SCHOOL OF PUBLIC HEALTH, COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

THE USE OF PERSONAL PROTECTIVE EQUIPMENT AND THE OCCURRENCE OF RESPIRATORY DISEASES:

A CASE STUDY OF SMALL-SCALE MINERS IN TARKWA-NSUAEM MUNICIPALITY

BY

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DECLARATION

I, JOHN GORKEH-MIAH hereby declare that this study is my own work and that to the best of my knowledge it contains no material that has been previously published or written by another person nor any material which to a substantial extent, has been accepted for the award of any degree or diploma of a university or other institution of learning except where acknowledgement is made in the text.

Signed……

(John Gorkeh-Miah)

Academic Supervisors

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Date

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Date

DEDICATION

This work is dedicated to Mrs. Anita Gorkeh-Miah, my wife, partner, friend, mother and lover, with whom I share and enjoy a complete marriage.

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No one ever does a research all by oneself, and in my case this is particularly true. This work has come to be, not through my singular efforts and ideas alone but because of many other people who gave of their time, talent, ideas and directions.

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ABSTRACT

Background: Small-Scale mining which feature large rudimentary, unmonitored and uncontrolled practices had been vulnerable to miners due to the use of labour-intensive and crude methods of extracting the ore which tend to produce lots of dust and fumes.

Objective: To determine the effect of personal protective equipment use and occurrence of respiratory diseases among small-scale miners in Tarkwa-Nsuaem Municipality.

Methods: A cross sectional study was performed among small-scale miners and small-scale mining community members aged 17 years and above. Participants completed in person interviews. Demographic characteristics, knowledge and use of personal protective equipment, health seeking behaviour, signs and experiencing of respiratory diseases were evaluated.

Results: The sample consisted of 208 respondents with mean age of 34.6years consisting of 119 (57.2%) males and 89 (42.8%) females out of which 82 (65.1%) had never used personal protective equipment before even when they were exposed to silica dust and fumes that cause respiratory diseases.

Factors and reasons that made miners not to use personal protective equipment were identified as being some of the presumable causes associated with occurrence of respiratory diseases in small-scale miners in Tarkwa-Nsuaem Municipality.

Conclusion: This study shows that in the absence of personal protective equipment use, the miners in the Tarkwa-Nsuaem Municipal area could presumably be at a high risk of developing respiratory diseases. However, the study established no significance association between the use of protective equipment and the occurrence of respiratory diseases.

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Respondents were asked a number of questions that relate to their knowledge, availability and the uses of protective equipment. Out of the 148 responses, 117 indicated they have heard of protective equipment while thirty one have not heard of protective equipment. Regarding the uses of protective equipment ever heard of it said that the equipments are used basically to protect them from diseases and injuries. Eight respondents said protective equipments are used for washing. It also became evident that some of the respondents did not use protective equipment. While some intimated that the use ordinary dresses in place of protective clothing, some lacked knowledge about the where to acquire them. Others said they do not have the money to acquire these equipments. A cross tabulation showing the use and non-use of protective equipment and the occurrence of respiratory diseases is shown in Table 6.

Table 6: Relationship between the use of personal protective equipment and occurrence of respiratory diseases 35

Experienced bodily and chest pains, coughing and breathing difficulties		35
Yes		35
No		35
Total		35
Use protective equipment at the work place		35
Count	20	35
% within use of protective equipment	58.8%	35
% within experienced chest pains etc	37.7%	35
% of total	16.9%	35
14		35
41.2%		35
21.5%		35
11.9%		35
34		35
100%		35
28.8%		35
28.8%		35
Do not use protective equipment at the work place		35
Count	33	35
% within use of protective equipment	39.3%	35
% within experienced chest pains etc	62.3%	36
% of total	28.0%	36
51		35
60.7%		35
78.5%		36
43.2%		36
84		35
100%		35
71.2%		36
71.2%		36

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LIST OF ACRONYMS AND ABBREVIATIONS

ASM	Artisanal Small-Scale Mining
WACIPAC	West African Centre For International Parasite Control
TB	Tuberculosis

MHA	Municipal Health Administration
ILO	International Labour Organization
MIS	Management Information System
Dept.	Department

CHAPTER ONE

1.0 INTRODUCTION

Common perceptions of mining practices tend to exclude Artisanal and small-scale mining. Most people are aware of the conflicts over environmental, social and health impacts from large scale mining; however, an area that has not been extensively studied is the impact from the artisanal and small-scale mining in developing countries. This is despite the fact that artisanal and small scale mining employs a greater number of people than the large scale mining companies worldwide. According to a recent survey carried out by the International Labour Organization (ILO, 1999), at present around 13 million people work directly in small mines throughout the world, most of them in developing countries (Graveit et al, 2001).

1.1 An Overview of Small-scale Mining in Ghana

1.1.1 Historical Perspective

The Ghanaian small-scale mining industry is well over 2000 years old (Hilson, 2001) Vestiges of alluvial gold extraction and winning activities have been found that date as far back as the sixth century, and there is a wealth of evidence indicating that precious metals recovered from regional artisan activities attracted Arab traders to certain parts of the country as early as the 7th and 8th centuries AD. In fact, it was the rich gold deposits of the Western Sahara that were largely responsible for the wealth and strength of large ancient Ghana empires and cultures (Botchway, 1995), and by the 15th and 16th centuries, at the peak of European colonial exploration, Ghana was fittingly labelled the " Gold Coast " (Hilson, 2001)

Small-scale mining in Ghana, as in most developing countries, was for decades treated as an informal industrial sector, employing thousands of people but featuring largely rudimentary, unmonitored and uncontrolled practices.

It is self evident that all clothing is to some extent protective, even if only of the wearer's modesty or the sensitivities of others. However, with an approach as broad as the topic it would become unmanageable and it is therefore necessary to draw some boundaries. The first of these is between clothing worn in the normal course of day-to-day activities in the usual range of environmental conditions found in Ghana, and clothing worn as specific protection against environmental or weather extremes or other hazards in the working environment. From ancient to modern industry, the range of such hazards is truly vast and growing year by year. (Allan, J. A. 1995).

Protection against hazards in the working environment in ancient time was nothing to write home about especially in the mining industry. Mining being one of the oldest industries has always been hazardous. It has also often been considered to be a special industry involving close-knit communities and workers doing dirty dangerous job.

1.2 General Objective

The general objective of the study was to determine the effect of personal protective equipment use and the occurrence of respiratory diseases among small-scale miners in Tarkwa-Nsuaem Municipality

1.2.1 Specific Objectives

The specific objectives of the study were to:

1. Identify factors that influence the occurrence of respiratory diseases among small-scale miners.

2. Examine the reasons for the use and non-use of personal protective equipment among small-scale miners

3. Explore relationship between use of personal protective equipment and occurrence of respiratory diseases.

Due to the hazardous nature of gold mining, colonial and early post-colonial era authorities actively discouraged small-scale mining (especially alluvial gold mining) by means of legislation. It was however carried out illegally and clandestinely; according to T.E. Anin, under the provision of the Mercury Ordinance, mere possession of mercury, used for the extraction of gold, was made a criminal offence. Secondly, under the provision of the Rivers Ordinance, the diversion of river courses for the purposes of extracting gold, diamond and other minerals was forbidden. Apart from these legal obstacles, alluvial gold mining in the post 1918 era was not very lucrative and un-remunerative as the price of gold had fallen. This led to most indigenous gold miners turning to Cocoa farming due to attraction offered by higher prices of cocoa.

The return of people to gold mining was precipitated by the Economic Recovery Programme embarked upon by the PNDC in 1982-6 with one of the aims being rejuvenation of the gold mining activities in Ghana. With support of the World Bank the gold mining industry entered a period of renewed development and growth. Two main mining decrees were promulgated;

- The Minerals Commission Law 1986 (PNDCL 154)
- Minerals and Mining Law 1986 (PNDCL 153)

These decrees provided fiscal and other incentives to would-be mining companies. They were later followed by the small-scale mining law in 1989 (PNDCL 218) which made alluvial and lode gold mining by indigenous gold miners legal. This legislation coupled with recent upsurge of gold price has increased in the rush of migrant unemployed youth to mining communities to undertake mining.

