



## Base Station Antenna: Better Connectivity at What Price

### Community Medicine

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### ABSTRACT

**Background:** Cell towers known as mobile phone masts or base stations, hold antennas and other communications equipment. Selective personal exposure to EMF as a consequence of urban living through wireless networks like high-speed internet access and services like wireless local area networks (WLANs), is increasingly common in homes, offices, and many public areas (airports, schools, residential and urban areas). As the number of base stations and local wireless networks increase, so does the RF exposure of the population, one of the strongest EMF is due to the Base station Antennas and widespread public concern looms as there aren't sufficient studies to draw firm conclusions on effects of EMF.

**Methods:** Review of various studies and reports on the subject.

**Conclusion:** Electromagnetic radiation around the area of installation of a base tower should be measured at least once a year. Residents need to be informed to approach Health authorities in case of symptoms of disturbed sleep or any other abnormal symptoms pointing towards Cancer. Efforts should be made to keep exposure minimum.

### KEYWORDS:

Base Station Antenna. Electro Magnetic Frequency. Radiation exposure.

### INTRODUCTION

The scientific journey in evolution of Human beings has gone through inadvertent experiments with nature, without being aware of the consequences on being a potential threat to life on earth.

Humankind's injection of massive amounts of greenhouse gases into the Earth's atmosphere is a giant experiment with unknown consequences. In much the same way, recent flooding of the "civilized" world with a sea of electromagnetic field is also an experiment with probable potentially disastrous outcomes. A low intensity Electromagnetic Fields (EMF) in nature has always been present on earth, in sync with the Human body's own electromagnetic field of a very low level—around 10 hertz. It's been shown that each one of our cells has its own Electromagnetic field (EMF). Maintaining balance in those cellular EMFs is critical for staying healthy.

Besides natural sources, the electromagnetic spectrum also includes fields generated by human-made sources which amounts to more than 100 million times the radiation exposure of our great grandparents: The X-rays that are employed so unsuspectingly for diagnostic radiology, to the electricity power socket with low frequency electromagnetic fields, to other high frequency radio waves for transmission of information through TV antennas and dishes, radio stations or mobile phone base stations in the public domain add to the various sources of radiation around us. [1]

Selective personal exposure to EMF as a consequence of urban living through wireless networks like high-speed internet access and services like wireless local area networks (WLANs), is increasingly common in homes, offices, and many public areas (airports, schools, residential and urban areas). As the number of base stations and local wireless networks increase, so does the RF exposure of the population, one of the strongest EMF is due to the Base station Antennas and Widespread public concern looms as there aren't sufficient studies to draw firm conclusions on effects of EMF.

### RADIATION EXPOSURE THROUGH BASE STATION ANTENNA: IS THE THREAT REAL

Cell towers known as mobile phone masts or base stations are sources that hold antennas and other communications equipment. These towers flood the area for miles around with powerful high frequency radio waves or microwaves, to support the use of cell phones as well as Wi-Fi, Wi-Max, Wireless LANs, 802.11 networks, Bluetooth supported devices, and more.

Varied views exist on concerns related to health risks linked with proximity to base station antennas. Significantly higher concentration of alpha amylase in saliva was found in participants of a study carried out to ascertain psychobiological strain on people living in proximity to base station antennas.[2] A survey study conducted, using a

questionnaire, on 530 people (270 men, 260 women) living or not in proximity to cellular phone base stations studied eighteen different symptoms (Non Specific Health Symptoms-NSHS), described as radiofrequency sickness, by means of the chi-square test with Yates correction. The results that were obtained underline that certain complaints are experienced only in the immediate vicinity of base stations (up to 10 m for nausea, loss of appetite, visual disturbances), and others at greater distances from base stations (up to 100 m for irritability, depressive tendencies, lowering of libido, and up to 200 m for headaches, sleep disturbances, feeling of discomfort). In the 200 m to 300 m zone, only the complaint of fatigue is experienced significantly more often when compared with subjects residing at more than 300 m or not exposed (reference group). For seven of the studied symptoms and for the distance up to 300 m, the frequency of reported complaints is significantly higher ( $p < 0.05$ ) for women in comparison with men. Significant differences are also observed in relation to the age of subjects, and for the location of subjects in relation to the antennas and other electromagnetic factors. [3]

### BASE STATION ANTENNAS

The popularity of wireless communication devices has resulted in a proliferation of cell towers all around us. While all of us have had our share of comfort with mobile technology, it is now time to introspect into the problems one could face because of staying in close proximity to these so called lifelines. Over 1.4 million base stations exist worldwide [4] and the number is increasing significantly with the introduction of third generation technology thus intensifying the EMF network around.

