



UNIVERSITI PUTRA MALAYSIA

***SOCIAL, PSYCHOSOCIAL AND HEALTH IMPACTS OF BAUXITE
MINING TO FELDA BUKIT GOH AND NEIGHBOURING COMMUNITIES
IN KUANTAN, PAHANG***

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BY

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**Thesis submitted in fulfilment of the requirement for the degree of Bachelor
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ABSTRACT

SOCIAL, PSYCHOSOCIAL AND HEALTH IMPACTS OF BAUXITE MINING TO FELDA BUKIT GOH AND NEIGHBOURING COMMUNITIES IN KUANTAN, PAHANG

Nurul Hidayah Hussain

Introduction: Communities who live near bauxite mining areas experienced social psychosocial and health impact from the environmental activities. The nuisance of noise emanating from bauxite lorries, traffic congestions, road damage with red mud, deforestation, increase of erosion, air pollution such as dust which resulted in bad vision during hot dry days, dusty homes and properties, respiratory and skin problems, soil and water pollutions were some of the problems identified. **Objectives:** The objectives were to study the social, psychosocial and health impacts of bauxite activities on neighbouring communities in Felda Bukit Goh, Kuantan. **Methodology:** 162 residents were selected as respondents. The respondents were selected randomly within the bauxite mining areas. Face to face interview using questionnaires were used to collect data. **Result:** Majority of respondents had medium scores (85.2%) for social factors. Stress of noise (35.8%), cough with phlegm (27.8%) and itchiness (19.1%) were some of the health symptoms reported. About 52.5% of respondents had psychosocial impacts from environmental factors in the low score category while for the health symptoms due to stress was 27.2% The highest percentages of environmental problems were due to the increase of air pollution which resulted in dustier house (87.7%). Only dry cough was a significant association for male and female $p = 0.037$. There was significant correlation between the psychosocial impacts (environmental factors) with health complaint (stress of noise). Musculoskeletal system related symptoms (0.047), physical system related symptoms (<0.001), physical energy problem (0.019), sleeping problem (0.023) and dietary problem (0.020) were significant association between the psychosocial impacts (health problems due to stress) with health complaint (stress of noise). Land erosion/landslide and road damage were $p < 0.001$ respectively so resulted in significant association between perception to environment impact with social impacts. Air pollution increase, dustier house, stress/loss of calmness, land erosion/landslide and house cleaning problem were $p < 0.001$ respectively. Only water resource problem (p is 0.005) means there is significant difference between perception to environment impact with the psychosocial impacts (environmental factors). **Conclusion:** The combined effects of the environmental disturbance due to mining activities have culminated into health problems among the surrounding communities with high prevalence of diseases such as respiratory tract and skin problems. The social problems faced were mainly moderate. The psychosocial impacts were mainly in the low and medium categories. There were also incidence of pollution of various types such as noise pollution, traffic congestion and dusty residential environment as a result of the mining activities. The impacts on the communities would be worst if no appropriate mitigating measure provided to protect of human environment.

Keywords: Social factors, health symptoms, psychosocial impacts, environmental problems

ABSTRAK

KESAN-KESAN SOSIAL, PSIKOSOSIAL DAN KESIHATAN DISEBABKAN OLEH PERLOMBONGAN BAUKSIT KEPADA FELDA BUKIT GOH DAN KEJIRANAN KOMUNITI DI KUANTAN, PAHANG

Nurul Hidayah Hussain

Pengenalan: Komuniti yang tinggal berhampiran kawasan perlombongan bauksit mengalami kesan sosial, psikososial dan kesihatan akibat dari aktiviti alam sekitar. Sebagai contoh, gangguan bunyi bising yang berpunca dari lori bauksit, kesesakan lalu lintas, kerosakan jalan dengan lumpur merah, penebangan hutan, peningkatan hakisan, pencemaran udara seperti habuk yang menyebabkan penglihatan buruk semasa hari panas terik, rumah berdebu, masalah pernafasan dan kulit, pencemaran tanah dan air adalah sebahagian masalah yang dapat dikenalpasti. **Objektif:** Objektif kajian ini adalah untuk mengkaji kesan-kesan sosial, psikososial dan kesihatan akibat dari aktiviti bauksit terhadap keejiranan komuniti di Felda Bukit Goh, Kuantan. **Metodologi:** 162 penduduk telah dipilih sebagai responden. Responden telah dipilih secara rawak di kawasan yang berhampiran dengan perlombongan. Temubual dengan menggunakan borang soal selidik telah digunakan untuk mengumpul data. **Keputusan:** Majoriti responden mempunyai skor sederhana (85.2%) untuk faktor sosial. Tekanan akibat bunyi bising (35.8%), batuk dengan berkahak (27.8%) dan kulit gatal-gatal (19.1%) adalah sebahagian aduan kesihatan yang dilaporkan. Sebanyak 52.5% responden mempunyai kesan psikososial daripada faktor alam sekitar dalam kategori skor rendah manakala gejala kesihatan akibat tekanan adalah 27.2%. Peratusan tertinggi bagi masalah alam sekitar adalah disebabkan oleh peningkatan pencemaran udara yang mengakibatkan rumah menjadi kotor (87.7%). Hanya batuk kering yang signifikan bagi lelaki dan $p = 0.037$ perempuan. Terdapat juga signifikan antara kesan psikososial (faktor alam sekitar) dengan aduan kesihatan (tekanan bunyi). Sistem otot (0.047), sistem fizikal (<0.001), masalah tenaga (0.019), masalah tidur (0.023) dan masalah pemakanan (0.020) yang signifikan antara kesan psikososial (masalah kesihatan akibat tekanan) dengan aduan kesihatan (tekanan bunyi). Hakisan tanah/tanah runtuh dan kerosakan jalan ($p <0.001$) yang signifikan antara persepsi terhadap kesan alam sekitar dengan kesan sosial. Pencemaran udara, rumah berhabuk, tekanan/hilang ketenangan, hakisan tanah/tanah runtuh dan masalah membersihkan rumah ($p <0.001$). Hanya masalah sumber air (p ialah 0.005) bermakna terdapat signifikan antara persepsi terhadap kesan alam sekitar dengan kesan psikososial (faktor alam sekitar). **Kesimpulan:** Kesan dari gangguan alam sekitar disebabkan aktiviti perlombongan telah memuncak terhadap masalah kesihatan pada masyarakat sekitar seperti masalah saluran pernafasan dan kulit. Masalah sosial yang dihadapi responden lebih cenderung kepada skor sederhana. Kesan psikososial lebih utamanya dalam kategori rendah dan sederhana. Terdapat juga insiden pencemaran dari pelbagai jenis seperti pencemaran bunyi, kesesakan lalu lintas dan persekitaran kediaman yang berdebu akibat aktiviti perlombongan. Kesan pada komuniti ini akan menjadi lebih teruk jika tiada langkah kawalan yang sesuai disediakan untuk melindungi alam sekitar.

Kata kunci: Faktor sosial, gejala kesihatan, kesan psikososial, masalah alam sekitar

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LIST OF ABBREVIATIONS

<	Less than
>	More than
=	Equal to
N	Sample size
n	Number of sample size
et al.	and others
NST	New Straits Times
DOE	Department of Environmental
PSI	Personal Stress Inventory
ILO	International Labour Organisation
SD	Standard deviation
SPSS	Statistical Package for Social Sciences

CHAPTER 1

INTRODUCTION

1.1 Background

Bauxite is the principal ore of alumina (Al_2O_3), which is used to produce aluminum (Al). It is composed of hydrated aluminum oxides, hydrated aluminosilicates, iron oxides, hydrated iron oxides, titanium oxide, and silica. It contains mixtures of various minerals. Bauxite is a residual rock formed from the weathering of various igneous, sedimentary, and metamorphic rocks. These parent rocks have been exposed to long periods of weathering under tropical, subtropical, or very wet temperate conditions.

The greatest concentrations of bauxite are in Central and South America, in West Africa, in particular Guinea, and then in India, Vietnam, and Australia. Some deposits also exist in the north of Russia and in the center of Saudi Arabia. Usually, bauxite occurs near the surface. Nevertheless, there are occurrences of buried bauxite deposits in which the bauxite has been covered by other materials postformation of the bauxite. The current estimated global bauxite resource is more than 70 billion tonnes. Of this the greatest concentration is in Guinea, where there are well-proven resources of approximately 25 billion tonnes.

Most bauxite occurs close to the surface, with only 1 or 2 m of overburden. Typical deposits range in thickness from 3 to 15 m. The majority of the bauxite can be mined and processed without beneficiation, but the ore in the north of Brazil and in Vietnam has high clay content and has to be washed before processing (Donoghue, et al, 2014).

The objectives of this study were to identify the social, psychosocial and health impacts of bauxite mining to Felda Bukit Goh and neighboring communities from the complaints reported through questionnaire interviews among the selected respondents in the bauxite mining areas in Kuantan, Pahang. In addition, the study also included the identifications of social, psychosocial and health problems faced by respondents.

The parameters that can be measure because of social impact were enters of foreign workers, roads became congested, increases of criminal cases, local business or health services condition and income of the respondents. For example, criminal cases may be have changes from time to time and mining income also affected to basic need to get food in that area and health problems related such as respiratory problem or skin problems.

Stress is definitely the most prevalent mental health concern. This not only leads to other mental health problems, but is the root cause of other physical and social problems. People living in the mining environment experience stress for a variety of reasons that range from financial pressures, to coping with the expectations of the physical mine environment (Cronjé, et al., 2010). The state of mental health among mining communities not only focuses on mental health problems but also on what constitutes positive mental health (Gable, et al., 2005).

On the other hands, the respondent also had environmental problems that can lead to health status of the respondents. For example, the respondents need to face air pollution because of dust from bauxite mining called 'red' dust waste from the first process of bauxite spread widely to the road. So it could be worst and can cause accident or kill road to the other drivers when the dust become mud in the raining day. Dust absolutely covers very large surrounding areas that affect the habitats including residential and agricultural neighborhoods of the bauxite exploitation site. In addition, this phenomenon is very harmful to the growth of the agricultural products and reduces the productivity of these trees to respondents at there.

Moreover, this dust consisting of toxic chemicals plus the natural emissions of radiation products as radium, thorium, and beryllium in the long term periods can cause of lung cancer for respondents in the surrounding areas as borne out by statistical data coming from coal mine areas in Western countries (Thanh, 2009).

Apart from that, respondents also need to face water pollution because of digging a bauxite site would tremendously damage huge depths of the topsoil level that can never be replenished as in the condition before digging. Besides, it requires an estimated area equivalent to the bauxite site to dump the red sludge. According to historical data or bauxite exploitation data taken from different advanced countries, the process of bauxite mining give red sludge are the result. When the toxic red sludge is dumped on the ground, its toxic chemicals will be percolated to the underground water table along with rainwater, which would then contaminate the main water sources. In addition, the red sludge is carried by rain can be hazardous waste is seriously harmful to respondents and causes agricultural damage to the respondents farms (Thanh, 2009).