1.3 Statement of the Problem

Small-scale mining in developing countries provide employment for an estimated thirteen (13) million people (ILO, 1999). No precise small-scale mining employment figures are available in Ghana, although it is estimated that some 200,000 are involved directly in the extraction of gold and diamonds (Appiah, 1998), the great majority of which are galamsey. In a technical paper published by the World Bank entitled Strategy for African Mining (World Bank, 1995), it is estimated that some 30,000 people are employed within the segment of the Ghana small-scale mining sector. Regional employment assessments has also been made, notably that of Agyapong,(1998) who estimates that over 6,000 illegal and 117 registered artisanal gold miners are found in Tarkwa alone (Agyapong, 1998).

These mines are labour intensive, with low levels of mechanization and working conditions are generally far removed from international labour standards. Despite the revenue and employment generating potential of small-scale gold mining, there have been repeated calls by individuals and communities for its banning because of the health and environmental consequences. Unlike the major mining companies who before, during and after being employed take prospective employees through rigorous

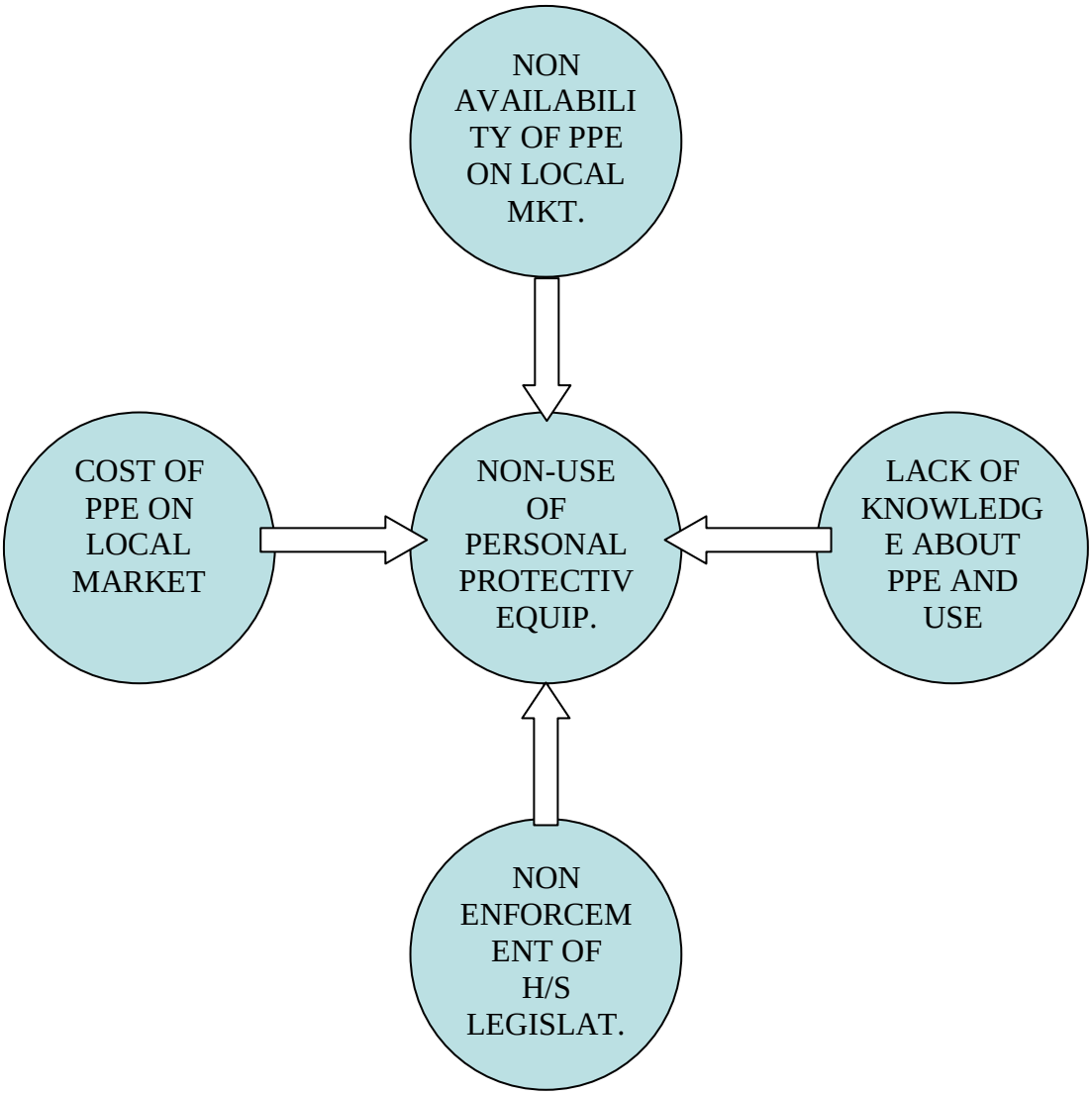
medical examination to determine the state of health, the small-scale and artisanal mining simply do not do this.

While reports and records at the Mine hospital at Akoon, Tarkwa which caters for employees of all three (3) major mining companies in the Tarkwa-Nsuaem municipality indicate zero tuberculosis and reduced cases of respiratory infections among mine workers, the Municipal health administration is reporting increased cases of tuberculosis leading to the establishment of forty (40) TB zones in seven (7) communities, predominantly " galamsey ",and also respiratory diseases are second always to malaria.

The small-scale gold miner, who does not have any regular medical care and safety and health measures may therefore have a high rate of respiratory diseases due to exposure to dust and other psychosocial activities he under takes that has the potential of increasing risk.

This study therefore sought to ascertain the reasons for the use and non-use of personal Protective equipment and the occurrence of respiratory disease among small scale Miners in Tarkwa-Nsuaem Municipal Assembly. The reasons could be attributed to the availability of the personal protective equipment and cost on the local market; knowledge about use of personal protective equipment; enforcement of existing legislation on health and safety and socio-economic status.

