable but at the same time, it requires a proper introspection of the problem which it may create and its solution. We are taking benefit of the use of cell phones but at the same time, we have to raise our concerns to reconsider the problems that are caused by the mobile mast especially when mobile towers are installed in populated areas. The mushrooming of new mobile phones and telecom industries which are flourishing in India has increased the number of subscribers in the recent past. This is raising a huge debate on how to tackle the problem. The importance and benefits of the telecom sector cannot be ignored.³

The mobile mast and the antenna of the base station are made of heavy iron and steel which may be harmful to the people of that area. It is inherently dangerous irrespective of its impact on human health. However, it is to be noted that the mobile tower or mast does not release any radiation but the antenna which generates RF radiation. There are several cases filed in the different high courts and the Supreme Court against the installation of these towers in the residential area. The concerned authorities kept saying that there is no scientific proof that the level of radiofrequency radiation is sufficient to cause any harm to the human body. Health agencies, including WHO have denied any adverse health impact of the mobile tower radiation.⁴ They have claimed that there is no harm from the cellular tower. The question arises that why there is fear in the mind of people those mobile tower causes harmful radiation and are the primary cause of increased cancer and other diseases. There is also a perception that these reports of the authorities and health agencies are not fair. The IT

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¹Information technology signifies computing technology, such as the Internet, networking, software, hardware, or the people that work with these technologies [John Daintith (ed.), *A Dictionary of Physics* (Oxford University Press, 2009).

²Mobile masts refer giant structures that are designed to support antennas for broadcasting and telecommunications. These masts are tallest among all the human-made structures and the reason behind are that the radio waves are available at a certain height.

³Rei Ohkuma, Jumpei Takahashi, *et.al.*, "Thirty-two years post-Chernobyl: risk perception about radiation and health effects among the young generation in Gomel, Republic of Belarus" 59(6) *Journal of Radiation Research* 765-766 (Nov., 2018), available at: <https://doi.org/10.1093/jrr/try079> (last visited on Aug. 01, 2019).

⁴World Health Organisation, "Ionizing radiation, health effects and protective measures", available at: <https://www.who.int/news-room/fact-sheets/detail/ionizing-radiation-health-effects-and-protective-measures> (July 01, 2019).

industries are doing well, and they are in a position to affect the decision of the government and other bodies. The present study seeks to know the reality behind the scene.

II. THEORETICAL FRAMEWORK

Increased demand for mobile phones requires more and more installation of mobile towers and masts that will certainly result in huge radiation of Radio Frequency waves. In the past decades, there has been also an increase in cancer patients and other diseases that were not earlier. The rapid rate of declination of several animal and bird diseases bound us to rethink before any further expansion of these masts that is triggered by the inadequate regulatory framework on telecommunication and the lack of willpower by the government which is reflected by their approach towards the encouragement of more and more expansion of mobile tower and blanket denial of the harmful impact of the same.

III. METHODOLOGY

The purpose of this study is to draw attention to the key issues related to the radiation by the antenna fixed in the mobile tower and how the current legal regime has failed to tackle these issues. To accomplish this objective, the paper will be identifying the lacunas in laws on telecommunication and unfold the proof of adverse effects of Radio Frequency radiation. The current study will be explicating the detrimental effect of mobile tower radiation and propose the wanted changes in the existing laws to introduce reforms that may lead towards suitable suggestions.

IV. HOW DOES MOBILE TECHNOLOGY WORK?

A mobile handset is of no use without communication between the caller and receiver through radio waves that work on two-way telephonic line bases. Mobile phones receive signals through radio waves and as such both the handset and mobile tower antenna release radiation. The cell phone works based on radio waves naturally available in the atmosphere but becomes usable only by satellite launched by nations and therefore government regulates the use of these radio waves by allocating spectrum to the bidders. The radio signals communicate through an antenna mounted on a handset and a big antenna on a mobile tower. The connection between the handset and the base station through radio waves carries the voice call and there are two such links; one is known as uplinks which carry voice from the mobile users and the other one is known as downlink which carries voices from base station to the mobile users.⁵

V. ELECTRO-MAGNETIC RADIATION

Communication technology and the use of other electric devices have exposed us to electromagnetic radiation. Increased use of electronic devices and the information revolution has the potential of causing huge quantities of these electromagnetic waves. Hence there is a close relation between electronic devices which emanate radio frequency waves called electromagnetic radiation. These radiations from power lines constitute to electromagnetic spectrum that is characterized by their occurrence or frequency. Most of the devices emit a low level of frequencies and there is no harm from the release of that level but enormous rate

