Health and safety issues faced by women engaged in small scale mining in PNG - could a flexible and informal training program improve their quality of life?

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Artisanal and small scale mining (ASM) is globally an important livelihood source in developing nations including Papua New Guinea. However it is associated with many negative environmental and social impacts, and presents significant health and safety challenges to both those working in the sector and those working to assist the sector develop sustainable and safe work practices. Papua New Guinea (PNG) is a mineral rich country, and traditionally a patrilineal society with economic and social power differing accordingly. While undertaking similar work men and women are differently involved in and differently affected by mining practices, cultural practices and legislative practices. PNG women generally have less education, lower literacy rates and limited economic opportunities compared to their male counterparts. They are predominantly restricted from entering small scale mining (in PNG the term small scale mining (SSM) is used to describe this sector) by their lack of ownership over mining land, with almost all registered mining leases, tributary agreements and customary land held by men. Investigation undertaken by the regulatory body overseeing the mining sector in PNG indicates improving benefits and reducing costs at the local level is not sufficient to address these issues as existing gender bias means benefits tend to be captured by men with negative impacts falling most heavily on women. While SSM represents a potential livelihood source for women, many of the issues affecting them including health and safety concerns and their experiences in relation to these concerns are not well documented or translated into in-country assistance programs specific to their needs.

Aspects of health and safety in this sector have captured international attention and concern primarily due to the use of mercury in the gold processing stage. A lack of information exists on other health and safety risks and vulnerabilities or “occupational uncertainties” that impact artisanal gold miners, particularly from the perspective of women miners and their communities. Using field examples this paper explores in greater depth some of the occupational health and safety issues faced by women small scale miners, and their communities in an alluvial gold mining province in Papua New Guinea and seeks to better understand their concerns. All women interviewed reported significant health and safety issues arising from the lack of ownership over mining land, with almost all registered mining leases, tributary agreements and customary land held by men. Investigation undertaken by the regulatory body overseeing the mining sector in PNG indicates improving benefits and reducing costs at the local level is not sufficient to address these issues as existing gender bias means benefits tend to be captured by men with negative impacts falling most heavily on women. While SSM represents a potential livelihood source for women, many of the issues affecting them including health and safety concerns and their experiences in relation to these concerns are not well documented or translated into in-country assistance programs specific to their needs.

Keywords: SSM, health, safety, training, women

1. Introduction

“We have been neglected for a long time, even our parents were neglected. It is only now we are being recognised and recently there has been some change. We need to be recognised, I have had enough of working in rivers...if I could do something else...or if there was machinery we could use to help us so we don’t need to work so hard I could keep going.”

(Narrative from older woman in SSM alluvial mining area in PNG)

ASM is a significant driver of local economic development across mineral rich developing countries and an important and growing sector, taking place in more than 80 countries and producing approximately 15-20% of global minerals and metals (Buxton, 2013; World Bank 2013). No specific definition is given to the ASM sector but traditionally it is characterised as “low tech, labour intensive mineral extraction and processes found across the developing world” (Hilson and McQuilken, 2014), and is generally distinguished from industrial/ large scale mining by low rates of production, lack of long term planning, and poor safety, health and environment conditions (Hinton 2003; Lahiri-Dutt 2004; Adler Miserendino et al. 2013). Viega et al. (2004) comment it is difficult to make a clear distinction between artisanal and small scale mining, leading to
the term small scale mining (SSM) being often used to include both artisanal and small scale mining operations that range from individuals panning along riverbanks to organised mechanised operations. SSM is used in the PNG mining context to represent this sector.

A 1999 ILO estimate places the number of people directly and indirectly dependent on ASM at 100 million, and the worldwide mineral boom coupled with the continued diversification of rural livelihoods suggests the number of people dependent on ASM is steadily increasing (WHO 2013). While ASM represents an important livelihood strategy for rural households it is characterized by an extreme amount of risk and vulnerability including problems with government licensing schemes, disputes over land, environmental degradation, and health and safety issues. Hilson (2012) argues miners become trapped in a vicious trap of poverty once they enter ASM. Driven by poverty, the situation is exacerbated by low levels of skill and technology, poor ore recovery levels and low earnings. With environmental and health issues compounding the situation, most ASM workers lack access to the social and economic infrastructure needed to break the cycle and move ahead (Siegel and Viega 2009). Without being able to either increase their earnings or retain a larger share of their earnings the situation is perpetuated.

