

ARTISANAL OIL MINING IN MINHLA TOWNSHIP: LIVELIHOODS, CHALLENGES AND OPPORTUNITIES

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Abstract

Major focus is on the study of livelihoods, challenges and opportunities of artisanal oil mining in Minhla Township, Magway Region. Artisanal or subsistence mining is generally defined as mining that relies on physical work force and simple tools, such as ordinary hand tools or 'light' machinery. Therefore, the objectives of research are to investigate the socioeconomic characteristics of artisanal oil miners, to assess the soil, water and air qualities at artisanal oil mining site and to study occupational safety and health at mining area. This research relies on both qualitative and quantitative research methods, semi-structured interviews and field surveys. Respondents were chosen among a random selection of artisanal miners, stakeholders and local people. In addition, field surveys conducted for sample data collection as well as air quality, water quality and soil contamination at Htan Kaing artisan oil mining area. These samples were experiment at the field and laboratory of University Research Center (URC) Lab, University of Magway. According to the results of structure interviews, reasons for becoming artisanal oil miners as their livelihoods being mostly economic, they earned on average over 300,000 kyats per month. Compared to Myanmar's average monthly income of approximately 169,000 kyats (Labour Force Survey 2017). The miners earned more than 30% what they earned before becoming artisanal miners. This is a major opportunity for artisan oil miners. Occupational safety and health are major challenges of artisanal oil miners. The result of lab experiment and field survey, on air quality of artisanal oil mine site, shows during the operating time, high impact on air pollution but low impact on break time and after operating time and nearby oil mining site. This paper clearly describes that water and soil from the study area has iron (Fe) content is greater than acceptable level of WHO standard. Many oil miners do not use any safety equipment, that is highly vulnerable to occupational safety and health.

Keywords: artisanal, challenges, iron, livelihoods, occupational health, occupational safety, opportunities

Introduction

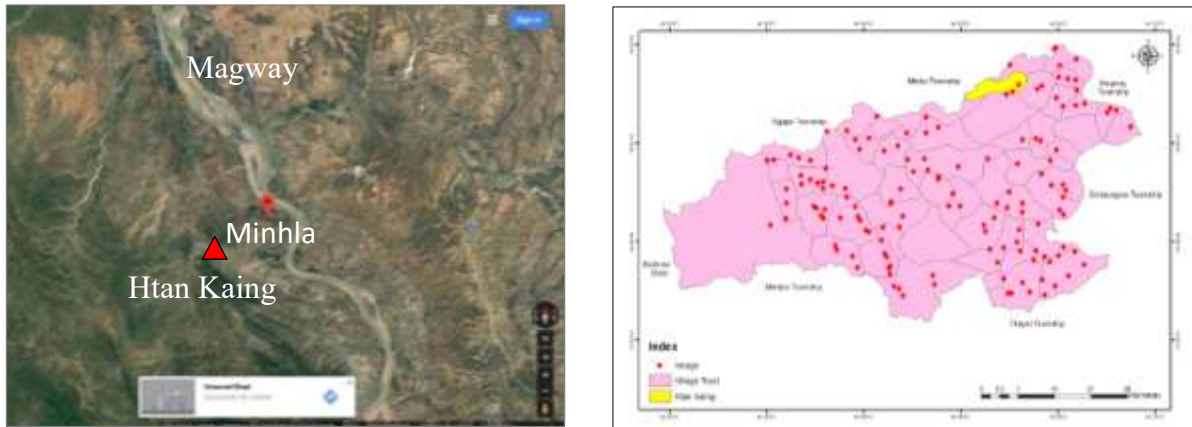
Artisanal mining is a type of small-scale mining operation that is not associated with large corporate enterprises. This type of subsistence mining is somewhat common in the developing world, and uses many hand tools and methods that have been employed by prospectors throughout history. Some artisanal mining is undertaken by individuals, though small-scale mining operations also pay people to engage in the same activities. In some cases, seasonal agricultural workers find employment in artisanal mining when there are no crops to harvest, though full-time artisanal miners also exist. Many other economic factors can also drive people to artisanal mining as an alternative way to support their livelihoods (wise-geek.com).

Artisanal or subsistence mining is generally defined as mining that relies on physical work force and simple tools, such as ordinary hand tools or 'light' machinery, according to the Myanmar Centre for Responsible Business (MCRB). Myanmar's informal artisanal mining sector is vast. It is estimated that around 22,955 people work as artisanal oil miners/hand-pickers in Htan Kaing artisanal oil mining area, Minhla Township, Magway Region. Very little is known about how artisanal oil mining functions and what are the nature, scale, and causes of its problems/challenges.

