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Jinky Leilanie Lu

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## Occupational Health and Safety in Small Scale Mining: Focus on Women Workers in the Philippines

By Jinky Leilanie Lu<sup>1</sup>

### Abstract

This study highlights women's participation in small scale mining, and their occupational safety and health conditions. Small scale mining is a significant source of income in many developing countries such as the Philippines, Papua New Guinea, Bolivia, Colombia, Indonesia, Mali, and Zimbabwe. In the Philippines, small-scale mining has been the leading occupational group among all mineral industries. However, data show that women face many issues in mining such as double burden of work-home responsibilities, chemical exposure to either cyanide or mercury used in extracting gold, dust from manganese and other minerals, and respiratory and systemic diseases from toxic chemical exposures. Mining work is also labor-intensive and hazardous. Women work longer hours and have no social safety net. Gender sensitive strategies on occupational health and safety of women in small scale mining should be implemented. For long term development goals, women should be given alternative and more environmentally sustainable forms of employment. Gender equality and equity should always accompany any policy response as the impact goes beyond the employment and labour sector, to the overall stability of society considering the varied roles and functions that women take in both the public and private spheres of life.

*Keywords:* Small Scale Mining, Women in Mining, Occupational Health and Safety, Policy Directives in Mining, Artisanal Mining

### Introduction

Small scale mining is defined as a single unit mining operation with an annual production of unprocessed material of 50,000 tons or less. It is usually characterized as informal, illegal and unregulated by government, undercapitalized, utilizing simple tools and lacking in technology, and hazardous under labor intensive conditions. However, it is a source of income for those living in rural, remote, and poor areas of the country (Shoko, 2002). Small scale miners are described as poor people or small groups who are largely dependent on mining for sustenance (Aryee et. al., 2003 and Asia Pacific Learning Event, 2005).

Small scale mining is a significant source of income in many developing countries such as Papua New Guinea, Bolivia, Colombia, Indonesia, Mali, the Philippines, and Zimbabwe (Shoko, 2002). In the Philippines, small-scale mining has been the leading occupational group among all mineral industries (Caballero, 1996).

Small scale and artisanal mining plays an important role in the Philippines' local revenue and currently employs 300,000 miners. About 80% of the country's gold supply come from small scale mining, making the country one of the top gold producers in the world (Zubiri, 2010). The Philippines earned P49.8B (USD1.1billion) gold produce. Of

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<sup>1</sup> Research Professor 7, Institute of Health Policy and Development Studies, Environmental and Occupational Health Study Group, National Institutes of Health, University of the Philippines Manila  
jinky\_lu@yahoo.com.

this, P19.3B came from small scale gold mining. The trajectory is that the production of small scale mining will be constantly increasing while that of large scale mining will decrease (Zubiri, 2010).

Although women play significant roles in small scale-mining activities, they are rarely recognized as “miners.” Consequently, the roles of women in small scale-mining have been largely overlooked by policy makers (Yakovleva, 2007). This study was conducted to look into the occupational health and safety issues of women engaged in small scale mining in the hope of increasing awareness on their plight. Likewise, the social, political, economic and gender issues associated with mining were put to light for consideration in the regulatory and policy frameworks of both local and national governments.

### **Methodology**

This was an assessment of the state of occupational safety and health in small scale mining in general and particularly focused on women, based on secondary data. National data were taken from agencies such as Mines and Geosciences Bureau, Department of Environment and Natural Resources, Environmental Management Bureau, Occupational Safety and Health Center, Department of Labor and Employment, and other local agencies involved in occupational safety of women in mining. Civil society data and those from non government organizations were also analyzed.

### **Results and Discussion**

The Philippine government fully supports the development of its small-scale mining industry. This is clearly manifested in its developmental directives such as the enactment of specific small-scale mining laws and regulations, including a separate set of safety rules; establishment of small-scale mining unit within the Mines and Geoscience Bureau to support and regulate the sector; and decentralization of the issue and control of small-scale mining permits and licenses through local government units. Presidential Decree No. 1899 also establishes small-scale mining as a new dimension in mineral development. Republic Act No. 7076 otherwise known as the *People's Small-Scale Mining Act of 1991*.

Technology employed in small scale mining includes traditional pick-and-shovel concerns. Mining practices of small-scale miners are mostly open-cast or quarrying operations. But underground mining (stopping) methods can also be seen for the gold mines. Gold-processing techniques include the more sophisticated gold-recovery methods involving cyanide digestion followed by precipitation with zinc dust or with activated carbon. Otherwise, the general method of gold recovery is through gravity-concentration process using pans and sluice boxes. An amalgamation process is also applied particularly in gold-rush areas (Saarkoppel, et al., 2005).