Figure 1: Problem analysis

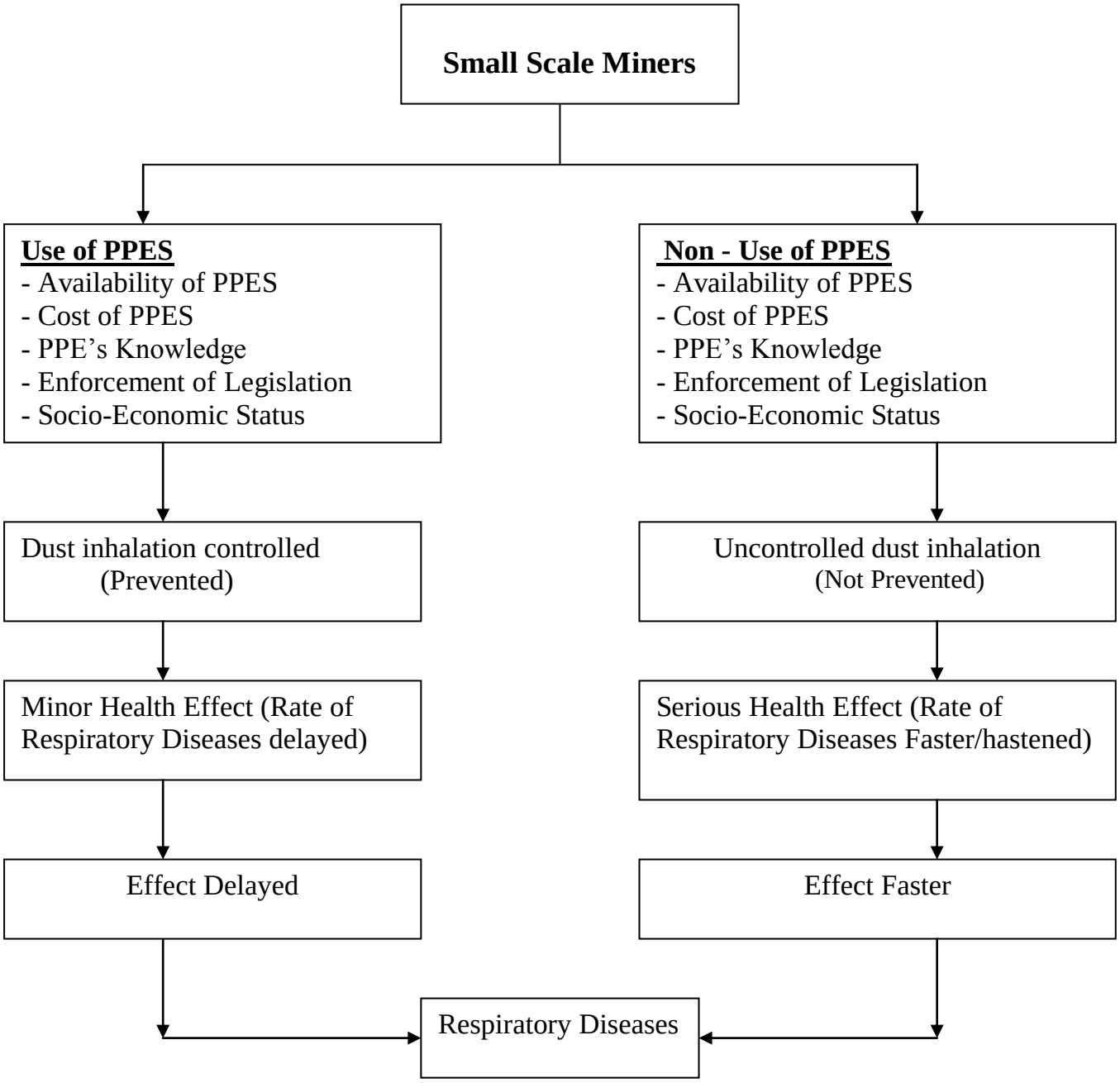


Key

PPE-Personal Protective Equipment

H/S-Health and Safety

Figure 2: Conceptual framework - Relationship between uses of personal protective equipment and respiratory diseases



The conceptual frame work explains the relationship between use of personal protective equipment and respiratory diseases. Since personal protective equipment, particularly respirators are important in reducing the extent of inhaling respirable dust, smoke and fumes; it should also be readily available on the local market for easy accessibility by those who need them for their work.

Cost of Personal Protective Equipment.

The regular use of respirators by small-scale miners depended on a number of factors including cost and availability on the local market. If the cost of respirators are within the reach of the marginally poor like most of the people involved in small-scale mining then acquiring it for use would not be much of a problem. If the cost is high, the likelihood of deterring those supposed to acquire them become high. It is therefore important to make them available on the local market and the prices very affordable to encourage a lot more people to acquire them for use.

Knowledge of Personal Protective Equipment

Inadequate information and knowledge about the importance and use coupled with the legal implications in non-use of respirators are major contributing factors to inhaling dusts. If the people are well and adequately informed and have ample or sufficient knowledge about the preventive properties of respirators, people will rush for them instead of working in dusty areas without them.

Enforcement of Legislation on Personal Protective Equipment.

Non-use of personal protective equipment is largely to the fact that the legislation that makes it mandatory for its use is not being enforced by the authorities entrusted with such duties. If those charged with this responsibility ensures full compliance it would do a lot of good.

Socio-Economic Status.

The socio-economic status of the small-scale miner can also be a contributory factor for acquiring personal protective equipment for their operations. If they are financially empowered it would encourage them to go for it.

Clean air intake is a prerequisite to a healthy workforce in the mining area where most of the activities generate a lot of dust: (example, chiselling, blasting, milling etc.) Respiratory diseases can be rife in people who work in dusty environments with out the least preventive measures and actions taken to reduce its impact.

The Study Area

The study area was Tarkwa- Nsuaem Municipality. It covered communities that were randomly selected from small-scale mining communities. Basically, the study examined the use of personal protective equipment by small-scale miners between the ages of 15-65 years and above. It also examined the availability and cost of protective equipment on the local market as well as explored the correlation personal protective equipment use and occurrence of respiratory diseases among the small-scale and artisanal miners reporting at both private and public health facilities within the study area.

Profile of the Municipality

The Tarkwa-Nsuaem Municipality was established by Li 1316 in 1994 with a mission to improve the quality of life of the district through provision of effective and efficient social and economic service.

The municipality has a land size of 2354sqkm with a population of 290,103; 201 communities and 70,393 households. (Projected from 2000 census) at 3% annual growth rate. It is bounded on the north by Prestea-Huni Valley District Assembly, on the East by Mpohor Wassa East on the south by Ahanta West and the West by Nzema East.

Administration

The municipality in headed by a municipal chief executive who is the political and administrative head with Tarkwa as the administrative headquarters. The population of the municipality is predominately Wassas. They are the indigenes and form 42.4% of the population whilst the other groups form 57.6%.

Climate

The Tarkwa Nsuaem municipality lies within the south western equatorial zone, has fairly uniform temperature ranging between 26^{o}C in August and 30^{o}C in March.

Sunshine duration for most part of the year averages 7 hours per say. Relative humidity is between 70-80 percent in the dry season and 75-80 percent in the wet season.

The municipality has the highest rainfall in Ghana with a mean annual rainfall of 187.83cm which creates watershreds, large expanses of stagnant water bodies, deep trenches and gullies as well as leaching nutrients out of the soil.

Ethnicity

The municipality consists of numerous migrant communities most of which are difficult to access and pose special problems for health programs planning. Most

migrants also engage in small-scale mining without adequate protection and health care. Respiratory diseases may therefore exist among these migrant communities.

Geology

The municipality has the Birimian and the Tarkwaian types of rock formation with the latter which is confined to the Tarkwa area being solid with higher granite content. This explains the higher incidence/prevalence of silicosis, silicotuberculosis among other respiratory diseases among miners in Tarkwa mines than occurs in Obuasi mine (Tuffour – Kwarteng, and Forson, 1992). The Birimian is of soft formation and occurs in Prestea and Obuasi areas.

Economic Activities

A good number of economic activities are carried out in the Tarkwa-Nsuaem municipality. Notable among them are:

- Farming (48.1% - cocoa, teak, rubber, plantain, cassava and cocoyam)
- Industrial (12.4% - gold, manganese)
- Service 16.4% and Commerce 23.1%.

There is also a good number of small scale miners (both formal and artisanal) scattered in various communities in the municipality.

Gold, diamond and manganese mining and rubber production form main socio economic activities carried out on a large scale. The municipality contributes 60% of total gold output and 100% manganese output, which is a significant contribution to Ghana's Gross Domestic Product (GDP).

The municipality is currently home to three (3) major Gold mining companies

- Goldfields, Tarkwa
- AngloGold Ashanti, Tarkwa
- Ghana Manganese Company, Nsuta.

Educational Facilities

The municipal Assembly has 205 pre- schools (145 public, private 60) 234 primary schools, public 181, private 53 166 junior high school 6 senior high school, 2 vocational, 2 technical, 1 tertiary institution.

Health Service Delivery

According to the 2004 Report of the District Health Administration the continued upsurge of small scale gold mining (galamsey) activities in the district, notwithstanding the vast economic impact. Culminate into serious environmental degradation and adverse health effects on the population (DHA annual report, 2004)

The top ten (10) diseases from 2004 to date 2007 have malaria as the leading cause of morbidity (42.9%) followed by respiratory tract infection (6.6%).The municipality has 2 public and 3 private hospitals; 7 health centres 5 functional maternity homes 267 chemical shops and 6 CHPS compounds. There are a number of prayer camps and shrines.