2. Gender focused ASM involvement and health and safety issues

Globally it is difficult to determine accurately the number of women working directly or contributing to the ASM sector largely due to the informal and unregulated activity of the sector and with women’s roles often hidden within mining operations. (Hinton et al 2003) estimate that over 30% of all ASM activity worldwide is undertaken by women but depending on the region this may be much greater with reports indicating up to 10 - 50% in Asia, and 10-30% in Latin America (Eftimie et al. 2012), and up to 50% in Madagascar, Mali and Zimbabwe, and 74% in Guinea (Yakovleva 2007). Current estimates indicate over 100,000 are persons involved in alluvial SSM across PNG of which approximately 20% are female (Moretti, 2007). Despite the significance of these numbers many authors highlight the invisibility of women and children in ASM activity (Jenkins, 2014; Hinton et al 2003; Lahiri-Dutt, 2008). ASM is associated with significant health impacts for both men and women but generally site work is segregated and the health and safety impacts on women are quite specific.

Women can be found at all levels of ASM, however typically there are involved in ore processing tasks involving high levels of manual activity to extract mineral remnants by hand from tailings, forming human chains to carry large buckets of tailings on their heads, and panning and sluicing mud and sand to recover particles of gold. It is not uncommon to see children by their side. Their tasks are the most labour intensive while yielding the lowest economic return. Because of their involvement in ore processing activities they and their children suffer dust inhalation leading to respiratory diseases, exposure to mercury and its neurotoxic affects and in some cases cyanide exposure when used in reworking tailings.

Women also perform ancillary roles such as service providers in addition to working directly in mining operations, including working as shopkeepers and cooks and often as nite club entertainers and prostitutes. While in some countries women do own mines and mining equipment this is not common practice (Heemskerk 2003; Van Hoeck, 2006). Typically, women encounter difficulties obtaining development assistance including access to bank credit, technical knowledge and skill development (Hilson, 2002; Eftimie et al, 2012) often requiring their husbands’ consent before obtaining a permit to mine. Because some women are household heads these barriers pose significant challenges as frequently mining is their only economic option. Women often do not receive an independent wage and regularly earn less for performing similar work than their male counterparts (Hentschel et al., 2002; Hilson, 2002; Hinton et al., 2003; Van Hoeck, 2006). It is not unusual for them to be prohibited from direct contact with more valuable deposits because of taboos forbidding them from working underground or being on site when menstruating (Moretti 2005; Van Hoeck, 2006). Women’s mining contributions are frequently performed in addition to their domestic responsibilities often making their contribution “less visible” and therefore less recognized and valued (Lahiri-Dutt and McIntyre, 2006; Lahiri-Dutt, 2012).

Gender specific health risks include miscarriages due to stress and injury, sexual violence and abuse. Hayes (2008) reported Ugandan women salt miners suffering from genital corrosions and miscarriages due
to prolonged standing in concentrated saltwater and women ASM workers in the Congo exposed to various health risk factors including poor hygiene, malnutrition, difficulty of work and high rates of miscarriage. Many authors argue that health effects of environmental pollution are disproportionately felt by women because of their dual roles as primary carer and responsible for the health of their families and also as agriculturalists (Hinton et al 2003; Van Hoecke, 2006; Lahiri-Dutt, 2006; Simatauw, 2009; Jenkins, 2014). Women’s reproductive role increases their vulnerability to mercury and other heavy metals in water and food supplies with mercury known to severely affect foetal development (Hinton et al 2003; Hayes, 2008). A comprehensive literature critique by Jenkins (2014) provides valuable insight into the ways women are affected by ASM mining activities and highlights a lack of in-depth analysis of women’s diverse experiences across a number of parameters including gender impacts of mining, changing gender dynamics and gender inequalities in mining communities.

3. Mining in PNG

Dominate during the colonial era by Europeans who employed PNG nationals, by the late 1960s most had abandoned their leases and growing numbers of nationals commenced their own operations (Moretti 2007). Since independence in 1975 SSM has rapidly increased in scale and the sector financially underpins economic activity in much of rural and remote PNG. Unlike in other parts of the world, PNG recognises the SSM sector as a legal contributor to the national economy with estimates of up to 90% of alluvial gold production extracted by rural based miners using sluice boxes and panning dishes and by mechanised operations using predominantly portable dredges, water pumps and excavators. Alluvial gold and placer gold is found almost everywhere in PNG with many sites situated in remote areas making it difficult financially and technically to locate mechanised equipment on site. As a result, simple non-mechanised techniques are most usually used and mercury remains widely used with between 60% and 90% of SSM operations reportedly using it to capture and amalgamate the gold (Crispin 2006).