The mining process in small scale mining is very tedious. A tunnel is constructed using a sharp metal pounded by a hammer manually by miners after which they collect samples of ore and test them if they contain gold. They collect more ores and crush them in a ball mill. The crushed ores are collected and mixed with nitric acid to separate gold from other minerals such as silver and copper. The purified product is mixed with lime and burned to purify it more and to liquefy the gold as gold nuggets. The waste products of purification are processed further using cyanide or mercury to extract more gold.

Mercury is used to remove gold by forming a mercury-gold amalgam, which then is heated to purified gold. This is where cyanide or mercury contamination of the environment can occur (Hatheway, 2007).

Women are largely seen in the mining sector, particularly small scale mining. According to the International Labor Organization (ILO), 3.5 - 4.0 million women are engaged in mining activities out of the 11.5 - 13 million small scale miners. Africa has the highest percentage of female miners at 40-50%. In Zimbabwe, 50% of the small scale miners are women, 40% in Tanzania, and 30% in India (Nyambe and Amunkete, 2009). In Asia, less than 10% of miners are women and in Latin America, women comprise 10-20% of the labor force in mining (Susapu and Crispin, 2001; Economic Commission for Africa, 2002). Generally, women work unofficially or are found at the lowest end of the sector's hierarchy, even though most of the mining activities are carried out by them (Dreschler, 2001). According to Chakravorty (2001), women are employed in mining activities because of their alleged feminine characteristics such as being assiduous, regular, and dependable. Their work comprises panning, hand sorting, picking, manual grinding/breaking of ores and stones, filling up the measuring boxes, transporting, and improving the quality of extracted minerals through blending. All of these activities are manually done (Chakravorty, 2001 and CASM, 2007). Guye (2001) reported that women involved in small scale mining in Burkina Faso performed 90% of mine ore processing activities.

Records from the Bureau of Labor and Employment Statistics (BLES) show that women are constantly employed in the mining industry (Table 1).

**Table 1. Women's Employment in the Mining Industry Employing 20 and Over: 1999-2006 (latest statistics)**

<b>Year</b>	<b>Number of Women Employed</b>
1999	1169
2001	962
2003	755
2005	735
2006	797

Source: Bureau of Labor and Employment Statistics (BLES), 2010.

Comparing accidents in mining activities between developed and developing countries, the ILO reported that occupational fatality rate in small scale mining in developing countries rose up to 90 times higher than in industrialized countries. In the Philippines, based on the records of Mines and Geosciences Bureau (MGB) in the Cordillera Administrative Region (CAR), fatal accidents in small scale mines were higher than in the large scale mines (DENR-MGB, 2011). Each year in China, about 6,000 fatalities are recorded occurring in small scale mining and the main cause of deaths is gas or coal dust explosion. Other causes of deaths in other countries are mudslides and flooding. In Colombia, mudslides killed 100 gemstone miners in 1998. In Tanzania, 100 miners died due to flooding in 1997.

### *Small Scale Mining in the Philippines*

Small scale mining in the Philippines has been a traditional livelihood and a family-based activity. The women perform precarious work such as handpicking and processing of the ores. Mineral processing which is mostly performed by women requires a lot of dexterity. It also requires patience which is why some aspect of the work is given to women (Hayes, 2008).

Caballero (1996) investigated small scale mining in one community in the Philippines in the province of Benguet. She noted that small scale mining has been a significant activity to this community and part of the tradition of the Kan-kanaey tribes in Benguet. The whole family is involved in the mining activity. Both men and women participate in the extraction of gold. The tools used are simple such as iron chisels, double sided iron hammers with a wooden handle, iron crow bars, iron shovels, and battery operated lamps. The women are primarily involved in ore processing while the men perform ore extraction, milling, gravitation, and panning to separate the gold from the ore. The ores are processed using small improvised crushers. After crushing, the ores are loaded in rod mills or ball mills for grinding. This is followed by smelting and processing wherein women do most of the work (Caballero, 1996).

Processing of the ore is usually done at home to fit into the household responsibilities of the women. Bringing the processing of ore to the home, however, also exposes the other members of the family to the hazards and chemical exposures inherent in mineral processing conducted in one of the mining sites in the Philippines showed that women worked in the milling process, specifically panning, and were exposed to mercury, a hazardous chemical (Bugnosen, 1998).