1.4 Justification of the Study

The predisposal of small-scale miners to the numerous occupational health hazards, like falling objects, cuts and abrasions from sharp stones, inhalation of dust and fumes from working surface and blasting without the least protection presupposes the ample vulnerability of this group of workers.

Examined reports and records of disease occurrence between the mine hospital and municipal health administration which has Acute Respiratory Tract Infection cases coming second to malaria (DHA annual report, 2006); It was a clear indication of the fact that respiratory disorders were a serious threat to people besides malaria, especially, those exposed to continuous dust by virtue of their work. It was also as a result of the fact that the Municipal Health Administration was seriously looking for funds to undertake a study into respiratory tract infection among others in small-scale miners in the municipality.(MHA, 2006). It was therefore justified that a study was carried out especially at this time to among other things, offer some understanding to the use or non-use of personal protective equipment in small-scale mining. Furthermore it will serve as further research into occurrence of respiratory infections in small-scale mining while adding to knowledge.

1.5 Research Question

The following research questions were asked:

- Were there any significant association between personal protective equipment use and occurrence of respiratory diseases?
- What factors influenced the occurrence of respiratory diseases?
- What were the possible reasons why small-scale miners did not use personal protective equipment?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

The literature review provided an overview of artisanal and small-scale mining in general, outlined the numerous impacts of non-use of personal protective equipment in artisanal and small-scale mining, discussed the alternative which existed, gave the background on artisanal and small-scale mining in Ghana. In addition laws on mining were discussed.

Artisanal and Small-scale Mining Background Artisanal and Small-Scale Mining (ASM) Overview

There is currently no universal definition of artisanal and small-scale mining (ASM), due to the fact that the definition often varies from country to country (Hilson, 2002). A number of attempts have been made to define small-scale mining in an international context using criteria such as investment costs, mine output, labour productivity, size of concessions, amount of reserves, annual sales, levels of technology, or combination of these. A broad definition of small-scale mining characterized the operation as both labour-intensive and low-technology. This definition was sometimes expanded, placing small-scale mining operations in one of two categories: high value mineral extraction including gold, silver and precious stones; and quarry mining or the mining of industrial minerals and construction materials (Hilson, 2002).Most literature tended to provide a specific definition based on the study which was undertaken and provided this definition to the reader (Hilson, 2002) Although there were many different definitions it was generally accepted that, “small-scale or artisanal mining generally encompasses small, medium, informal, legal and illegal miners who use rudimentary methods and processes to extract more than 30 different mineral

substances worldwide" (Gef et al. 2003). Usually such mines were individual enterprises, cooperatives of a few people or small family-owned companies which were not affiliated to any multinational corporations. Thus studying such small mines also provides a critical analysis of scale in mining.

In 1999, the International Labour Organization (ILO) estimated there were thirteen (13) million small-scale miners in fifty-five (55) countries, with the majority in the developing countries. These numbers suggested that 80 to 100 million people indirectly or directly depended on this activity for their livelihood. In Latin America alone, there were an estimated 1.4-1.6 million miners. Gold is the main metal being extracted due to its easy transport across borders and because it was less vulnerable to the instability of local or national governments (Veiga 2001; Hinton et al. 2003) It had been estimated that one in every 900 Latin Americans are employed in gold and silver artisanal mining ((Veiga, 2001). Precious metals and gemstones are by far the most economically important minerals mined on a small-scale due to their high value per unit weight. Other minerals materials mined include: clays, tin, tungsten, limestone, sulphur, lithium, salt and uranium. Base metals such as copper, iron ore, lead, manganese, nickel and zinc do not usually lend themselves to small-scale mining because of their economies of scale for their production (ILO, 1999).

The socio-economic contribution of ASM in developing countries is well documented and agreed upon; it has been estimated that small-scale mines account for 20-25% of all non-fuel mineral production (Jennings, 1993; Hilson, 2002; Echavarria, 2004). In many countries and for certain minerals, these numbers are much higher.

Close to US$2 billion in gold and gems have been mined in Africa and more than US$200 million in gold had been mined in more than six countries (Echavarria, 2004). In South America, specifically Brazil, almost 90% of gold comes from the nearly 200 small sites operated by informal miners called garimpeiros (Veiga and Hinton2002). Artisanal and Small-scale Mining provides an economic livelihood to more than six million of the most vulnerable families and excluded groups, often complimenting agriculture and other seasonal jobs. Artisanal and Small-scale Mining employs more people in the world than large-scale mining. It serves as a social "safety net" to people who are unemployed and have no other opportunities, as well as to subsistence farmers who are affected by drought (Bugnosen et al. 2000). It was often seen as the only way to alleviate poverty in many areas, where the population had no other economic opportunities. While some miners dreamt of becoming rich, the majority had no other way to provide for their families and are forced to work in the mines (Heemskerk, 2002). Veiga and Hinton (2002) agreed that, ultimately it was survival which drove most Artisanal miners, to work to provide for the needs of their families. In addition to the direct employment opportunities, Artisanal and small-scale mining contributed to the generation of substantial number of indirect jobs in other sectors of the economy. Artisanal and small-scale mining created the demand for production inputs, transportation and other services, as well as benefits due to increased income and consumer spending (Noetsaller, 1977). However, until artisana and small-scale gold mining was made cleaner and safer it can not be an encouraged livelihood and means of development (Lovitz, 2006). Two renowned physicians, George Bauer and Paracelsus were the first to make their observation on miners and their diseases in the 16th century (Schilling, 1995).

Physician George Bauer in 1556 described in the " De Remetallica", the diseases that prevailed in mining communities (Schilling, 1973). Paracelsus in 1567 described tuberculosis as miners' disease and indicated that increasing risk of occupational chest disease was as a result of industrial development, particularly mining (Schilling, 1995). Bernardino Ramanzzini, an Italian, emphasized in the 16th century that lung diseases were not due to the type of labour performed, but the materials worked on (Schilling, 1995). In a similar situation Dr. Azantilow, a medical superintendent of Prestea government hospital in an interview with the Ghanaian Chronicle revealed that the effect of surface mining, which Billinton Goldfields Limited (BGL) perform on sites approximately one kilometre from Prestea "The increased dust from surface mining this close to communities, results in respiratory infections, coughs, asthma, tuberculosis bad silicosis etc. Gold miners are exposed to a wide range of hazards which vary in nature, intensity and geological formations of the area where mining takes place and also more importantly the general health of the population from which miners are recruited.

Current Mining Legislation in Ghana - the Minerals Commission Law 1986 (PNDCL 154).

This was the law that established the Mineral Commission giving it the sole responsibility for formulation of national policy on the exploration and exploitation of mineral resources in Ghana. This commission is the statutory body solely vested with all the legal powers to sue and be sued, own and dispose of property and also to enter into contractual obligation with proponents. Government is however responsible for appointment of the Chairman and the Chief Executive run the day to day administration of the commission.

2.1.1 Mineral and Mining Law 1986 (PNDCL 153)

Section 1 of the law states that "All minerals are the property of the Republic of Ghana and the Government has power to acquire compulsorily any land which may be required to secure the development or utilization of any mineral resource" Section 14 subsection 2 goes on to say that "The Secretary (now Minister) for Lands and Mineral Resources shall on behalf of the republic have power to negotiate, grant, revoke, suspend or renew any mineral right under this law". The Secretary is also empowered to make legislative instruments to restrict prospecting near any water body, prevent pollution of water ,ensure public safety, and welfare of workers, prevent injury to persons or property by chemicals and set penalties for offences against the regulations Section 9 directs the holder of a mining right to have a responsible Manager in charge of his mining operations at all times and also provides for the appointment of Chief Inspector of Mines who shall supervise the proper carrying out of provisions of the law. He has power to enter into a mining area to take samples of rock, tailings and ore and inspect explosives magazines satisfy himself that all documentations and records are kept well. He has power to hold inquiries into mining fires or other occurrences on the mine that result in fatalities.

2.1.2 Small Scale Gold Mining Law 1989 (PNDCL 218)

This law states that "No person shall engage in or undertake any small-scale mining operations unless there is in existence in respect of such operations a license granted by the Secretary for lands and Natural Resources or by an officer authorised in that behalf.

