A STUDY ON MENTAL EMOTIONAL DISORDERS WITH CORNELL MEDICAL INDEX (CMI) SCORE AMONG COMMUNITY LIVING UNDERNEATH SUTETI (POWERLINE FREQUENCY) 500KV, 2008

Corrie Wawolumaya

Department of Community Medicine, School of Medicine UI, e-mail: corrie_w@cbn.net.id

Abstract. Suteti 500 kV or the Powerline 500 kV is the Extra High Electrical energy Transmission lines more often being associated with mental emotional disorders suffered by people who have been living underneath. A study was carried out in East Jakarta and Tambun West Jawa, 2006 aiming to identify the association between the exposure of Suteti and the mental emotional disorders using the Cornell Medical Index (CMI) instrument and Sleeping disorders. A cross sectional study was carried out among 1200 respondents who have been living about 15 years and more underneath. The sample unit was the head of family, recruited proportionally in three zones, zone 1 0-30 meters (ms); zone 2 30-70 ms, zone 3 70 -100 m right and left hand side away from the median of Suteti tower foot. The independent variables were sociodemographic, nutritional status, hypertension, annoyance, satisfaction, smoking habits, zone, electric field dose, magnetic field dose and melatonin. Hypertension and sleeping disorders were diagnosed by medical doctors. The statistical analyses were bivariate and the multivariate logistic regression function. Study results found that the highest electric field was 3,2 kV/m and magnetic field was 534 dm (6.7 x 10^-6 mT), both were still below the threshold values of SNI, 2003, for electric field 5kV/m and magnetic field 0,1 mT. Annoyance was reported significant different identified among three zones (p = 0,000) The first zone, 30.70 %; zone 2, 21.98 % and zone 3, 25.22 %. The reasons of annoyance identified were, tower collapse, broken off SUTETI wire, burning of testpens, electrical shock, noise of corona, and impaired of domestic electronic equipments such as tvs, sound systems in mosque etc. About satisfaction, 99.01 respondents felt satisfied living in the location, no difference identified among zones 1, 2 and 3. The latter could be explained by the socioeconomic condition of population which mostly low. Eventhought the annoyance does exist but there is no chance for them to move to another place to live due to the skyrocketed unthinkable high price of land in Jakarta. Study results revealed among the 1117 respondents filling out CMI, 641 (57,4%) respondents were normal, the prevalence of mental emotional disorders was 42.6 %. The prevalence of mental emotional disorders were significant different among zones ( p =0,000) as follows: the highest prevalence was zone 1, 20.41 %, zone 2, 13.61 % lesser and zone 3, 8.59 % the smallest, still less from the prevalence of Jakarta. The CMI also revealed 11 psychosomatic disorders with the highest percentages as follows, nausea, sleeping disturbance; chronic fatigue syndrome, migraine, easily shocked and trembled hearing sound, feeling frightened at night when listening to alien voice, feeling tensed and dizziness, feeling rapid heart beat, being easily offended (sensitive), loss of appetite to eat and watery eyes. The determinant identified was zone (p = 0.024) ; OR 7.355 (95% Confidence Interval/CI 1.297 - 41.711). Respondents living in zone 1 and 2 (0-70 meters), were risky 7 x to suffer from mental emotional disorders compared to respondents living in zone 3 (70-100 meters ).

About Sleeping disorders, the total prevalence was 50.44 %, 99.0% suffering moderate and mild insomnia. The determinant was nutritional status p =0.012. ; OR 0.584 (95 % CI 0.385 - 0.886) meaning, being normal and underweight are protective from sleeping disorders. The conclusions found, there were no significant associations between the
A Study on Mental Emotional... (Corry)

Electromagnetic exposure of Suteti and mental emotional disorders as well as sleeping disorders

Keywords: Powerline 500 kV, mental emotional disorders using Cornell Medical Index (CMI), Sleeping Disorders, electric field, magnetic field

INTRODUCTION

The Extra High Electrical Voltage Power Lines 500 kV (Powerline frequency 500 kV) popular as Suteti (Saluran Udara Ekstra Tegangan Tinggi) is the electrical energy transmission lines which transfer the energy from the Power Electricity Installation to the consumers through the connection of Power Relay Stations.