Fishery pollution can be facing by the respondents living near bauxite area which is the fishing industry will also be damaged due to the poisonous chemicals from the red sludge as fish can subsequently be vanishing or even become extinct. According to researches carried out by American and Italian scientists, red sludge can cause the genetic distortion of fish in the ocean (Thanh, 2009).

The health and lives of the respondents living near bauxite area also can be affected to the toxicity. The red sludge puts health and human lives at risk of being lost or harmed due to air, water and aquatic pollution. The medical statistics prove that prolonged toxicity may cause encephalopathy, osteoporosis, anemia, and possibly Parkinson diseases. An Australian researcher in Australia where bauxite mining is largely developed proved that red sludge causes lung cancer and uterus deformation in rat experiments. Some of common symptoms of toxicity on humans are dizziness, nausea, fainting, or coma if breathing or taking in a large dosage (Thanh, 2009).

According to Occupational Safety and Health Act (1994), the sodium hydroxide (NaOH) is the primary waste in red sludge and it is harmful to human beings after prolonged contact, for example 15 years. Direct contact may cause skin irritation, or inflammation of the respiratory system such as blistering of the throat, mouth or nose.

The important of this study is to collect the data for impacts toward respondents living bauxite area. This is a chance for helping the future or further study related to the impacts among respondents. Besides that, this study can give awareness and some information to respondents to be concern due to any impacts.

For this study, the independent variable is the people who lived at Felda Bukit Goh and neighbouring community to the bauxite area in Kuantan while the dependent variable is social, health and psychosocial impacts. This study measures the variables through questionnaires surveys and interviews with the respondents living near bauxite area.

1.2 Problem Statement

Communities who lived near bauxite areas exposed to environmental factors from the mining activities which could result in social, psychosocial and health impact such as nuisance of noise presence because of lorries carry the bauxite, limited deforestation or habitat destruction, home range de-fragmentation due to roads, limited increase of erosion and turbidity, road kills because damage the road with red mud (The star online, 2016), air pollution such as dusty and give bad vision during raining day, threat to aquatic biodiversity which problem for downstream so will decrease and change of aquatic biodiversity, soil pollution (bad structure and very poor), and water pollutions(New Straits Times, 2015).

Long-term exposure to bauxite dust can lead to miners and residents living along transport routes developing Alzheimer's disease, said Research fellow at Universiti

Sultan Zainal Abidin's (UniSZA) Air Quality Division of the East Coast Environmental Research Institute, Azman Azid (Malaysiakini News, 2016).

There were also concern with regard to the possibility of drinking water contamination for the residents of Bukit Sagu and Bukit Goh. The presence of heavy metals such as aluminum can cause health complications (The Malaysian Insider, 2015).

There is a need to identify the complaints, awareness and perception of the community on the various social, psychosocial and health impacts on respondents due to the mining activities. The mining activities without complying with the regulations could be damaging to the environment as well as the human well-being.

1.3 Study Justification

The awareness of the community towards bauxite mining activities is essential in protecting their well-being. The Ministry of Health suggested that the bauxite mining in Pahang to be halted altogether, if the activity continues to pose a health risk with the polluted waterways, water supply, aquatic organisms and the atmospheric pollution. Kuantan residents were warned against drinking bauxite-polluted river water as it was harmful to their health even after boiling, because it contained heavy metal that was detrimental to health and could remain in the body undetected for a long time (Malaysiakini News, 2016). Bauxite ores contain heavy metals such as aluminum, cadmium, nickel, chromium, lead and arsenic which are neurotoxin or carcinogenic toxicologically (New Straits Times online, 2016).

The neighbouring communities which made up of 150 residents of Taman Balok Baru, Kuantan held a peaceful demonstration to protest against bauxite-laden lorries entering and using the roads in their residential area because they were worried of accidents and damage to public facilities. As residents, they feel stressed about the situation due to noise pollution, dust and damage to the road surface, drains and water

pipes (Free Malaysia Today News online, 2016). Polluted air with inhalable bauxite particulate can affect the respiratory system and results in asthma, bronchitis, allergy, cough (New Straits Times online, 2016).

Therefore, this study was to identify the social, psychosocial and health impacts to the community nearby. The data was collected through interview sessions using questionnaires on respondents lived nearby bauxite mining areas. In addition, complaints reported by the respondents due to the mining activities will be documented.

1.4 Objectives

1.4.1 General Objective

The general objective was to study the social, psychosocial and health impacts of bauxite mining activities on the neighbouring communities of Felda Bukit Goh, Kuantan.

1.4.2 Specific Objectives

- a. To identify the social impacts of bauxite mining impact to respondents.
- b. To identify the health complaints reported by respondents due to bauxite mining activities.
- c. To identify the environmental factors which resulted in psychosocial problems among the respondents.
- d. To identify the health problems due to stress from psychosocial impact of bauxite mining to the respondents.
- e. To identify the perception of the respondents related to environmental impact of bauxite mining to the respondents.
- f. To compare the health complaint between male and female respondents.

- g. To determine correlation between social and psychosocial (environmental factors) impacts with health complaint (stress of noise).
- h. To determine association the psychosocial impacts (health problems due to stress) with health complaint (stress of noise).
- i. To determine association of the perception to environment impact with social impact.
- j. To determine association of the perception to environment impact with psychosocial impacts (environmental factors).

1.5 Hypothesis

- i. There is a significant difference in the health complaints between male and female respondents.
- ii. There are significant correlations between the social and psychosocial (environmental factors) impacts with the health complaints (stress of noise).
- iii. There is a significant association between the psychosocial impacts (health problems due to stress) with the health complaint (stress of noise).
- iv. There is a significant association between the perceptions to environment impact with the social impact.
- v. There is a significant different association between the perceptions to environment impact with the psychosocial impact (environmental factors).

1.6 Definition of Term

1.6.1 Social Impact

Conceptual Definition

Social impact is jargon, broad, vague, and somewhat inaccessible by definition. Technically, social impact is how organizations' actions affect the surrounding community. In the same context, the organizations manage actions are how they are applying the skills from their activity to affect the surroundings. Social impact is a multi-faceted topic, and pondering one's own actions, activities and motivations in a broad and long-term context is essential, especially given the privilege at a something that more than adequately prepares us to engage a variety of civic and social obligations (*Elizabeth Woodson, 2013*).

Operational Definition

This study is mean social impact either positive or negative impact toward communities living near bauxite area. The social impact can be from any aspects included health problems and environmental problems because bauxite activities give impact to the communities.

1.6.2 Communities

Conceptual Definition

Social groups of any size whose members reside in a specific locality, share government, and often have a common cultural and historical heritage. A locality inhabited by such a group. In addition for same social, religious, occupational, or other group sharing common characteristics or interests and perceived or perceiving itself as distinct in some respect from the larger society within which it exists. The group of associated nations was sharing common interests or a common heritage (*Dictionary.com online*).

Operational Definition

In this study, communities are referring to the population that living the area of study and share same social environment, culture and background. The communities were sharing the same historical heritage and interest. They living in the range of study will be conduct.

1.6.3 Bauxite

Conceptual Definition

It is an impure mixture off earthy hydrous aluminum oxides and hydroxides that is the principal source of aluminum (Merriam-Webster, Inc dictionaries online).

Operational Definition

Bauxite area means the area that mining activities of the bauxite. The range area geographical has matured bauxite in the soil which can give production. The bauxite area is more likely in tropical and monsoonal country.

1.6.4 Health Impact

Conceptual Definition

A health impact can be positive or negative. A positive health impact is an effect which contributes to good health or to improving health. A negative health impact has the opposite effect, causing or contributing to ill health (www.who.int glossary of terms used).

Operational Definition

Health impact is impact changes either good or bad to the neighbouring community exposed to mining activities. The perception of the community is an important to classify the impact either good or bad to them.

1.6.5 Environmental Factor

Conceptual Definition

It is an observed environmental issue which is threatens the well-being of the organisms living in it. It is an unwanted, negative effect occurring and impacting environmental quality because by a known process (Featuring Black's Law Dictionary Free Online Legal Dictionary 2nd Ed).

Operational Definition

Environmental factor is the related to surrounding us that got the impact from human activities or man-made. In this study environment got the impact from process of bauxite mining involve of some of pollution then will give health problem to the communities.

1.6.6 Psychosocial Impact

Conceptual Definition

It is a term referring to the mind's ability to, consciously or unconsciously, adjust and relate the body to its social environment (Gale Encyclopedia of Medicine, 2008).

Operational Definition

The psychosocial is the impact in combination of psychology and social aspects that give the impact to respondents because of environment activities surrounding.

1.7 Conceptual Framework

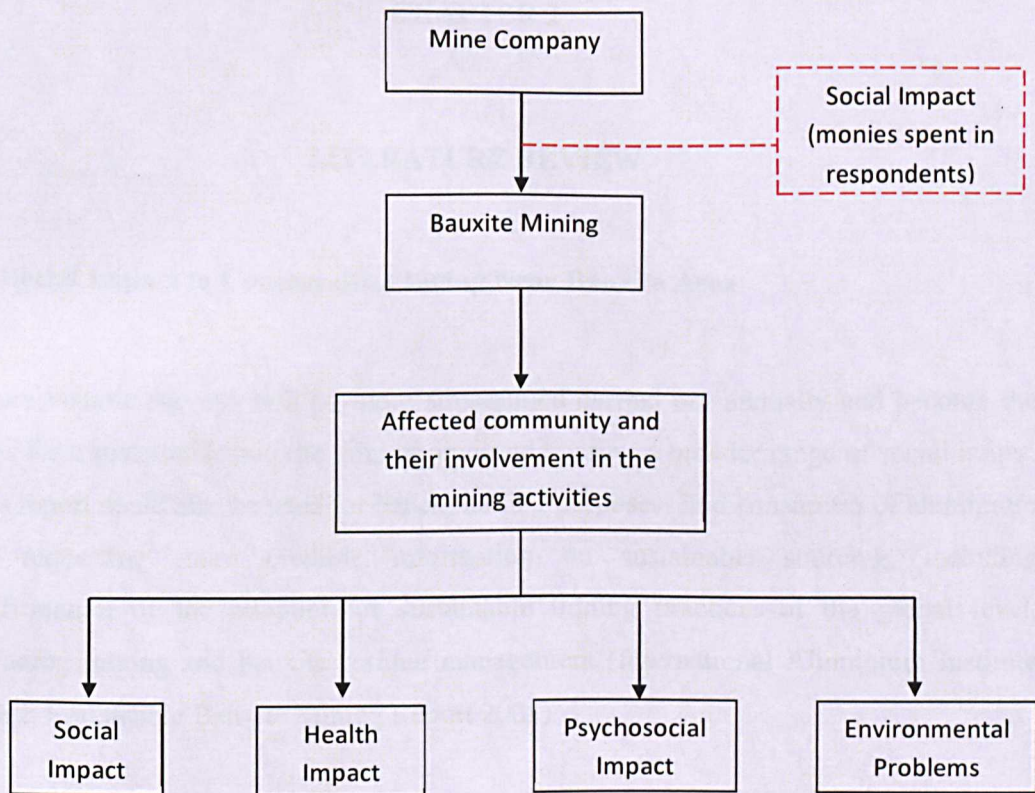


Figure 1: Conceptual Framework of Social Impact, Health Impact, Psychosocial Impact & Environmental Problems toward Communities

Figure 1 shows that the development flow of these impacts to Felda Bukit Goh and neighbouring communities in Kuantan, Pahang because of bauxite mining activities. The mining company was involved to pay the money to mining involvement people. But at the same time the people who did not involve will get the impacts too.

