The Romanian Public's Perception of Electromagnetic Fields Risk

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Abstract— **Potential health risks from exposure to electromagnetic fields (EMF) are a hot topic in recent environmental health research. The aim of this survey is to help understanding of the perception that the Romanian public has upon the links between electromagnetic fields and health. Nervousness/restlessness, headache and sleep disturbances were the most often reported symptoms and power lines, mobile phones, microwave ovens, computers and TV screens were perceived as the main EMF sources suspected to be associated to symptoms. The general results show that the level of knowledge about the event increases the concern about risks incurring from it. Population's information level was strongly related to level of perceived risk, growing concern about EMF.**

Keywords— **Electromagnetic fields, risk perception, environment, health.**

I. Introduction

In today's world, there is increasing concern about various suspected environmental illnesses. The electric and magnetic fields are unavoidably produced wherever electrical energy is generated, transmitted or used, and are thus inherent in modern societies. These fields surround all electrical wires and all electrical equipment, such as computers, televisions, electrical stoves, telephones, transformers, electric heaters, cell phones, fluorescent lights, all types of wireless devices and more. The health consequences of technological developments can be difficult to predict and manage, and the public reaction is largely hesitant and in many cases tends to develop a negative attitude toward this matter.

Despite evidence that there are no adverse health effects within guideline limits, a number of individuals have reported a variety of health problems that they have attributed to exposure to electromagnetic field (EMF). These individuals have often been described as being "electromagnetic hypersensitive" (EHS), and EHS is considered a new illness of industrialized society. Although there is little scientific evidence to support the idea of EHS, the World Health Organization (WHO) says the "symptoms are certainly real" and "can be a disabling problem for the affected individual". Reacting to this rising tide of claims of a new illness, the WHO issued a fact sheet on the allergies, which it dubbed "electromagnetic hypersensitivity" and likened it to multiple chemical sensitivities [1]. The understanding of risk perception is of fundamental importance not only to improve the communication between scientists and the general public, but also to evaluate the plausibility and relevance of claimed effects such as "electromagnetic hypersensitivity".

The aim of this work was to assess the Rumanian Public's perception upon the links between electromagnetic fields and health and to looks at what proportion the population has received information on EMF and whether receiving this information affects levels of concern about possible health risks.

II. Material and method

In order to assess and understand in detail the public's perception of electromagnetic fields risk and to investigate population's information upon this issue, a questionnaire was handed out to 500 of adult residents from Cluj-Napoca. The reply rate was 65 % (325 responders). The survey's effective respondents were almost gender balanced (with 55% male and 45% female). More than half of the interviewed were above 45 years old (48% aged between 20-45 years old and 52% between 46-70 years old), and 60% of them have high school diploma and above. The current jobs of the respondents are in the industries of service (24%), students (20%), retired (17.2%), manufacturing (12%), health or education (10.8%) freelance (8%) and house persons (8%).

III. Results

The particular questions were designed to assist in determining the levels of environmental health concern, risk perception and general information about EMF.

The first part of the study looks at the place of EMF between the other environmental issues.

As Figure 1 show, the electromagnetic fields are not the top health concerns in people's minds, and the responders were most concerned about air pollution than any other environmental health risk. Among the 10 environmental factors presented as potential threats to health, the sources of electromagnetic fields appear in the lowest three positions.

After the study of environmental issues that people perceive as affecting their health, we looked in more detail at the specific area of EMF.

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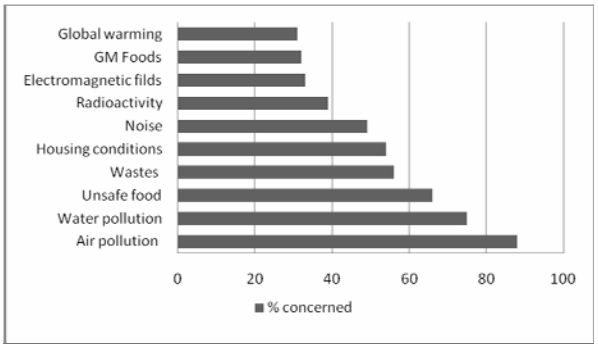

Fig. 1 Main concerns on environmental issues

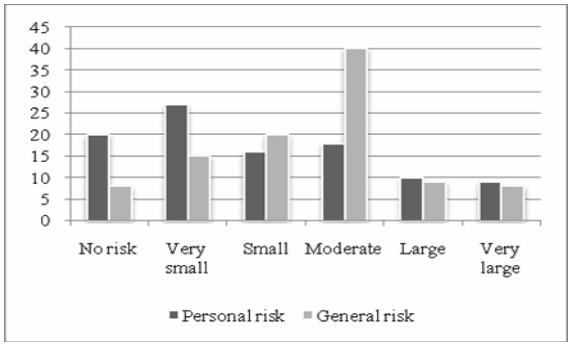

Fig. 2 Distributions of perceived risk according to rating scale

The respondents were presented a list of objects and asked which of them emit EMF in order to assess their knowledge about the possible source of EMF. Broadcasting stations, TV towers and mobile communication masts were cited by a majority of respondents (66%), followed closely by mobile telephones (64%) and power lines or transformer stations (58%). High mentions are also noted for visual display units or TV sets (44%), computers (40%), radar equipment (39%) and electrical household appliances (35%) and much lower mentions are recorded for wireless computer networks (12%) and electric wiring in houses (9%). It is worth noting that only 8% of interviewed say that everything on the list is a source of EMF and 2% of them don't recognize any source of EMF. See Table 1.