### SAFE LIMITS OF RADIATION

The WHO's International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B), based on an increased risk for glioma.[6] EMF (Electromagnetic Frequency) exposure limit (Base Station Emissions) which has been lowered to 1/10th of the existing ICNIRP exposure level, effective 1st Sept. 2012 should be adhered to [7]. The level of exposure should not increase beyond 0.45Watt/ Sq meter for 900 MHz and 0.9Watt/ Sq meter for 1800MHz frequency.[7] However, even these limits are more than those acceptable for other countries.

### LOCATION OF TOWER

The question of why the cell phone towers should be allowed to be installed in residential areas? There are technical and commercial aspects for installation of these antennas. Technically uninterrupted connectivity and ease of access to information and data bank are some of the reasons why people want these towers close to where they stay. It also helps in instant transmission of vital information at all times even while not at the work place. The commercial aspects are that the service providers pay rent for installation of towers which is a good

source of income for property owners and institutions which comes as a low cost proposition for the companies. The guidelines are that no tower should be installed within 100 metres radius of hospitals [5] and educational institutes as children and patients are more susceptible to Electro Magnetic Field. Installation of Base Station Antennas in narrow lanes should be avoided in order to reduce the risks caused by any earth quake or wind related disaster. The Base Station Antennas should be at least 3 metres away from the nearby building and antennas should not directly face the building. Further, the lower end of the antenna should be at least 3 metres above the ground or roof.

### SAFETY FROM BASE STATION ANTENNA

Access to Base Station Antenna sites should be prohibited for general public by suitable means such as wire fencing, locking of the door to the roof etc. Access to tower site, even for the maintenance personnel, should be for a minimum period as far as possible. Sign boards/ Warning Signs are to be provided at Base Station Antenna sites which should be clearly visible and identifiable. A warning sign should be placed at the entrance to such a zone.[5] The "Warning Sign" should discourage longer stay in the zone, even for the maintenance personnel.

### STRUCTURAL STABILITY

Structural Safety evaluation of all buildings should be undertaken by laid down competent authority before installation of towers. This should also consider the aspects of safety cordon around the tower to minimize the accidental exposure.

### PREVENTION

The first and most important thing we all need to do is to avoid exposure to EMFs. This is next to impossible in today's world, but we can greatly reduce our exposure by knowing what and where the sources are in our environment, and then taking action to eliminate or minimize our exposure to them.

### WHAT WE NEED TO KNOW

(a) Electromagnetic radiation around the area of installation of a base tower should be measured at least once a year. RF (radio frequency) gauss meter designed for measuring electromagnetic radiation in the cell phone frequency (microwave) range can be used at community level for the same.

(b) Indemnity Bond should be filled from owner or service provider for the installation of tower. Indemnity Bond is to take care of any loss or injury due to accident caused by the tower.

(c) In case of multiple transmitter sites at a specific locality sharing of a common tower infrastructure, should be explored, as far as possible.

(d) For subsequent siting of towers first preference should be given to the location of tower in the Forest areas. Second preference should be to the location of tower in an open or public area away from residential locations. Where it is not possible to avoid the location of the tower in residential area, the same should be located in open space or a park, with prior consent of owners of adjoining residential houses.

(e) Residents need to be informed to approach Health authorities in case of symptoms of disturbed sleep or any other abnormal symptoms pointing towards Cancer.

(f) A database of all residents needs to be created along with specifications of the base station Antenna's installed in each locality. This information needs to be analyzed based on reporting of any abnormal symptoms such as irritability, loss of sleep etc and its association with distance from source of radiation.

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