Section 2 of the law limits the granting of licenses to only Ghanaian citizens who have reached the age of 18 years. However the companies' code may allow for the participation of non-Ghanaians on provision that a Ghanaian is majority share holder. A prospective applicant for small-scale mining license notifies the District Small-Scale Officer of his intension. The officer then inspects the site to determine its suitability before going ahead to demarcate the area. A site plan is then prepared by the prospective miner. A Notice of intention to allocate the area for small-scale gold mining is published at the District Assembly, local information centre and Magistrate court for twenty one (21) days. If no objections are made the applicant completes the application forms fulfils other obligations of the mineral commission and recommendation is submitted to the Secretary of Mines and Energy. A successful applicant is given a code of practice which details other guidelines for:

- Protection for working place
- Environmental protection
- Surface protection (ie land surface protection)

Section 13 prohibits the use of explosives by small-scale miners (No small-scale gold miner shall use any explosive in his operations but due to pack of supervision and poor enforcement of this section of the law small-scale miners use explosives. However the purchase of mercury is allowed under section 14 and lastly the sale of gold is to be made to authorised buyers only (section 17).

Operations of small-scale mining generate a lot of particle dust from blasting, chiselling, heaping through to grinding the gold bearing rock into fine powder to amalgamation. These particulate dusts are fine and inhalable and are inhaled by these

workers most of whom do not use any protective equipment and could lead to contracting respiratory diseases.

Edward Headlam Greenhow (1814-88), one of the outstanding epidemiologists of the 19th century used unpublished records of the general register office to examine occupational mortality in more detail. He compared crude death rates from pulmonary diseases in the lead-mining towns of Alston and Reeth in the North of England with those of nearby Halthwistle, which had no lead-mines. He did not consider the possibility of differences in age distribution affecting the rates, but his conclusion that the near four-fold mortality excess in Alston and Reeth were associated with heavy exposure to dust in the lead mines was almost certainly correct.

Greenhow was however of the view that much of the very high mortality from pulmonary disease in the different district of England and Wales was due to the inhalation of dust and fumes arising out of work. Small-Scale and Artisanal miners in Tarkwa-Nsuaem Municipality operate in much similar occupational environment and are presumably most likely to suffer from respiratory diseases from frequent and excessive exposure to granite gold bearing rock dust.

CHAPTER THREE

3.0 METHODS

3.1 Introduction

This chapter dealt with the description of the source of data, research design, the target population, the sampling procedure, data collection techniques. It also drew attention to training of field assistants, data entry assistants and secretariat staff, pre-test, data processing and analysis of the characteristics of the respondents, ethical consideration and finally the limitation of the study.

3.2 Type of Study

The study type was Descriptive cross sectional survey. The study employed both qualitative and quantitative methods of data collection. Qualitative method was used to capture views not catered for in the quantitative technique. It was also used to validate findings offered through the qualitative methods.

3.3 The Study Population

The study had as its target population members of households in small scale mining communities and small-scale miners within Tarkwa-Nsuaem municipality. Individual members of the households and small-scale miners aged 15-65years and above constituted units of analysis. Records of respiratory diseases in the Municipal Health Administration were also included in the analysis.

3.3.1 Sampling Procedure

Multiple sampling procedures were applied for generating the sample for study. An estimated 208 respondents was divided into zones as already exist by sub municipal (e.g. Nsuaem, Dompim, Simpa, Abontiakoon, and Cyanide). Simple random sampling procedure was employed to select communities, houses and individuals within the household for interview or administration of the questionnaire.

3.3.2 Sample Size

The sample size was derived at Utilities in Epi info version 3.3.2 (2005) to determine the appropriate sample size for the study. Size of population from which the sample was calculated was 129,103. Expected frequency of the factor under study was (error towards 5%).

With a worst acceptable frequency of 8% and confidence level of 95%, a sample size of 202 was obtained. This was increased to 210 to make room for lost to follow up and withdrawals.

3.4 Data Collection Techniques and Tools.

The study involved the collection and analysis of data from primary and secondary sources. Primary data was obtained from the field studies undertaken in Tarkwa-Nsuaem Municipality using instruments such as questionnaires, structured interview schedules, focal groups discussion and personal observation (appendix A). The main source of data collection was residents in the municipality engaged in small scale mining and hospital staff.

The source of secondary data has been classified into two categories comprising of data from libraries materials, reports, from higher institutions of learning. The second source was from records from public and private hospitals and clinics and health centres. Focal group discussion and participant observation was conducted and used to collect qualitative data using discussion as technique and focal group discussion guide, participant observation guide as tools.

For quantitative, interviewing of small scale gold miners using questionnaire was used and reviewed 5 - year medical record (2003-2007) of cases of respiratory diseases reporting at the medical records of Tarkwa government hospital.

3.4.1 Pre-test

Before pre-testing the instruments for data collection, five research field assistants, two data entry assistants and two secretariat staff were enrolled and trained. The training of the research assistants was two days and covered such areas like: Community entry and mobilization skills, ethics, rights and confidentiality of all especially elders, opinion leaders, government officials and respondents. The data collection instrument was studied extensively and translated into the local dialect for easy comprehension by illiterate respondents.

The pre-testing proceeded after the training and this took one day to do. The pre-test afforded the opportunity to gauge respondents to provide insight into new areas and ideas and ideals and unforeseen or unanticipated problems for collection. It also

afforded the opportunity of sharpening the instruments so that reliable and well validated result was obtained.

3.5 Data Processing and Analysis

A good number of steps were taken to ensure that all questionnaire and interview schedules issued out to the research assistants were returned: viz each set of questionnaire was numbered using indelible marker to write an Identification Number. Cross-checked and edited instrument returned after each day's work.

All data that emanated from the field was edited, coded and entered onto the computer. Descriptive and analytical method were used to analyse the data which was summarized in cross tabulation, frequencies, percentages, graphs and tables. Basically the following areas were looked at during data analysis.

- Age distribution
- Educational background
- Vulnerable occupational groups among miners
- Number of Respiratory cases per year from 2003-2007
- Years of service in small-scale mining
- Number of hours spent on the job daily.
- Use of personal protective equipment. (Respiratory protection; eg nose and dust masks)
- Common ailment among miners
- Health seeking behaviour

3.6 Ethical Consideration

For the purpose of integrity and quality of the data collected the School of Public Health obtained the first and foremost ethical clearance for the Ghana Health Service Ethics Committee.

Reconnaissance survey, personal contacts followed by official letters were sent to the Municipal Assembly, District Health Administration, small scale gold mining office. Hospital administrator, small scale gold miners, assembly members, unit committee members, chiefs and elders and opinion leaders in the small scale mining communities of the study area for their permission and informed consent.

3.7 Limitation to the Study

Even though the area of study was of paramount interest to the researcher, the District Health administration and all stakeholders in the mining industry; lack of time (short period) mobility, constant rainfall, and unwillingness of some stakeholders to respond to the in-depth interview and financial constraints remained the major set back. The success and the pace at which every programme goes depend largely on money (finance) and the willingness of respondents to give accurate and correct information within the stipulated time. This study was no exception and resulted in delay in completing the study and also did not allow for a wider coverage, especially the target group – Small-Scale miners.

Financial constraint and mobility were serious limitations in the study for the fact that the researcher had not been able to secure funds and means of travelling around for data collection and is largely depended on his personal funding source which was his salary.

CHAPTER FOUR

4.0 RESULTS

4.1 Demographic Characteristics of respondents

A sample of 208 respondents was included in this survey. Table 1 below shows the demographic characteristics of the respondents. Out of these 119 (57.2%) were males and 89 (42.8%) were females. The ages of the respondents ranged from 17 years to 81 years with a mean age of 34.6 years. Majority of the respondents were married 123(59.1%) followed by single 68(32.7%) and divorced / separated 12(5.7%).