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Source: Myanmar Information Management Unit (MIMU) and Google Image.

Figure 1 Location of Htan Kaing artisan oil field in Minhla Township, Magway Region, Myanmar.

In addition, surveys conducted in this artisanal mining area are for air quality, water quality and soil contamination at Htan Kaing artisan oil mining area. Particulate matter (PM) data collection for air quality at study area Htan Kaing, Minhla Township. Water samples were collected from stream water, waste water, surface well and tube well for water quality and soil samples were collected from surface and underground soil at this artisan mining site. These samples were tested at the field and laboratory of University Research Center (URC) Lab, University of Magway. Aerosol Mass Monitor was used to detect PM 2.5 to PM10 for air quality assessment, Atomic Absorption Spectrophotometer (AAS) was used to measure heavy metals, for water quality and soil contamination. Factorial discriminate analysis and lab experiments were used for the data analysis. Work flow for the major steps of the study is shown in (Figure 2).

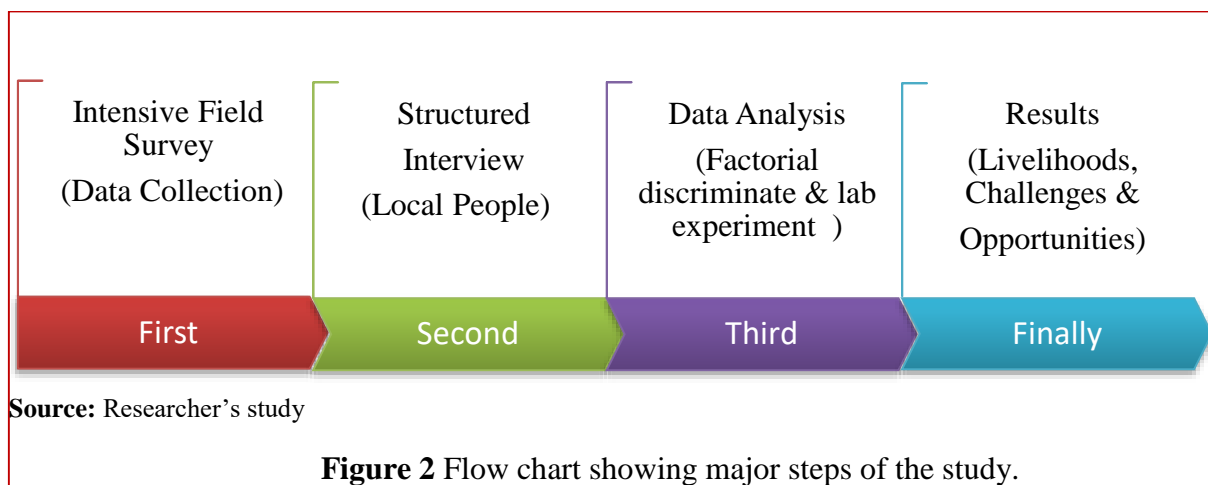


Figure 2 Flow chart showing major steps of the study.

Basic Geographical Factors of Research Area

Mountain ranges run from north to south in central part of the township, numerous valleys are found in this area. In Minhla Township, Pani Chaung, Yaykyi chaung, Paenaut chaung take source from western Yoma. Pati chaung, Tanyaung chaung, flows across the central part of the township and it enters into the Ayeyarwaddy River. This river is use for navigation. According to H.L Chibber, around Minhla is a built up Ayeyarwady sedimentary rock from the period of last 5 to 1.8 million years ago, named as Tertiary Period and Cenozoic Era deposits. On the other hand,

the underlying rock is Irriwaddian series. The geologic setting of Minhla is small traced for folding and faults. It is a capacity of underground water as very little composition of salt and calcium contents. According to climatic data 2015, Minhla Township received tropical climate with the maximum temperature 45°C and the minimum temperature 17°C. Rainfall received 863 mm (34 inches) with 62 rainy days in 2019. Type of soils in Minhla Township are dry forest soils and alluvial soils. Natural Vegetation are Kyun, Pyinkadoe, Thityar, Ingyin, Padauk, Shar, Thann, Dahatt, Letpan, Kokeko, etc. are found in Minhla Township. Forest cover about 69.91 percent with hectares (17,920.22 acres) (3.53 Percent) is reserved forest and protest forest is about 948.09 acre (0.32 percent).

Total population of Minhla Township has 146,082 persons with 73,133 males and 72,949 female in 2019. It has urban population 12,510 persons (8.6 % of Total Population) and rural Population 133,572 persons (91.4 % of Total Population) respectively. There have 28,952 houses and 31,622 households in 2019. Bamar, Chin, Rakhine, Shan and Kayin national races are found in this area. Among them 99.67 percent of township population are Bamar. In religion, Buddhist, Christian, Hindu, Islam are found in this area. Buddhist is 93.03 percentage of township population.

