SECTION - 1
A Survey of Electromagnetic Field (EMF) Smog in Chandigarh

Introduction and Rationale
The use of wireless telecommunications devices in India has increased dramatically in last decade. As a result, the number of hand phone users increases everyday and so the base stations/towers almost everywhere. This increased use of the technology has enhanced the public concern over health impacts of electromagnetic field (EMF) emanating from these cell-phone towers. These cell-phone towers with multiple antennas transmit signals at 900 MHz, 1800 MHz or 2100 MHz in the radio frequency region of electromagnetic spectrum continuously. The constant emission of EMF causing electro-smog has raised serious concerns about their possible ill-effects on human health. Chandigarh, consisting of 56 Sectors, Two industrial areas (industrial area-1 and II), adjoining 20 villages, railway station, IT park, and Grain markets, falling under its territory has witnessed growth of large number of steel structures (base Stations) with antennas for cell-phone communication since 1990. Concerns have been raised by local residents about their safety while living in close proximity to these mobile phone towers. To address these concerns, a survey was commissioned to assess the quantum of EMF radiations in Chandigarh.

Materials and Methods
Two surveys were conducted to find out quantum of electro-smog level in different Sectors of Chandigarh including industrial areas, and adjoining villages. First survey was commissioned from September 2005 to March 2006, and second from September 2008 to March 2009. Survey was conducted to find out the power density (Pd) level (as μW/cm²) of electromagnetic field radiations propagating from antennas mounted on towers.

Power density indicates the strength of the radiofrequency (RF), and reflects the amount of energy present in an area, field in air and refers to the power crossing a unit.
area. It is expressed in micro-watt per square cm (µW/cm²) or watt per square meter (W/m²) (ICNIRP, 1998). It was measured using a RF Power Density Meter (Orgone Biophysical Research Laboratory, Inc., USA; Fig. 1.1, 1.2). It expresses true power density directly on 4½ digit LCD display as low as 0.001µW/cm² to maximum 2000 microwatts/cm²). Internal detection system (sensor) of the meter yields a flat response over wide range of frequencies from 0.5 MHz to 3 GHz (GSM and CDMA network systems).

*Fig. 1.1. A photograph of the RF Power Density/Field Strength Meter used for measurements in the present study.*

*Fig. 1.2. Use of RF Field Strength Meter to Measure EMFr in (a) Sector 17, (b) Sector 35, and (c) Panjab University Campus (near Gandhi Bhawan).*

*Set-up / Design of Survey*

All the sectors, villages, and industrial areas of the city were surveyed for the presence of cell-phone towers. The location of towers, select sites/sampling points where EMFr was measured and distribution of towers has been given in Figs. 1.3, 1.4 and 1.5 respectively.
Fig. 1.3. A map of Chandigarh (including villages) indicating location of cell-phone towers.

Chandigarh Union Territory
LOCATION OF CELL TOWERS
(Data by Sectors)

Source: Based on Field Survey conducted during September 2008 - March 2009
Fig. 1.4. A map of Chandigarh (including villages) indicating selected sites/sampling points.
Fig. 1.5. Map of Chandigarh (including villages) indicating density of cell-phone towers in different localities.
Each Sector of planned city Chandigarh was divided into 4 sub parts (A, B, C and D) in clockwise directions. For measuring the power density levels of EMF under real-life conditions, measurements were taken from all the parts (A, B, C and D) of each sector at the distances of 50, 100, 200, and 300 m in direct line of sight of antenna and at random locations, in all directions (North-South-East-West) at different distances. The measurements were made at three levels - ground level (5 cm above ground), chest level (4 ft), and head level (5.7 ft). Meter was generally held at arm’s length in vertical position slightly tilting (~110°) by keeping backside toward towers since radiation from cell-phone tower are vertical orientated electric field.

Average power density readings were taken as per ICNIRP (International Commission on Non-Ionizing Radiation Protection) guidelines to ensure correct measurements. Sufficient measurement time was given to each reading (30 sec) until it becomes stable but did not exceed the 6 minutes limit (ICNIRP, 1998). Most of the measurements were made in line of sight of the antennas to ensure that maximum values were captured. To avoid the ambiguity in recordings due to lesser number of sampling points, the sampling size averaging 30 was kept throughout the survey. Electro-smog maps (distribution of towers, sampling sites, and density of towers) has been prepared in Arc View 3.2a GIS software using data (information) collected in second survey.