The highest level of education attained by most of the respondents was Junior High School 129(62.0%) followed by Senior High School and about 30(14.4%) had no formal education. Over eighty percent of the respondents interviewed were Christians 179(86.1%), Moslems 16(7.7%) and about 12(5.8%) had no religious affiliations.

Table 1: Demographic Characteristics of respondents

Categories	**Frequency**	**Percent**
Sex		**(%)**
Male	119	57.2
Female	89	42.8
Total	**208**	**100**
Age group (years)		
Less than 20	10	8.5
20 - 24	41	34.7
25 - 29	38	32.2
30 - 34	29	24.6
35 – 39	32	15.4
40 – 44	19	9.1
45 – 49	10	4.8
50 – 54	9	4.3
55 – 59	4	1.9
60 – 64	4	1.9
65 +	12	5.8

Total	**208**	**100**
Marital Status		
Married	123	59.1
Single	68	32.7
Divorced /Separated	12	5.7
Widowed	3	1.4
Cohabitation	2	1
Total	**208**	**100**
Educational level		
No Education	30	14.4
Junior High School	129	62
Senior High School	37	17.8
Technical School	9	4.3
Tertiary	3	1.4
Total	**208**	**99.9**
Occupation		
Mining	56	26.9
Petty Trading	70	33.7
Farming	30	14.4
Milling	2	0.9
Driving	3	1.4
Artisan	18	8.7
Apprentice	7	3.4
Salaried Workers	9	4.3
Unemployed	6	2.9
Student	6	2.9
Other	1	0.5
Total	**208**	**100**
Length of stay in community		
Less than 1 year	20	9.6
1 – 4 years	32	15.4
5 – 9 years	25	12

10+years	131	63
Total	**208**	**100**

4.2 Description of Small scale miners

Artisanal and Small scale miners are individuals, groups, families or cooperatives with poor educational qualification who turn the rock and the soil for gold with minimal or no mechanization on purely physical and manual basis on a very small scale and often in the informal (illegal) sector.

Table 2 below illustrates the characteristics of small-scale miners interviewed in this survey. Out of 208 respondents, 56 (27%) were engaged in small-scale mining for various reasons notably, for money 39 (69.6%), unemployment 12 (21.4%), and, interest in mining. Most of these miners have worked in this sector for between 2 - 6 years 24(42.8%) followed by 0-1 years 21(37.5%) and 5 respondents had been in it for 12 -16 years.

Table 2: Characteristics of small scale miners

Categories	Frequency N=56	Percent
1	34	60.7
2	22	39.3
Total	56	100

Out of 208 respondents 56 were actually small-scale miners and had the under listed characteristics:

1. They exploit marginal or small deposits

2. They lack capital

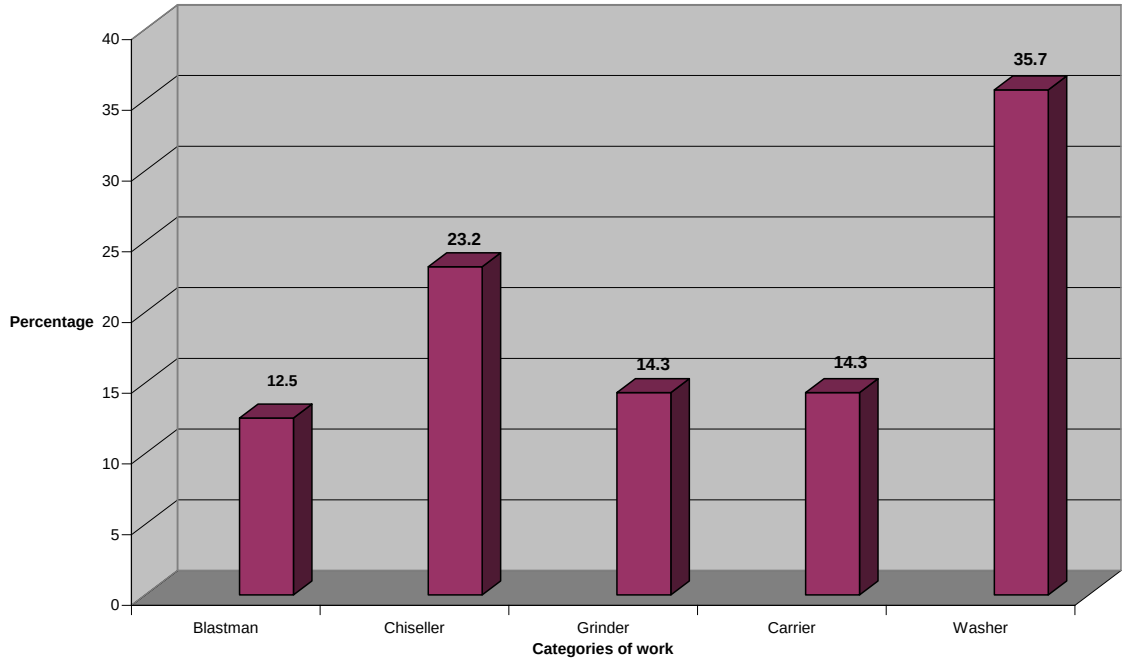
3. They are labour intensive with low rates of recovery

4. They have low standards of safety and health.

5. They have a significant impact on the environment.

Fig 3 below, illustrates the type of work small-scale miners were engaged in. More than a third of the small scale miners (35.7%) were engaged in washing the ground stones and sand, 23.2% were chisellers with 14.3% specializing in carrying and grinding. The rest (12.5%) were engaged in blasting stones.

Figure 3: Type of work among small scale miners



4.3 Knowledge of Occupational health hazards associated with mining

Respondents were asked of their knowledge of mining associated occupational hazards. About 84.4% of them were knowledgeable about some of the hazards while 15.6% had no knowledge of occupational hazards. Those respondents with knowledge in mining related hazards were asked to indicate some the hazards associated with mining. Table 2 showing multiple responses of mining related hazards is presented below.

Table 2: Mining related hazards

Likely hazards	Frequency	Percent
Malaria	26	12.2
Diarrhoea	3	1.4
Chest pains	12	5.6
Difficulty breathing and coughing	28	13.1
Cholera	3	1.4
Skin diseases	14	6.6
TB	78	36.6
Typhoid	17	8.0
Headache	3	1.4
Hernia	1	0.5
Body pains	19	8.9
Eye infections	5	2.3
Deafness	4	1.9
Total	213*	100

*Multiple responses exist

Source: Field data, 2008

Table 2 shows multiple responses of some of the likely hazards related to mining. About 36.6% of the responses identified TB to be major hazards associate with mining, followed by difficulty in breathing and coughing and malaria. Other mining associated hazards identified include chest pains, skin diseases, body pains, typhoid and eye infections.

4.3.1 Use of Personal Protective Equipment

Personal protective equipments are clothing and materials designed to afford preventive and protection where engineering, administrative and other preventive measures have failed or not in place (eg, Dust and Nose Masks, Goggles, Hand Gloves, Hard Boots, Wellington Boots Vests and Overalls.

28 out of 134 (64.4%) respondents who were aware of occupational health hazards associated with mining used personal protective equipment while 13 did not use them. Table 3 explains that 126 (60.6%) small-scale miners are aware of personal protective equipment with 80 (38.5%) claiming they are unaware. Only 2 (1.0%) did not remember. With regards to ever using personal protective equipment 41(32.5%) respondents affirmed this while 82 (65.1%) responded in the negative and 3 (2.4%) did not remember. Currently, 28 (68.3%) claimed to be using personal protective equipment with 13 (31.7%) said they are not using it.

Table 3: Awareness of occupational hazards

Categories	Frequency N=56	Percent
1	34	60.7
2	22	39.3
Total	56	100
Reasons for engaging in Mining activities		
Money	39	69.6
Unemployment	12	21.4
Have interest in mining	4	7.1
Others*	3	5.4
Total	58	103.5

39 (69.6%) gave their reasons for engaging in small-scale mining as purely for money while 12 (21.4%) did so due to unemployment.