CHAPTER 2

LITERATURE REVIEW

2.1 Social Impact to Communities Living Near Bauxite Area

Future bauxite surveys will be more streamlined carried out annually and become the basis for a sustainable bauxite mining report addressing a broader range of social issues. This report could also be used for benchmarking purposes. End consumers of aluminium are requesting more credible information on sustainable sourcing, including confirmation of the adoption of sustainable mining practices at the global level, including mining and bauxite residue management (International Aluminium Institute Fourth Sustainable Bauxite Mining Report 2008).

Vietnam's capability in the present conditions is due to lack of water and the absence of low cost electric power. Water and electricity are requirements for processing bauxite into aluminum that pose the biggest obstacle at the present time. Dalat is national tourist spot also largest city and currently still restricted in its use of electricity and water for its residents. To achieve the goal, they plan to deploy the construction of a hydroelectric plant and use water from four lakes near it for a bauxite site. But this is impossible and its project schedule cannot be met because of the difficulties in developing the region's infrastructure due to inadequate resources of water and the demand of huge amounts of electricity.

The environmental and humanitarian concerns due to bauxite exploitation because resulting from hazardous waste are simply too risky and severely impact the entire region. Its exploitation will cause the hazardous waste of chemicals and polluted parameters that may be lethal to human life and lead to the destruction of the region's

ecology in which agricultural land cannot be recovered for generations. Furthermore, the infrastructure of the region is not developed enough for the transportation of heavy equipments and an enormous amount of supplies needed for the project (Thanh, 2009).

2.2 Psychosocial Impact to Communities Living Near Bauxite Area

The state of mental health in mining communities, not only focuses on mental health problems, but also on what constitutes positive mental health. Looking at mental health through the scope of positive psychology involves examining those conditions and processes that contribute to the optimal functioning of people or groups (Gable, et al., 2005). This is in line with definitions of mental health that describe not only the absence of disease, but the presence of different components of well-being (Cronje, et al., 2013).

Stress is definitely the most prevalent mental health concern. This not only leads to mental health problems, but is the root cause of other physical and social problems. People living in the mining environment experience stress for a variety of reasons that range from financial pressures, to coping with the expectations of the physical mine environment. The following are some of the stressors found in the mining environment, based on the voices from the ground in the respondents (Cronjé, et al., 2010).

2.3 Health and Environmental Impacts to Communities Living Near Bauxite Area

From aspect physical risk, bauxite classified as low-level natural of radioactive material. It shows has small quantities of uranium (^{238}U), thorium (^{232}Th), and potassium (^{40}K). Besides that, it present during refining process which is almost ore transfers to the solid residue stream and divide two residues which are some to sand residue and most to mud residue. In Western Australia, they use positional and personal monitoring data from refineries in Western Australia have been use to assess the above-background annual doses of the workforce across a range of jobs. The exposures have been considered. The some issues also have been considered at mining area, but are unlikely to be of concern.

Other than that, have biological risk because of tropical diseases such as malaria and dengue fever are significant at some mining areas. The precautions to prevent mosquito bites is one of the important things need to be considered and sometimes prescribed (Donoghue, et. al, 2014).

The result of humidity tropical and monsoonal conditions can cause formation of bauxite by the low relief of the land and good drainage. To a large extent its formation was probably controlled, along with other processes, by repeated saturation and desiccation due to fluctuation of the water table during dry and wet seasons. The existence of the Kuantan port enhances the economic importance of its bauxite reserves. However exploitation of the bauxite in the area is not presently feasible because a large proportion of the area is currently under the cultivation of high-yielding oil palm and rubber. Also some sectors of the area have been earmarked for industrial and housing development. Despite these constraints more detailed prospecting and evaluation are warranted over the area to determine whether the Kuantan bauxite deposit is viable for exploitation (Rajah, 1986).

Almost all the large scale mining companies in the country employ the open-pit method of mining in addition to cyanide heap leach operations. These methods have far-reaching consequences for human health and environmental safety (Akabzaa, 2000). The use of heavy machinery in exploiting the minerals also has a destructive effect on the vegetation as it generates more dust (ILO, 2005) and noise pollutants.

The impact of mining operations in Ghana both from the large and small scale miners are diverse and quite devastating for it touches on the livelihood and the very existence of people. The principal elements of the environment have been severely affected by mining activities in Ghana. Large tracts of land for farming activities have been acquired by mining companies for large scale surface mining operations depriving mining respondents of their source of livelihood (Akabzaa et. al., 2001).

Statistics from the Inspectorate Division of the Minerals Commission on occupational health problems caused by mining activities from 2000-2004 includes malaria and upper respiratory tract infection, the two topmost causes of outpatient morbidity from 2000-2006 (Ghana Health Service, 2007). Thus the “gains” from the sector in the form of increased investment and foreign exchange earnings are being achieved at some significant environmental, health and social costs to the people living in mining respondents and the nation as a whole (Amponsah et. al., 2011).

The creation of large scale surface disturbances, the generation of volumes of waste materials and the exposure of previously buried geological materials to the forces of oxidation and precipitation are intrinsic to the mining industry and can continue to present complex environmental and health problems even when the best available practices are followed (Chiaro & Joklik, 1998). The use of chemicals and explosives in many areas of mining also create health and safety hazards by exposing the environment to other pollutants such as dust, chemicals and fumes (Omalu & Zamora, 1999).

The practice of conducting Environmental Social Impact Assessments (ESIAs) began in the late 1960s and early 1970s. During the last half century, the ESIA has been gradually improving the most elements are well known and have become standard procedure. An important element of the process is the establishment of checks-and-balances to ensure that the process is as frank and transparent as possible. The ESIA has become one of the most successful tools in improving economic development by minimizing negative impacts, while boosting positive impacts, and saving much money by preventing problems. By and large, ESIA works well and effectively. However, in the Bakhuis case, it will be seen that the standard system of check-and-balances seems to have largely been by passed (Goodland, 2009).

A major health and environmental concern is dust from the bauxite ore. If the ore is transported in uncovered railway cars and river barges, bauxite dust will be a major pollutant. Apparently the company plans to use water to limit the dust, although this

raises concerns about run-off at the transfer site. Wet ore weighs more and consequently costs more to transport so there will be financial pressure to transport dry bauxite. The Environmental and Social Impact Report (ESIR) does not address these issues, or the potential health impacts of inhaling bauxite dust over a fifty year period (Kirsch, 2009).

The significant mining-related impacts associated with poor air quality are human health (medium) and vegetation (low) impacts also an increase in carbon emissions (high). These impacts were rated before control measures. However, more protective Canadian standard of 25 $\mu\text{g}/\text{m}^3$ (Health Canada, 1998) was used rather than the 70 $\mu\text{g}/\text{m}^3$ standard, the significance of the impacts to human health would be high without control measures. The control measures was only proposed for the impacts to human health, and after control measures, which included using dust suppressant on roads, limiting the speed limit to 40 km/hr on site, and limiting load sizes to reduce spillage. The use of dust suppressant can adversely affect stream ecology by increasing contaminant concentrations in runoff to streams, but this was not discussed in the Draft Environmental & Social Impact Report (DESIR).

No control measures were presented for the impact of poor air quality on terrestrial vegetation. Only chemical air pollutants such as SO_x, NO_x, and ozone were considered, yet the impact from dust associated with the mining operation will likely be the most important air quality impact to vegetation. Similarly, no control measures were included for increased carbon emissions, even though this impact was listed as having high national or international significance. The mining company should commit to using low-emission vehicles, minimizing their carbon footprint, and purchasing carbon credits, planting trees (Thanh, 2009).

CHAPTER 3

METHODOLOGY

3.1 Study location

This study was conducted in the communities of Felda Bukit Goh Kuantan, Pahang. This area was suitable to study area because of its proximity to the mining activities. The geographical of that area had mature bauxite to do the mining activities. Based on Guidance Document on Health Impact Assessment in Environmental Impact Assessment (DOE Malaysia, 2012), the area of environmental impact must within 5 km radius from the boundary of the project site so for this study only focus 5 km radius from the project site as study location due to the nearest exposure of bauxite mining. Figure 2 shows the aerial view of bauxite mining area.



Figure 2: The aerial view of bauxite mining area in Bukit Goh, Kuantan

3.2 Study background

This study was conducted from September 2015 until June 2016 and the data collection was carried out from mid of January to the end of February 2016, in Felda Bukit Goh, Kuantan. All data was collected from face-to-face interviews using questionnaires, conducted by the researchers and trained interviewers.

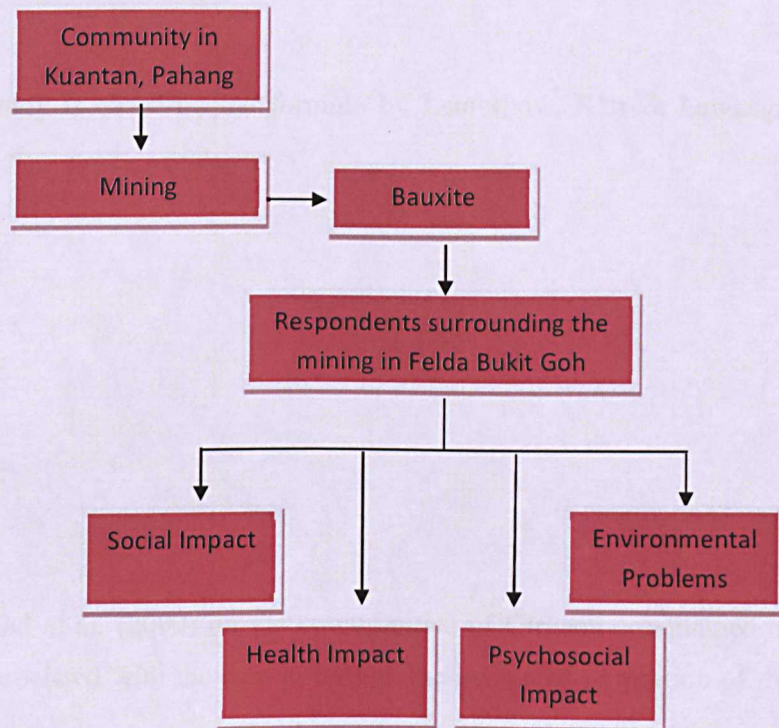
3.3 Study design

This study is a cross-sectional study because the data collections were carried out at one point of time where the exposure and outcome were carried out concurrently. This design is recommended due to its cost effectiveness, time and man power constraint.

3.4 Sampling

3.4.1 Sample population and sampling frame

From the Figure 3, the sample population consists of neighbouring communities of Felda Bukit Goh Kuantan, Pahang. The map of all the residences was obtained from the Administrative Office of Felda Bukit Goh. All the residences in the area were numbered and selected by simple random sampling to make up for the sample size calculated.