Observations
An electro-smog map of Chandigarh was prepared to depict the exact location of towers. RF power density measuring spots/select sites and distribution of cell-phone towers (Fig. 1.3, 1.4, 1.5).

Number of Towers / Base Stations in City
A preliminary (1st) survey was conducted in Chandigarh from September 2005 to March 2006 to know the factual position of electromagnetic field (EMF) level and positions of cell-phone base-stations/towers/masts. A total 199 cell-phone towers were recorded in Chandigarh, out of which 8 masts were found in adjoining villages (Table 1.1).
Table 1.1. Total number of Towers / Masts / Base Stations in Chandigarh, including villages and industrial areas, recorded during two surveys conducted in September 2005-March 2006 and September 2008-March 2009.

<table>
<thead>
<tr>
<th>Base Station/Towers in Chandigarh (UT)</th>
<th>Towers/Masts/Base Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Survey (September 2005 to March 2006)</td>
<td>199</td>
</tr>
<tr>
<td>2nd Survey (September 2008 to March 2009)</td>
<td>335</td>
</tr>
<tr>
<td>Towers in Chandigarh and adjoining villages</td>
<td>Chandigarh</td>
</tr>
<tr>
<td>1st Survey</td>
<td>191 (96%)</td>
</tr>
<tr>
<td>2nd Survey</td>
<td>282 (85%)</td>
</tr>
</tbody>
</table>

Tower Location - Chandigarh city (Sector 1-56, Industrial Areas)

- Market/Commercial complexes (Roof Top) | 242 (86%)
- Ground Level | 29 (10%)
- Residence | 11 (4%)

In 1st survey, the maximum numbers of towers (13) were found in Sector 34 followed by Sector 17 where 12 towers were installed. There were 9 towers each in Sectors 20 and 22, 8 each in Sectors 8, 37 and industrial area Phase-I, and 7 each in Sectors 35 and 44 (Fig. 1.6). It was followed by 6 towers each in Sectors 11, 38, 46 and industrial area Phase-II, while 4 towers were seen in Sector 15, 19, 24, 30, 31, 40 and 42 (Fig. 1.6). The Sectors 7, 9, 10, 21, 27, 28, 32 and 39 have 3 towers each, where 2 towers were present in Sectors 3, 4, 12, 16, 18, 23, 33, 41, 47 and 49. However, only 1 tower each was located in Sector 14, 29, 36, 38-West, 45, 50, 51, and 52. Surprisingly, there was not even a single tower in Sectors 1, 2, 5, 6, 25, 39-west, 43, 48, 53, 54, 55, and 56 (Fig. 1.6).

The second survey conducted during September 2008 to March 2009 witnessed a total of 335 masts. It indicated an increase of ~59% over that in September 2005-March 2006. Of these, 282 (accounting for 85%) are in city including industrial areas I and II, and remaining 53 (15%) in surrounding villages. In city, 86% (242 in number) towers are located on the roof-tops of the commercial complexes, mainly in
markets, which are in centre of the Sectors (C and D area) and 10% (29 only) are erected in ground level gaining the height of approximately 30 meters. 4% (only 11) of the masts are mounted on residence buildings (Fig. 1.6, Table 1.1).

Fig. 1.6. Variations in the number of Base Stations / Towers in the city Chandigarh noticed during two surveys conducted during September 2005-March 2006 and September 2008-march 2009, respectively.