The evidence of mental emotional disorders among community living underneath Suteti many times was being connected to the powerline frequency electromagnetic field exposure, some experts called the Electrical Hypersensitivity Syndrome (EHS). This group of subjective complaints sometimes named psychosomatic disorders, covers a variety of symptoms such as, digestive disturbance, skin problems, neurobehavior disorders etc. The syndrome first appeared in Norway in the early 1980’s among users of Video Display Terminals (VDT). Sweden mid 90’s. Different global study results reported pro and contra towards the hypothesis of existing relation between electromagnetic exposure and EHS. The European community has made a reporting net system on the so-called electromagnetic sensitivity, ranging from several studies until personal cases through out Europe i.e Italy, France, United Kingdom, the Scandinavian with inconsistent results. WHO in Environmental Health Criteria 238, 2007 reported also different studies of pro and contra results.

Anies, in Indonesia, 2004 reported his study results on the electrical sensitivity among community living beneath Suteti in Central Java, people were very risky to get dizzy living underneath. Panggabean, 2004 reported no relation identified between place of work and mental emotional disorders among electrical generating power station workers in Jakarta.

These subjective symptoms have been considered by people living underneath Suteti as Suteti’s negative health impact. There is an urgent need to study about the mental emotional disorders underneath the Suteti towers, answering the question on the relationship with the electromagnetic field exposure, the related factors and how to cope with it.

The aim of study is to identify the prevalence of mental emotional disorders using CMI, the related factors, and the relationship with the powerline frequency electrical and magnetic field.

METHODOLOGY

The study was a crosssectional survey carried out among people living underneath Suteti in two networks, the Cawang – Bekasi lines, lengths of 17 kms and the Cibinong – Bekasi network, 40 kms, both were installed in the 80’s. About 1200 respondents were sampled proportionally from the residential hamlets among community and then stratified based on three zones, first zone 0-30 meters (ms) left and right side from the central median of tower foot, zone 2, 30-70ms and zone 3, 70 – 100 ms. The unit of cluster sample is the head of family. Data
were collected by medical doctors, health personals and interviewers through physical examination, interview, observation and filling out questionnaires as well as laboratory specimens i.e., blood chemistry and saliva for melatonin examination. The Suteti's electromagnetic field, inside and outside the house were measured by the electric technicians using Holoday apparatus.\(^{(7)}\)

The inclusion criteria was, heads of family with head of family card, residing in zone 1, zone 2 and zone 3, agree to participate in the study.

Respondents were adults, aged 14 and above (the oldest 65 years of age) who went through examination of hyper-tension and sleeping disorders which were carried out by medical doctors. About 1200 adults through interview were filling out the Cornell Medical Index (CMI) questionnaire. The calculated sample size is 350 based on the prevalence of mental emotional disorders 20-25% . The revised CMI health questionnaire, 2007, developed to obtain details of the medical history as an adjunct to medical interviews. It consists of 195 questions, dichotomic with the answer Yes or No, divided into 18 sections, the first twelve deal with somatic complaints and the last six with mood and feeling patterns. CMI is used also as a personality inventory or in epidemiological studies., while the outcome was either mental emotional disturbed (the answer of Yes less than or equal to 30) and no mental emotional/psychosomatic disturbed.(the number of Yes answer is more than 30)\(^{(8)}\). Sleeping disorders was grouped into disturbed (suffer from insomnia categorized into heavy, moderate, mild insomnia) and no disturbance (no insomnia.)

The independent factors were socio demographic (age, sex, education) as well as socioeconomic factor (income), duration of stay at the location, length of stay at home in one day, exercise, smoking habit, nutritional status, annoyance, satisfaction as well as electric field dose and magnetic field dose. Annoyance was measuring the perception of people of being saved living beneath Suteti and the reason of not feeling save, while satisfaction measuring the satisfaction of people living beneath Suteti and the reason of it. The electric and magnetic dose were the function of length of stay at home in 24 hours and the electric and magnetic field measured using Holoday instrument, inside the house one meter from the ground when the lamps were on. The measurements of electric field and magnetic field were also in the yard and outside the house. The melatonin enzyme using saliva as specimen was collected during night time 20:00 -23:00 p.m to identify the relationship with mental disorder.\(^{(9)}\) Identification of melatonin using the methode of Elisa, Buhlmann Version 2005-05-25-ALPCO 06-01-05-unit of measurement pg/ml.\(^{(10)}\)