*note: flow of this study

FIGURE 3: Flowchart of the study population

3.4.2 Study sample

This study sample consisted of those head of household or wife (if the husband was not available at that time) who have resided in the area at least 1 year and willing to cooperate in the study.

3.4.3 Sample size

Sample size for this study is based on the formula by Lemeshow, Klar & Lawanga, (1990).

$$n = \frac{z^2 1 - \alpha/2 P (1 - P)}{d^2}$$

where,

P = estimated proportion

d = desired precision

Based on a study by Lad et al. (2009) on the communities of Girgaon complained of respiratory problems associated with the dust pollution, the estimated proportion of the study is 0.9.

$$n = \frac{z^2 1 - \alpha/2 P (1 - P)}{d^2}$$

$$= \frac{(1.96)^2 \times (0.9)(1 - 0.9)}{(0.05)^2}$$

$$= 138$$

After adding of 10 percent to the number of respondents, the minimum number of respondents required for this study is 152.

3.5 Instrumentation

3.5.1 Questionnaire

The questionnaire consists of a brief inventory listing five sections of question on demographic information, modified question to measure social, health, environmental impacts (Lad et al. 2009) and modified question to measure personal stressors (Personal Stress Inventory). This questionnaire was translated into Malay language, modified Personal Stress Inventory and face to face interviews sessions.

3.5.1.1 Demographic information

Demographic information includes age, sex, smoking, education, income, employment, duration of stay and mining involvement.

3.5.1.2 Social impact

The parameters were measured on social impact such as enters of foreign workers, roads became congested, increases of criminal cases, local business or health services condition and income of the respondents. For example, criminal cases may be have changes from time to time and mining income also affected to basic need to get food in that area and health problems. The social impact scores was divided into three categorised. The scores were categorized 0 to 8 as low, 9 to 16 as medium and 17 to 24 as high. The distribution of social impact scores among respondents was range 12 to 22.

3.5.1.3 Health impact

Health impacts were measured using questions related to health symptoms, condition, status and services. The health symptoms divided into three parts which are general

problems, respiratory tract problems and skin problems. For health symptoms is more focus on duration of the symptoms to the respondents. Besides that, this study was measure health conditions, types of freshwater fish consume, frequent of freshwater fish consume, water supply and potable water use that contribute to health impacts among respondents.

3.5.1.4 Psychosocial section

Psychosocial section was measured using the modified Personal Stress Inventory (PSI) questionnaire. This questionnaire was using to assess the psychological and physiological symptoms of stress to respondents. This questionnaire is divided into two parts. Part one is a 7-items question perceived on the personal stressors that is surrounding environmental factors. This part scoring was rated on Likert-scale with 4 responses (0 to 3). Part two measures the stress based on the health symptoms due to stress. This part includes 47 items subdivided into 9 subscales that include musculoskeletal systems related symptoms (4 items), gastrointestinal systems related symptoms (6 items), physical systems related symptoms (6 items), depression related symptoms (6 items), tension due to emotion and nervousness (11 items), physical energy related symptoms (3 items), sleeping habit and pattern problems (3 items), memory and attention span related symptoms (5 items) and dietary pattern (3 items). The subscales are scored on a Likert-scale ranging from 0 (did not or never) to 3 (almost everyday). A score of ≥ 1 is an indication for the presence of the subscales related symptoms (O'Donnell, et al., 1984).

The psychosocial impact was included of uncomfortable house surrounding, erosion land or landslide, environmental polluted and criminal cases. The psychosocial impact scores was divided into three categorised which are 0-7 as low, 8-14 as medium and 15-21 as high. The distribution of psychosocial impact scores among respondents was range 0 to 18.

3.5.1.5 Environmental problems section

The environmental problems were measure on air pollution increases, dustier house, house cleaning and agriculture problems, damage road, stress or loss of calmness, land erosion or landslide and water or food resources problems. This study was measure the perception of the environmental problems among respondents.

3.6 Data analysis

Data obtained were analysed using the Statistical Package for Social Sciences (SPSS) version 22 for Microsoft Windows. All data were presented descriptively as mean, standard deviation, frequency and percentage. Univariate analysis was used to obtain the frequency, percentage, mean, range and standard deviation in order to describe the data collected of the respondents.

3.7 Quality control of data

Pre-test was conducted on a group with the same exposure as the study sample. All interviewers were well-trained to conduct the interview and were briefed on the purpose and procedure of data collection.

3.8 Study Ethics

This research involves human subjects as the study samples, and therefore require approval from the Ethics Committee, UPM [UPM/TNCPI/RMC/1.4.18.1 (JKEUPM)/F2]. A clear information letter indicating the research background and the purpose of the project was given to all respondents. Written consents were obtained from the respondents prior to the study. The privacy of the information gathered was protected at all phases of the study. The confidentiality of all respondents was also ensuring at all the times. The permission from the respondents was obtained before data collection.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Socio-Demographic Section

Table 4.1 shows that the respondents mostly were female 61.7% because of their head of household (husband) had passed away and went to work. The respondents were mostly full time housewife (48.1%). Majority did not smoke (73.5%) because of they were mainly female. Majority of the respondents had secondary school (40.1%) because of they were from poor family and they cannot afford to further their study. The highest income was 1000-3000 per month (57.4%), because of they were mostly from the moderate income family that depend on palm oil revenue as income. Some had income from mining activities (30.2%).

About 69.8% of the respondents' families were not involved with the mining activities since they did not want their land destroyed by the mining activities. From the observation, some of the respondents had their own reason for not involving in the mining. Some of the respondents were cheated by the mining company in that the bauxite in their land did not mature yet or their land was not suitable for mining. The worst issue reported was that some of them were gullible to accept low price for low quality bauxite.

Table 4.1: The socio-demographic information of respondents

Variables	Frequency (n)	Percentage (%)
Sex		
Male	62	38.3
Female	100	61.7
Smoking		
Yes	43	26.5
No	119	73.5
Education		
Primary	54	33.3
Secondary	65	40.1
Certificate	10	6.2
Diploma	7	4.3
Degree	4	2.5
Others (no education)	22	13.6
Income		
<1000	52	32.1
1000-3000	93	57.4
3000-5000	8	4.9
>5000	7	4.3
Employment		
Government	4	2.5
Private	5	3.1
Self-employed	56	34.6
Retirees	19	11.7
Not working	78	48.1
Mining Involvement		
Yes	49	30.2
No	113	69.8

N=162

Table 4.2 shows that the minimum age was 18 years old and maximum age was 100 years old. Most of them were the new generations compared to first generation whom mostly had passed away. The minimum duration of residence was one year and the maximum was 50 years. Most of them were settlers from the beginning when Felda Bukit Goh was opened. The mean score for age was 51.32 years while the duration of residence was 32.62 years

Table 4.2: The age and duration of residence of respondents

Variables	Mean (SD)	Range
Age	51.31 (18.39)	18-100
Duration of residence (year)	32.62 (15.40)	1-50

N=162

4.2 Social Aspect of Respondents

Table 4.3 shows three categories of social factors scores which were low, medium and high. Low category score was 0-8, medium was 9-16 and high was 17-24. From the results, range score was from 12 to 22. In this section, social factors scores were in the medium and high categories only. The respondents categorised as medium was 85.2% compared to high with 14.8%. The social impacts include the presence of foreign workers which increased the crime rate in their area. Besides that, the respondents also agreed that the road had become congested with bauxite lorries. The respondents complaint that almost 30 lorries per day passed through and the roads were busy during the peak hours in the morning and evening.

Some respondents reported, their local business and food premises decreases in sale because of dust from bauxite lorries. The dusty and dirty premises were not attractive to customers. From the observation, they need to clean their table every day because of the bauxite dust and they also closed the food stall during peak operation of

mining. On the other hands, palm oil plantation for those who were not involved in the mining became less productive because the bauxite dust hindered the palm oil flowers from pollination, thus less and smaller fruits were produced.

Table 4.3: The social impact scores among respondents

Variables	Frequency (n)	Percentage (%)
Social Scores		
Low (0-8)	0	0
Medium (9-16)	138	85.2
High (17-24)	24	14.8

N=162

Based on International Aluminum Institute Fourth Sustainable Bauxite Mining Report (2008), future bauxite surveys will be more streamlined and to be carried out annually and become the basis for a sustainable bauxite mining report addressing a broader range of social issues. This situation has led to adverse effects not only on mining communities but the economy at large. It has also created other social problems such as overpopulation, congestion, and pressure on social amenities among others. Thus the “gains” from this sector in the form of increased investment and foreign exchange earnings are being achieved at some significant environmental, health and social costs to the people living in mining communities and the nation as a whole (Amposah, et al., 2011).

Previous study Kitula (2006) stated that mining is one of contribution to local income. Local people employed in mining obtain direct income as mining wages while non-miners increase their income through different socio-economic activities, including sales from food crops and business activities. Other than that, mining has also had socio-cultural impacts. These include accidents and theft has resulted in changes to indigenous lifestyle and increased competition among local residents for natural resources. The

accidents could be severe during the rainy seasons and mine rushes. Crop theft was identified as a growing problem to acquire food supplies and other basic necessities.

4.3 Health Section

Table 4.4 shows that the health symptoms were divided into 3 types, namely, general symptoms, respiratory and skin problems. The highest general symptoms experienced were stress during the last six months ago due to noise (35.8%). This was because of some of respondent complaint that the excavating machine used in extracting the bauxite from the earth was noisy and disturbed their sleep. Some mining company finished the operation at night and start early in the morning. A second common symptom was headache (11.7%). This was because of some of the older respondents needed good sleep without noise and dust in the environment which lead to headaches.

For respiratory tract problems, the highest prevalence six months ago was cough with phlegm (27.8%), followed by dry cough (23.5%), and difficulty breathing, (13.6%). These complaints were because the mining activities were at the peak before moratorium was enforced. The increase in exposure to bauxite dusts to the surrounding communities who were susceptible, resulted in skin problems, the such as itchiness (19.1%) followed by redness and rashes (14.2%) since the bauxite dust contained of heavy metals such as chromium and nickel which can cause skin problems.

Among the exposed communities in previous studies Hassan, et al. (2015) stated that headaches had the highest prevalence of all symptoms. The community living within a 5 km radius from the mine was three times more likely to have headaches. This prevalence was still lower than of the others study conducted by Oosthuizen et al. (2010) in South Africa, where 50% of the respondents complained of headaches. Skin irritation was common symptom of low cyanide exposure. Results showed that the community living near the mine was twice as likely to experience skin irritation. This finding was

supported by Adei et al. (2010) in a community living in Ntotroso, Ghana who reported that 42% of the respondents had skin problems.

Table 4.5 shows that the health conditions for cough 4-6 times per day or more in a week was 19.1% and next was coughing along the day or night. This is because of moratorium was held a week before data collection, therefore, the coughing decreased as there was less dust produced from the mining activities.