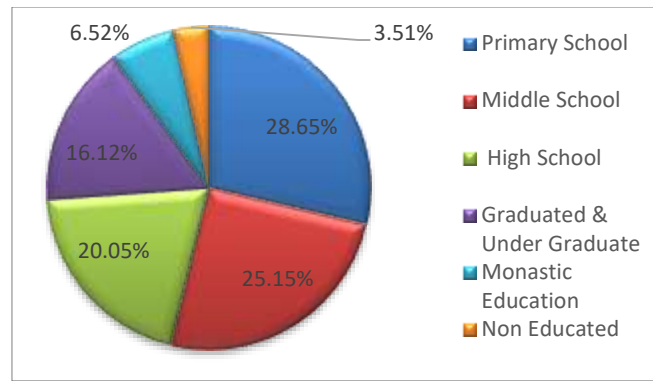
Results and Findings

As a result of structure interviews, the number of Htan Kaing artisanal oil miners has rapidly increased from over 10,000 in 2015-16 to over 20,000 in 2019-20. Most artisanal miners are migrants from outside of Minhla Township who migrated mainly for economic survival for their family. Many of migrant miners are from Central Myanmar and Rakhine State. Therefore, the survey findings indicate the livelihoods, challenges and opportunities of these artisanal oil miners at Htan Kaing mining area, Minhla Township in Magway Region.

Livelihoods

Approaches to defining livelihoods means a way of earning money in order to live. It mainly has economic focus on employment, production and household income. Although many other employments are carried out in study area, artisanal oil mining is the main economy for their household income. Majority of the people are agriculture labourers and oil miners. Those people in study areas who work as labour in the fields and get daily wages. The result shows that the majority of the artisanal miners are migrants. The reasons who move to Minhla artisan oil mining area, Htan Kaing for their livelihoods. Artisanal oil mining is the backbone of their livelihoods of the miners.

The educational attainment among artisanal miners is slightly lower than the average level of education in Myanmar. 28.65 percent of the survey participants had a primary school level, The remaining 25.15 percent attained a high school level, and the lowest is 3.51 percent of non-educated persons (Figure 3).

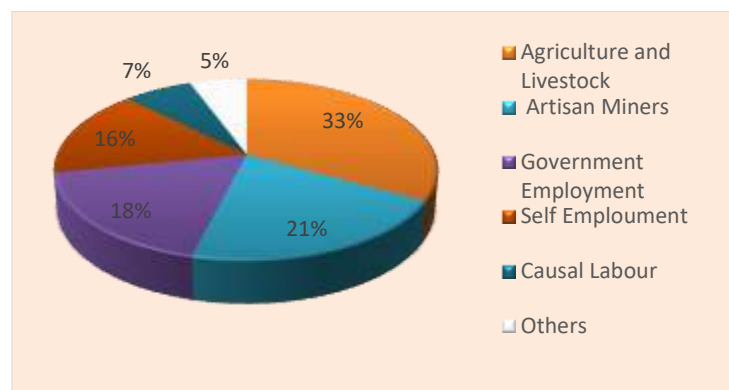


Source: Result of structure interviews and field survey.

Figure 3 Educational attainment of miners at artisanal oil mining area, Minhla Township.

Economic well-being of oil miners usually their monthly income coming from hand-picking activity, with an average monthly income of over 300,000 kyats. The Labour Force Survey (2017) reported that the average monthly income in Myanmar is 169,000 kyats. In their previous jobs, artisanal miners, on average, earned over 200,000 Kyat per month. Thus, this finding indicates that miners earned over 30% more than what they earned before becoming an artisanal miner.

In employment of local people, 33.13 percent of the people engaged in agriculture and livestock, 20.78 percent work as artisan oil miners, 17.88 percent are government employment, 15.80 percent work as self-employment and people earn as causal labour and the others (Figure 4). 102,612 persons or 70.24 % of total population are working people and 43,470 persons or 29.76 % of total population are dependents. Therefore, working population is more than dependent population which is the important factor for the development of livelihoods in study area.

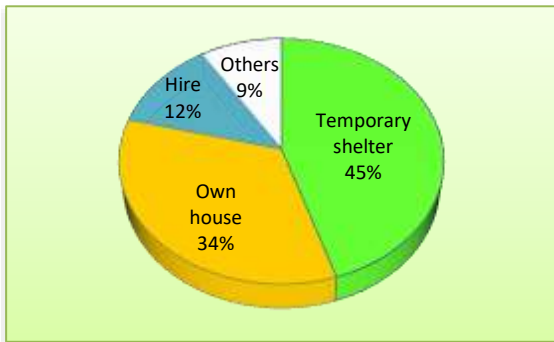


Source: Results of structure interviews and field survey, 2019.