Parallel to 1st survey, in 2nd survey density of towers increased in all sectors (Fig. 1.5), the number of towers remained high in two Sectors, i.e. 19 towers in Sector 34 and 15 in Sector 17. It was followed by 14, 13, and 12 towers in Sector 26, 8 and industrial area-I, respectively (Fig. 1.6). There were 11 towers each in Sector 22 and 37, whereas 10 towers are in Sector 20. The Sectors 35, 40, 44 each had 9 towers and followed by 8 towers each in Sector 38 and 46. Sector 11 has 7 towers, whereas Sectors 9, 12, 49, and industrial area Phase-II has 6 towers. The Sectors 7, 15, 28, 30, 31, 39 have 5 towers each, whereas, only 4 towers each were located in Sectors 14, 19, 21, 24, 27, 32, 36, 42, 45, and 47 (Fig. 1.6). The number of towers was still lesser in Sectors 4, 10, 16, 18, 29, 33, 41, and 48, with each having 3 towers. However, there were only 2 towers in Sector 3, 23 and 25, whereas only 1 tower each was located in Sectors 38 west, 53 and 56. However, no towers were witnessed in Sector 1, 2, 5, 6, 39-west, 43, 50, 51, 52, 54 and 55 (Fig. 1.6).
During the 2nd survey, it was observed that a total of two towers have been removed over the last 3 years. These include 1 each in Sector 21 (residence area) and Sector 26 (SGGS Khalsa College; removed after writ petition).

**Number of Towers / Base Stations in Villages**

Not only in the city sectors, but the number of towers witnessed a sharp increase even in villages during the period of survey. In the 2nd survey (2008-2009), a total of 35 towers were recorded in villages with highest number of towers (11) in Manimajara town, followed by 5 each in Dhanas, Kansal and Kishangarh (Fig. 1.7). However, out of 5 towers in Kishangarh, 2 were located on a movable trailer.

The villages - Burail, Daria, Kuda Ali Sher, Kajheri and Mauli Jagran have 3 towers each, while Attawa, Hallo Majra, Khuda Lahora and Maloya have 2 towers each. There was only 1 tower each in Badheri, Palsaura, Raipur Khurd, and Sarangpur. However, no tower was located in Behalana, Dadu Majara, Kaimbala, Makhan Majra, Raipur Kalan, and Toga, and in other places like 2nd Grain Market, IT Park, Railway Station and Vikas Nagar (Fig. 1.7).

![Fig. 1.7. Number of Base Stations in the villages of Chandigarh observed during survey of 2008-2009.](image)

In addition to commercial establishment, 24 towers are located on educational institutions, community centers, old age home, and in a temple (Table 1.2).
Power Density of EMFr

The average electromagnetic field radiations (EMFr) emanating from these cell-phone base stations in Chandigarh city was 1.235 μW/cm² based on 873 readings recorded in first survey conducted from September 2005 to March 2006. The EMFr level increased to 1.274 μW/cm² as depicted by 2nd survey conducted during September 2008 to March 2009 and based upon 1788 readings. In contrast to city, the radiation level in adjoining villages was found quite lower being 0.178 μW/cm² (during 2nd survey) and based on 467 readings (Table 1.3).

Table 1.2. Total number of towers in non-commercial places based upon the survey conducted during September 2008-March 2009.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Number of Towers</th>
<th>Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>University/Colleges/Institutes</td>
<td>10</td>
<td>11, 12, 14, 25, 26</td>
</tr>
<tr>
<td>Creche/Schools</td>
<td>4</td>
<td>15, 20, 44, 56</td>
</tr>
<tr>
<td>Community Centre</td>
<td>7</td>
<td>28, 29, 33, 37, 38, 44, 45</td>
</tr>
<tr>
<td>Old Age Home</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>Temple</td>
<td>1</td>
<td>29</td>
</tr>
</tbody>
</table>

Table 1.3. EMF radiation level in Chandigarh city and its adjoining villages.

<table>
<thead>
<tr>
<th>EMF Survey</th>
<th>Chandigarh</th>
<th>Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Power density (μW/cm²)</td>
<td>Sample size</td>
</tr>
<tr>
<td>1st</td>
<td>1.235 (12350)</td>
<td>873</td>
</tr>
<tr>
<td>2nd</td>
<td>1.274 (12740)</td>
<td>1788</td>
</tr>
</tbody>
</table>

The highest level of the total electromagnetic field power density (9.793 μ/cm²) was measured during the 1st survey in Sector 46. In contrast, the lowest values was recorded in Sectors 54, 53, 5, 2, 1 and 39-west where it was < 0.1 μW/cm² (Fig. 1.8). In the 2nd survey, highest value of power density (4.764 μW/cm²) was recorded in Sector 17 followed by 4.702 μW/cm², 4.665 μW/cm² and 4.138 μW/cm² in Sectors...
21, 46 and 40, respectively (Fig. 1.8). The lowest value (<0.1 \mu W/cm^2) was recorded in Sectors 54, 53, 5, 2, 1 and Sector 38-west (Fig. 1.8).

