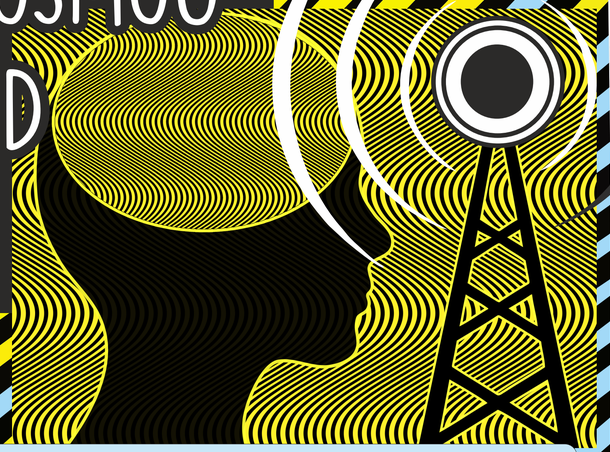
ELECTROSMOG AROUND US



INTRODUCTION

Electromagnetic radiation, also called electromagnetic waves, are a system of fields – electric and magnetic – propagating through space. Its natural sources are the Earth, the Sun, and the Universe. It is also produced artificially by electrical and telecommunication devices. This artificial radiation is treated as pollution and colloquially referred to as 'electrosmog'. As continuous technological progress requires the creation of an increasingly large number of devices that pollute the environment with electromagnetic radiation, the issue has become a matter of interest as there exists a major concern that excessive exposure to artificial electromagnetic radiation may have an adverse effect on the human health. This is why every person should use the devices properly and be aware of the possible risks posed by staying in electromagnetic smog emitted by electrical and telecommunication devices for a long time.

RESEARCH PURPOSE AND HYPOTHESIS

The aim of the research was to monitor electromagnetic pollution in our environment and study the social awareness concerning electrosmog and its influence on people in the school community and white-collar workers, who spend much time at work in front of the computer. The following research directions were adopted: showing the existence of electrosmog in our environment; determining the influence of distance from the device emitting electrosmog on the measured values of the electromotive force; determining the level of knowledge concerning electrosmog and the possible risks posed by excessive exposure to electromagnetic fields as well as possible means of protection against its possible negative effects on the human body.

MATERIALS AND METHODS

The monitoring of electrosmog was performed with the use of a custom-made electromagnetic field sensor. It consisted of a universal digital meter (model UT50A) and a 50-turn coil (Fig. 1). The tests consisted in measurement of the value of voltage, i.e. the electromotive force (EMF) induced in the coil. For everyday devices, measurements with the use of the sensor were performed at the turn of November and December 2020 at a distance of 10 to 50 cm from the source of the electromagnetic field; for telecommunication devices, the distance was adopted as 1 m to 50 m (mobile telecommunications transmitter (Fig. 2) and 100 kV power line (Fig. 3) in Jastrzębie-Zdrój).

Fig. 1 Electromagnetic field sensor.

Fig. 2 Place of measurement – mobile telecommunications transmitter.

Fig. 3 Place of measurement – 100 kV power line.

For the purpose of the survey, an anonymous questionnaire consisting of 12 questions was used. It was addressed to administrative and office workers, and secondary school pupils. The survey was carried out from September to mid-October 2020 in a group of 320 persons residing in Pszczyna county (Silesian Voivodeship). The first surveyed group of 200 (115 girls, 95 boys) consisted of students aged 16-19 from the John Paul II General Education Secondary School Complex in Pawłowice. The second group of 120 (84 men, 36 women) were white-collar workers with a higher education level: programmers, graphic designers, architects, accountants, and bank workers aged 26-50. Statistical analysis of the survey and experimental research was carried out using Origin Pro 8.6 software.

SURVEY RESULTS

Unlike the workers, over half of the surveyed school pupils is not familiar with the term 'electrosmog' (Fig. 4) and think that telecommunication and everyday devices do not contribute to environment pollution by electrosmog (Fig. 5). Both groups of respondents unanimously indicated the mobile phone as a possible source of electrosmog (Fig. 6). The surveyed administrative and office workers indicated the computer as one of the five most commonly devices used by them, which does not surprise as most of their work is performed with the use of the computer. School pupils indicated the mobile phone the most often, which can also be easily explained as it constitutes their favourite gadget (Fig. 7). The survey also showed that over 50% of pupils aged 16 to 19 spend 2 hours a day in front of the computer, while 91% of workers use it for over 8 hours (Fig. 8). Both the surveyed groups unanimously stated that they spend time in front of the TV every day (Fig. 9). School pupils admitted that they use the mobile phone for over 3 hours a day; workers for 1 hour only (Fig. 10). Among the methods of electrosmog prevention that school pupils use the most readily, they indicated unplugging devices from electrical sockets as the main one. Workers, on the other hand, for protection against electrosmog, would prefer to spend their free time without devices emitting electromagnetic waves (Fig. 11). Administrative and office workers consider headache, tiredness, and problems with concentration as the main symptoms that accompany long-term use of electrical devices, observed in themselves or their close relatives. Similar answers were given by school pupils (Fig. 12).

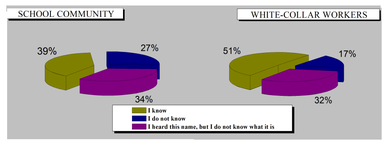


Fig. 4 Awareness of the term "electrosmog" among respondents.

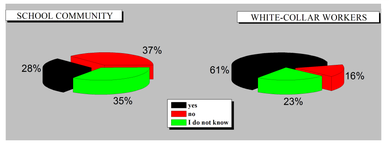


Fig. 5 Telecommunication devices/everyday devices contributing to global pollution.