Figure 4 Employment of sample household members in study area.

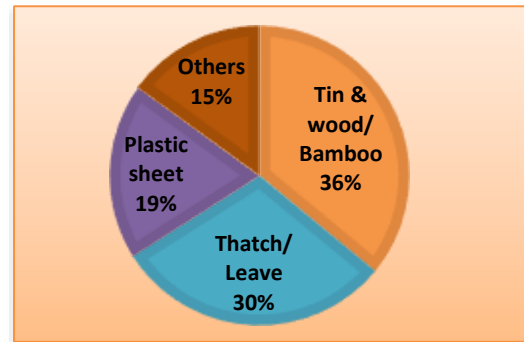
Generally, artisanal oil miners live at the mining site. The artisanal miners' houses close to the mining areas can be very dangerous. Some of the hand pick oil drilling work is within their house compound. Most miners live in a temporary shelter (56%) at mine site, some have their own house (34%). Those who live in a temporary shelter mostly own it, while a small number hire (12%) a shelter (Figure 5 & Plate 1). The average initial costs for a shelter are over 300,000 kyats. The roofs of the miners' houses are commonly made of tin and their walls of bamboo, or wood

(45 %). Thatches/leaves for the roof and walls (36 %), plastic sheets for both roof and walls are not uncommon (around 19 %) (figure 6).



Source: Structure interviews and field

Figure 5 Type housing condition.



Source: Structure interviews and field

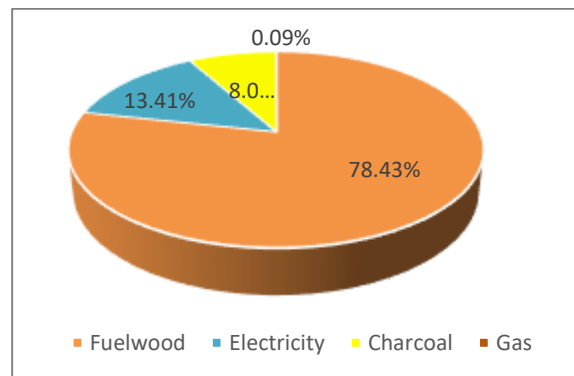
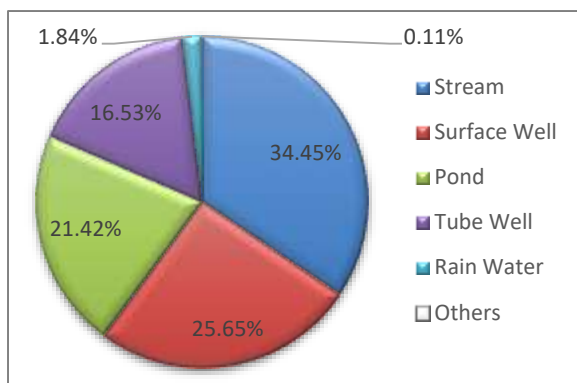
Figure 6 Materials of roof and wall of shelters.



Source: Field Survey 2019

Plate 1: Type of shelter or housing condition of artisanal oil miners at Htan Kaing.

Among the respondent families, 34.45 percent use domestic water use from stream water, 21.42 percent from pond water in the rainy season, 25.65 percent from surface well and 16.53 percent from tube-well. Majority of the inhabitants use poor water quality. Majority of the respondents were using firewood as cooking purpose (78.43 %), utilization of electric light was 13.41 percent, the use of charcoal as fuelwood about 8.07 % and gas (0.09 %) were used for their families. Figure 7 and Plate 2 shows the utilization of domestic water and fuelwood in study area.



Source: Result of structure interviews and field survey, 2019.

Figure 7 Utilization of domestic water and fuelwood at study area.



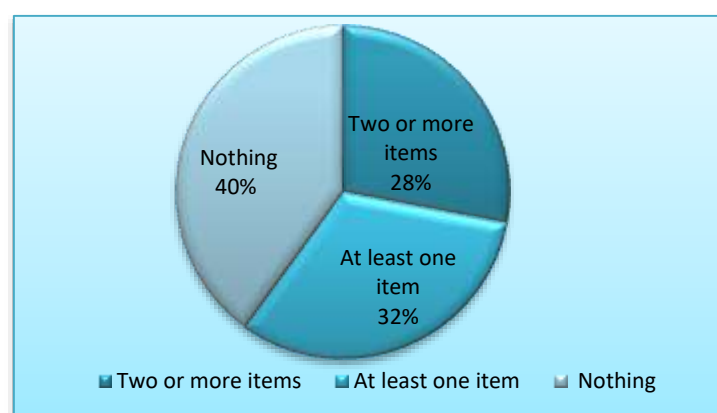
Source: Field Survey 2019

Plate 2: Domestic water use of artisanal oil miners at Htan Kaing mine site.

