CONCERN ABOUT BASE STATIONS FOR MOBILE COMMUNICATIONS IN THE NETHERLANDS

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ABSTRACT

People experiencing adverse non-specific health effects, such as headaches or sleep disturbances, often associate these effects with radio frequency radiation from base stations for mobile telecommunications. In an exploratory study on concern, RIVM has combined the results from a questionnaire with the locations of GSM base stations and residences of the respondents. It was found that the percentage of concerned people is associated with the subjective idea of living 'in the vicinity' of a base station. Up to 300 m this percentage does not depend on the actual distance of the residences to the base stations. Currently a new data set is studied to find out whether the concerned respondents display any observable health effects.

INTRODUCTION

People in the Netherlands express concern about GSM and UMTS base stations in various media such as papers and websites on electrosmog [1]. RIVM found in a separate study that people also experience non-specific adverse health effects as headaches and sleep disturbances, which they attribute to exposure to radiation from base stations for mobile telecommunication [2]. The National Health Council of the Netherlands observed in 2000 that there are strong indications that people fearing to be exposed to adverse environmental factors might start experiencing non-specific health effects [3].

It is unclear whether the non-specific health effects could be caused by an unknown physical mechanism initiated by exposure to radio frequency radiation, or by a psychological mechanism initiated by concern. In this exploratory study RIVM investigates whether an association exists between the number of concerned people and the distance to the nearest base station. In a following study the association between observable health effects and respectively concern, distance and level of exposure will be investigated.

METHOD AND DATA

We combined the data of the GSM base stations with the data of the respondents in the Inventory of Perceived Environmental Quality in a GIS application [4]. In this way we determined the number of concerned respondents within distances of 50, 100, 200 and 300 m to the nearest GSM base station

Inventory of Perceived Environmental Quality

In 2003 RIVM performed the fifth National Inventory of Perceived Environmental Quality. In a non-selective sample survey 2,076 respondents of 16 years and older were asked about annoyances and disturbances with respect to environmental factors (noise, smell and vibrations and risk perception and livability). For 1,937 respondents out of 2,076 the XY-coordinates of the locations of their residences could be determined and they were imported in the GIS application. In 2003 also questions were included about concern with respect to the safety about living in the vicinity of a GSM base station. Firstly, the respondent was asked if one of a series of 18 cases was applicable to his living environment, amongst which "living in the vicinity of a GSM mast". Only if the respondent confirmed, the second question was: "How concerned or non-concerned are you about your safety with respect to living in the vicinity of a GSM mast". The level of concern could be expressed on an 11-point scale (0-10).

Data on GSM base stations

Due to a covenant between the government and the telecom providers [5], the providers have to report for every transmitter/receiver unit, TRX, amongst others the location and height of the antenna, the Effective Radiated Power (ERP), the azimuth and the frequency to the National Antenna Bureau of the Netherlands. A general analysis of the data shows that in total 11,000 unique locations for 22,000 TRXs in the 900 MHz band and 33,000 TRXs in the 1800 MHz band exist. The XY-coordinates of the locations of the TRXs were imported in the GIS application.

RESULTS

Figure 1 displays the distribution of the measure of concern of 158 respondents, on a total of 2076 respondents, claiming to live in the vicinity of a GSM base station. On a scale from 0 to 10 every respondent declaring a measure of concern of 4 and higher is defined as "concerned". Based on this definition 33 out of the 158 respondents who report to live in the vicinity of a GSM base station are concerned. Due to the sequence of questions, no information is available on the concern of respondents who do not consider themselves to live in the vicinity of a GSM base station.

Table 1 presents the distribution over actual distances of 50, 100, 200 and 300 m from the nearest GSM base station. Given are: the total number of respondents for whom the residences could be located, the number of respondents living self-declared in the vicinity and the number of respondents living self-declared in the vicinity *and* expressing concern.

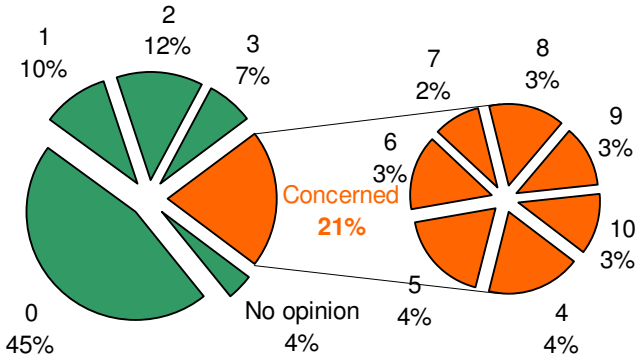

Figure 1 *Distribution of the 158 (population=2076) respondents claiming to live in the vicinity of a GSM base station over their declared measure of concern on their safety on an 11-point scale (0=not concerned, 10=extremely concerned).*