Table 4.4: The distribution of health symptoms reported by the respondents

Variables	Frequency (%)			
	None	1 Week	1 Month	6 Month
Types of Health Symptoms				
General Problems				
Stress of noise	98(60.5)	0(0)	6(3.7)	58(35.8)
Headache	141(87.0)	1(0.6)	1(0.6)	19(11.7)
Vomiting	160(98.8)	0(0)	0(0)	2(1.2)
Diarrhea	160(98.8)	1(0.6)	0(0)	1(0.6)
Muscle cramp	157(96.9)	0(0)	0(0)	5(3.1)
Respiratory Tract Problems				
Dry cough	112(69.1)	3(1.9)	9(5.6)	38(23.5)
Cough with phlegm	113(69.8)	0(0)	4(2.5)	45(27.8)
Difficulty breathing	135(83.3)	0(0)	5(3.1)	22(13.6)
Asthma	150(92.6)	0(0)	0(0)	12(7.4)
Bronchitis	161(99.4)	0(0)	0(0)	1(0.6)
Skin Problems				
Itchiness	121(74.7)	2(1.2)	8(4.9)	31(19.1)
Itchiness & freckle	145(89.5)	0(0)	3(1.9)	14(8.6)
Redness & rashes	136(84.0)	0(0)	3(1.9)	23(14.2)
Swelling & oedema	159(98.1)	0(0)	0(0)	3(1.9)

N=162

Table 4.5: The cough conditions among respondents

Health Condition	Frequency (n)	Percentage(%)
Cough 4-6 times per day or more in a week	31	19.1
Cough along the day or night	33	20.4
Cough when wake up at the morning	22	13.6

N=162

The previous study found that the grievances of the affected communities on air quality have been the airborne particulate matter, emissions of the smoke, noise and vibration. Airborne particulates of major concern include respirable dust, gaseous such as sulphur dioxide, nitrogen dioxide, carbon monoxide and black smoke. The activities that produce this particulate matter include site clearance and road building, open-pit drilling and blasting, loading, vehicular movement and waste rock handlings as well as heap leach crushing by companies during heap leach processing. The discharge of airborne particulate matter into the environment principally minute dust particles of less than 10 microns poses health threats to the people. All fine dust at a high level of exposure has the potential to cause respiratory diseases and disorders and can exacerbate the condition of people with asthma (Akabzaa, et al., 2001).

The red sludge puts health and human lives at risk of being lost or harmed due to air, water and fish pollution. An Australian researcher in Australia where bauxite mining is largely developed proved that red sludge causes lung cancer and uterus deformation in rat experiments. The common symptoms of toxicity on humans are dizziness, nausea and fainting if breathing or taking in a large dosage. According to Occupational Safety and Health Act (1994), the sodium hydroxide (NaOH) is the primary waste in red sludge and it is harmful to human beings after prolonged contact 15 years.

From the findings from Stephens and Ahern (2001) have called for the need for more openness and transparency within the mining sector, particularly in countries of Latin America, Asia and Africa. There was a further need for in-depth long-term

evaluation of the impacts of mining on health of communities. There was an evidence of long-term impacts of mining on health of communities. This implies that the sector's activities currently undermine the human objectives of sustainable development, which are to protect the health of current and future generations. There was still a long way to go before mining becomes a healthy work or a healthy development activity to take place in a community. There was also a long way to go before the community agrees over the real health impacts of the sector and the real responsibility of each of the actors in the sector (Stephens, et al., 2001).

From the previous study Akabzaa (2000) stated almost all the large scale mining companies in the country employ the open-pit method of mining in addition to cyanide heap leach operations. These methods have reaching consequences for human health and environmental safety. The principal elements of the environment such as land, water and air have been severely affected by mining activities in Ghana besides the use of chemicals and explosives in many areas of mining also create health and safety hazards by exposing the environment to pollutants like dust (Amposah, et al., 2011). The creation of large scale surface disturbances, the generation of volumes of waste materials and the exposure of previously buried geological materials to the forces of oxidation and precipitation may continue to present complex environmental and health problems even when the best available practices are conscientiously followed (Chiaro, et al., 1998).

4.4 Psychosocial Section

a. Environmental Factors

Table 4.6 shows that psychosocial impact scores was divided into three categories which are 0-7 as low, 8-14 as medium and 15-21 as high. From the results, the range was 0 to 18. About 52.5% of respondents were categorised as low and followed by 43.2% was categorised as medium.

The environmental factors of psychosocial impacts were mostly due to bauxite lorries drove in and out of narrow routes, noisy sound produce from the lorries and the houses turn to red because of dust emitted from their loads. Besides that, some of them were stressed with the environmental pollution such as air pollution from red dust and noisy sound from the bauxite lorries or the mining machineries. They need to close all the windows and doors to avoid the dust from entering their houses during the mining operations.

Some of the respondents were stressed because of noise pollution which disturbed sleeping time at night and early morning. Some of the respondents were also worried and stressed because of the structure of the soil might cause landslide or floods. This was because the mining activities were very close to their houses. The other problems included the lorries' drivers using routes without permission or late company payment to the plantation owners.

Table 4.6: The psychosocial impact scores for environmental factors in bauxite mining areas among respondents

Variables	Frequency (n)	Percentage (%)
Psychosocial Scores		
Low (0-7)	85	52.5
Medium (8-14)	70	43.2
High (15-21)	7	4.3

N=162

b. Health Problems due to Stress

The physical system related symptoms due to stress has the highest prevalence, followed by sleeping habit and pattern problem. Physical system related symptoms mostly were flu and skin rashes because some of respondents were sensitive to the dust from mining activities nearby. The other highest symptoms were sleeping disturbance and sleeping

pattern changes. This is because of some of mining company finished the operations late at night and started their operation in the early morning (Table 4.7).

Previous study found that the sources of noise and vibration in the area comprise mobile equipment, air blasts and vibration from blasting and other machineries. The impact of high-pitched and other noises is known to include damage to the auditory system, cracks in buildings, stress and discomfort (Akabzaa, et al., 2001). These noises can also terrify animals, hinder their mating processes and also cause abortions, therefore adversely affecting the animal population.

In determining the state of mental health in the researched mining communities, one needs to focus not only on mental health problems or pathology, but also on what constitutes positive mental health. Looking at mental health through the scope of positive psychology, involves examining those conditions and processes that contribute to the optimal functioning of people, groups and institutions (Gable, et al., 2005). This is in line with definitions of mental health that describe not only the absence of disease, but the presence of different components of well-being (Cronjé, et al., 2013).

Table 4.7: The health problems due to stress faced by respondents

Variables	Frequency (n)	Percentage (%)
Physical system related symptoms	44	27.2
Sleeping habit and pattern problem	32	19.8
Tension due to emotion and nervousness	20	12.3
Dietary pattern problem	14	8.6
Musculoskeletal system related symptoms	9	5.6
Gastrointestinal system related symptoms	5	3.1
Physical energy problem	3	1.9
Memory and attention span related problem	3	1.9
Depression related emotion	2	1.2

N=162

Stress is definitely the most prevalent mental health concern. This not only led to other mental health problems, but is the root cause of other physical and social problems. People living in the mining environment experience stress for a variety of reasons that range from financial pressures, to coping with the expectations of the physical mine environment (Cronjé, et al., 2010).

4.5 Environmental Perception of Respondents

Table 4.8 shows that the respondents had five highest complained from the respondents. The highest was air pollution increment and dusty houses (87.7%). This was because of the dust come from mining activities nearby such as excavation process near to their houses and the dust produced from the bauxite lorries along the road. Besides that, some of them complained that the dust entered their houses and turn them red in colour. The dust stuck to the wall, windows and floor made them looked dirty. House cleaning was another problem as they need to clean frequently during the mining operations.

From the survey, one of the respondents who were maternal mother said that during her pregnancy she needed to mop four times every day and she ended up with pregnancy complication. The other environmental problem was road damage, because the road were heavily used and covered with red dust caused from the bauxite lorries passing along the road every day. Sometimes road damage and dust might cause accident to others road users. The last environmental problem was on agricultural, since the dust covered the flowers or leaves of oil palm tree which made the trees become less productive or infertile.

Table 4.8: The environmental problems faced by the respondents

Environmental Problems	Frequency (n)	Percentage (%)
Air pollution increase	142	87.7
Dustier house	142	87.7
House cleaning problem	129	79.6
Road damage	113	69.8
Agricultural problem	86	53.1
Stress/loss of calmness	75	46.3
Land erosion/landslide	60	37.0
Water resource problem	50	30.9
Food resource problem	12	7.4

N=162

The use of heavy machineries in exploiting the minerals also has a destructive effect on the vegetation as it generates more dust (ILO, 2005) and noise pollutants. The previous study was found that the land degradation caused by the gold mining is pronounced as chemical contamination from the extraction process imposes a double burden on the environment, with harmful health implications for mining communities (Yelpaala, 2004). In Ghana several studies in mining towns have revealed that environmental problems such as land degradation, pollution and others are associated with mining activities.

In other previous study found that agricultural lands were not only generally degraded, but the loss of land for agricultural production has also led to a shortening of the fallow period from 10-15 years to 2-3 years. The traditional bush fallow system, which sufficiently recycled substantial amounts of nutrients and made the next cycle productive, can no longer be practised due to insufficiency of land (Akabzaa, et al., 2001).

The deforestation that has emanated from surface mining has long-term effects even when the soil is replaced and trees are planted after mine decommissioning. The new species that might be introduced have the potential to influence the composition of the topsoil and then determine soil fertility and fallow period for certain crops. In addition to erosion when surface vegetation is depleted, there is deterioration in the viability of the land for agricultural activities. This has degenerated into destruction of the luxuriant plant life, biodiversity, cultural sites and water bodies (Akabzaa, et al., 2001).

Dust was a primarily environmental problem caused by bauxite mining. Dust absolutely covers very large surrounding areas that affect the habitats, including residential and agricultural neighborhoods of the bauxite exploitation site. The “red” dust waste from the first process of bauxite definitely will cling to the income producing plantations and remain on their leaves for a long period of time. This phenomenon was very harmful to the growth of the agricultural products and reduces the productivity of these trees. Digging a bauxite site would tremendously damage huge depths of the topsoil level that can never be replenished as in the condition before digging. So that the land was not suitable for agricultural activities once the lands were mined.

A table 4.9 show that female was more than male of the respondents. This is because of most of the respondents which available as respondents during data collection. So that mean rank for female was 86.40. This analysis was not normally distributed so Mann Whitney U was used to analyse and compare for these two groups with health complaints. So only dry cough was a significant association for male and female $p= 0.037$. This is because of air pollution occurred in the surrounding environment. Besides that, the dust from the mining is dangerous to the health and can affect respiratory tract. It resulted in dry cough among the respondents in the vicinity.

A study found that the grievances of the affected communities on air quality have been the airborne particulate matter or emissions of the smoke from the vehicles or

machineries. Airborne particulates of major concern include respirable dust and gaseous. The discharge of airborne particulate matter into the environment principally minute dust particles of less than 10 microns poses health threats to the people. All fine dust at a high level of exposure has the potential to cause respiratory diseases and disorders and can exacerbate the condition of people with asthma (Akabzaa, et al., 2001).

Other study stated a majority (over 75 %) of the respondents from population study agreed that mining has led to increase in dust pollution in the area. A majority of these respondents (66%) said that the transportation activity was the main source of dust pollution. While 50 % of all respondents were of the opinion that mining site operations were the other major source of dust pollution. However, almost 90% of the respondents from Girgaon complained of respiratory problems associated with the dust pollution (Lad, et al., 2009).