Challenges

The most significant challenge of artisanal oil miners is occupational safety and health (OSH) at Htan Kaing artisanal oil field, Minhla Township, Magway Region. Occupational safety and health relate to safety, health and welfare issues in the workplace. It aimed at making the workplace better for workers with co-workers, family members and stakeholders (WHO_OSH_Manual).

Many miners are not equipped with effective safety gear, making them highly vulnerable to occupational safety and health. Most of artisanal miners believe that they could play a role in preventing challenges, they can also mitigate physical harm by wearing safety equipment. While the vast majority uses some basic safety equipment, about half of the miners (32 %) uses at least one item or only boots or shoes. (Figure 8 & Plate 3) and 28 percent use two or more items to protect themselves and 40 percent use no equipment. Of those miners who do not use any safety equipment, the most common reasons are that they seek to avoid danger, they find the equipment uncomfortable or hot, or they don't think it is required.



Source: Result of structure interviews and field survey, 2019.

Figure 8 Usage of safety equipment by artisanal oil miners.

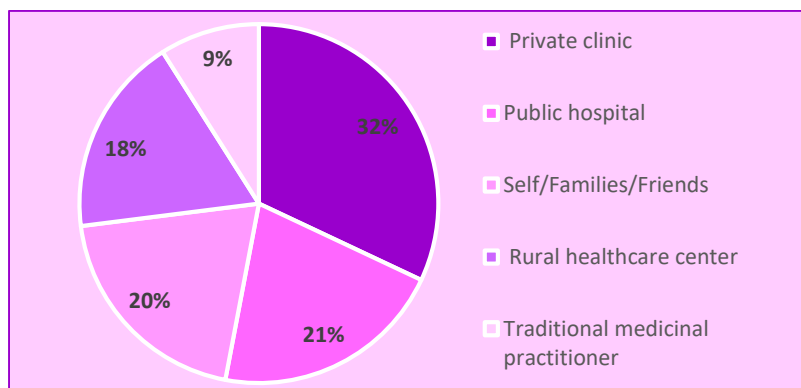


Source: Field Survey 2019

Plate 3: Usage of safety equipment by artisanal oil miners at Htan Kaing mine site.

Therefore, most of the miners in this artisan oil mining do not take preventive facilities for their safety such as mask, gloves, safety glasses, ear plugs (or) ear phone, helmet, long sleeve shirt etc. Therefore, some miners have some problems with physical health such as allergic conjunctivitis in their eyes, loss of hearing, headache, skin irritation etc. Many harmful effects of working behaviors can increase health problems to miners.

Artisanal oil miners usually seek help from each other in the mining areas in case of injury or illness. Most of the miners rely on private clinics, rather than public hospital. Survey data shows that most artisanal miners 32 percent rely on private clinics when they get ill or injured. Only 21 percent of hand-pickers use public hospitals. Around 20 percent rely exclusively on themselves or on families/friends to attain necessary medical treatment, while 18 percent on rural healthcare centre, some are relying on traditional medicinal practitioners (9 %) (figure 9).



Source: Result of structure interviews and field survey, 2019.

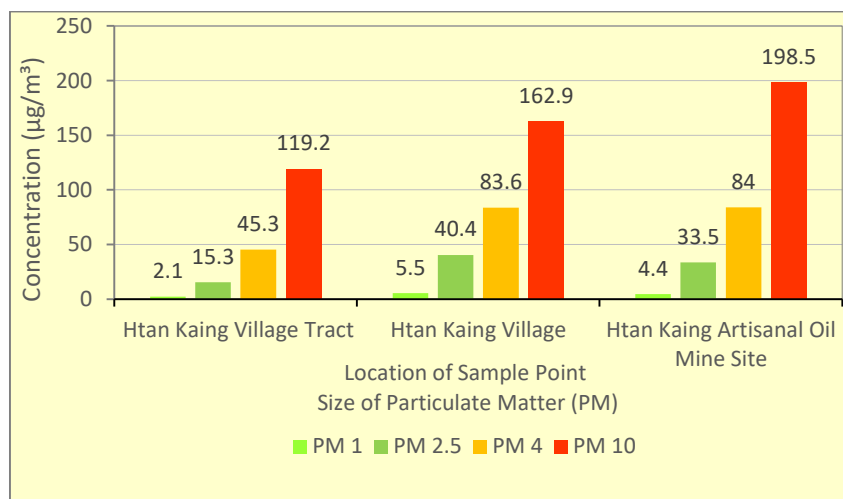
Figure 9 Artisanal oil miners seek help in case of injury or illness.