### ***Small Scale Mining in other Countries***

In other countries, small scale mining was also reported to be labor intensive and hazardous. In Bolivia, women work as gravel scratchers and hand pickers. They work longer hours and are exposed to contaminated water without any protection. They sometimes work without pay as they merely help their husbands in the processing of ores. The health of these women are also compromised. For instance, women engaged in small scale mining in Bolivia have a life expectancy rarely more than 40 years (Bocangel, 2001).

Bhagyalakshmi (2007) noted there are two types of work where women are employed in small scale mining in Africa. One is mineral processing such as digging and crushing, and the other involves transporting or wagon loading. In a study among women working in artisanal and small scale mining in Africa, women were engaged in almost all activities of small scale mining from digging, crushing and pounding rocks, transporting, washing and sorting materials, processing (i.e., amalgamation of gold), to trading activities (Hayes, 2008). Women were also noted to be involved in in drilling and exploratory excavations which are traditionally men's work.

The income that women get from small scale mining is much lower than their male counterparts. In the study of Bhagyalakshmi in 2007, the monthly income of the women was USD120,00. In the study of Hayes (2009), the income of women in Congo ranged from \$2-\$4 per day.

### ***Unsafe Work Practices and Behaviour***

One of the most common occupational health and safety deficiencies in small scale mining is lack of awareness of the risks in mining coupled with lack of education and training (Hentschel et al., 2002). In the study of Hayes (2009), women engaged in small scale mining in Congo were found exposed to various health risk factors such as poor hygiene, malnutrition, and difficulty of work. The study also found that there was a high rate of miscarriages due to accidents and stress inherent in mining work.

The women miners are also found lacking in proper protective equipment. According to Bhagyalakshmi (2007), women in small scale mining are not provided with or do not have protective equipments such as masks, goggles, shoes and helmets since they only involved in ancillary work. In Papua New Guinea, personal protective equipment (PPE) was never been used in small scale mining activities. In the study of Hentschel et. al. (2002), the small scale miners purchase their own safety equipments such as helmet, boots, gloves, and face mask. Hentschel (2002) underscored that non-use of safety equipment is due to lack of awareness, lack of training, non-application of safety regulation, and illiteracy.

### ***Occupational Hazards in Mines***

One of the most popular issues in mining is non-compliance with occupational health safety standards. Many small scale mining operations are said to be lacking in the following- safety regulations, reinforcement of mine safety requirements, awareness of the risks inherent in mining, and access to better equipments (Hentschel et. al., 2002). These risk factors lead to higher health risks and poorer working conditions in small scale mining compared to formal and large scale mining. In fact, the incidence of accidents in small scale coal mining in Africa was found significantly higher than in large scale mines (Hentschel et. al., 2002).

Exposure to dust is another common hazard exposure among women in mining. This is supported by the study of Chakravorty (2001) which reported that the source of health problem among women in mining sites is dust. This is a high risk to women involved in ore crushing or working near ore crushing sites. In the study of Bhagyalakshmi (2007) among the women workers in Southwest India, towels were used by the women to cover their face as a protection from the red dusts generated by spraying off the manganese. The dust, when inhaled, can cause lung diseases and other respiratory ailments. Exposure to dust can also cause skin irritation and eye damage.

Miners who are constantly exposed to airborne particulates are vulnerable to systemic and respiratory diseases. Miners also suffer from musculoskeletal disorders such as back pain. Part of the small scale mining activities is the manual lifting of materials which is usually done by women. This type of work can cause back pain and injuries (Colina, 2006; Chakravorty, 2001).

There are other health risks attendant to women miners such as physical trauma, miscarriages due to stress and injuries, exposure to mercury and cyanide, and sexual violence and abuse. In Uganda, women working as salt miners were reported suffering from genital corrosions and miscarriages due to prolonged standing in concentrated saltwater (Hayes, 2008) The women also developed silicosis and mercury poisoning (Hayes, 2008).

Cyanide and mercury exposures are also risks that women face in mining. To extract gold from an ore, sodium cyanide is used. Liquid mercury is then used in

amalgamation. Cyanide has the ability to block the transfer of oxygen from the blood to the tissues. Signs and symptoms of cyanide poisoning include rapid breathing, tremors, gasping, convulsions and death. Mild poisoning manifests in headache, dizziness and thyroid enlargement (Colina, 2006). Findings of the study in and around small scale gold mining camps in Tanzania showed that workers handling mercury, mainly the small scale gold miners, were highly at risk of mercury poisoning (van Straaten, 2000). In the study of Veiga et. al (2006), high levels of mercury in the urine samples were detected among the eight amalgamation workers in Venezuela, and four workers showed symptoms of mercury poisoning such as nausea, stomach irritation, headache and behaviour changes.