Statistical analyses used were the descriptive statistics and the multivariate logistic regression function.\(^{(11)}\)

**STUDY RESULTS**

The study found that the electric field outside the house, one meter from the ground, the highest between 10-20 ms, 3.2 kV/m declined become nearly zero at 70 – 100 ms, 0,5 kV.m The magnetic field showed similar trend to electric field, the highest 20-30 ms, 534 mA/m (6.7 x 10^{-2} mT), declining at 70 ms, 110 mA/m (1,3 x 10^{-2} mT), very small at 100 ms closer to 50 mA/m ( 6,3 x 10^{-3} mT).

Study results showed among the 1117 respondents filling out CMI, 641 (57.4%) respondents according to CMI were normal, the prevalence of mental
emotional disorders was 42.6 %. The proportions among zones were significant different (p =0.000) as follows: the highest proportion was zone 1, 20.41 %, zone 2, 13.61 % and zone 3, 8.59 %. The CMI also identified 11 psychosomatic disorders with high percentages as follows on Table 1:

The Conceptual Framework

![Diagram](image)

<table>
<thead>
<tr>
<th>Agent</th>
<th>Host</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Suteti exposure</td>
<td>- Age</td>
</tr>
<tr>
<td>- Electric field dose</td>
<td>- Sex</td>
</tr>
<tr>
<td>- Magnetic field dose</td>
<td>- Education</td>
</tr>
<tr>
<td>- Electric and magnetic field outside the house</td>
<td>- Duration of stay</td>
</tr>
</tbody>
</table>

Mental emotional Disorders based on CMI scores

Environment

family income

<table>
<thead>
<tr>
<th>Disorders</th>
<th>( f )</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nausea</td>
<td>359</td>
<td>32.1</td>
</tr>
<tr>
<td>2. Sleeping disturbance</td>
<td>351</td>
<td>31.4</td>
</tr>
<tr>
<td>3. Persistent fatigue</td>
<td>315</td>
<td>29.0</td>
</tr>
<tr>
<td>3. Migraine</td>
<td>317</td>
<td>28.2</td>
</tr>
<tr>
<td>5. Easily shocked and tremb. hear. sound</td>
<td>304</td>
<td>27.2</td>
</tr>
<tr>
<td>6. Feeling fright. at night listen. to alien voice</td>
<td>304</td>
<td>27.2</td>
</tr>
<tr>
<td>7. Feeling tensed and dizziness</td>
<td>288</td>
<td>25.8</td>
</tr>
<tr>
<td>8. Feeling rapid heart beat</td>
<td>262</td>
<td>23.5</td>
</tr>
<tr>
<td>9. Easily offended (sensitive)</td>
<td>265</td>
<td>23.7</td>
</tr>
<tr>
<td>10. Loss of appetite</td>
<td>260</td>
<td>23.2</td>
</tr>
<tr>
<td>11. Watery eyes</td>
<td>227</td>
<td>20.3</td>
</tr>
</tbody>
</table>

Table 1. Distribution of respondents with psychosomatic disorders identified through CMI
Several disorders were also identified in relative small percentages i.e., feeling itchy, reddish skin, headache, tired, fatigue, digestive disturbance and other psychosomatics neurobehavior disorders.

Statistical Inference Analyses

In the bivariate analyses, the independent variables were age, sex, education, income, smoking habit, duration of stay, annoyance, satisfaction, hypertension, melatonin, zone, nutritional status, electric field dose, magnetic field dose with the outcome of interest was mental emotional disorders based on CMI. The bivariate analyses identified several variables with p < = 25 % i.e., sex (p = 0.253), low income (p = 0.185); high income (p = 0.173); smoking habit (p = 0.005); magnetic field dose (p = 0.039); zone (p = 0.000); nutritional status (p = 0.208) in which those variables were used in the model of logistic regression function.\(^{(11)}\)

The results of the logistic regression function analysis showed: the fit of model p = 0.005; R square 0.253, with one determinant only was identified, i.e. zone (p = 0.024); OR 7.355 (95% CI: 1.297 – 41.711). Respondents living in zone 1 and 2, were risky 7 x to suffer from mental emotional disorders compared to respondents living in zone 3.