⁵Manasi Dash and Arun Mehta, "Understanding Mobile Phone Radiation and Its Effects" 46(17) *Economic and Political Weekly* 22-25 (Apr. 23, 2011).

of frequencies such as X-rays has a high level of frequency that can break the chemical bonds.⁶In other words, there are two types of radiation; one is electromagnetic waves measured in Hertz and enough to break the chemical bonds. On the other side there are radio frequency radiations and the energy release thereby has a low level of frequency and cannot break the chemical bonds.⁷

VI. RF RADIATION AND HUMAN HEALTH

Signals in the form of RF waves are transmitted from and back to the base station while making or receiving calls. Radiation effects are of two types- thermal and non-thermal. Thermal effects are similar to that of cooking in the microwave oven but there is no definition prescribed for non-thermal effects and no concrete findings are there. But it is delineated that thermal effects are seldom less dangerous than non-thermal effects.⁸Radiation from cellphones is described by its SAR value which is 1.6W/Kg in the USA, which means mobile phones can be used for 6 minutes in a day. These limits are set by having a protection margin of 3 to 4, so someone can use a mobile phone for 18 to 24 minutes per day.⁹

People have reported suffering from ear lobes getting warm which escorts to hearing impairment and even ear tumours if they operate cell phones for more than 20 minutes. This is reported that it is caused because microwave energy produced by mobile phones heating the blood. Certain other problems such as skin drying, watering eyes, absentmindedness, loss of memory, and different types of cancer can be caused due to overuse of cell phones.¹⁰

The radiation emitted by the antenna at the base station spread in the environment and affects human health as well as animals and plants. The energy released at the base station and radio and broadcasting station are set free parallel to the land with a downward scatter. The level of energy release at the base station is much higher and that is why it is important at least to keep maximum distance from the ground.¹¹It is considered that there is no harm to human health by radio frequency radiation due to the low level of frequency. But one of the studies conducted by the International Agency for Research on Cancer (IARC) suggests that there are two criteria for the assessment of the impact of these radiations on human health; one is in short-term effect¹²and the other is in long-term effect.¹³ There is no doubt that contact with radiofrequency radiation for a short period does not cause any harm but in the long term, people residing in those areas where mobile towers are installed have continued exposure to these radiations for a longer time that increase the risk of glioma and acoustic neuroma.¹⁴RF has been labelled as carcinogenic to humans (Group 2B) by International Agency for Research on Cancer (IARC). Epidemiological research shows the increased risk

⁶Jacquelyn L. Banasik, *Pathophysiology* 73(Elsevier Health Sciences, 6th edn., 2018).

⁷*Id.* at 75.

⁸IIT Kharagpur, "Technical Advisory Committee Report on cell phone towers radiation hazards" 4 (2011), available at: <https://www.ee.iitb.ac.in/~mwave/Cell-tower-rad-report-WB-Environ-Oct2011.pdf> (last visited on May 07, 2019).

⁹*Ibid.*

¹⁰*Ibid.*

¹¹The consensus of the international scientific community is that the power from these mobile phone base station antennas is far too low to produce health risks as long as people are kept away from direct contact with the antennas. See Manasi Dash and Arun Mehta, *supra* note 5.

¹²Short term effect on the health from the radiation can be blood pressure, heart rate etc. See *ibid.*

¹³Long term health effect may result into headaches, muscle problem, tinnitus, cancers, joint pain, memory loss, tumours etc. See *ibid.*

¹⁴Lennart Hardell, "World Health Organization, radiofrequency radiation and health: A hard nut to crack" (Review) 51(2) *International Journal of Oncology* 405-413(2017).

of radiation in the frequency range of 30 to 300 GHz which may be cancerous.¹⁵The cumulative effect of the base station on the health of people residing in these areas puts them at life-threatening risk. The continuous exposures to these radiations are long-term and round the clock have the potential to cause radiation-related diseases. In the long-term heating effects occur with the increased rate of installation of mobile masts escalating environmental exposure levels. Heat release from the mobile mast increases the body temperature by a degree Celsius after long-term exposure.¹⁶

High-frequency fields can infiltrate the human body, though if the frequency is high; it has a low chance to impact. The human body can regulate its internal temperature which is why small temperature increases can be adjusted or controlled while doing any type of exercise or similar activities. But if the degree of temperature is expanded past versatile limits; exposure to high frequency along with an increase in temperature, can cause serious well-being impacts.¹⁷