### ***Mine Accidents and Injuries***

Mining is considered by ILO as one of the most unsafe human activities. In the study of the Institute for Occupational Health and Safety and Development (IOHSAD) in the Philippines, the reported leading types of accident in the mines included the following- being hit by falling objects, suffocation from chemical fumes, and crushing injuries. Other occupational health hazards in mining include exposure to intense heat, poor ventilation, vibration, dust, fumes, repetitive stress injury (RSI), intense noise, and biological hazards. In underground mining, poor ventilation causes respiratory failure that can cause brain malfunction or even death.

Most of the relevant causes of accidents among small scale miners are rock falls and subsidence, use of poorly maintained equipments, and non-compliance on wearing proper protective equipments, and safety practices. Erosion, suffocation, poisoning, explosion, and being trapped or buried are among the most common accidents. In the Cordillera region, results of MGB-CAR investigations showed that suffocation, drowning, falling, blasting, and rock fall were the most common causes of deaths in the region (DENR-MGB, 2011).

### ***Environmental Pollution***

Women as mining workers are exposed to the harmful effects of physical, chemical, and ergonomic hazards in small scale mining. Even as not mining workers, women in communities that have small scale mining operations are still exposed to safety and health hazards due to contamination of the larger environment through water run offs, air contamination, and ground contamination from landslides and subsidence. The adverse effects of mining to the environment include contamination of water due to improper waste disposal from mines, erosion in the mining sites, and mercury and cyanide poisoning.

One of the adverse effects of small scale mining is contamination of rivers and lakes. River siltation and pollution due to small scale mining affect drinking water. Mercury contamination in water system disrupts the aquatic ecosystem and then eventually affects humans (Veiga et. al., 2006). In the Philippines, mining sites are near rivers and lakes, thus increasing the risk of water pollution. In other communities, dumping of mine tailing and effluents directly into the nearby rivers and lakes is one of the major pollutants. erosion and deforestation (Veiga et. al., 2006). Mercury and cyanide are the two significant chemicals used in mining. The downside of this is that mercury is poisonous to humans and other living organisms and the effect is aggravated through bioaccumulation. Cyanide is also poisonous to both domestic and wild animals

(Shoko, 2002). In the study of Babut et. al. (2003) in Ghana, high concentrations of mercury were found in the sediments and fishes collected in the rivers close to mining sites. Water samples collected from a lake near mines operated in Tanzania were also found contaminated with mercury at significant concentrations (Shoko, 2002). In the Philippines, high level of mercury, 50 times up above the WHO limit among the miners was reported (Zubiri, 2010).

### ***Social and Political Issues Associated with Small Scale Mining***

Minerals can be a contested commodity. In sub-Saharan Africa, The artisanal and small-scale mining (ASM) sectors are usually characterized by conflict minerals, fatal diseases, smuggling, criminal activity and civil war. The sector is burdened with issues of child labour, gender inequality, spread of HIV/AIDS, environmental devastation, poor health and safety, migrant workers, lack of capital and fair markets, and conflict with the private large-scale mining sector. The paper of D'Souza in 2005 discussed the complexity of drivers, challenges, constraints and issues that characterize the sector and considers the potential solutions through sustainable livelihoods in the ASM sector and overall poverty alleviation, institutional capacity, and gender mainstreaming.. Along with this, Quiroga in 2002 has shown in a case study that small scale miners are impoverished, and therefore outlines strategies on how to move forward towards social equity vis-à-vis foreign investors, among others.

Environmental mismanagement can occur in the nexus between large-scale mines and national or regional government, as well as between local government and small-scale mining operations. Crowson pointed out that certainly the standards and accountability demanded and required by society have risen, and there is more public debate in the area of mining and the environment. This led to the formulation of corporate social responsibility (CSR) policies and strategies (Jenkins, 2004) in which the company must have its own strategies for social responsibility to assist the needs of the community where they are operating.

