

Cyprus study

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September 29th 2005

source : <http://www.emfacts.com/weblog/?p=255>

Project Announcement 2002

Academics at Bristol University's Division of Medical Physics have been awarded **£250,000** to carry out a major study investigating the health of Cypriots living near the large military antennae at Akrotiri.

The study aims to address the concerns of people living near to the antennae about possible health effects. Detailed information about the health of residents who live within **one kilometre** of the military communications antennae and that of a similar community 20 kilometres away will be collected. This will establish whether there is any difference in the health status of the exposed and unexposed villages. The electromagnetic field levels, both from electricity power sources and the radio-frequency antennae, will also be measured in a sample of homes to give a clear picture of exposure levels.

We hope the result of the **study in 18 months** will address any concerns about possible health effects.'

Executive Summary 2005

There have been antennae on the Akrotiri Salt Lake military site for a number of years, but the proposal to erect Pluto 2, a larger antenna, was greeted with massive demonstrations and media campaigns. In January 2002 the village leader of Akrotiri sent a letter to the Ministry of Health of the Republic of Cyprus requesting the immediate commission of a health survey. It was decided that a team of consultants from the University of Bristol in the United Kingdom in collaboration with the Ministry of Health of the Republic of Cyprus should carry out the survey.

The objective of the study was to establish a baseline of the health status of two communities, Akrotiri and Asomatos, compared with a control community, Pano Kyvides and to measure their exposure to specific environmental factors. The health survey investigated the prevalence of specific symptoms and diseases, using specifically designed questionnaires; a risk perception survey; and a collection of health and mortality data from available registry and other sources. The measurement survey collected electromagnetic field (EMF) data. This report gives a brief review of the literature and describes the methodology that was used for both the health survey and the measurement survey. It presents detailed results and comments.

The analysis has shown that the three villages were in fact well matched and provided a good basis for the comparison of exposed and unexposed populations. The overall response rate was 87%. In analysing the questionnaire data a number of important issues have become apparent. Firstly the responses to the adult health questionnaire provided significant differences between the villages (and not just between exposed and unexposed). In Akrotiri there was an increased reporting of migraine, headache, dizziness and depression. A similar trend was noted in Asomatos although at lower levels. What was also observed in Asomatos was a significant increase in reported asthma and heart problems. Using a standard validated questionnaire (SF36) the villagers in Akrotiri reported a more negative view of their health than those from the other two villages. Akrotiri reported a higher degree of physical limitation, emotional distress and pain. In addition the risk perception sections of the

questionnaire showed that Akrotiri respondents had a higher level of perceived risk than the other two villages.

In reviewing these findings in relation to the published literature there is no evidence of an association between asthma and heart problems and exposure to electromagnetic fields. On the other hand there is a consistent literature that cognitive and neurological effects are associated with electromagnetic field exposure. However, this is normally only found at higher levels and higher frequencies and associated with mobile phone use as covered in detail in the Stewart Report. There is subsequently only one report of an association between cognitive function and well-being effects at low exposures and the exposures levels recorded in that report were of 1 volt per metre. The measurement study here confirmed an average value of **0.57 volts per metre** in Akrotiri and **0.46** in Asomatos. In Pano Kyvides the levels were less than 0.001 volts per metre. It is worth noting that the Pluto Antenna contributed 10% of exposure in Asomatos and about 20% in Akrotiri. The other sources are various broadcast antennae in particular the cell phone mast in Akrotiri. In the communities under study it is to be noted that the electric field levels from all sources were less than the precautionary level generally applied in a number of countries. It seems unlikely that the EM level is contributing to the neurological symptoms reported by those living in close to the military antenna. Given the importance of the high levels of neurological symptoms reported in Akrotiri the information provided by the adult questionnaire gave the opportunity to analyse the relative importance of location (i.e. village) in explaining this outcome. The logistic regression analysis confirmed the importance of village, but also the contribution made by several other key factors including gender and education.

The findings from female questionnaires do not provide evidence of any differences between exposed and unexposed sites in gynaecological and obstetric history. Of particular interest, there was an absence of any difference in reported levels of miscarriage. Miscarriage has been associated with exposure to high levels of EMF in previous studies; however, this has not been found in this research.

Birth abnormalities have been associated with high-level EMF in the literature; no evidence of any abnormalities was found in the child questionnaire. There were, however, significant differences in the reporting of migraine, headache, dizziness and depression, with exposed sites reporting increased incidence. In relation to infectious diseases there were six conditions where increased levels were reported, five of these in Asomatos and one in Akrotiri.

The mortality studies produced results that were difficult to interpret, due to the different results produced by the different methods of estimating the Standardised Mortality Ratios. Although attempts were made to check the reliability of reporting systems, one against another, this was not entirely satisfactory.

One of the specific objectives was to establish whether there was an excess of brain tumours and leukaemias from Akrotiri. This did not appear to be the case but with such small numbers over a ten-year period the absence of evidence does not imply that there is no association; it would be impossible for this study to come to any definitive conclusions using data covering the period of operation for the antennae.