About Sleeping Disorders, n=1034, the total prevalence was 50.44 % suffering insomnia from heavy, moderate and mild. Only small percentage 0.1 % suffered from heavy insomnia, 99.0 % were mild and moderate insomnia. No significant difference identified among the zones (p = 0.47). The proportions of SD, suffering insomnia, zone 1, 19.03 %, zone 2, 14.66 % and zone 3, 16.75 %

The logistic function is as follows: The variables used in the bivariate analyses were age, sex, education, income, smoking habit, annoyance, satisfaction, hypertension, melatonin, zone, nutritional status, electric field dose, magnetic field dose. The bivariate identified several variables p < = 25 % ; age p 0.172 ; satisfaction p 0.125, melatonin p 0.149, nutritional status p 0.03, and magnetic field dose p 0.040 which were used in the logistic regression function model.

The logistic regression function results: the model fitting p =0.031, R square 0.041, the determinant was nutritional status p =0.012. ; OR 0.584 ( CI 95 % 0.385 – 0.886 ) meaning, being normal and underweight were protective to have sleeping disorders.

DISCUSSION

Suteti in Indonesia is similar to Power – frequency fields in USA and other countries in the world, the wavelength 60 cycles/second or the frequency is 60 Hz belonged to Extremely Low Frequency (ELF) group in the Electromagnetic wavelength spectrum.

The spectrum is a range of rays from the longest wavelength till the shortest, Ultraviolet (UV), Visible Light, Infrared (IR), Microwaves (MW), Radio-frequency (RF), Low frequency (LF), Very Low Frequency ( VLF) dan Extremely Low Frequency (ELF).

The negative health impact of ELF exposure to human body until now still inconclusive.\(^{(14)}\)

The results of the electromagnetic measurements showed that both were lower than the SNI 2003, powerline field standard in Indonesia, stating for electric field 5kV/m and magnetic field 0.1 mT.\(^{(13)}\) According to the Epidemiologic Triad of Gordon if the agent is still lower than the standard adopted there is no hazardous effect will occur, meaning no mental
emotional disorders will happen. (12) This result is also in accordance with the logistic regression function analyses results showing that the electromagnetic doses both the electric field dose and the magnetic field dose were not associated with the mental emotional disorders of CMI. The logistic regression function of mental emotional disorders identified only one determinant i.e., zone, OR 7.355 (95% CI: 1.297 - 41.711), OR is significant as the determinant of the mental emotional disorders. Zone was divided into three zones, zone 1 and 2 the distance is 0-70 meters right and left side from the tower and zone 3 70-100 meters away from the towers. Respondents living in 0-70 meters away from the towers were being risky 7 x to suffer from mental emotional disorders compared to respondents living with distance > 70 meters from the towers. This showed that people living nearer the tower will suffer more mental emotional disorders than people lived farther from the tower. This finding was synchronized the facts of total prevalence of mental emotional disorders found was 42.6% and the proportions among zones were significant different with the largest proportion in zone 1, 20.41 % getting smaller zone 2, the smallest zone 3, 8.59 %. These findings could be explained by the findings of annoyance and satisfaction. Annoyance was found significant different among three zones ( p = 0.000) The first zone 30.70 % ; zone 2, 21.98 % and zone 3, 25.22 %. The findings proved that people lived in zone 3 had bigger annoyance than zone 2 but people who lived 0-30 meters beneath the towers had got the largest annoyance, still the total prevalence is high. The reasons of annoyance or feeling not save identified were the burning of testpens, tower collapse, broken off Suteti wire, electrical shock, noise of corona, and impaired of domestic electronic equipments such as tvs, sound systems in mosque etc. These reasons were people ‘s complaints based on their daily experience living under the towers. These complaints make people annoyed, feeling not save, may cause people feeling sick.

About satisfaction, almost 99.01 respondents felt satisfied living in the location, no difference identified among zones 1, 2 and 3. This result could be explained by the socioeconomic condition of population which mostly low. Even though the annoyance does exist but there is no chance for them to move to another place to live due to the skyrocketed unthinkable high price of land in Jakarta.