**Fig. 1.8. Variations in the power density of EMF radiations in different Sectors of Chandigarh.**

In villages, power density level was not recorded during first survey, however, during 2nd survey the highest level of power density was 1.120 \mu W/cm^2 in Manimajra followed by 0.643 \mu W/cm^2 in Kansal, 0.480 \mu W/cm^2 in Kishangarh and the lowest of 0.021 \mu W/cm^2 in Toga (Fig. 1.9).

**Fig. 1.9. Power density of EMF radiations in villages adjoining Chandigarh.**

In both surveys, power density level in most of the Sectors increased with the increase of towers number, except a few Sectors like 21 where only 4 towers were located but density level was found higher because of surrounding of number of towers in Sector 34, 22 and 20 (Figs. 1.8, 1.10).
In general, power density level was lowest in the gardens, parks and valleys such as Rose Garden, Leisure Valley and Shanti Kunj (Sector 16), Bougainvillea Garden (Sector 3), Rajindra Park (Sector 1), Fitness Trail (Sector 10), Children Park (Sector 23), Dahlia and Fragrance Gardens (Sector 36), Garden of Shrubs (Sector 46), Terraced garden (Sector 33), Topiary park (Sector 35) and in Botanical Garden (Sarangpur village).
The power density in Sukhna Lake was recorded to be 0.020 μW/cm², whereas it was 0.017 μW/cm² in Rock Garden. In contrast, the highest level of power density was recorded in the commercial places like outside of markets and opposite market pedestrian road/walkway. In general, power density was found lesser at ground, chest, and head level up to a distance of 45 m from tower. However, it enhanced at ≥50 m up to 170 m at the line of sight of the antenna and start decreasing further (Fig. 1.11).

Fig. 1.11. Variation in the power density at ground, chest and head level at different distances from base of tower in Sector 11.

![Graph showing power density variation](image)

Fig. 1.12. A diagrammatic representation of the path of main beam from cell-phone tower to ground level.

![Diagram of cell tower and antenna](image)
Fig.1.13. A map of Chandigarh (Sector-34) indicating EMFr intensity of cell-phone towers.

Further, it was noticed that RF power density decreases with the increase of distance. However, it was the minimum below the towers (Fig. 1.12). It was also observed during survey that intensity of EMFr was higher at places where numbers of towers were more at one place and intensity faded away with the reduction of towers (Fig. 1.13).
Discussion
In the present experiment, mobile phone towers emanated EMFr measurements were made in all Sectors of Chandigarh, including industrial areas I and II and adjoining villages, to ascertain current EMFr levels in the city. In first preliminary survey during 2005-2006 only 873 sites were accessed, whereas in 2008-2009 during the 2nd survey 2255 sites were assessed. These selected sites were representative of markets, residential, industrial areas and parks. It was observed that most of the towers are located in the Chandigarh in markets, which are the centre of the every Sector, thereby indicating maximum public exposure.

RF power density meter express intensity of EMFr in term of power density and values in micro watt per square cm (\(\mu W/cm^2\)). Similarly various researchers also have given power density values in \(\mu W/cm^2\). However, these values are also given/converted in \(\mu W/m^2\), since effects of the EMFr are not restricted to smaller (cm\(^2\)) area; it has wider (m\(^2\)) area effects whether on animals, plants, human or environment, so power density values needs to be expressed in m\(^2\). ICNIRP frequency based EMFr exposure guidelines expressed in W/m\(^2\) (ICNIRP, 1998).

It was observed that power density increased during 2\(^{nd}\) survey, because of the increased installation of towers during the 2-year period between two surveys. The number of towers increased from 199 in 2005-2006 to 335 in 2008-2009. EMF power density remained high in all Sectors during the 2\(^{nd}\) survey. The highest EMF level of 4.764 \(\mu W/cm^2\) (47640 \(\mu W/m^2\)) and 15 towers was recorded in Sector 17. The observed increased EMFr levels in the city are parallel to increase cell-phone subscriber base. As per Statistical Abstract 2007 of Chandigarh Administration there are 11 lakh mobile phone subscribers in a population of around 12 lakh (i.e. ~ 91.6%), while there were around 5.9 lakh mobile phone users in 2005, the figure doubled in 2007 with the number of subscribers crossed 10 lakh (Indian Express, 2008).