VII. RADIATIONS FROM TELECOM MASTS

A high-frequency range of the electromagnetic spectrum is used in mobile phones for the functioning of wireless phone calls, data transfer, and communication through the internet. Countries have the control to fix the frequency band used according to technologies (GSM, UMTS, 4G, 5G, etc.).¹⁸Antennas from mobile towers transmit radiation in the following frequency range¹⁹ :-

869 to 890 MHz	CDMA
935 to 960 MHz	GSM900
1810 to 1880 MHz	GSM1800
2110 to 2170 MHz	3G
2 to 8 GHz	4G
600 MHz to 6 GHz	5G

A region is divided into a large number of cells by mobile phone operators, and then every cell is divided into a range of sectors. There is a connection between base stations and directional antennas which are set up on the roofs of buildings or Ground Based Towers. There is a down tilt of the antennas which capacitates the signals to be directed closer to the ground degree. Huge numbers of mobile masts are erected near highly populated residential areas and workplace buildings to provide good cell phone coverage to the users. These mobile towers keep on transmitting radiation all the time, so those who reside closer to the

¹⁵IARC Monographs, CII *Non-Ionizing Radiation, Part 2: Radiofrequency Electromagnetic* (WHO Press, Lyon, France 2013).

¹⁶Standards for low frequency electromagnetic fields ensure that induced electric currents are below the normal level of background currents within the body. Standards for radiofrequency and microwaves prevent health effects caused by localized or whole-body heating[Kanu Megha, Pravin SuryakantraoDeshmukh, *et.al.*, "Low Intensity Microwave Radiation Induced Oxidative Stress, Inflammatory Response and DNA Damage in Rat Brain" 51 *NeuroToxicology* 158-165 (Dec., 2015), available at: <https://www.sciencedirect.com/science/article/abs/pii/S0161813X15300097?via%3Dihub> (last visited on July 28, 2019)].

¹⁷ICNIRP's note on Recent Animal Carcinogenesis Studies(2018), available at:<https://www.icnirp.org/cms/upload/publications/ICNIRPnote2018.pdf> (last visited on July 28, 2019).

¹⁸*Ibid.*

¹⁹*Supra* note 5.

tower will receive multiple times stronger signals than needed for telecommunications. Crores of unaware people in India live within these high EMF radiation zones.²⁰

VIII. ICNIRP'S GUIDELINES FOR LIMITING EXPOSURE TO EMF RADIATION

International exposure guidelines for radiofrequency (RF) electromagnetic fields were set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) in 1998 and later on, revised guidelines were issued in 2010. These guidelines prescribe calculable EMF levels for safe personal exposure. If these safety levels are adhered to, humans can be protected from all proven detrimental effects of EMF radiation. The guidelines make a classification between occupationally-exposed individuals and members of the general public. Occupationally-exposed individuals are described as healthy adults who work under such controlled conditions associated with their occupational duties, but they are aware of probable EMF radiation risks and trained to mitigate those harms. The general public is described as people of different ages with differing health conditions, which may include vulnerable individuals such as children and patients and those who may have no awareness of or control over their exposure to EMF. This classification proposes the necessity to have more strict limitations for the general public, as members of the general public would not be knowing how to mitigate harm, or sometimes they may not even have the capability to do so. Occupationally-exposed individuals are not considered to be at greater risk than the general public, because appropriate protection and training are so provided to incapacitate the probable risks.²¹ The latest guidelines were about to be issued in 2018 which had to replace 1998 guidelines for restricting high-level exposure of EMF so that people can be protected against familiar unfavourable health effects, but no strong pieces of evidence were found against the adverse impact of EMF on human health and environment if the set limits are adhered to.

As per ICNIRP²², EMF radiation can affect the body through three primary biological effects i.e., nerve stimulation, membrane permeabilization, and temperature elevation. For the compliance of prescribed low-frequency guidelines by ICNIRP (2010), the exposure cannot exceed any of the limitations, which include protection against nerve stimulation, and significant temperature rise due to EMF power deposition within tissues.²³

U.S. National Toxicology Program and the *Ramazzini Institute* conducted animal studies for the investigation of the causation of cancer from long-term subjection to EMF radiation released from cell phones. ICNIRP took these studies into account while doing revisions of guidelines related to radiofrequency exposure. Both studies need to be appraised within the context of other animal and human carcinogenicity research because of their invariability and restrictions that impact the usefulness of their outcomes for deciding on exposure guidelines. Based on the reports submitted by both, ICNIRP decided to non-revision the existing radiofrequency exposure guidelines based on the non-availability of reliable pieces of evidence.²⁴

²⁰*Ibid.*

²¹ ICNIRP Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic And Electromagnetic Fields, p.no. 3, available at: https://www.icnirp.org/cms/upload/consultation_upload/ICNIRP_RF_Guidelines_PCD_2018_07_11.pdf (last visited on July 28, 2019).