Setiawan, 2006 from the Department of Health reported that one out of three puskesmas (community health center) visitors suffered from mental emotional disturbance while the study among 11 center for mental health in Indonesia reported that one out of five respondents has ever experienced mental disorders in life. (15)

Using CMI as the tool for identification of mental emotional disorders different from the method of Setiawan ‘s report showed that the prevalence of mental emotional disorders in zone 1 and zone 2 were normal, while zone 3 is much smaller than normal. The differentiation in zone is valid based on the differentiation of the electromagnetic field measured in each zone. CMI is a screening tool instrument using in the field by epidemiologists. (8)

About Sleeping Disorders, the total prevalence was 50.44 % suffering insomnia from heavy, moderate and mild. Only small percentage 0.1 % suffered from heavy insomnia, 99.0 % were mild and moderate insomnia. No significant difference identified among the zones ( p = 0.47 ). The proportions of SD, suffering insomnia
zone 1, 19.03\%, zone 2, 14.66\% and zone 3, 16.75\%. The logistic function results found only one determinant, nutritional status OR 0.584 (CI 95\% 0.385 – 0.886) meaning, being normal and underweight were protective to have sleeping disorders. No association detected with the electromagnetic field doses. Sleeping disorders identified from CMI score was 31.4\% this identification was based on the respondent perceptions not the doctors’ diagnoses as insomnia. Both prevalences are quite high still no relationship with the electromagnetic exposures identified.

In this study sleeping disorders were analyzed separately from the mental emotional disorders since both of them were the major complaints of people living underneath Suteti.

Analytically, it was identified that both CMI mental emotional disorders and sleeping disorders were not associated with the electromagnetic field exposure, eventhough people living 0-70 ms were more sensitive to have mental disorders than > 70 ms. Table 1 displayed the high percentages of mental emotional disorders which were found in the location should be taken into consideration of how to eliminate them. While the CMI logistic regression functions did not find any correlations with annoyance, satisfaction, and electromagnetic field exposures, nevertheless several factors reported as reasons of annoyance might be very strongly related to the mental emotional disorders found in Table 1. i.e., several electrical technical faults which are the causes of flaming of testpens, electrical shock, damaging domestic electronic devices etc, people worry about the tower collapse, broken off electrical wire, and the noise of corona, as mentioned above as people’s complaints based on daily experiences.

When the towers first installed there were hardly no education and campaign on technical and health aspects more specific about technical faults which might happen and the potential health impact. The humming and buzzing sound of corona may be heard around electrical transformers or high voltage lines. Corona or electrical discharges into the air are produced around the high voltage power lines, sometimes visible on a humid night or during rainfall and can produce noise and ozone. Both the noise levels and ozone concentrations around powerlines have no health consequence.\(^{(16)}\)

These education and campaigns will reduce the feeling of annoyance which were pretty high reported. The education and campaigns should be continually executed not only in the phase of pre construction of towers, but until the phase of operation. The method of communication of education should be specific for example, for women/housewives through the informal women association of government officials (Dharma Wanita) and the cadres of ‘posyandu’. For men through films and official meetings in the hamlets or subdistrict offices. For students, the material should be inserted as local material in the elementary, junior and high school local curriculum.\(^{(17)}\)

The technical way of treatment of annoyance is to provide and to implement proper grounding technique to public housing and individual housing while for new location the grounding should be carried out simultaneously with the installment of towers. About noise of corona PLN should consider the types of transmission wire use which will reduce the noise of corona especially in the residential location.\(^{(17)}\)

The question of are people sensitive to or allergic to the exposure of power frequency field have been raised by
A Study on Mental Emotional...........(Corry)

researchers based on public cases reports globally.

The syndrome called EHS was first identified in Norway among the users of VDTs in 1980’s, by mid 90’s has grown to epidemic proportion in many parts of the world. Since then many research did studies with the initial syndrome of transient skin reaction but then developed to syndrome included central nervous system, respiratory, cardiovascular and digestive systems. Pro and contra presented by authors based on their study results. Lyskov, Sandstrom & Hansson Mild, 2001 (18); Sandstrom et al, 1997 (19) did not dismiss the possibility of EHF. Their study reported about subtle differences in heart rate, visual evoked potentials, electroretinogram amplitudes and electrodermal activity between normal and hypersensitive volunteers Johannsson et al, 2001 (20) reported that increased responsiveness was attributed to changes in the expression of histamine and somatostatin and other inflammatory peptides, while similar effects in the dermis have been reported following provocation tests in normal, healthy volunteers

Anies, 2004 (5) Central Java, a study on the electric sensitivity which consists of headache, dizzy and chronic fatigue syndrome among people living underneath SUTETI reported, the risk of having sensitivity were larger 5 times bigger to the people lived underneath SUTETI. This study was a case control, had used the bivariate analysis only, and the measurements of electric and magnetic field should be taken into consideration. A multivariate analysis or logistic regression function is recommended to fully analyzing the study results.