Table 1 Public's awareness about the sources of EMF

Possible source of EMF	recorders
Broadcasting stations, TV towers or telecommunication masts	66%
Electrical appliances at home (electric clocks, hairdryers, vacuum cleaners, microwave ovens etc)	35%
Electric wiring in houses	9%
Computers	40%
Wireless computer networks	12%
Light sources (fluorescent tubes or other)	14%
Mobile phones	64%
Power lines or transformer stations	63%
Anti-theft devices (e.g. motion detectors of alarm systems, security gates/barriers)	18%
Radar stations	27%
Railways	24%
Visual display units or TV sets	44%
All of these	8%
None of these	2%

When the subjects were asked to reply to the question "How concerned are you about the potential health risks of electromagnetic fields?" the public is evenly divided on the matter. While 48% of respondents say that they are indeed concerned about the potential health risks of EMF, a slightly larger proportion of the poll (50%) say they are not very concerned or even not at all concerned about this issue and only 2% have no opinion on the matter. A socio-demographic analysis reveals that young people aged 20 to 45 are less likely to be concerned about the adverse health effects of EMF (only 35% of this age group, compared with 61% in the other age group).

Risk perception was studied by means of rating scales from 0=No risk at all to 6=A very large risk. "Don't know" answers were treated as missing data. Because the people tend to believe that others are at greater risk then themselves, the respondents were asked to judge both general risk (the risk to others), and personal risk (risk to themselves). These ratings typically differ as to level. Personal risks are typically judged as smaller than general risks. The differences between personal and general risk suggest that it is probable that people believe they can protect themselves from the hazards. The risks were rated at the level rather small – moderate. The data are illustrated in Fig. 2.

Not to suggest any possible answer, the interviewed were asked to list the five most common symptoms which could be associated with the electromagnetic field exposure. The answers may be classified into the following groups - the first two are further specified:

- Nervous system symptoms; nervousness/restlessness, headache, sleep disorders, stress, anxiety, and neurasthenia.
- Cardiac arrhythmias, tinnitus/ ringing in the ears
- Hormonal disorders, eye symptoms, and digestive problems
- Other responses concerned different types of cancer, reproductive and pregnancy problems and various symptoms attributed to the sick building syndrome.

Overall, the most common symptoms encountered among the responses were nervousness/restlessness, headache and sleep disturbances. Other more specific symptoms such as cancer or pregnancy problems occurred less consistently among these descriptions.

These reactions were analyzed in different situations and have been attributed to different sources. 45% of respondents considered that the most common situations appear "at work", 31% specified "at home", and 24% reported "outdoors" as places for apparition of these problems. Excepting mobile phones, the sources of radiofrequency (RF) fields such as telecommunication masts, broadcasting or TV towers and radar stations were not mentioned as being a common source of problem. A quarter (26%) of respondents affirms that mobile phones affect citizens' health to a major extent. Power lines or transformer stations, visual display units (especially computers and TV screens), and some electrical appliances (especially microwave ovens) were frequently mentioned also. More general suspected sources included "all EMF sources", or "all EMF from household". There were no clear patterns between the reported symptoms and their suspected sources.

One of the most important criteria used when taking a decision or forming an opinion on any particular issue is information. Therefore, the survey looks at the extent to which information on electromagnetic fields has been received by the population. Only 38% of the responders say they have received information on the potential health risks of EMF. The majority of respondents (62%) report that they have not received any information on the matter. Among the majority proportion of the poll who had not received this information, just 36% say they are worried compared to 69% among those who received information. Education and occupation have a significant influence. In terms of education, 39% of those who have high school diploma and above had received information on these potential health risks compared with just 7% of those who left school at age 16 or before. A similar disparity is seen on the basis of occupation. Among students this figure rise to 46%, and approaches one in three for managers and those working in health or education compared with just 9% of house persons, 11% of the retired and 17% of manual workers. The results show that 40% of respondents claim to be not very satisfied with the information received because the material they had received was insufficient or not objective. However, when respondents were asked about the two main ways they received information on potential health risks linked to EMF, television (75%) and newspapers and magazines (54%) were by far the most frequently mentioned. 21% of those questioned say they received information over the Internet, and fewer than 5% of the respondents mentioned specialist publications (science or health journals) and other channels of information, such as official publications, institution manuals, seminars, information in the workplace, books or conferences.