Table 4.9: Comparison of the health complaint between male and female

Variables	Mean Rank	U	p
Stress of noise			
Male	78.27	-0.805	0.421
Female	83.50		
Headache			
Male	78.94	-0.941	0.347
Female	83.09		
Vomiting			
Male	83.11	-1.802	0.072
Female	80.50		
Diarrhea			
Male	83.11	-1.802	0.072
Female	80.50		
Muscle cramp			
Male	81.61	-0.081	0.936
Female	81.43		
Dry cough			
Male	73.60	-2.082	0.037*
Female	86.40		
Cough with phlegm			
Male	80.70	-0.213	0.831
Female	82.00		
Difficulty breathing			
Male	81.03	-0.154	0.877
Female	81.79		
Asthma			
Male	82.03	-0.251	0.802
Female	81.17		
Bronchitis			
Male	81.00	-0.787	0.431
Female	81.81		
Itchiness			
Male	78.40	-0.872	0.383
Female	83.42		
Itchiness & freckle			
Male	78.32	-1.278	0.201
Female	83.47		
Redness & rashes			
Male	80.48	-0.344	0.731
Female	82.14		
Swelling & oedema			
Male	80.00	-1.372	0.170
Female	82.43		

*p<0.05 means there is significant difference between male and female

Table 4.10 shows that there was no correlation between social impacts with health complaint (stress of noise). There was significant correlation between the psychosocial impacts (environmental factors) with health complaint (stress of noise). Results showed social and psychosocial (environmental factors) impacts might affect the health of the respondents especially the stress of noise.

From the previous study stated that conventional open cast bauxite mining operations noise pollution is one of the environmental hazards. Particularly, it could have serious ecological consequences on wildlife in the remote areas. In that study most of the respondents (83%) were of the opinion that mining activity significantly contributed to the noise pollution. As per the majority (75%) blasting is the main source of noise, including moving of heavy machinery (36 %) and truck transport (24%), (Lad, et al.,2009).

Other study stated that the sources of noise and vibration in the area comprise mobile equipment, air blasts and vibration from blasting and other machinery will resulted in the impact of high-pitched and other noises is known to include damage to the auditory system, cracks in buildings, stress and discomfort (Akabzaa and Darimani, 2001).

Table 4.10: Correlation between social and psychosocial (environmental factors) impacts with health complaint (stress of noise)

Variables	Stress of noise	
	r	P
Social score	0.068	0.389
Psychosocial score	0.342**	<0.001*

* $p < 0.05$ means there is correlation between the psychosocial impacts (environmental factors) with health complaint (stress of noise)

**fair correlation (0.26-0.50)

Table 4.11 shows that musculoskeletal system related symptoms (0.047), physical system related symptoms (<0.001), physical energy problem (0.019), sleeping problem (0.023) and dietary problem (0.020) were significant association between the psychosocial impacts (health problems due to stress) with health complaint (stress of noise) which mean $p < 0.05$. These show that the psychosocial impacts (health problems due to stress) can affect health of the respondents which is stress of noise. For example the noise was produce loud sound and it will disturb sleeping problems of the communities nearby during early morning or night. Besides that, air pollution was occurred because of dust from mining operations so it will give loss of appetite to the communities.

Musculoskeletal system related symptoms such as muscle stress, waist pain, headache and tetanus. Physical system related symptoms such as flu, chest pain, rashes skin, dry mouth, sore throat and heart palpitations. Physical energy problems such as fatigue, less of energy and apathy. Sleeping problem such as difficult to sleep or wake up and facing nightmares. Dietary problem such as loss of appetite, eat too much or do not have time to eat.

Previous study found noise affected health such as stress and discomfort. The source was from mobile equipment and machineries of the mining activities (Akabzaa, et al., 2001). Skin diseases, fever and diarrhoea have been caused by polluted rivers and other water bodies which are depended upon by residents in some of the communities (Yeboah, 2008). When enquired about impacts of dust pollution, 65% of their respondents reported that the pollution has led to accumulation of mine dust on their houses (Lad, et al., 2009).

Table 4.11: Association the psychosocial impacts (health problems due to stress) with health complaint (stress of noise)

Variables	Stress of noise score, n(%)		χ^2	<i>p</i>
	Low	High		
Musculoskeletal system				
Absent	101(66.0)	52(34.0)	3.950	0.047*
Present	3(33.3)	6(66.7)		
Gastrointestinal system				
Absent	102(65.0)	55(35.0)	1.314	0.252
Present	2(40.0)	3(60.0)		
Physical system				
Absent	89(75.4)	29(24.6)	23.822	<0.001*
Present	15(34.1)	29(65.9)		
Depression				
Absent	102(63.7)	58(36.3)	1.129	0.288
Present	2(100.0)	0(0.0)		
Tension and nervousness				
Absent	89(62.7)	53(37.3)	1.158	0.282
Present	15(75.0)	5(25.0)		
Physical energy problem				
Absent	104(65.4)	55(34.6)	5.481	0.019*
Present	0(0.0)	3(100.0)		
Sleeping problem				
Absent	89(68.5)	41(31.5)	5.206	0.023*
Present	15(46.9)	17(53.1)		
Attention problem				
Absent	103(64.8)	56(35.2)	1.267	0.260
Present	1(33.3)	2(66.7)		
Dietary problem				
Absent	99(66.9)	49(33.1)	5.409	0.020*
Present	5(35.7)	9(64.3)		

* $p < 0.05$ means there is significant difference between the psychosocial impacts (health problems due to stress) with health complaint (stress of noise)

Table 4.12 shows that land erosion/landslide and road damage were $p < 0.001$ respectively so resulted in significant association which $p < 0.05$ means there is significant difference between perception to environment impact with social impacts. This shows that social impact was effect the environment impact through respondent's

perception. Land erosion or land slide might occurred because of some of the respondents were involve in mining do the mining near their house. Large open pit or excavation was made so it might be high chances to land erosion or land slide occur. Road damage also was occurred because of the heavy vehicles passing along the road for many times per day and the road became red and dirty.

Previous studies found that the soil erosion caused by the open cast mining through its overburdens is a common phenomenon in the Western Ghats. Over time and particularly during heavy monsoon there is erosion of this loose soil in the neighbouring slopes and depressions thus causing siltation and blocking of water sources such as springs and streams (Lad, et al., 2009). In addition to erosion when surface vegetation is depleted, there is deterioration in the viability of the land for agricultural activities and loss of habitat for birds and other animals (Yeboah, 2008).

Bauxite mining has led to the influx of labour force from outside which include truck drivers, labourers, workers on heavy machinery and labour in roadside services. The frequency of accidents is more during night time as the trucks move also during the night time even if prohibited. Heavy vehicles such as trucks, dumpers, earth movers continuously operate on this road during the season. The road and the roadside forest suffer from heavy vehicular traffic of around 200 to 250 trucks both ways daily during mining season (Lad, et al., 2009).

Table 4.12: Association of the perception to environment impacts with social impact

Variables	Social impact		
	Mean Rank	U	p
Air pollution increase			
No	68.40	-1.364	0.173
Yes	83.35		
Dustier house			
No	78.75	-0.286	0.775
Yes	81.89		
Water resource problem			
No	79.69	-0.751	0.453
Yes	85.55		
Food resource problem			
No	80.71	-0.778	0.437
Yes	91.42		
Stress/loss of calmness			
No	77.34	-1.241	0.214
Yes	86.32		
Land erosion/landslide			
No	69.49	-4.343	<0.001*
Yes	101.92		
Agricultural problem			
No	79.49	-0.525	0.600
Yes	83.28		
Road damage			
No	53.26	-5.159	<0.001*
Yes	93.75		
House cleaning problem			
No	67.86	-1.913	0.056
Yes	84.99		

*p<0.05 means there is significant difference between perception to environment impact with social impact

Table 4.13 shows that air pollution increase, dustier house, stress/loss of calmness, land erosion/landslide and house cleaning problem were p<0.001 respectively.

Only water resource problem (p is 0.005) were significant association which $p < 0.05$ means there is significant difference between perception to environment impact with the psychosocial impacts (environmental factors). This was show that the respondents were having psychosocial in term of environmental factors and it was influences by environmental problems.

Air pollution occurred because of red dust were produced from the mining activities and it was entered their house became dirty. The dust is not easy dust to clean once settled in the house. Land erosion might occur because of large open pit or excavation of mining activities. Besides that, water resource also might contamination from the red sludge of bauxite mining activities.

From previous study Yeboah (2008) stated that air pollution has emanated from emission of dust and other particles into the air, emission of chemicals such as carbon, sulphur, arsenic from processing plants and waste disposed off into tailings dams. The other study Lad, et al. (2009) found that dust pollution, 65% of their respondents opined that the pollution has lead to accumulation of mine dust on their houses. A majority (over 75 %) of the respondents agreed that mining has led to increase in dust pollution in the area. A majority of their respondents (66%) said that the transportation activity was the main source of dust pollution. Dust pollution is a major problem in any opencast mining activity including bauxite.

Table 4.13: Association of the perception to environment impact with psychosocial impact (environmental factors)

Variables	Psychosocial impact		
	Mean Rank	U	p
Air pollution increase			
No	35.08	-4.747	<0.001*
Yes	88.04		
Dustier house			
No	29.25	-5.343	<0.001*
Yes	88.86		
Water resource problem			
No	74.63	-2.804	0.005*
Yes	96.90		
Food resource problem			
No	81.24	-0.250	0.802
Yes	84.75		
Stress/loss of calmness			
No	65.97	-4.557	<0.001*
Yes	99.51		
Land erosion/landslide			
No	69.85	-4.138	<0.001*
Yes	101.30		
Agricultural problem			
No	78.73	-0.709	0.478
Yes	83.95		
Road damage			
No	71.35	-1.822	0.069
Yes	85.90		
House cleaning problem			
No	42.76	-5.339	<0.001*
Yes	91.41		

*p<0.05 means there is significant difference between perception to environment impact with the psychosocial impacts (environmental factors)

Overall, the literature review showed that much of the negative environmental and health effects of mining activities and most of them were focused mainly on mining

and economic development. Hence, these presented less findings on environmental and health impacts of mining to communities nearby. This research work therefore was intended to undertake a broader outlook into the social, psychosocial, health and environmental implications of mining to communities nearby and recommend further steps to some improvement as well as reducing the rate of hazardous health effects of the mining activities.

4.6 Study limitation

The research was carried out with certain constraints. Among the constraints encountered were lack of time, problems with data collection which include recall bias, reluctance to answer certain questions and lack of co-operation from some individuals.. Data collection problems were completed face to face interview which took more time to complete especially when the data needed were relevant to the study objectives. The researcher had to also cross check the authenticity of information gathered.