Length of Involvement in Mining (years)		
0-1	21	37.5
2-6	24	42.8
7-11	3	5.4
12-16	5	8.9
17-21	1	1.8
22-26	1	1.8
27-31	1	1.8
Total	56	100

Out of the 56 small-scale miners majority 24 (42.82%) have been involved in mining for between 2-6years while 21(37.5%) have been in there for less than a year (0-1year)

4.4 Health seeking behaviour of respondents

Signs of bodily and chest pain, difficulty breathing and coughing were experienced by 86 (41.3%) of the respondents while 122 (58.7%) had not experienced any signs.

Table 4 below shows the health seeking behaviour of the respondents any time they fell ill. Most of the respondents 48 (55.8%) used self medication and local herbs 32 (37.2%) went to the public clinics while 11 (12.8%) used the services of private clinics and 1 (1.2%) the prayer camp.

The table goes on to depict that 120 (57.7%) of the respondents had knowledge of occupational health hazards associated with mining while 88 (42.3%) had knowledge in other diseases.

4.5 Respiratory diseases in Tarkwa -Nsuaem Municipality

The table 4 below clearly shows the various respiratory diseases that are reported in all health facilities (both public and private) in the Tarkwa-Nsuaem Municipality. The table also indicates the progressive progression of acute respiratory infections cases reporting at health facilities from 5118 in 2003, 3605 in 2004, 7032, 11034, 10541 in 2005 to 2007. Second in numbers on the table is tuberculosis which has been enjoying a steady progression, peaking in 2006 with 247 cases with cases of pneumonia, respiratory tract infection and asthma featuring prominently over the years. The cases of respiratory diseases in the table below are reported by sixteen (16) public and private health institutions in the municipality. Occupational groups affected with the diseases were: -

1.” Galamsey” Operators

2. People living close to the mining areas

3. Farmers who farm near to mining environments

Communities with more respiratory diseases were:- 1. Akoon 2. Tebrebe

3. Iduapriem 4. Nsuaem.

Table 4: Signs of respiratory diseases and health seeking behaviour

Signs of respiratory diseases	**Frequency**	**Percent**
Yes	**86**	**41.3**
No	**122**	**58.7**
Total	**208**	**100**
Health seeking behaviour		
Private Clinic	11	12.8
Public Clinic	32	37.2
Prayer Camp	1	1.2
Self Medication and Local Herbs	48	55.8
Respiratory diseases (from MHA)		
Tuberculosis	68	32.7
Chest pain	15	7.2
Cold	3	1.4
Cough	30	14.4
Difficulty breathing	1	0.5
Rib pain	1	0.5
Lung disease	1	0.5
Silicosis	1	0.5
Others	88	42.3

Table 5: Respiratory diseases in Tarkwa -Nsuaem Municipality: 2003-2007

Disease	Cases in					
	2003	2004	2005	2006	2007	Age grp.
ARI	5,118	3,605	7,032	11,034	10,541	1-9&20-50
Asthma	0	0	0	194	9	All ages
TB	314	227	245	247	0	30-70 yrs
Chest Inf.	0	0	0	53	21	1-5 yrs
Bronchitis	0	1	0	24	9	All ages
Pneumonia	128	86	14	134	0	All ages

RTI	10	138	25	38	129	All ages
Cough	2	1	3	10	4	All ages
Total	5,572	4,058	7,319	11,674	10,713	

(Source: MHA,MIS dept.2008)

Use of protective equipment and respiratory diseases

Respondents were asked a number of questions that relate to their knowledge, availability and the uses of protective equipment. Out of the 148 responses, 117 indicated they have heard of protective equipment while thirty one have not heard of protective equipment. Regarding the uses of protective equipment ever heard of it said that the equipments are used basically to protect them from diseases and injuries. Eight respondents said protective equipments are used for washing. It also became evident that some of the respondents did not use protective equipment. While some intimated that the use ordinary dresses in place of protective clothing, some lacked knowledge about the where to acquire them. Others said they do not have the money to acquire these equipments. A cross tabulation showing the use and non-use of protective equipment and the occurrence of respiratory diseases is shown in Table 6.

Table 6: Relationship between the use of personal protective equipment and occurrence of respiratory diseases

	Experienced bodily and chest pains, coughing and breathing difficulties		
		Yes	No	Total
Use protective equipment at the work place	Count	20	14	34
	% within use of protective equipment	58.8%	41.2%	100%
	% within experienced chest pains etc	37.7%	21.5%	28.8%
	% of total	16.9%	11.9%	28.8%
Do not use protective	Count	33	51	84
	% within use of protective equipment	39.3%	60.7%	100%

equipment at the work place	% within experienced chest pains etc	62.3%	78.5%	71.2%
	% of total	28.0%	43.2%	71.2%
Total	Count	53	65	118
	% within use of protective equipment	44.9%	55.1%	100%
	% within experienced chest pains etc	100%	100%	100%
	% of total	44.9%	55.1%	100%

Source: Field data, 2008

Table 5 shows the relationship between the use of personal protective equipment and the occurrence of respiratory diseases. Out of the 118 respondents thirty four use protective equipment at the work place while eighty four do not. About 44.9% (53) of the respondents have either experienced bodily and chest pains, coughing or breathing difficulties. Within those who have experienced chest and bodily pains, breathing difficulty or coughing, thirty three of them do not use protective equipment at the work place while twenty said they use protective equipment at the work place.

A Pearson Chi-square test was conducted to establish the significance of the association between the use of protective equipment and the occurrence of respiratory diseases. At the 5% alpha level a p-value of 0.084 (continuity correction) and a Fisher's Exact significance of 0.067 suggest that there is no significant association between the use of protective equipment and the occurrence of respiratory diseases. The details of the Chi-square test are captured in Table 7.

Table 7: Chi-Square Tests

	Value	Degrees of freedom	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.734	1	0.053
Continuity Correction	2.986	1	0.084

Likelihood ratio	3.729	1	0.053
Fishers's Exact Test			0.067 (Exact sig.)
Linear-by-Linear Association	3.703	1	0.053
N. of valid cases	118		

Source: Field data, 2008

CHAPTER FIVE

5.0 DISCUSSION

Majority 134 (64.4%) of the respondents correctly knew that there are occupational heath hazards associated with mining. Forty-two point three percent (42.3%) also knew of other diseases some of which are related to mining. This revelation goes to buttress the statement by (Lovitz, 2006.) that "Until artisanal and small-scale mining is cleaner and safer it can not be an encouraged livelihood and means of development".

Although 70 (33.7%) of respondents were engaged in petty trading, 56 (26%) were engaged in artisanal and small-scale mining for various reasons, notable among them being for money 39 (69%) and unemployment 12 (21.4%) confirming Bugnosen et al,2000) assertion that artisanal and small-scale mining employs more people in the world than large scale mining and serves as the "safety net" to people who are unemployed and have no other economic opportunities. Veiga and Hinton (2002) also agreed that, ultimately it is survival which drove most people into artisanal mining. Majority of participants 24 (42%) had worked in small-scale mining for between 2-6 years, 21 (37.5%) for less than one year while 5 (8.9%) 12-16 years; with as many as 35.7% engaged in washing the ground granite rocks and sand. 23.2% were chisellers,

14.35 did grinding (milling) and carrying while 12% were blast men. These were the materials that produced lots of dust and fumes into the working environment of the small-scale miners to inhale. Schilling, 1995 in his work re-echoed what Bernardino Ramanzzini emphasized in the 16th century that lung diseases were due to the materials worked on and not the type of labour performed.

As many as 126 (60%) respondents were aware of the presence and availability of personal protective equipment on the local market, only 28 (22.2%) presently used it. This is a clear manifestation of the extent to which most of the small-scale miners expose themselves to dust and fumes which have the tendency of influencing respiratory diseases.

Most of the participants 122 (58.7%) did not know signs of respiratory diseases. Only 86 (41.3%) said they knew signs of respiratory diseases. This could be attributed to their educational level where most 129(62.0%) of the respondents being Junior High School graduates with 37 (17.8%) as Senior High School leavers and 30 (14.4%) with no education.

