

Regional Development Forum 2008

“Bridging the Standardization Gap in Developing Countries”

Accra, Ghana, 26-28 May 2008

Electromagnetic Radiation from Mobile Phones and their base stations: Health Effects

Joseph K. Amoako

**Radiation Protection Institute
Ghana Atomic Energy Commission**

Accra, Ghana, 26-28 May 2008

BACKGROUND (1)

- Everyone is exposed to a complex mix of Electromagnetic fields of different frequencies
- The worldwide estimate of mobile phone users is over 1.6billion
- In Ghana, it is estimated that mobiles phone users numbers about 8 million (35% of population)

BACKGROUND (2)

- There is increase in the number of base stations installed mostly in residential area, school premises, etc.
- Despite the tremendous benefit of mobile phones and other related technologies there are public concerns about the potential adverse health effects from exposure to radio frequency radiation from base stations and handsets

SOME STATISTICS IN GHANA

YEAR	NUMBER OF FIXED LINES	NUMBER OF MOBILE SUBSCRIBERS
1997	78,000	
2001	220,000	
2006	360,375	3.4million

CONCERNS FOR HEALTH

- Given the number of mobile phone users in Ghana, even a small adverse effect on health could have a major public health implication
- A number of public agitation through letters, public demonstration and legal suits against installation of mobile phone antennae in some communities have taken place

Public Agitations in Ghana

- Agitations are very strong in communities such Aburi, Kitase, Ahwerease Ashongman, Macarthy Hill and Tema where the number of cell base stations have increased in recent years
- There are at least two court cases pending in Accra on installation of mobile phone masts in residential areas
- These agitation had led to convening of several meeting between operators, NCA and EPA but a permanent solution is yet to be found.

Examples of RF masts install very close to homes leading to litigation



Accra, Ghana, 26-28 May 2008

Exposure Levels

- Exposure situations presented by handsets and base station are quite different , i.e
- RF exposure to users of mobile phones are higher than to persons living near base stations
- The heighest power density measured from a base station around Ahwerease, Ghana was $0.00092\mu\text{W}/\text{cm}^2$
- Handsets, however, transmits RF only while a call is talking on the phone.

Handsets

- Mobile Phone handsets are low-powered RF transmitters emitting powers in the range of 0.2 to 0.6 watt
- The RF field strength falls off rapidly with distance from handset
- If “hands free” kits are used exposure is much lower for a user who places the headset against the head/ear.

Base Station

- A typical base station transmit power levels from a few watts to 100watts or more depending on the size of the region or cell
- Typical Base station antenna is about 30cm wide and a metre long, mounted on building or towers of height of 15 to 50m above ground.
- Intensity at ground directly under antenna is low.
- RF field intensity increases slightly as moves away from the base station and then decreases at greater distances
- Typical power density values measured in Ghana averaged $0.0006\mu\text{W}/\text{cm}^2$

Health Effects

- Review of scientific publication show that whereas RF can interact with body tissues such interactions can not cause adverse health effect.
- Very low temperature change have been calculated using mathematical models at the Radiation Protection Institute
- For example maximum calculated temperature rise in the head was 0.017°C for 1.7W/Kg SAR
- Current scientific evidence and data indicate that exposure to RF is such that emission from mobile phones and their base station is unlikely to induce or promote cancers.

Other health effects and risks

- Some studies have reveal the increase incidence of motor accidents attributable to use of mobile phones while driving
- There are also scientific reports of increase changes in brain activity, reaction time and sleep disturbances. There is still the need for more research to confirm some of these findings.

Electromagnetic Hypersensitive Subpopulation: Do they exist?

- Electromagnetic Sensitivity (EHS) being an emerging public health issue is a self declaration based on own experience
- Scientific review indicate it is prevalent in:
 - California (3.2%,Levallois 2002)
 - United Kingdom(4%, Eltiti, 2007
 - Germany(8 – 10%, Infas, 2002 -2007)
 - Switzerland (5%, Schreier, 2006)
- There is no scientific data on EHS in Ghana even though there are occasional reports from individual of perceived symptoms

Recommendations

- Adoption and adherence to international health based guidelines as a precautionary measure
- Local regulations on installation of RF antennae and use of handsets should be strictly enforce
- Consultation with communities on siting of base station should made part of licensing requirements
- Public education to address fears and concerns
- Strict enforcement of laws regarding use of phones whilst driving
- Research institution should be encouraged and resourced to under take research into health effects of RF emissions

Additional Recommendation for Base Stations installation

In addition to Compliance with ICNIRP guidelines the following precautionary measures are shall be adopted for Macro Base Station Antenna:

- Installation of Base Station Antennas within the premises of schools and hospitals may be avoided to the extent possible because children and patient are more susceptible to EMF
- Installation of Base Station Antennas in narrow lanes should be avoided in order in order to reduce the risks caused by any earth quake or wind related disaster.
- The base station antennas should be at least 3 m away from the nearby building and antennas should not directly face building. Further the lower end of the antenna should be at least 3 m above the ground or roof. Exclusion zones should be determined and defined by acceptable physical barriers and appropriate gating. The physical barrier shall be a minimum of 3 meters in height within the curtilage of the site to prevent intrusion.
- In case of multiple transmitter sites at a specific locality sharing of a common tower infrastructure, should be explored, as far possible, which can be coordinated through a nodal agency.