Despite the constraints and other challenges, it can be emphasized that the research has contributed immensely to the existing knowledge. First, the research has revealed that mining effects on health of residents in the communities is related to distance from the mines. However, the symptoms were those reported by the respondents and medical examination was not made. That is, proximity to mine site is very crucial in determining the prevalence of mining related diseases such as respiratory tract problem and skin problem in the area. It was established that rates of mining related diseases (respiratory tract problem and skin problem) decrease as one move further away from mine sites. Only qualitative methods have been used to analyze the findings of this research work. This is because of the quantitative methods are difficult to use in social researches hence should be limited to natural and physical sciences.

CHAPTER 5

RECOMMENDATION AND CONCLUSION

5.1 Conclusion

There was the need to recognize the environmental and health hazards that come with the mining in order to find ways of dealing with them. The combined effects of the problems have culminated into health problems of the communities surrounding with high prevalence of health complaints such as respiratory system and skin problems among the inhabitants. Socially, the communities were very affected as the score were found to be in the medium and high categories. However, psychosocially, they were not very affected yet as their scores were shown to be distributed only in the low and medium categories. There were also various types of pollutions, such as noise, air and water pollution. Thus, the social, psychosocial and health impacts on the communities were tremendous and would be worst if no appropriate mitigating measure were provided to protect the community well-being.

5.2 Recommendations

After a thorough the study and analysis of the problem, the following recommendations are made to recommend in future:

- a. Continuous monitoring (environmental monitoring) of mining operations on site, transport of ore & storage dumps should be carried out by concerned authority. The mining companies should be made to strictly adhere to the environmental rules and regulations which must be followed with sincere and successful efforts.
- b. The state government should ensure that the mining companies had to comply with the mining regulations and carry out mitigating measures during the mining activities.
- c. This study only studied the effect on adult. Further study on children who are more susceptible should be carried out.
- d. In the future, a cohort study is recommended instead of a cross sectional study design to determine the impacts of bauxite exposure to communities over a longer period of time.

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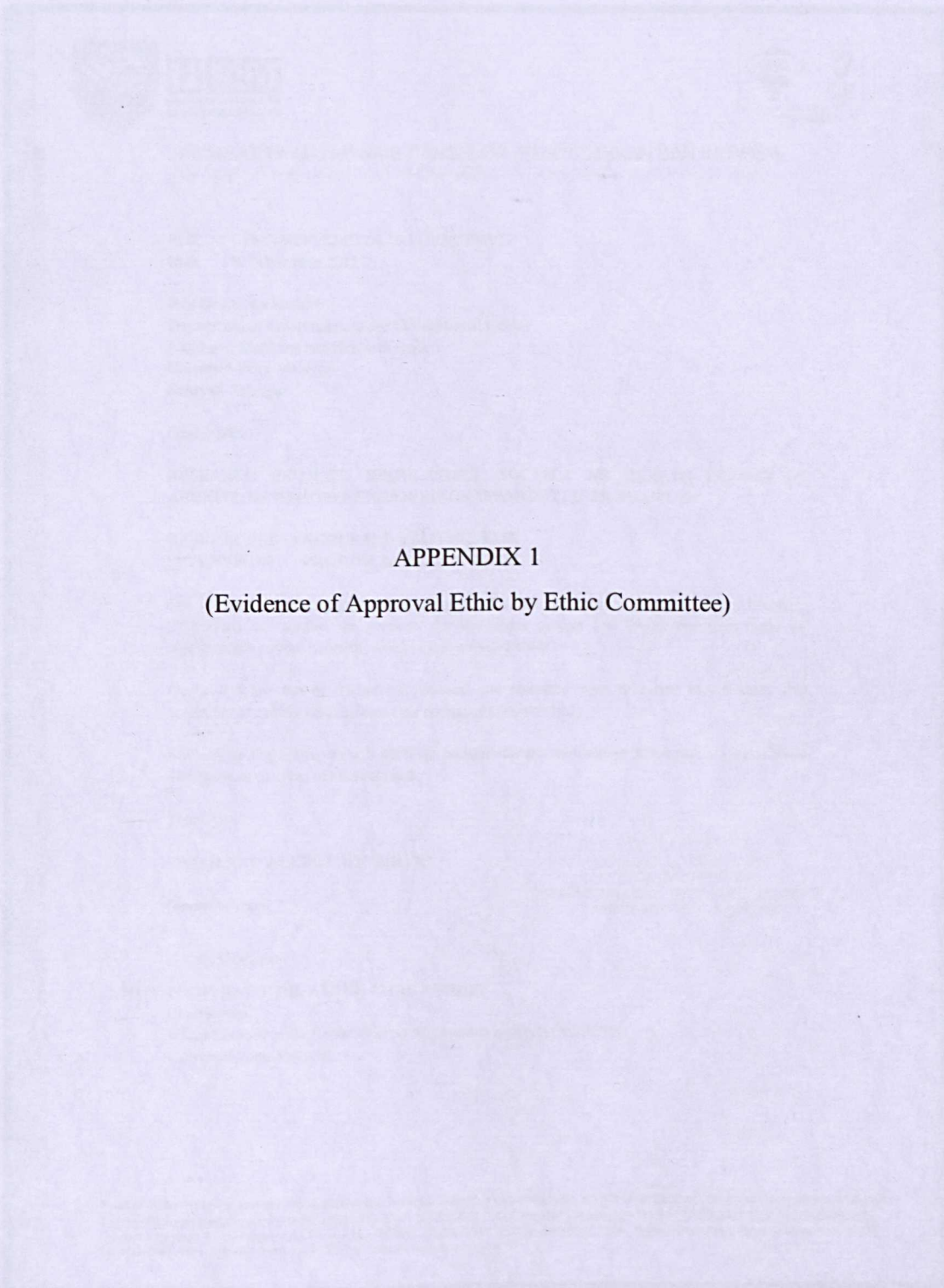
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APPENDIX 1
(Evidence of Approval Ethic by Ethic Committee)

FELDA BUKIT GOH, NEGERI KUALA TANG, PAHANG

APPENDIX 2

(Evidence of Approval Permission from Administrative Office of Felda Bukit Goh)



BUKANG BIL. PERTANGGAPAN DAN BERSERTUJUAN RESPONDEN

Di bawah ini adalah format untuk mengisi maklumat yang diperlukan untuk mendapatkan persetujuan responden.

1. TAJUK KAJIAN

Isikan tajuk kajian, kaedah dan lokasi kajian. Jika kajian berkaitan dengan perubatan, sila nyatakan Kementerian Kesihatan yang terlibat.

2. PENGENALAN

Tajuk ini adalah untuk mengenalpasti kajian yang dijalankan oleh responden. Tajuk ini akan digunakan untuk mengenalpasti responden dalam semua dokumen berkaitan dengan kajian ini. Tajuk ini akan digunakan untuk mengenalpasti responden dalam semua dokumen berkaitan dengan kajian ini.

APPENDIX 3

(Subject Information Sheet & Informed Consent)

3. LAPORAN TAPAK PENELITIAN DAN LAPORAN

Isikan maklumat mengenai tapak penelitian dan laporan yang berkaitan dengan kajian ini.

4. BUKANG BIL. BERSERTUJUAN DAN BERSERTUJUAN

Isikan maklumat mengenai bujang bil. bersertujuan dan bersertujuan yang berkaitan dengan kajian ini.

5. KEFALAKUATAN DAN KEKUALIFIKASIAN

Isikan maklumat mengenai kefalakutan dan kekualifikan yang berkaitan dengan kajian ini.

6. TERIMA KASIH

Isikan maklumat mengenai terima kasih yang berkaitan dengan kajian ini.



**JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA
(JKEUPM)**

BORANG B1: PENERANGAN DAN PERSETUJUAN RESPONDEN

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik.

1.TAJUK KAJIAN

Kesan-kesan Sosial, Kesihatan dan Psikososial Disebabkan Oleh Perlombongan Bauksit Terhadap Komuniti Di Bukit Goh, Kuantan

2. PENGENALAN

Tujuan kajian ini dijalankan adalah untuk mengenalpasti kesan-kesan sosial, kesihatan dan psikososial disebabkan oleh perlombongan bauksit terhadap komuniti di Bukit Goh, Kuantan. Kajian ini lebih mengkaji tentang aduan-aduan dan gejala-gejala kepada komuniti akibat dari aktiviti perlombongan bauksit. Selain itu juga, kajian ini hendak mengkaji aspek-aspek kesihatan kepada komuniti. Kepentingan di dalam kajian ini adalah untuk mengumpul data tentang kesan-kesan ini terhadap komuniti yang tinggal di kawasan berdekatan perlombongan bauksit. Kajian ini juga adalah satu peluang untuk memberikan maklumat yang lebih teratur dari segi ilmiah.

3. APAKAH YANG PERLU ANDA LAKUKAN?

Responden hanya perlu menjawab borang soal selidik yang diajukan oleh penyelidik dengan memenuhi setiap ruang maklumat yang diperlukan dan memberi kerjasama untuk ditemubual.

4. SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Responden yang tidak mempunyai ciri-ciri yang diperlukan dalam kajian ini seperti tidak terdedah di dalam kawasan yang dikaji dan duduk melebihi dari keluasan 5km radius dari kawasan kajian.

5. APAKAH FAEDAH MENYERTAI KAJIAN INI?

a) KEPADA ANDA SEBAGAI PESERTA?

Dapat membantu penyelidikan masa akan datang dengan memudahkan pengumpulan maklumat yang diperlukan serta membantu memberi kesedaran maklumat terhadap masalah komuniti hadapi akibat aktiviti perlombongan ini.

b) KEPADA PENYELIDIK?

Untuk membantu kajian akan datang serta untuk membantu komuniti untuk mengenalpasti masalah komuniti hadapi akibat aktiviti perlombongan ini.

9. PERSETUJUAN

Saya..... No Kad Pengenalan.
beralamat.....
.....dengan ini bersetuju untuk mengambil bahagian secara sukarela
dalam penyelidikan yang tersebut di atas *(kajian klinikal/percubaan ubat-ubatan/rakaman
video/kumpulan sasaran/temuduga/ soal selidik).

Saya telah diberi penjelasan secara menyeluruh mengenai penyelidikan ini dari segi metodologi,
risiko dan komplikasi (seperti tertulis pada Helaian Penerangan Responden). Saya memahami
bahawa saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi
sebarang alasan.Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti saya
akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang melibatkan saya.

Saya setuju/tidak bersetuju untuk imei/gambar/rakaman video/ rakaman suara digunakan dalam
apa jua bentuk penerbitan atau pembentangan. (sekiranya berkaitan).

*potong yang tidak berkenaan

Tandatangan
(Responden)

Tandatangan
(Saksi)

Tarikh :.....

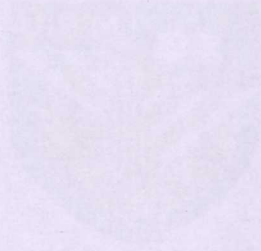
Nama :.....

No. K/P:

Saya mengesahkan bahawa saya telah menerangkan kepada responden ini sifat dan tujuan
penyelidikan yang tersebut di atas.