Miners generally start their work day early. Most of the miners starts the work day at 7 am or 8 am or earlier. Most of them stop around 11 am or 12 pm and continue with a second work shift from the afternoon until the evening. Morning shifts (average 4.5 hours) tend to be slightly

longer than afternoon or evening shifts (average 4 hours). Most artisanal miners work between seven and nine hours in total per day, with an average of slightly over 7.5 hours.

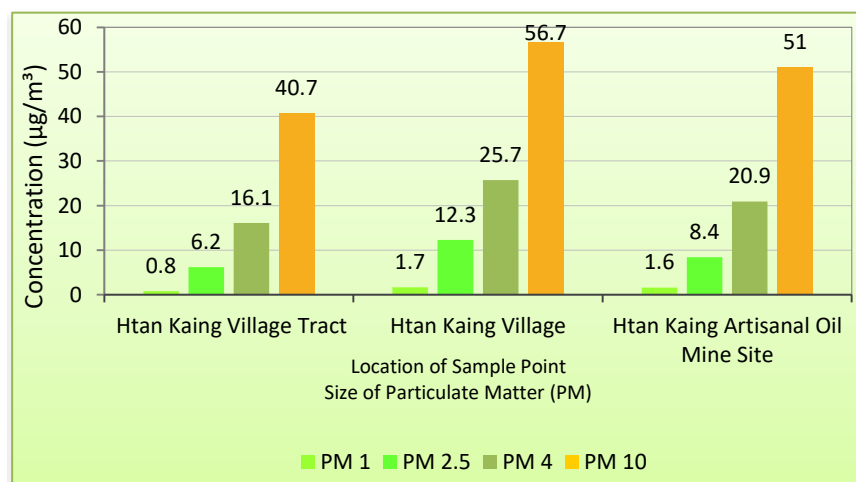
Quality of air, water and soil at oil mining site are the most important for occupational health of miners. According to the result of lab experiment, the air of artisan oil mine site at during the operating time has high impact on level of air pollution about (Unhealthy 151 to 200 $\mu\text{g}/\text{m}^3$) but have low impact on break time and after operating (Good to Moderate <50 to >50 $\mu\text{g}/\text{m}^3$) at nearby oil mining site. This condition may have challenges on safety and health of miners (Figure 10 and Figure 11).

Oil mining produce toxic waste can cause contamination of soil (Soil pollution) and water. Lead (Pb) concentration is more than 0.05 mg/l in water and 200 mg/kg in soil can cause toxicity, it can cause neurological damage as well as anemia. The main effects of Cadmium (Cd) poisoning are weak and brittle bones, other complications include coughing, anemia and kidney failure, leading to death. At the present, artisanal miners suffering from respiratory diseases, loose of hearing, muscle pain, lung damage, eye and skin diseases at Htan Kaing artisanal oil mining site.



Source: PM data collection with Aerosol Mass Monitor at study area.

Figure 10 Variation of particulate matter (PM) (Air Quality/ Pollution) at operating time.



Source: PM data collection with Aerosol Mass Monitor at study area.

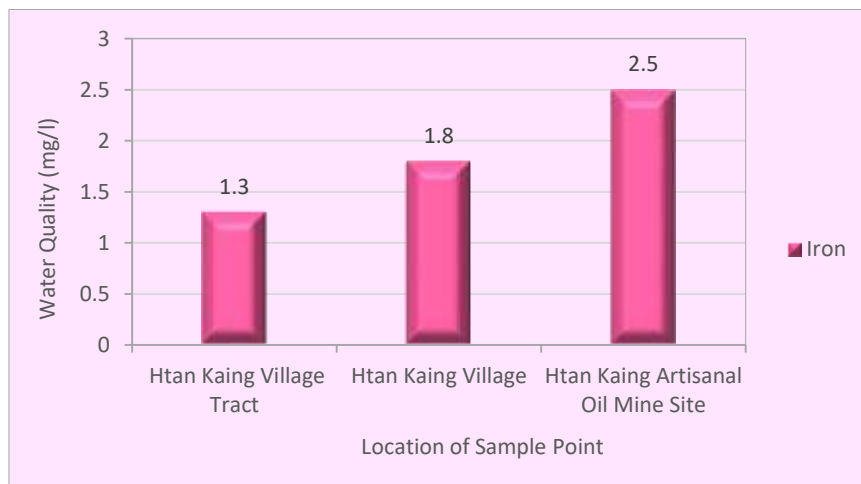
Figure 11 Variation of particulate matter (PM) (Air Quality/ Pollution) at break time.