The health seeking behaviour of majority of the respondents 48 (55.8%) were self Medication and the use of local herbs with 32 (37.2%) seeking treatment from public clinics while 11 (12.8%) sought treatment from the private clinics. Most of the respondents have experienced chest pains, difficulty breathing, cold and coughing which confirmed that they have had respiratory infections and diseases before.

The table of respiratory diseases provided by municipal health administration also give credence to the findings of the study. Sixty- eight (32.7) of the respondents had

tuberculosis, 30 (14.4%) had cough, 15 (7.2%) had chest pains, 3 (1.2%) had cold while 1 (0.5%) experienced difficulty breathing, rib pain, lung disease and silicosis respectively.

In a study by J. C. Nowacki and J. W. Ephson (1966), they reported that the progress of Silicosis in Ghana followed a more rapid cause than was observed among European workers exposed to free silica concentration in the air of the working area. In a similar vein the cases of many respiratory diseases reported at the health facilities attest to the fact that there is a correlation between non-use of personal protective equipment and the occurrence of respiratory diseases. The fact is that if personal protective equipment is used in the working area, free silica dust likely to be inhaled will be prevented from entering the respiratory system.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

Generally 82 (65.1%) of respondents had never used personal protective equipment before which indicated that small-scale miners were exposed to the dust and fumes emanating from operations like chiselling, crushing, milling and blasting from granite gold bearing rocks and sand. This may be a contributory factor that influenced the occurrence of respiratory diseases among small-scale miners in Tarkwa-Nsuaem Municipality.

My conclusion is that small-scale miners are likely to contract respiratory diseases because they work in humid environmental conditions, do not like using personal protective equipment for the fact that it emits heat, not comfortable to wear, and are unable to breath. In addition they (small-scale miners) are not supplied personal protective equipment by their employers.

With a good number of respondents experiencing some kinds of respiratory disease, as depicted in the Municipal Health Directorate's report (tuberculosis 68 (32.7%), cough 30 (14.4%), chest pain 15 (7.2%), it is clear that in the absence of engineering and administrative controls and preventive measures the effective use of personal protective equipment would be a better option.

6.2 Recommendations

Having observed the humid environmental factors that could influence the occurrence of respiratory diseases and also reasons for the use and non-use of personal protective equipment among small-scale miners through this study, I recommend that:

1. The exposure of dust in the atmosphere should be monitored on a regular basis and miners made aware of danger as and when they become necessary.

- When dust control is a problem and measures have not been taken miners should use personal protective equipment such as dust and nose masks to prevent dust from being inhaled.

2. Department of Cooperatives to mount an extensive educational programme on the need for small-scale miners to form cooperatives, assist and encourage them to do it so that they can assess loans and equipment for their work.

3. The Inspectorate Division of the Minerals Commission should strengthen its collaboration with the miners and also assist them to acquire modern small-scale mining equipment that employ

- Wet drilling techniques.
- Water sprays during mineral getting, loading, crushing, grinding and milling
- Keeping stone surfaces moist at all times to reduce dust escape.

4. The small-scale mining department of the minerals commission should ensure that concessionaires mine according to mining technologies

5. The Municipal Assembly should enact bye laws on health and safety in response to the health hazards faced by small-scale miners and encourages the Municipal Environmental management committee to enforce same.

6. The Municipal Health Administration should collaborate with all the stake holders to plan a sustainable district wide preventive health education and information program for small-scale mining communities and the miners.

7. Further research should be conducted to identify other environmental factors that are associated with the occurrence of respiratory and other mining diseases in small-scale miners.

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APPENDICES

Appendix A: Questionnaire for community and small scale miners

QUESTIONNAIRE FOR SMALL-SCALE AND

ARTISANAL MINERS

ID. NUMBER DATE

NAME OF INTERVIEWER

Section A

1. Name of community:

2. Name of interviewee:

3. Sex: 1. Male
   2. Female ☐

4. Age ☐

5. Educational level:
   1. None
   2. JHS
   3. SHS
   4. Technical
   5. Tertiary

6. Marital Status:
   1. Single
   2. Cohabitation
   3. Married
   4. Separated
   5. Divorced
   6. Widow

7. Religion: 1. Christianity
   2. Islam
   3. Traditional
   4. None
   5. Other….(Specify)

Section B

8. How long have you lived in this community?

1. <1 year
2. 1-4 years
3. 5-9 years
4. 10 years and over

9. What work do you do? 1. Farming
2. Petty Trading
3. Mining
4. Milling
5. Driving
6. Artisan
7. Apprentice
8. Other…(specify)

10. How long have you been involved in gold mining activities in this

Community?.....

11. How long have you worked in the gold mining industry in general?.....

12. Have you always worked in mining? 1. Yes
2. No
3. I don't know

13. If No what type of work did you do previously? A. Farming
2. Petty Trading
3. Clerical
4. Driving
5. Other (Specify)

14. What are some of the reasons why you work as a gold miner today? .....

15. How many people do you work with? .....

16. What type of work do you do? 1. Blastman
2. Chiseller
3. Grinder
4. Carrier
5. Washer

17. Have you always done this same work? 1. Yes
2. No

21. If No, what different capacity were you involved in previously? ……..

22. Do you know of any occupational health hazards that are associated with mining?

1. Yes
2. No

23. If Yes, can you name what you know? .....

24. Have you heard of personal protective equipment? 1. Yes
2. No
3. Can't remember

25. If Yes, what is it used for? 1. Don't know
2. Washing
3. Sampling
4. Protection

26. Have you ever used personal protective equipment? 1. Yes
2. No
3. Don't remember

27. Do you use personal protective equipment now at your work place? 1. Yes
2. No

28. If No, why don't you use personal protective equipment? .....

29. Have you or any of your colleagues been arrested for not using personal protective equipment before? 1. Yes
2. No
3. Nobody checks this

30. Are personal protective equipment readily available on the local market? 1. Yes
2. No
3. I don't know

31. How much does respirators or nose masks cost on the local market? .....

32. What would you say about the price of respirator or nose mask? 1. Very moderate
2. Moderate

3. Cheap
4. Expensive

33. How often do you buy personal protective equipment for use at the work place?

1.Yearly
2. Monthly
3. Weekly
4. Every three days
5. Every two days
6. Daily

34. Do you enjoy using personal protective equipment? 1. Yes
2. No

34b. If yes, why? ..... 34c. If No, why? .....

35. What kinds of illness are common in this community? 1. Malaria
2. Diarrhoea
3. Chest Pain
4. Difficulty breathing & coughing
5. Cholera
6. Skin diseases

36. Have you been experiencing bodily and chest pains, difficulty breathing and coughing? 1. Yes
2. No

37. When was the last time you experienced this condition?
1. Body and Chest Pain……..
2. Difficulty Breathing and Coughing……

38. Where do seek treatment any time you experience this condition?
1. Private Clinic
2. Public Clinic
3. Prayer Camp
4. Shrine
5. Self Medication and Local Herbs

GUIDE FOR FOCAL GROUP DISCUSSION

ID. NUMBER DATE

NAME OF CONDUCTOR

Section A

Name of community

Number of participants (Between 8 and 10)

Gender of participants a. Male
b. Female

Type of group
1. Opinion
2. Artisanal and Small-Scale Miners
3. Community members

Items Needed 1 number Tape Recorder, 1 number Note Pad and 4 A4

Batteries

Section B

1. Probe to start with main economic activities of the community

2. Whether artisanal and small-scale mining is carried on in the community or

nearby communities

3. Probe to know how long artisanal and small-scale mining has been going on there

4. Probe to know whether they know mining produces a lot of dust

5. Find out what they use to protect dust from entering them

6. Find out if they have heard of personal protective equipment and use them

7. Whether personal protective equipment are on the local market and their perception of their prices

8. Whether community members experience difficulty breathing and coughing sometimes.