Tarikh

Tandatangan
(Penyelidik)



JABATAN KEMAHACAPAN, PRESENTASI DAN SUKSES KEMAHACAPAN

FAKULTI PERUBAHAN DAN SAINS KEMAHACAPAN

UNIVERSITI MALAYSIA

APPENDIX 4
(Questionnaire)

REYAN KEMAHACAPAN, KEMAHACAPAN DAN SUKSES KEMAHACAPAN, DISEBARKAN
OLAH PERLOMBINGAN BAHAGI TERNYATA KOMUNITI OF BUNCI

DAFTAR ISI

- 1. Daftar Isi
- 2. Bab 1: Pendahuluan
- 3. Bab 2: Metodologi
- 4. Bab 3: Hasil dan Pembahasan
- 5. Bab 4: Kesimpulan
- 6. Bab 5: Rujukan
- 7. Bab 6: Lampiran

Kod Responden:

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JABATAN KESIHATAN PERSEKITARAN DAN PEKERJAAN
FAKULTI PERUBATAN DAN SAINS KESIHATAN
UNIVERSITI PUTRA MALAYSIA

**KESAN-KESAN SOSIAL, KESIHATAN DAN PSIKOSOSIAL DISEBABKAN
OLEH PERLOMBONGAN BAUKSIT TERHADAP KOMUNITI DI BUKIT
GOH, KUANTAN**

ARAHAN SOALAN:

1. Borang soal selidik ini mengandungi **LIMA (5)** bahagian iaitu:
 - Bahagian A :** Maklumat Diri
 - Bahagian B :** Masalah Sosial Akibat Aktiviti Perlombongan
 - Bahagian C :** Masalah Kesihatan Akibat Pendedahan Aktiviti Perlombongan
 - Bahagian D :** Masalah Psikososial Akibat Pendedahan Aktiviti Perlombongan
 - Bahagian E :** Masalah Persekitaran Akibat Pendedahan Aktiviti Perlombongan
2. Anda dikehendaki **menjawab semua soalan** yang ada dalam borang soal selidik ini

BAHAGIAN A : MAKLUMAT DIRI

1. Nama:

2. Alamat:

.....
.....

3. No. Telefon:

4. Umur: tahun

5. Jantina: Lelaki
 Perempuan

6. Bangsa: Melayu
 Cina
 India
 Lain-lain (Sila nyatakan):

7. Berat: kg

8. Tinggi: m

9. Adakah anda merokok?

Ya, merokok sekarang. (jumlah tahun:.....;jumlah batang/hari:.....)

Pernah merokok (bila berhenti:.....)

Tidak pernah

10. Tahap Pendidikan:

Sekolah Rendah

Sekolah Menengah

Sijil

Ijazah

Lain-lain (sila nyatakan):

.....

11. Pendapatan Seisi Rumah Sebulan:

< 1000 1000-3000 3000 – 5000 >5000

12. Tempoh tinggal di tempat ini: tahun

13. Pekerjaan sekarang:

.....

14. Tempoh bekerja di tempat sekarang: bulan/tahun

15. Tempat bekerja sekarang:

.....

16. Adakah anda terlibat dengan aktiviti perlombongan? Ya Tidak

17. Sila jawab soalan ini sekiranya anda menjawab Ya di soalan 16.

Jika Ya :

a. Membenarkan tanah milik sendiri dilombong

b. Bekerja di kawasan perlombongan

c. Ahli keluarga bekerja dilombong

d. Lain-lain (Sila nyatakan):

.....

BAHAGIAN B : MASALAH SOSIAL AKIBAT AKTIVITI PERLOMBONGAN

Arahan: Tandakan (√) pada jawapan yang dikehendaki berdasarkan soalan yang diberikan selepas wujudnya aktiviti perlombongan.

SOALAN	SANGAT TIDAK BERSETUJU	TIDAK SETUJU	SETUJU	SANGAT BERSETUJU
18. Dengan wujudnya aktiviti perlombongan ini telah meningkatkan kemasukan pekerja asing di kawasan ini.				
19. Jalanraya di kawasan ini menjadi lebih sesak.				
20. Tahap jenayah di kawasan ini semakin meningkat.				
21. Perniagaan orang tempatan di kawasan ini semakin merosot.				

22. Pusat kesihatan di kawasan ini semakin sesak.				
23. Pendapatan semakin meningkat				

BAHAGIAN C : MASALAH KESIHATAN AKIBAT PENDEDAHAN AKTIVITI PERLOMBONGAN

24. Tandakan (√) pada gejala-gejala masalah kesihatan yang dihadapi selepas wujudnya aktiviti perlombongan untuk jangka masa **1 minggu, 1 bulan & 6 bulan** yang lepas. (Boleh tanda lebih dari satu)

a. Masalah Umum

Jenis Gejala Kesihatan	1 Minggu	1 Bulan	6 Bulan	Punca
Tekanan akibat bunyi bising				
Sakit kepala				
Muntah-muntah				
Cirit-birit				
Kekejangan otot				

b. Masalah Saluran Pernafasan

Jenis Gejala Kesehatan	1 Minggu	1 Bulan	6 Bulan	Punca
Batuk kering				
Batuk berkahak				
Masalah pernafasan /sesak nafas				
Asma				
Bronkitis				

c. Masalah Kulit

Jenis Gejala Kesehatan	1 Minggu	1 Bulan	6 Bulan	Punca
Kulit gatal				
Kulit gatal dan berbintat				
Kulit merah-merah/ruam				
Kulit bengkak /edema				

25. Adakah anda batuk 4 hingga 6 kali dalam sehari atau lebih dalam seminggu?

Ya Tidak

26. Adakah anda batuk sepanjang hari di waktu siang atau malam?

Ya Tidak

27. Adakah anda batuk ketika bangun dari tidur pada pagi hari?

Ya Tidak

**BAHAGIAN D : MASALAH PSIKOSOSIAL AKIBAT PENDEDAHAN
AKTIVITI PERLOMBONGAN**

Bulatkan pada sebab-sebab yang menyumbang kepada masalah psikososial yang anda hadapi selepas wujudnya aktiviti perlombongan.

a. Faktor Persekitaran

Nota: Interpretasi skala yang digunakan adalah seperti di bawah:

0 – Tiada langsung

1 – Sedikit

2 – Sederhana

3 – Banyak

28. Persekitaran rumah yang tidak selesa (contoh: berdekatan dengan jalan lori keluar masuk, bunyi bising lori, jalan/kereta/dinding rumah berdebu merah)	0	1	2	3
29. Persekitaran yang berbau busuk (berdekatan dengan sungai)	0	1	2	3
30. Bencana alam (contoh: struktur tanah yang tidak stabil mengakibatkan banjir/tanah runtuh)	0	1	2	3
31. Pencemaran alam sekitar (pencemaran udara/air/bunyi)	0	1	2	3

32. Gangguan akibat pembangunan (jalan raya/infrastruktur)	0	1	2	3
33. Gangguan akibat isu masalah sosial (isu dadah/ merokok/ kecurian/ramai kemasukan pekerja luar)	0	1	2	3
34. Takut dengan jenayah semasa (pembunuhan/ samun/ kecurian/rompakan/rogol)	0	1	2	3

b. Masalah Kesihatan Yang Dialami Akibat Tekanan

Nota: Interpretasi skala yang digunakan adalah seperti di bawah:

0 – Tidak pernah

1 – Sekali atau dua kali sahaja (setahun)

2 – Setiap minggu

3 – Hampir setiap hari

a)Sistem Otot Skeletal				
1. Ketegangan otot	0	1	2	3
2. Sakit pinggang	0	1	2	3
3. Sakit kepala	0	1	2	3
4. Ketap gigi	0	1	2	3

b)Sistem Gastro-Intestinal				
1. Tidak sedap perut	0	1	2	3
2. Sakit ulu hati	0	1	2	3
3. Muntah	0	1	2	3
4. Cirit-birit	0	1	2	3
5. Sembelit	0	1	2	3
6. Sakit perut	0	1	2	3
c)Sistem Fizikal Lain				
1. Selsema	0	1	2	3
2. Sakit dada	0	1	2	3
3. Ruam kulit	0	1	2	3
4. Mulut kering	0	1	2	3
5. Sakit tekak	0	1	2	3
6. Jantung berdebar-debar	0	1	2	3
d)Kemurungan				
1. Sedih/murung	0	1	2	3
2. Ketakutan	0	1	2	3
3. Tiada harapan/motivasi	0	1	2	3
4. Senang menangis	0	1	2	3
5. Mengkritik diri sendiri	0	1	2	3
6. Kehampaan	0	1	2	3

e)Ketegangan/Keresahan				
1. Menggeletar	0	1	2	3
2. Sentak otot	0	1	2	3
3. Pening	0	1	2	3
4. Cemas	0	1	2	3
5. Resah	0	1	2	3
6. Ketegangan	0	1	2	3
7. Buntu	0	1	2	3
8. Susah hati	0	1	2	3
9. Risau	0	1	2	3
10. Tidak boleh duduk diam	0	1	2	3
11. Perasaan takut sesuatu	0	1	2	3
f)Tahap Tenaga				
1. Lesu	0	1	2	3
2. Kurang Bertenaga	0	1	2	3
3. Sikap tidak ambil peduli	0	1	2	3
g)Tidur				
1. Sukar untuk tidur	0	1	2	3
2. Sukar untuk bangun	0	1	2	3
3. Mimpi ngeri/mimpi yang mengganggu	0	1	2	3
h)Perhatian				
1. Kemalangan/kecederaan	0	1	2	3
2. Sukar menumpukan perhatian	0	1	2	3
3. Fikiran buntu	0	1	2	3
4. Lupa perkara penting	0	1	2	3
5. Tidak boleh berhenti memikirkan sesuatu	0	1	2	3

i)Pemakanan				
1. Tiada selera makan	0	1	2	3
2. Makan berlebihan	0	1	2	3
3. Tiada masa untuk makan	0	1	2	3

**BAHAGIAN E : MASALAH PERSEKITARAN AKIBAT PENDEDAHAN
AKTIVITI PERLOMBONGAN**

Arahan: Tandakan (√) pada jawapan yang dikehendaki berdasarkan soalan yang diberikan berkaitan selepas wujudnya aktiviti perlombongan.

SOALAN	YA	TIDAK
35. Adakah pencemaran udara yang kotor semakin meningkat?		
36. Adakah anda menghadapi masalah rumah semakin banyak habuk?		
37. Adakah anda menghadapi masalah untuk mendapatkan sumber air yang bersih?		
38. Adakah anda menghadapi masalah untuk mendapatkan sumber makanan yang bersih?		
39. Adakah anda berasa tertekan/ hilang ketenangan akibat dari bunyi bising?		

40. Adakah aktiviti perlombongan akan menghakis struktur tanah atau mengakibatkan tanah runtuh?		
41. Adakah anda menghadapi masalah dalam melakukan aktiviti pertanian?(contoh: kurang hasil tanaman atau tanah sudah kurang subur)		
42. Adakah anda menghadapi masalah kesesakan jalan raya/struktur jalan semakin rosak serta mengakibatkan kemalangan kepada pengguna jalan raya?		
43. Adakah anda menghadapi masalah untuk mencuci rumah?		

-Soalan Tamat-

APPENDIX 5
(Data Collection Pictures)



Picture 1: Interview session by researcher



Picture 2: Interview session by trained interviewer