The result of field survey and lab experiments indicates that high iron (Fe) content 2.5 mg/l in water and 9.82 mg/kg in soil is outside the range of desirable level of WHO standard (Figure 12, 13 and 14). Some houses have surface wells and tube well, but the water from most of is not suitable for drinking purpose. Most of the miners live at temporary shelter at mining site, they use stream water and they drink it without boiling. Therefore, it is not safe for domestic water use in this Htan Kaing artisan oil mining area.



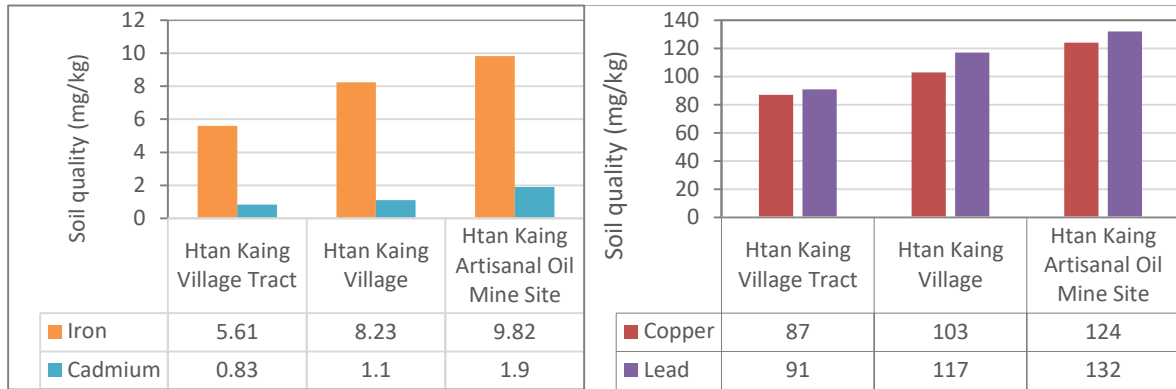
Source: University Research Centre (URC) Lab, University of Magway.

Figure 12 Result of chemical test for water quality (Lead, Copper & Cadmium) at study area Htan Kaing, Minhla Township.



Source: University Research Centre (URC) Lab, University of Magway

Figure 13 Result of chemical test for water quality (Iron) at study area Htan Kaing, Minhla Township.



Source: University Research Centre (URC) Lab, University of Magway

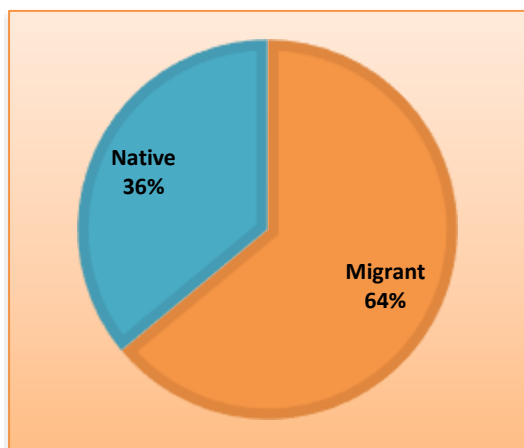
Figure 14 Result of chemical test for soil quality (Iron, Cadmium, Copper and Lead) at study area Htan Kaing, Minhla Township.

Opportunities

An overwhelming, majority of artisanal miners are not native to Minhla Township and come from across the country (figure 15). Among the respondents, 64 percent from Central Myanmar and Rakhine State. This is the important expectation to find opportunities that would allow them to support their families for their livelihoods.

Majority of the respondents (over 60 percent) had jobs before they became artisanal miners/ hand-pickers, but about over 30 percent of respondents had never experienced a paid job. Conditionally on having worked before, they most commonly worked in the agricultural farming, some were working in the private or their own business as shop keepers, carpenters, drivers, motor bike repairers, etc.

Most of the artisan oil mining activities are family basis, some of the families of miners worked as miscellaneous shop, small shopkeepers as hand tools for mining, spare parts of light machine, etc. some are taking care of their children at home in mining area. In terms of assets, 63.45 percent of the respondents possess television set, mobile phone and motorcycle, whereas 26.31 percent owns two of these items. (Figure 16).



Source: Results of structure interviews and field survey, 2019.