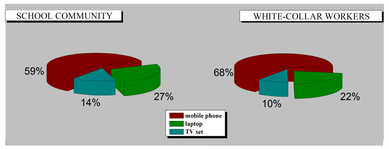


Fig.6. Devices which can be a source of electrosmog.

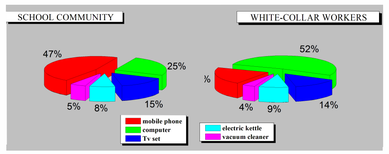


Fig. 7 Devices the most frequently used by respondents.

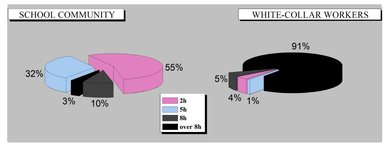


Fig.8. The amount of hours spent daily in front of the computer by respondents.

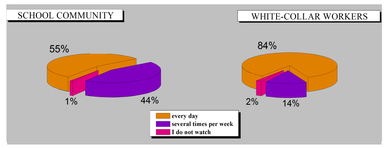


Fig. 9 Frequency of watching TV by respondents.

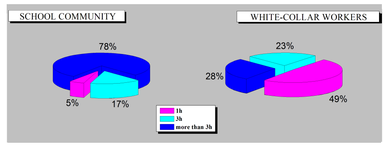


Fig. 10 Number of hours spent daily on mobile phones by respondents.

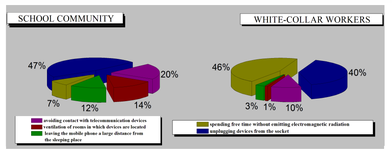


Fig.11. Methods of protection against electrosmog.

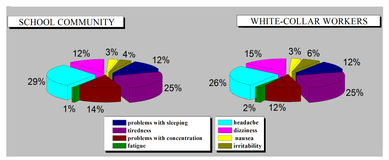


Fig. 12 Accompanying symptoms during long-term use of electrical devices.

EXPERIMENTAL RESULTS

Measurements of the electromotive force induced on the coil depending on the source of radiation, i.e. home appliances (Fig. 13) or telecommunication devices (Fig. 14). On the basis of the obtained data it was concluded that as distances increase, the measured EMF values decrease both for household appliances and telecommunication devices. The measured values of voltage for a given type of equipment are low and if it is used properly, then the influence of the electromagnetic field on the human body may be minimized. In addition, the values of the electromotive force emitted by old- and new-generation devices were measured (Fig.15). A comparison between of the measured electromagnetic radiation emission by old- and new-generation devices showed large differences in the measured values of voltage, which means that the devices currently in use are not only energy-saving but also safe in terms of the possible adverse impact of electrosmog on humans. Figure 16 shows the measured values of the electromotive force for the power line and the mobile telecommunications transmitter. The potential influence of the electromagnetic field produced by the power line is much greater than that produced by the mobile telecommunications transmitter. This difference may result from the orientation of the transmitter antennas, which is corroborated by the lack of a significant correlation between the measured electromotive force and distance. When staying within the range of influence of a high voltage power line, one has to take into account its possible influence on the human body. Perhaps the regulations in force concerning the location of houses and estates took this into account, specifying a protection zone.

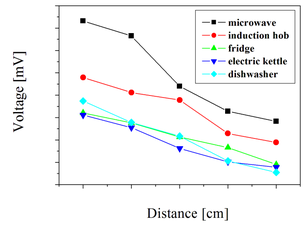


Fig. 13 Relationship between voltage and distance for household appliances.

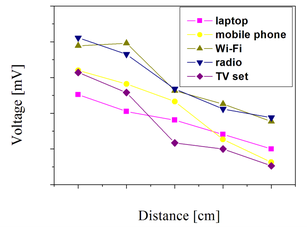


Fig. 14 Relationship between voltage and distance for telecommunication devices.

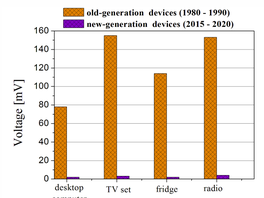


Fig. 15 Measurement of the electromotive force for old- and new-generation devices.

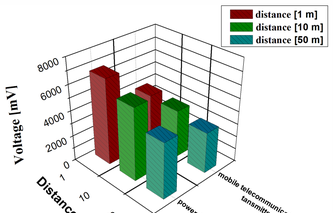
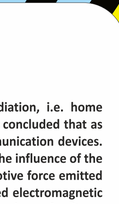


Fig. 16 Measurement of the electromotive force for power line and mobile telecommunications transmitter.



CONCLUSIONS

An analysis of the survey and experimental studies made it possible to draw several important conclusions. It is an indisputable fact that electromagnetic radiation is encountered every day. We are currently witnessing a dynamic development of new technologies, which contribute to minimizing emissions of electromagnetic waves – as indicated by measurements for technologically older devices and the state-of-the-art ones. Quite surprisingly, the results of the survey concerning the social awareness of electrosmog and its possible influence on humans show that the younger statistical population has considerably less knowledge in the area in comparison with the older population. Both pupils and workers spend most of their time in front of the computer or on the mobile phone and are aware of this fact – as shown by the survey. The respondents indicated the ailments that accompany them during long-term use of electrical and telecommunication devices; there is no direct confirmation, however, that they are – apart from scientifically documented thermal effects – indeed the result of the influence of electromagnetic field on the human body. The obtained survey results corroborate the preliminary research assumptions concerning the existence of electrosmog in our environment.

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