Preference for the Internet is best explained by age, education and occupation. While over a third (38%) of the youngest age group would prefer to receive information regarding EMF via the Internet, only 5% of those aged 46 and above have the same preference. Education is also an important determinant in the selection of this medium: only 4% of the least educated opt for the Internet as a way of receiving information on this subject, and for those educated stands at more than five times this figure (27%). Occupation is responsible for even more striking variations. Combining the factors of education and age, a third (65%) of students opts for this medium. A high figure of 42% is also recorded amongst managers. The figures fall to 16% for manual workers, 10% for house persons and just 4% among the retired.

In the light of the general criticism of the role of public authorities in this aspect of public health protection, it is interesting to look at how respondents feel that the authorities should act in this area. The most opinions were that public authorities should inform the public as to the potential health risks linked to EMF (53.8%). Other recommendations were setting safety standards for products (39%) and developing guidance for public health protection (38%), harmonizing national safety standards and policies with those of EU (36%), and even reviewing of the status of scientific evidence and financing of the research (22%) were proposed as a possible measure.

IV. Discussions

Over the course of the past decades, numerous electromagnetic field sources have become the focus of health concerns. It is recognized that this topic has received different awareness in various European countries: In Sweden, a substantial part of the EMF research and health related efforts is directed towards "electromagnetic hypersensitivity" primarily in relation to office work situations and visual display units. In other countries like Austria and Germany, concerns of people appear to be more concentrated on the exposure at home and focused on power lines and transmitter stations [2].

Studies of the risk perception of EMF have been carried out using various methods, including psychometric (questionnaire) techniques. These studies indicate that people in general do not rate electromagnetic sources as being among the highest sources of risk. The power lines are typically rated as having more severe consequences than other sources being much less controllable and much less

equitable then those from electrical appliances at home [3]. According to respondents' assessments, the power lines, mobile telephones, microwave ovens, computer and TV screens are considered the most risky source of EMF, which may affect their health in the fullest extent. Mobile phones, with their widespread adoption across the Romania in the past decade, are not only common place particularly amongst younger age groups but have generated substantial claims and denials as to the possible long-term harm they may cause to users. It is well known that voluntary exposure is an important factor in risk perception. Generally, people who do not use mobile telephones perceive the risk as high from the fields emitted from mobile telephone base stations. However, more a quarter of interviewed consider that mobile phones affect citizens' health to a major extent, but they are less worried by base stations.

In most of the cases (58%), the interviewed suggested their suspected association between an EMF source and some nervous system symptoms (nervousness/restlessness, headache and sleep disturbances). Because scientists cannot exclude that EMF may cause health problems, the application of the precautionary principle is debated heavily. It seems that precautionary measures will increase trust in risk management, which in turn will result in lower risk perceptions [4].

Risk perception depends on several factors, many of which are relevant for electromagnetic fields. They include lack of familiarity with the agent, difficulty in understanding interaction mechanisms, and uncertainty in scientific knowledge [5.] Because of uncertainty about health risks associated with EMF exposure, the public is more likely to experience difficulty in evaluating the available information and rely more on perceptions than facts when drawing conclusions. MacGregor and co-workers provided subjects with a brochure which discussed the 'possible, but not proved' health effects of ELF exposure. After reading the brochure, subjects perceived the health risks of ELF exposure as higher than before reading the brochure [6]. In another study, it was recommended to provide laypeople with information to take away exaggerated fears, thus lowering perceived risks [7]. In our study, 36% of respondents who have not received any information on the potential health effects of electromagnetic fields were worried compared to 69% among those who received information. This suggests that the information may have a backlash effect, increasing worries rather than decreasing them. On the other hand, mass media, which usually tend to scare-mongering, exert a powerful influence on people's perceptions.

V. Conclusions

The sources of EMF appear in the lowest three positions in context of public concerns for environmental issues. Young people tended to be less concerned about the adverse health effects of EMF than older people did. Personal risks are judged as smaller than general risks, probably because the people believe they can protect themselves. Nervousness/restlessness, headache and sleep disturbances were the most often reported symptoms and power lines, and the mobile phones, microwave ovens, computers and TV screens were perceived as the main EMF sources suspected to be associated to symptoms.

Information may have a backlash effect, increasing worries rather than decreasing them. This could be interpreted as an indication that information on these potential health risks has a major impact in increasing levels of concern. It could also be that people who tend to be more worried about the issue are more likely to look for information. Education and occupation have a significant influence, and the Internet is likely to become one of the preferred channels of information in the near future as it is chosen by more young people.

In future work, it would be interesting to relate perceived EMF risks to measures of precautionary attitudes.

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