Table 1 *Number of people vs. distance to nearest GSM base station*

	Dutch Population	Respondents		
Distance (m)	Actually	Actually	Self-reported living in the vicinity	Self-reported living in the vicinity **and** concerned
0 - 50	305.000	28	11	2
0 - 100	882.000	92	25	7
0 - 200	2.861.000	271	52	14
0 - 300	5.302.000	504	71	20
> 300	10.831.000	1.433	76	13
total	16.133.000	1.937	147	33

DISCUSSION

Figure 2 a shows, as expected, that the farther people live from a base station the less people declare themselves to live 'in the vicinity' of a base station. However, 5% of people living farther than 300 m from the nearest base station declare themselves to live in the vicinity. This might be due to the used subjective expression "in the vicinity" instead of a number of meters.

Figure 2 b shows for each of the four distance intervals up to 300 m that about 28% of the respondents living self-declared in the vicinity expresses concern. In the group "over 300 m" 17% expresses concern. The steady percentage of 28% indicates that up to an actual distance of 300 m no association exists between the actual distance to a base station and the number of concerned respondents. This suggests that the idea of living "in the vicinity" leads to concern.

From a study on concern about GSM base stations, mobile phones and cordless phones amongst 2,500 respondents in Germany by Infas in 2003 a similar image appears [6]. Out of the respondents living self-declared within a distance of 5 km of a GSM base station, 31% expresses concern, of the respondents self-declared outside a distance of 5 km 29 expresses concern. However, 44% of the German respondents declaring themselves to live within the "direct vicinity" of a base station expresses concern, whilst of the respondents declaring themselves not to live in the direct vicinity 31% expresses concern. This points again towards the subjective idea of "in the vicinity" as an initiator for concern.

The difference between the percentages in the Netherlands and Germany seem to depend on a number of factors. Firstly, in Germany information on radio frequency radiation is more extensively supplied to the public. One of the German observations was the better people are informed, the more concerned they get. Secondly, a complicating factor, which may have lead to an underestimation in the Netherlands, is the exact phrasing of the questions: in Germany questions were asked about concern with respect to health whilst in the Netherlands with respect to safety. Thirdly, the definition for a concerned respondent differed: in the German study a person was called concerned if he self states to be so, in the Netherlands a person was called concerned if his self-declared measure of concern exceeds 3 on an 11-point scale.

CONCLUSIONS AND RECOMMENDATIONS

It was found that the percentage of concerned people may be associated with the subjective idea of living 'in the vicinity' of a base station. Up to 300 m the percentage of concerned respondents does not depend on the actual distance. More or less similar observations are made in a German study.

This exploratory project gives a preliminary estimate of the number of people concerned about GSM base stations. In analogy with the German questionnaire also people who are not self-declared living near a base station could be asked about their concern. Other possible improvements include questions about their concern about base stations near the place where they stay during daytime and their ability to recognize a base station.

Further research on non-specific adverse health effects can be performed on data gathered in a survey in the area around Amsterdam Airport Schiphol [7]. Originally, the survey was designed to investigate the connection between aircraft noise and various cognitive skills. Although the survey was not developed to investigate associations between base stations and non-specific health effects, it contains questions on both and therefore offers an opportunity to study the concern and health effects with respect to living close to GSM base stations.

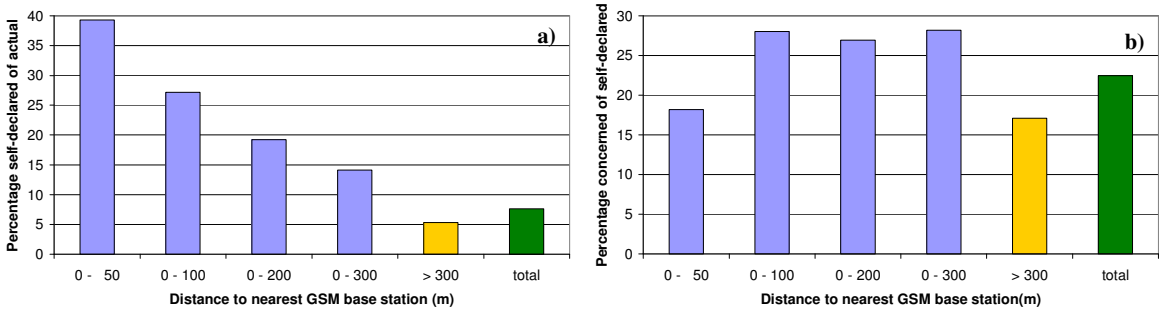

Figure 2 *a) The percentage of respondents living actually within the distance group that live self-declared in the vicinity b) The percentage of respondents per distance group living self-declared in the vicinity that expresses concern.*

ACKNOWLEDGEMENT

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