Reports indicate over 100,000 are persons involved in alluvial mining across PNG of which approximately 20% are female, and 30% school age children under the age of 16 years (Moretti 2006). In 2006 the sector was worth around US$80,880,000 and contributed 1.4% of national GDP (World Bank). Traditionally, non and semi-mechanised activity is undertaken in family units of less than 10 with estimates indicating this group comprises almost 99% of total operations (Lole, 2005; Javia and Siop, 2010). Research indicates most of the SSM population lacks the financial and educational capacity required to undertake fully mechanised or larger scale mining operations (Lole, 2005; Crispin, 2006), however many are now looking for opportunities to form joint venture (JV) operations that may provide necessary capital and skills to increase production levels and improve livelihoods (Crispin, 2006; Moretti, 2007).

3.1. Health and safety issues in SSM in PNG

Across the developed world most effective health and safety management programs are based on strong risk management principles underpinned by knowledge that provides the ability to assess work related hazards. A study by Hentschel et al (2002) found most common occupational health and safety deficiencies in SSM to be lack of awareness of the risks in mining coupled with lack of education and training. An extensive literature review reveals globally most health and safety issues faced by SSM workers can be attributed to competing socio- economic demands, lack of expertise and training in safety measures, and inadequate equipment. When in the role of Assistant Director of the PNG Small Scale Mining Branch of the Department of Mines, Lole (2005) reported the main cause of death as overhanging materials falling on miners while they were boring or tunnelling in alluvial ground. He argued the fundamental safety issue was that most miners lacked knowledge and skills on health and safety issues. This in turn translated into inability to identify hazards and underestimation of the risk of being injured or killed as the primary goal was to access high grade gold for economic survival. The ILO (1999) report indicated non-fatal deaths in SSM were up to six to seven times that of formal large scale operations (Hinton et al 2003). Widespread informality within the SSM sector generally leads to under reporting of accidents and deaths and limited regulatory recording practices increases the difficulty in gathering accurate information. Review of current literature review does not indicate a decreasing trend.
In an account of fieldwork undertaken in the Mount Kaindi area of PNG Moretti (2006) observed local women “face serious obstacles to full and equitable participation in mining” including cultural beliefs, land tenure practices, unequal control of household resources and gender division of labour. In many regions of PNG women are considered a dangerous presence on a mine site with the belief they can pollute the gold and anger hikoapa the ancestral and nature spirits that guard the land and its riches (Moretti 2005). Crispin (2006) highlighted the vital source of income SSM provides for many rural based communities arguing “access for women to the economic benefits, skills involved, and awareness of possible health and safety issues is important for community based mining to remain sustainable and to continue to contribute to economic survival and development”. Narratives from the field support these observations.

4. Method

Ethnographic research provided the opportunity to better understand how gender specific health and safety concerns impact on the lives of the women involved in alluvial gold mining in PNG. A workshop was organised as part of a field trip undertaken in October 2014 to investigate health and safety issues associated with alluvial gold SSM operations. 16 local women actively engaged in small scale mining attended. Informal group and individual semi-structured interviews, direct field observation, photos and video footage were used to gain an overall picture of the health and safety issues experienced by the group.

5. Women in SSM in PNG – Reflections from the field

Extract from the field narratives:

“I have had no control over the lease since my husband died – others (“settlers”) have come in and we are trying to move them on. My son-in-law and grandsons make the decisions.”

Women in PNG are predominantly restricted by their lack of ownership over mining land. While in practice some women do hold certain secondary rights to land and resources of their kin, these rights are mostly claimed and exercised by their spouses and male relations (Moretti 2006). Gender bias means the men tend to benefit while the negative aspects impact most heavily on the women. With division of ownership rights comes violence, rape, HIV/AIDS, lack of economic equality between women and men, and lack of adequate opportunities to obtain equality (Crispin in Lahir-Dutt 2006). Women within the group reported being victims of domestic violence.