Silny, 1999 (21) did a review and released some comments as follows: The electrical hypersensitivity cannot be explained by any known mechanism, the prevalence of syndrome varies by a factor of 1000 or more between countries, the pattern of syndrome varies from country to country and the types of exposures alleged to cause the syndrome varies from country to country for example in Sweden and Finland, the exposure is video display terminals, while in German due to power frequency sources, radio tv and transmission towers.

Mueller, Krueger & Schiers, 2002 (22) study of the electromagnetic perception among 49 subjects with hypersensitivity perception and 14 controls reported no difference in perception between subjects with or without self reported hypersensitivity.

Rubin et al, 2005 (23) review 31 experimental studies involving 725 participants. His meta analysis found no evidence of an improved ability to detect electromagnetic field in hypersensitivity participants. He suggested more studies on this area should be carried out. Panggabean, 2004 (6) Jakarta reported that the place of work is not a determinant of getting stressful among workers in the electrical generating station, while the electric and magnetic field in the working station were reported below the normal standard for workers, 10 kV/m, 0.5 mT. (9)

The UK Fact Sheet No 2 (24) mentioned about the Electrical Sensitivity and the Multiple Chemical Sensitivity considered in the Sick Building Syndrome talking about varies of pollutants in the environments included the electromagnetic field which not everybody being sensitive to those agents. Nevertheless not to dismiss the sensitive people which suffered. The five most common disorders mentioned were skin itch/flushing/burning and or tingling sensation, confusion/poor connection and or memory loss, fatigue.
/weakness, head ache and chest pain/heart problem. The less common symptoms were nausea, panic, ear pain, vibration paralyses and dizziness. Those syndrome were repeated and very disturbed to highly sensitive persons. The Electromagnetic Biocompatibility Association recommended to conduct education/campaign for preventive measure as well as treatment through avoidance, screening, and desensitization.

WHO issued the Fact Sheet on Electromagnetic Field (EMF) and public health: Electromagnetic Hypersensitivity in 2005. The term Electromagnetic hypersensitivity or EHS is characterized by a variety of non specific symptoms which afflicted individuals attribute to exposure to EMF. The symptoms include dermatological symptoms (redness, tingling and burning sensations) as well as neurasthenic and vegetative symptoms (fatigue, tiredness, concentration difficulties, dizziness, nausea, heart palpation and digestive disturbance). The symptoms could be mild, others severe affected their work and lifestyle. It was defined as a variety of health problems that the reporters relate to exposure of electromagnetic field. EHS resembles multiple chemical sensitivities (MCS), disorders associated with low level environmental exposures to chemicals, and a more general term for sensitivity to environmental factors tolerated by the majority of people should be termed 'Idiopathic Environmental Intolerance (IEI)' with attribution to EMF. The workshop concluded that IEI incorporate a number of disorders sharing similar nonspecific symptoms that adversely affect people and cause disruptions in their occupational, social and personal functioning. These symptoms are not explained by any known medical, psychiatric or psychological disorders and the term IEI has no medical diagnostic value. IEI individuals cannot detect EMF exposure anymore accurately than non IEI individuals, and well controlled and conducted double blind studies have consistently shown that their symptoms are related to EMF exposure per se.

This study is one of the many epidemiological studies in the world which...
found no relation existed between the electromagnetic powerline field exposure and mental emotional disorders as well as sleeping disorders. The location has the electric field and magnetic field both below the threshold of 5 kV/m and 0.5 mT. This result could be used as a local finding for Indonesia.

CONCLUSIONS

Study results revealed electric field outside the house, the highest between 10-20 ms, 3.2 kV/m, the magnetic field showed similar trend to electric field, the highest 20-30 ms, 534 mA/m (6.7 x 10^2 mT), both were normal, for the electric field the national standard which is stated for public, the thresholds of electrical field 5kV/m and magnetic field 0.1 mT, for workers 10 kV/m, 1 mT.