With the above long list of possible environmental and health impact of mining, there is a need to come up with strong policies and programs with efficient implementation. The old school mining orthodoxy which is merely focused on the exploitation of mineral deposits solely for technical and economic gains is long over, and does not solve the problems and issues in small scale mining. The old mining school also focuses on men's hazards in mining and therefore muted the need for gender-sensitive and gender-responsive policies and programs for women in this sector. New policies for the mining industry should also be leveraged in terms of recent global movements, e.g. globalization, economic interdependence and decentralization of government, and the emergence of civil society and social movements as political factors. There is also what we call the mining and the environmental agenda which address both the technical and social issues of mining aimed at working within the framework of sustainable development (Khanna, 1999).

### ***Policy Orientations with Gender Perspective***

According to the International Labour Organization (2012), artisanal and small scale mining worldwide is characterized by the following: 1) That nearly 13 million people work in this sector around the globe, and about 100 million depend on it for

livelihood and income; 2) That women provide about 50% of the labour force for small scale mining, but their compensation lags behind that of their male counterparts, or remain unpaid as it comes in the form of assistance to the male family members engaged in such work; 3) A large number of children are also engaged in artisanal and small scale mining; for instance, 30% of the work is provided by children in Ghana; 3) Many of these artisanal and small scale mining operations are done illegally, for instance, ILO estimates that about USD400 million worth of gemstones are exported annually from Madagascar illegally; 4) Since many of the small scale mining activities operate illegally, government regulations of safety and health standards are not enforced or complied with, and hence, millions die or are injured annually due to mining work, including women and children; 5) Among the noted illnesses associated with artisanal and small scale mining are fatal diseases such as silicosis and mercury poisoning that extend beyond the workforce to the communities within and outside the mining areas, both in the present and future generations.

Further, the impact of work and the labour force on women is not merely economic in nature, but social as well. This was reiterated by ILO (2009) in its assessment that women are often in disadvantaged position in comparison to men all over the world in terms of access to labour markets. The UN reports showed that women have been tapped in precarious work, seasonal work, and traditional work which are characterized by low earnings and low socio-economic recognition. There is a significant earnings gap between male and females beyond that which could be attributable to variations in skills, experiences and qualifications. This could be well said about women working in artisanal and small scale mining. The gains and projected advancement in the economic and social development of the country could be greater if the contribution of women is factored in at the very start, not merely as incidental, but a major actor in the labour force. Besides, the collateral impact of women's gains in economic productivity translates to greater social benefits for the rest of the household.

Based on these global statistics, the challenge for dialogue of the risks and dangers in artisanal and small scale mining in the policy agenda of governments is expedient. Women lag behind the males in compensation. In the Philippines, women work without pay as they assist the male members of the family in this livelihood (Colina, 2006). Women's health and safety are also compromised. Hence, a gender perspective should be accommodated in the policy directives in mining since involvement of women usually involves children as well. The health and safety hazards as well as poor working conditions to which a woman is exposed to extend to affect the entire household, including children. The woman's vulnerable position economically and health-wise also affects the economic and social condition of the entire household due to the varied roles that she takes.

Policy orientations should factor in women's roles in economic recovery. When governments design fiscal and monetary packages as economic stimulus, special focus should be put on women's existing marginalized position relative to men, and likewise accommodate economic and social growth targets for women. The explicit inclusion of women in policies and programs of government would only benefit the society and the household because of the undeniable contribution of women in productivity as well as their crucial and central role in the economic and health status of the family.

The Philippines is currently reformulating its mining law. This law should not only embody the technical aspects and legal coverage of mining and mining activities, but include legal frameworks for protecting women from the hazards of mining. This should be considered within the wider rubric of humane working conditions for women, sound labour relations, decent work, rights at work, social protection and social dialogue.

### **Conclusion**

Small scale mining is considered as an important contributor to social and economic well being of many people in poor and remote communities. Based on the above cited studies and data, women in small scale mining are at risk to various hazards. They lack proper education and training on safety work practices. They lack awareness on the hazards posed by the chemicals they handle. Hence, there is a need for surveillance and regulation by both national and local governments on this type of economic activity. Gender sensitive approaches that center on occupational health and safety of women in small scale mining should be implemented. Developmental projects of governments, however, should include provision of a more environmentally viable and sustainable employment for women.

The search for sustainable development and the consensus expressed at international conferences during the last decade have deepened social awareness and set the stage for enhanced social responsiveness in the mining sector. Since women are a vulnerable segment of the mining sector, special attention should be afforded to them, both in the areas of occupational safety and health as well as in the provision of more sustainable and environmentally viable forms of employment and productivity.

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