²²*Id.* at 5-6.

²³*Id.* at 11.

²⁴*Supra* note 17.

IX. CASE STUDIES ON THE EFFECT OF TELECOM MASTS ON HUMAN HEALTH

A. Study in Nigeria

An empirical study was conducted in Gombe Metropolis (Nigeria)²⁵ to find out the effects of GSM masts on human health and the environment. The questionnaires were being filled by inhabitants residing within a 700m radius of GSM masts. The study revealed that GSM masts were erected within the residential areas and the majority of people were not comfortable living close to masts due to the following problems-

- i. Noise emission from power generator sets
- ii. Carbon Monoxide from generator exhaust
- iii. Oil and fuel spills

B. Study in Israel

A study conducted in Israel indicates there is an affiliation between the elevated incidence of cancer and residing in the proximity of a cell phone transmitter station (within a 350 m radius).²⁶

C. Study in Germany

A study was conducted on two categories of patients- one who were residing within 400m of the cellular transmitter site for 10 years and the second those who were living farther away. The study was conducted on 1,000 patients in Naila, Germany and it was revealed that the ratio of newly growing cancer cases was drastically higher among first category sufferers compared to second category.²⁷

Another study conducted on 575 inhabitants in Westphalia, Germany revealed an arithmetically notable increase in the cancer incidences that happened to inhabitants residing inside the radius of 400-metre of a mobile mast after five years since its erection there.²⁸

X. POSITION IN INDIA

In India the total no of telecom (wireless) subscribers as of 31st March 2018 is as follows²⁹: -

Particulars	Wireless
Total Telephone Subscribers (Million)	1183.41
Urban Telephone Subscribers (Million)	662.18
Rural Telephone Subscribers (Million)	521.23

²⁵M.A. Husain, M.S.Gwary, *et.al.*, "Perception of Effects of GSM Infrastructure on Human Health in GOMBE, Nigeria" 1(2) *IOSR Journal of Environmental Science, Toxicology and Food Technology* 44-52 (2017).

²⁶Ronni Wolf and Danny Wolf, "Increased Incidence of Cancer near a Cell-Phone Transmitter Station" 1(2) *International Journal of Cancer Prevention* 1-19 (Jan., 2004).

²⁷H. Eger, K.U. Hagen, *et.al.*, "The Influence of Being Physically Near to a Cell Phone Transmission Station Mast on the Incidence of Cancer" 17 *Umwelt-Medizin-Gesellschaft* 1-7 (2004).

²⁸*Id.* at 55-60.

²⁹TRAI Annual Report (2017-18), available at: https://main.trai.gov.in/sites/default/files/Annual_Report_21022019.pdf (last visited on May 10, 2019).

Broadband Subscribers (Million)	394.65
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As per the above report, the total no. of telecom subscribers(wireless) as of 31st March 2019 was 1183.41 million and to provide services to these many subscribers, more base stations were needed to be installed, so telecom operators installed 6.34 lakh new Base Transceiver Stations(BTS) and 65,000 mobile towers from November 2016 to November 2018. This added to the existing 13.66 Lakh (BTSs) on 4.35 Lakh Mobile Towers and took the total number up to 20 Lakh BTSs on 5 Lakh Mobile Towers.³⁰

The reason for erecting such a huge no. of towers within the residential areas is explained that nowadays human beings depend upon cellular phones working everywhere at home, at college, and places of job. The transmitter strength necessitated by the cell phone and the base station to communicate is comparatively low when base stations are positioned close to users. If base stations are located further away, the strength required is typically higher, which means a higher EMF. Hence, base stations are necessitated to be located near users for good reception and minimum EMF. But is that not harmful to the students if masts are erected near schools, and to the patients if masts are erected near hospitals because these people are vulnerable to receiving more radiation than a normal healthy person?