The mental emotional disorders using CMI identified 641 (57.4%) respondents were normal, and the proportion of mental emotional disorders was 42.6 %, also revealing that there were no significant associations between mental disorders and annoyance, satisfactions, electric field dose and magnetic field dose. There is one determinant only identified, zone : OR 7.355, 95 % CI 1.297 – 41.711. Respondents living in zone 1 and 2 (0-70 meters ) were risky 7 x to suffer from mental emotional disorders compared to respondents live in zone 3 (70-100 meters). About Sleeping Disorders (SD), it was found that the total prevalence was 50.44 % suffering insomnia, there was only one determinant identified i.e., nutritional status OR 0.584 (CI 95% : 0.385 – 0.886 ) meaning, being normal and underweight were protective to have sleeping disorders.

Based on the measurement of the electro-magnetic exposure of Suteti and the logistic regression function analyses, it was proven that no correlation identified between mental emotional disorders and sleeping disorders with the electrical field dose and magnetic field dose.

Annoyance was reported significant difference identified among three zones, the first zone 30.70 % ; zone 2 21.98 % and zone 3 25.22 %. The reasons of annoyance reported were the burning of testpens, tower collapse, broken off Suteti wire, noise of corona, and impared of domestic electronic appliances such as tvs, sound systems in mosque etc The people lived in the first zone has the highest level of annoyance. About satisfaction, almost 90 % public feel satisfied living in the location

Annoyance was not related to the electromagnetic exposure of Suteti as well as mental emotional disorders nevertheless eliminating the reasons might improve the safety feeling of people.

RECOMMENDATION

A regular monitoring of the power of electromagnetic field of Suteti is necessary especially in the residence area to keep the electromagnetic field below standard SNI 2003. Thr reasons of annoyance should be reduced to improve people's safety feeling through conducting serious and continuous campaigns containing technical and health aspects of Suteti to the public underneath Suteti. Also to provide and to implement the proper grounding technique to public building such as mesjid and schools, as well as people houses. For new location the grounding should be carried out simultaneously with the construction of towers. About reducing corona noise different types of wire should be used.

The recommendation for phycisian of how to deal with treatment of patients
with mental disorders, the focus should be on health symptoms and clinical picture and not on the persons perceived need for reducing or eliminating EHS in the workplace or in the field.

Education about the electrical sensitivity should be provided for the public.

ACKNOWLEDGEMENT

This study is a twin study, collaborated with the Institute of Bandung/ITB. The ITB carried out the study of the electromagnetic aspect while the health aspect was being conducted by the Department of Community Medicine FKUI, 2006, using the same location and sampling frame.

The study was completed with many thanks to the contributions of institutions and personnel as follows:
1. The training consultants who prepared the medical doctors for specific knowledge before collecting data through physical examination and interviewing questionnaires in the field:
   - Department of Child Health RSCW FKUI
   - Department of Neurology RSCM FKUI
   - Department of Psychiatry RSCM FKUI
   - Department of Pulmonology RS Fatmawati
   - Department of Heart RS Dharmais
2. The Department of Clinical Pathology RSCM for lab exams.
3. The MAKMAL Lab for melatonin examination
4. ITB technicians for mapping and developing sampling frame
5. Heads of hamlets and subdistricts in Kampung Makasar East Jakarta and Tambun

6. The Magister Programme of Occupational Medicine FKUI which provided Medical Doctors to participate in the study.

Last but not least to the head of families participating in studies for the informed consent and good compliance.

REFERENCES

7. Holoday instrument for measuring the electromagnet field, ITB Bandung, 2006


13. The Indonesian National Standard on electromagnetic threshold values of Sutet and Sutt. The National Standard Board, SNI 2003; 04-6950


15. Setiawan P. One out of three community health center visitors suffered from mental emotional disorders while reports from a survey conducted by the 11 center for mental health in Indonesia mentioning that one out of five respondents has at least one time suffer from mental disorders. Available at: http://www.pikiran rakyat.com.cetak/2006/20/0101.htm. Accessible from Google, October 24, 2007


18. Lyskov E, Sandstrom M, Hansson Mild K. Provocation study of persons with perceived electrical hypersensitivity and controls using magnetic field exposure and recording of electrophysiological characteristics Bioelectromagnetics 2001; 22(7); 227-231.