One of the surprising finding of the study was that Sector 21 with only 4 towers has power density of 4.702\(\mu W/cm^2\) (47020 \(\mu W/m^2\)). Upon investigation, it was found that EMF level was greater in Sector 21 because it was surrounded by Sector 34 where maximum numbers of towers, i.e., 19, were erected. One side of the Sector 21
fall direct line of sight of Sector 34 antennas, other side is attached with Sector 22 where 11 antennas were located. The greater contribution of the power density to Sector 21 was from Sector 34. Power density level in Sector 34 was 3.661 μW/cm² (366.0 μW/m²). However, the lesser power density in sector 34 was probably due to high rise buildings (shop-cum-offices) leaving less open space for line of sight readings of antennas. Cluster of towers were recorded in sector 34 and higher intensity level was recorded around these towers.

In general, the EMF power density was more in Southern sector than Northern Sectors because of the presence of greater number of towers in Southern Sectors. The greater number of towers and thus EMF levels in Southern sectors is parallel to higher population and thus more users. In contrast, the Northern Sectors have lesser population, thus reduced number of towers, more of green areas with large number of trees and thus greater absorbance of EMF. In fact, there exists a positive correlation between the number of towers and human population in the city. During the period between two surveys (2005-2006, and 2008-2009, number of towers increased substantially (by 66%) whereas the increase in population was lesser (i.e., only 15%). The number of towers increased simply to provide services to enhanced number of users/subscribers due to increased population and other reasons such as reduced cost of the equipment and drop in user charges.

To the best of our knowledge, it is for the first time that a systematic survey has been conducted in India to assess the EMF levels in the environment due to cell-phone and their towers. However, it parallels the studies conducted on other parts of the world to assess power density levels in the atmosphere and their health implications; for example, Australia (Bangay and Henederson, 2004), London (Homer, 2004), Russia (Grigoriev, 2000), Austria (Hutter et al., 2004), and Malaysia (Islam et al., 2006).

The surveys conducted in proximity to base stations operating in Chandigarh indicate that the public is exposed to electromagnetic field radiations, although these exposures are lower than the recommended maximum exposure levels of ICNIRP (International Commission on Non-Ionizing Radiation Protection), whose guidelines are followed by most of the countries of the world. As per the 2nd survey, average
The EMF level of Chandigarh was 353-times lower of ICNIRP public guidelines. However, in villages' power density level was thousand times lesser of ICNIRP guidelines. According to ICNIRP, permissible levels range from 450-900 μW/cm² (ICNIRP, 1998). However, these limits are based upon thermal effects and did not include any non-thermal / biological effect. In this direction, Salzburg Resolution (2000) recommended outdoor EMF exposure limit to be ≤0.1μW/cm² (9000-times lower than ICNIRP). Similarly, Catania Resolution (2002) and Bioinitiative report (2007) concluded that the existing ICNIRP guidelines/standards to EMF levels are insufficiently protective of public health. Of late, at a meeting of the Royal Society, London, involving scientists, doctors and environmentalist, a question has been raised that “Are present ICNIRP EMF exposure recommendations Adequate?” (Johansson, 2009b). The meeting endorsed Bioinitiative report to reduce ICNIRP limits of EMFr and set new limits.

Variation of standards in threshold line in different countries is quite amazing. RF standards are frequency based. For different frequencies, different standards have been adopted. Mainly 900 and 1800 Mhz bands are used for cell-phone communication. For that reason, 450 μW/cm² (4.5 W/m²) power density for 900 MHz frequency and 900 μW/cm² (9 W/m²) for 1800 MHz. As already stated that EMFr from cell-telephony cause thermal effects, result into increase in temperature of the site/part they touch. In addition, these cause non-thermal impact. ICNIRP guidelines for human exposure are incidentally based on thermal effects, accordingly for adequately increasing the temperature to cause an effect on biological system, the EMFr intensity has to be high. In that context, the EMFr intensity as per ICNIRP guidelines appears to low although for non-thermal effects they are very high. Both the modes (thermal and non-thermal) are operating simultaneously. It is precisely for this reason that other resolutions (Salzburg Resolution, 2000; Catania Resolution, 2002 and Benevento Resolution, 2006 etc., were felt necessary by International community. Bioinitiative (2007) report concluded that the existing standards for public safety are inadequate and needs to be revised. Some other countries have their own low-intensity based exposure standards on non-thermal (non-heating) effects which are hundreds or thousands of times lower than ICNIRP guidelines like .001 μW/cm² in New South Wales, Australia, 0.1 μW/cm² in Salzburg - Austria, 2.0μW/cm² in Russia and Hungary, 6 μW/cm² in China, 10μW/cm² in Italy, 50 μW/cm² in
in Auckland-New Zealand, 200 μW/cm² in Japan and Germany (Table 1 in Review of Literature).