“My body is tired. I want to stop working, I will only work when we need extra money for school and medical help”.  
(Older woman from SSM alluvial mining area in PNG)

Women in mining regions are particularly vulnerable to socio-economic hardship and largely are forced towards mining for the economic survival of their families. An account of women in Lihir province by McIntyre (2006) indicated women take on multiple roles simultaneously leading to them being over-worked and over burdened. Many of the women reported extreme tiredness with their mining work additional to their domestic responsibilities, and many confirmed tiredness lead them to undertake what they considered unsafe practices in order to complete their work to get back to their families.

Traditionally women involved in SSM undertake heavy manual work and a number within the group reported back and knee pain from shovelling, lifting, and carrying heavy rocks. All women reported working long hours bending and twisting to pan and sieve while standing or squatting in water often contaminated by mercury. Across the group most of the women reported back pain and internal organ pain/uterine pain, indicated they lifted heavy loads and awkward equipment while pregnant, and continued working while breast feeding. The women described manual work practices leading to musculo-skeletal, joint and abdominal pain, infected cuts that were slow to heal, abrasions and bruising from large stones falling on them. On observation many of the women had abrasions on their hands and feet and broken toe nails.

Typical narratives:
I work long hours in the river water - I have sores on my fingers that don't heal. Rubbing the gravel on the sluice boxes gives me a rash and blisters that take a long time to heal. I have sores on my feet from standing for a long time in the river.

My body aches. I have back pain, my joints hurt. I have back pain, and pain in my shoulders and knees from using shovels and crowbars. My hands and fingers are sore from long hours using sieves. I have sores that don't heal from handling big stones. I get headaches from working long hours in the sun. I am exhausted.

My back hurts all the time now and my insides hurt by the end of the day - I am standing in water all day, I have been doing this since I was 7 years old - my body is just so tired, I don't think I can do this anymore. If there was another way to do this maybe I could keep working.

Mercury is widely used across alluvial mining activities in PNG. All women interviewed reported concerns about mercury use and its related effects and described symptoms attributable to mercury exposure. Many admitted burning mercury in their home kitchens and subsequently suffering problems from mercury fumes including eye irritation, redness and tears. Practiced out of necessity rather than choice, the women reported recovering gold daily, the sale providing immediate money for household essentials. Typical narratives included:

I know I shouldn't burn the mercury on the stove at home, but the days are long and I am bending and panning all day - I get home tired. I get up early to get my housework done and my children to school, then I travel by truck to river - it is a long way. I spend long hours lifting, shovelling and throwing stones – it's a long day and by the time I get home I am exhausted. If the day is too long I bring home the gold and do it (the amalgamation) at home so I can sell it to pay for food.

I get up at 6am to do my housework and get my children ready for school. I then work until 3 or 4pm collecting concentrate. I then need to amalgamate it. Sometimes I am still on site at 6pm. I am too tired at the end of the day so I take it home and burn it at home.

Most of the women reported living in traditional houses, often without running water or sanitation facilities meaning additionally they walked long distances to obtain fresh water for washing and cooking. Transport limitations add long hours either on foot or travelling in the back of a truck to their lease or shopping facilities, while some families reported living on the riverbank in make shift housing to be close to their lease to protect it from being mined by others or being robbed. A number of the women indicated the time spent mining impacted negatively on the time available for their children and domestic responsibilities.

By the end I am too tired to wash before I prepare food – I just need to get food ready for my family. Sometimes I just get ready made food from the streets.

Many of the women tended family vegetable and market gardens to supplement household income. Most reported that despite their concerns financially they had no choice but to continue mining as they needed the additional money to pay school and medical fees and support their households. Some of the women interviewed indicated they needed additional sources of income because the men would go away to sell the gold and often spent the money received on alcohol and prostitutes.

6. Discussion and Conclusion

The interviews provided a rich and valuable source of gender specific information on SSM related health and safety issues which to date has not been well documented. Despite the significant health and safety issues related to SSM alluvial gold mining remains attractive in PNG as miners can receive up to 70-90% of market value compared to rural commodities which are paid at a much smaller rate and generally take longer to generate financial return. While women's participation in SSM operations is estimated at around 20%, and as described in the narratives they are involved in and affected differently by mining, cultural and legislative practices surrounding these operations. PNG men tend to view mining as unsuitable for women often
discouraging them from taking part in mining operations, in particular the more lucrative mining of hard rock deposits. Cultural norms dictate the women are most often excluded from ownership over mining land leaving them dependant on their husbands or male relatives and unable to retain earnings or receive a fair share of earnings for household expenses. While women are critical to the cohesiveness and stability of their communities and often act as change facilitators they are often excluded from the decision making process based on gender, and in communities where women feel they do have the ability to influence decisions they often lack access to knowledge that will better equip them to act in an informed capacity.