Figure 15 Natives versus migrants

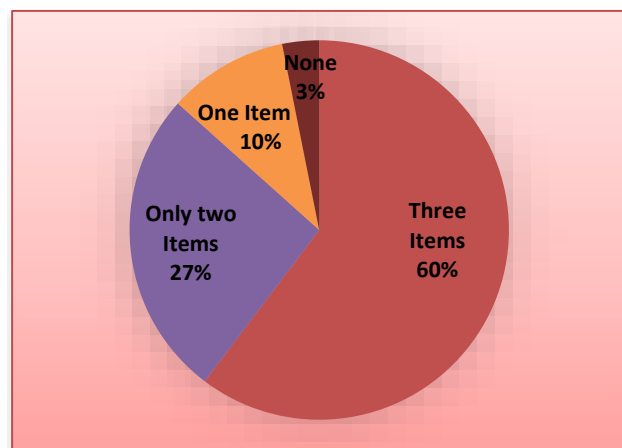
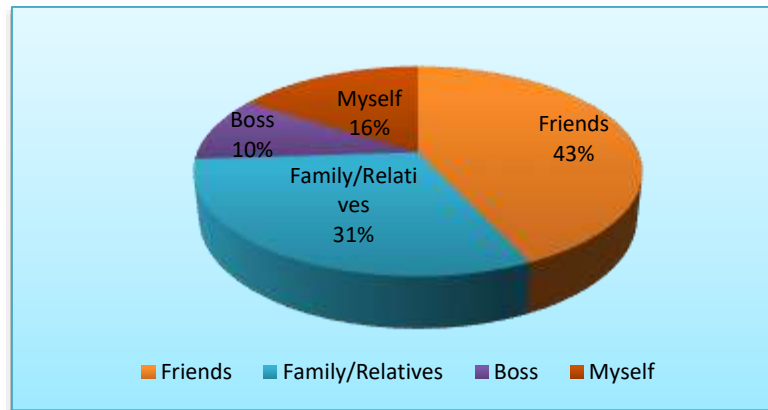


Figure 16 Type of asset owned by artisanal miners.

According to the result of structured interviews, the average monthly income of artisan oil miners is over 300,000 Kyats, compared to Myanmar's average monthly income of approximately 169,000 kyats. The miners earned more than 30% what they earned before becoming artisanal miners. This is a major opportunity for artisan miners.

Artisanal miners most commonly acquire their oil mining skills, though (43%) of respondents received oil mining skills from their friends. Others have acquired their skills via family and relatives (31%). Some only (10%) learned their skills from their boss. Interestingly, artisanal miners (16 %) claimed to acquire their skills by themselves (Figure 17).



Source: Results of structure interviews and field survey, 2019.

Figure 17 How artisanal miners acquire mining skills.

Discussion and Conclusion

According to the result of structured interviews, average monthly income of artisan oil miners is over 300,000 Kyats, compared to Myanmar's average monthly income of approximately 169,000 kyats (Labour Force Survey 2017). The miners earned 30% more than what they earned before becoming artisanal miners. Important in this is also the expectation to find opportunities that would allow them to support their families for their livelihoods. Judging by the miner's own estimates, entering the artisanal oil mining did bring them some of the expected economic benefits. The monthly incomes of those who chose to become artisanal oil miners nearly doubled compared to what they earned before.

Occupational safety and health are major challenge of artisanal oil miners. They were suffering from respiratory symptoms related to air pollutant (particulate matter) especially during operating time at artisan mine site level of air pollution is about (Unhealthy 151 to 200 $\mu\text{g}/\text{m}^3$). Field survey and lab experiments indicates that high iron (Fe) content was (2.5 mg/l) in water and (9.82 mg/kg) in soil is outside the range of desirable level of WHO standard (2011). Some houses have surface wells and tube well, but the water from most of them is not good quality water and it is not suitable for drinking purpose. Most of the miners live at temporary shelter at mining site, is they use stream water and they drink it without boiling. Therefore, not safe is domestic water use is not safe in this Htan Kaing artisan oil mining area.

According to the results of the survey, some suggestions to artisanal oil mining activities in Htan Kaing area, Minhla Township, Magway Region are as follows:- Artisanal oil miners should be more aware of safety procedures as a way of reducing the challenges associated with their

occupation at the mining areas. Key stakeholders and responsible administrative officials should collaborate freely. Government should work with NGOs to provide education for miners as training that focuses on practical mining, health and work safety issues, and the reduction of environmental and social impacts. The government and NGOs should collaborate in raising awareness on those of artisanal oil miners.

Research paper concludes that the government and other key stakeholders including non-governmental organizations (NGOs) could make progress towards a sustainable artisanal oil mining sector by addressing the safety issues of miners, formalizing artisanal miners, enhancing coordination between key stakeholders, increasing the role of local governments in managing artisanal mining and providing miners' welfare and education programmes.

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