The natural background power density of higher frequency in environment is <0.000001 μW/cm² (Philips, 2000) to which organisms (human beings) are adopted to live. This level of density is sufficiently released from many gadgets like electric chokes, photostat machines, cordless phones and hair-dryers etc. However, any interference or increase in it will certainly make an impact on flora and fauna, which may be invisible but outcome will be seen years to come. EMF is a pollutant and it is a product of dose and period of exposure to the pollutant that governs the effects. In case of the cell phone towers, EMF radiations are emitted 24 hr in all 365 days of a year. The enhanced power density coupled with continuous exposure of biosata is logically going to be more dangerous in causing its impact. The sensitivity or resistance to the toxic impacts of chemicals or radiations (non-ionizing or ionizing) is dependant on the age, stage of the life cycle and biomass or weight. In nature other than man, there are several short cycle and too low body weight/biomass. In other words, these continuous EMF are likely to affect the biotic components of any active community. It is this aspect that drew our attention to this study. In contrast to natural background EMF, power density level of higher frequency in Chandigarh is too higher due to installation of cell-phone towers. The average power density in the city (1.274 μW/cm²) was significantly greater than the permissible limits for human exposure set in highly developed countries like Austria. And if we consider, the proposed biological / health levels of EMF, then the observed levels in the city are well in the range of causing health implications.

Cell-phone EMF at levels below the recorded values in the city alter the EEG brain waves (at 0.11 μW/cm²; Von Klitzing, 1995), affect motor function, memory and attention in school going children in Latvia (at 0.16 μW/cm²; Kolodynski and Kolodynska, 1996), higher frequency of chromosomal aberration and incidence of leukaemia in US embassy employees at Moscow (at 0.02-0.1 μW/cm²; Goldsmith, 1997), change immunological functions and induce irreversible infertility in mice after five generations (at 0.168-1.053 μW/cm²; Magras and Xenos, 1997), and increase the incidence of childhood leukemia (at ≥0.2 μW/cm²; Hocking, 1998). To address to these alarming health issues confronting man, several developed nations
have set the permissible limit of EMFr based upon non-thermal effects rather than the thermal based guidelines like 0.01μW/cm² in New South Wales, Australia, 0.1μW/cm² in Salzburg - Austria, and 2.0μW/cm² in Russia and Hungary (Table 1 in Review of Literature).

The EMF density depends greatly upon the distance and direct line of sight of the antenna. The maximum radiations were observed at 50-100 m in the line of sight of antenna without any obstacle like buildings, and trees. Further, the level was greatest at 5-7 feet height, and the minimum at ground level. During the survey, it was observed that buildings and trees reduce the EMF level, though it depends upon the size of building and tree canopy. Further, the power density decreased with the increasing distance from the tower. An example of such an effect is seen in Sector 34 (discussed above).

Further, it has been opined that even if the EMFr density at ground surface is lesser and does not affect human health; yet, the densities are much higher at rooftops where antenna’s have been erected (Comar, 2000). At those levels, it can cause serious health implications in persons with heart pacemakers or other implanted devices. Additionally, it has been reported that cell-phone transmitters increase the incidence of cancer (Wolf and Wolf, 2004), and induce health-related complaints, mostly of the circulatory system, sleep disturbances, irritability, depression, blurred vision, concentration difficulties, nausea, lack of appetite, and headache (Bortkiewicz et al., 2004). However, the health-related effects depend upon the exposure level, and the distance from a base station. Though no such observation was made in the present study correlating EMF level and human health, yet the available literature points its implication to human well-being.