Through accidents or injuries affecting the main income earner of the household it is not uncommon for women who would otherwise be occupied with family and domestic responsibilities to be forced into mining operations. For others mining is the only occupation they have generational experience in, and many want to remain miners, preferring not to re-skill as farmers or service providers. Without adequate knowledge of good safety and health practice these women face unacceptable work related risk forcing them into actions that by western standards would be viewed as unsafe and unacceptable. Globally SSM health and safety issues are inextricably linked to community, economic and environmental aspects of mining activity, however women engaged in SSM generally do not have as many opportunities to acquire mining skills as their male counterparts which translates into further limitation of opportunities to improve their quality of life. All of the women interviewed expressed health and safety concerns, and highlighted their inability to attend formal training programs.

Across developing countries, training programs have been provided by various funding bodies to address the perceived needs of small scale mining operators (e.g. World Bank, Japanese Social Development Fund, Solidaridad). PNG is no exception, and the Japan Social Development Funded (JSDF) Small Scale Miners Training Centre (SSMTC) was established in Wau in the Morobe province in 2009 to provide direct training to SSM communities throughout PNG. Now administered by the Mineral Resources Authority, the centre provides both live-in training courses across a range of and a mobile outreach program across other provinces. While courses are available to both male and female participants, the women interviewed all cited family responsibilities as precluding them from attending formal training programs that require extensive time commitments such as the program offered by the SSMTC. Additionally, the women indicated they preferred to stay away from outreach programs where attendees were mostly men and felt more comfortable in a less formal environment. All reported they would value a means of obtaining knowledge and information to help them understand and manage the health and safety issues they saw as majors concerns influencing their family’s welfare. All expressed concern that health and safety extended beyond the worksite with most SSM related health and safety issues impacting on whole families and communities. Lack of understanding and knowledge of health and safety issues by those working in the sector means interventions aimed at reducing injury and improving work practices are extremely challenging.

In order to provide an effective training program it is necessary to understand the target audience and provide training best suited to the needs identified within that group. When asked what kind of program would work best for them the women nominated a flexible and informal training program lasting 2-3 hours per day over 3 days of the week, allowing them to participate in a training program and maintain their family and domestic responsibilities. Development of such a program would have widespread application to not only other PNG mining communities, but to other countries where women are engaged in SSM activities.

The women nominated the top priority areas for training as:

- Safer mining techniques
- Less physical mining practices
- Understanding the hazards associated with mining practices (“understanding what was safe and what was not”)
- Understanding how to prevent injury (to themselves and other family members engaged in mining)
- Knowledge of available simple machinery and of its operation
The interview process was also effective at highlighting key challenges experienced by women in SSM communities. Barriers cited by the group to attending formal training programs included:

- Males discourage women from attending courses
- Women uneasy at attending a male dominated event
- Time limitations - primarily responsible for child rearing, market gardening and other domestic responsibilities
- Cost of travel
- Course fees
- Need to take younger children with them

While not wanting to detract from the training provided by the SSMTC it would seem the current model does not have the flexibility to address the specific needs of women engaged in SSM activity. Engaging with local women in mining impacted communities to gain an increased awareness of the problems they encounter with mining related activities, and focussing on these issues from a gender perspective allows better understanding of how female worker actions need to be viewed and understood in the wider context of work and community responsibilities. The information gathered from the interviews allows establishment of a framework from which to assess and document current work health and safety issues and develop quality interventions. Awareness of these issues when designing capacity building training programs or training initiatives means developed programs would become readily transferrable to other countries where SSM is practiced and the framework suitable to effectively capture other relevant SSM topics.

The information contained in these field interviews in combination with review of available literature indicates gender specific similarities exist across most developing countries where SSM is practiced. The interviews highlight the need to ask the women themselves what is the most effective framework to understand and address their specific health and safety risks and vulnerabilities. The interviews provide valuable insight and information to inform development of a targeted training program. Helping women better understand and manage health and safety issues that affect them and their families is a step forward towards improving their overall quality of life.

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