Rajasthan High Court in *Justice I.S. Israni (Retd.) v. Union of India*³¹ has held that towers on hospitals and school buildings etc. should be avoided as children and patients may be more vulnerable to probable harmful effects of EMF radiation. The main issue, in this case, was related to the erection of mobile towers in certain high-risk areas such as schools, hospitals, and highly populated residential areas and the validity of bye-laws that prohibited the erection of mobile towers in such areas. The court directed the State Government and the local authorities to decide where the towers can be installed in the densely populated regions according to law.

Madras High Court has opined differently in the case of *Reliance Jio Infocom Limited v. The Commissioner of Police, Tiruppur Dist, and others*³². that no one can be averted from erecting cell phone towers on a mere apprehension about the effect of radiation from the mobile phone tower. The apprehension does not have scientific backing. Cell phone towers cannot be prevented to be installed on mere apprehensions until a positive finding is given in this regard viz., (a) Telecom authorities such as DOT (Department of Telecommunication) and TRAI (Telecom Regulatory Authority of India) are taking the best possible measures to control EMF radiations by reducing the limit to 1/10 of the limit prescribed by ITU (International Telecommunication Union) so that no harm can be caused either to human health or to the environment. But now the question rises about the erection of telecom masts of different service providers in a particular area even if they are complying with the guidelines of ITU and ICNIRP when they do not share the infrastructure and establish their set-up. In that case, it becomes a cluster of masts and the amount of EMF radiations they release exceeds the limit prescribed by any regulatory authority. So now the problems are the following cluster of telecom masts in residential areas releasing good amount of EMF radiations. (b) Such clusters near schools and hospitals.

³⁰ Press Release, “65,000 new mobile towers, 6.34 lakh new base stations installed between November 2016 and November 2018”, available at: <https://www.digit.in/press-release/telecom/65000-new-mobile-towers-634-lakh-new-base-stations-installed-between-november-2016-and-november-2018-44674.html> (last visited on Aug. 10, 2019).

³¹ 2013(4) CDR 1973 (Raj.).

³² MANU/TN/0487/2019.

(c) How far are these EMF radiations safe for human health and the environment in light of different studies conducted in different countries?

In a PIL made by the famous actress Miss Juhi Chawla, she alleged that a Parliamentary committee had earlier found that the Department of Telecommunications (DoT) had selectively recognized studies that were in the interests of telecom companies and higher power-density limits, while ignored studies that had concluded that electro-magnetic frequency (EMF) radiation from cell phones and cell-phone towers might be causing health risks to humans, flora and fauna.³³ Supreme Court of India has admitted this plea and the result is long-awaited.

A relevant pronouncement was made by Apex Court in *M.C. Mehta v. Union of India*³⁴, that even in case of suspicion or reasonable doubt, the precautionary principle needs that preventive action be taken to avoid any harm. Hence, considerations on the absence of direct proof on this issue certainly should not matter given the cases of ancillary loss and efforts should be made to take precautionary steps.

XI. CONCLUSION

The Indian Council of Medical Research has indicated, based on a number of studies that adverse impact may be caused by the radiation from mobile phones and towers. Besides, World Health Organization has categorized the RF electromagnetic radiation does not only affect the human body but can hurt wildlife as well. Though there are not sufficient evidence to prove the apprehended harmful effects of EMF radiations on human health and the environment, one thing is clear even WHO somewhere has an idea about the potential effects of EMF radiations, that is why ICNIRP and ITU have provided certain limits and guidelines for the functioning of telecom system.

Mobile mast radiation and related legal issues are a recent phenomenon that has emerged with the increased use of Information Technology. It is an environmental issue that is recognized as a subtle and unseen pollutant that affects life in multiple ways. The health of the people is at stake and there is a need for balanced approach that can tackle the issue without compromising socio-economic development. There is an environment principle called the “Precautionary Principle” which says that policy makers have discretionary powers where harm is probable from taking a particular decision when substantial scientific knowledge on the matter is not available. It also suggests that the state has the social responsibility to protect the public from subjection to harm when a believable risk is found by conducting a scientific investigation. This principle can be kept at rest if sound evidence of no harm is found by further scientific investigations. So, in light of this principle, the policymakers can design some more stringent policies to deal with EMF radiation which has the potential of causing harmful effects on the whole environment.

³³ Maitri Porecha, “SC admits pleas against mobile tower radiation” *The Hindu: Business Line*, Sep. 14, 2018, available at: <https://www.thehindubusinessline.com/info-tech/sc-admits-pleas-against-mobile-tower-radiation/article24949596.ece> (last visited on Aug. 10, 2019).

³⁴ I.A. Nos. 2310-2311 IN W.P. (C) No. 202/1995.