Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC
Швейцарийн хөгжлийн агентлаг

MNUMS SCHOOL OF PUBLIC HEALTH

World Health Organization
Western Pacific Region

RAPID ASSESSMENT OF THE HEALTH SITUATION OF ARTISANAL MINERS AND THEIR FAMILIES IN MONGOLIA

ULAANBAATAR
2014

ACKNOWLEDGEMENTS

This report details the findings of a rapid assessment conducted by the Mongolian National University of Medical Sciences, School of Public Health (HSUM) and the National Public Health Centre (NPHC). The principle investigator was O.Chimedsuren, PhD, Professor, HSUM, SPH and the Research Coordinator was E.Erdenechimeg, PhD, HSUM, SPH. Additional members of the Research Team and their respective roles and contributions are described below:

Researchers:

Ch.Tsolmon, PhD, Professor, MNUMS, SPH
N.Khuderchuluun, Dr of PH, MNUMS, SPH
D.Naransukh, MScPH, MNUMS, SPH
S.Myagmarchuluun, MPH, MNUMS, SPH
E.Zoljargal, MPH, NPHC
A.Erdenebat, NPHC
G.Nasantogtokh, NPHC
D.Oyunbileg, MPH, NPHC
D.Oyunbileg, MPH, Dornogobi Medical School, SPH PhD student
G.Undrakh, SPH Master's student

Report developed by:

O.Chimedsuren, PhD, Professor, MNUMS, SPH
E.Erdenechimeg, PhD, MNUMS, SPH

Edited by:

Ch.Tsolmon, PhD, Professor, MNUMS, SPH

Translated by:

D. Saintuya, MD, MPH

Statistical analysis by:

N.Khuderchuluun, Dr of PH, MNUMS, SPH
E.Erdenechimeg, PhD, MNUMS, SPH
O.Chimedsuren, PhD, Professor, MNUMS, SPH

Technical and financial support was provided by the World Health Organization and the Sustainable Artisanal Mining (SAM) Project. Financial support provided by the Swiss Development Cooperation is gratefully acknowledged.

CONTENTS

TABLES AND FIGURES

EXECUTIVE SUMMARY

The health impacts of artisanal mining can be considerable, negative, and are most often borne by the weakest segments of society, i.e. poor men, women and children living and working in close proximity to this form of mineral resource extraction activities.

Available information about the health conditions of ASM miners and their families in Mongolia is scanty and outdated. The most recent surveys were conducted in 2006 by the ILO, in 2007 UNFPA and School of Public Health, and in 2011 by the Sustainable Artisanal Mining Project, where health issues were considered as part of a wider socio-economic survey on ASM. The specific objective of the assessment was to generate insights about the current health situation of artisanal and small-scale miners (and their family members), so as to inform the development of a public health strategy or health sector response to the issue. The survey was conducted in 7 provinces and Ulaanbaatar city. Data and information collected as part of the rapid assessment was gathered using key informant interviews; focus group discussions; and questionnaires. In total 276 artisanal small-scale miners, 54 key informant interviews, and 28 (167 doctors, health workers, and ASM miners) focus group discussions were conducted. Fifteen health care facilities were surveyed using a standardized questionnaire that was developed based on an adapted version of the WHO Service Availability and Readiness Assessment (SARA) tool. The most common diseases prevalent among ASM miners and their families are pneumoconiosis, kidney and urinary tract disorders, joint disorders, STDs, and tuberculosis. Miners are not accustomed to use personal protective equipment and an adverse behaviour of seeking health care only after becoming sick persists. The majority of ASM miners are organized in the form of partnerships and NGOs and, although this led to progress in improving their health and occupational safety, access to and quality of health care services remain inadequate. The supply of basic medical equipment in rural health centers is good, however, the supply of specialized medical equipment and diagnostic capacity is inadequate.

With large number of miners working in some ASM mines, which is increased by migrant workers coming from other areas, it is difficult to obtain needed health care services. On the other hand, large number of migrant workers leads to overload of budget, human resources, and drug supply capacity of local health organizations. A special consideration at local and soum level needed for prevention, control, emergency treatment, and diagnosis of occupational diseases, accidents and injuries, and chemical poisoning among ASM miners, as well as strengthening capacity of doctors and medical staff of health care centres and improving service readiness.

1. INTRODUCTION

1.1. Health issues associated with artisanal and small-scale mining

More than 100 million people throughout the developing world directly or indirectly depend on artisanal and small-scale mining for their livelihood (ILO, 2001). In many parts of the world, artisanal mining activities are at least as important as large-scale mining activities, particularly in terms of the numbers of people employed (ICMM, CASM, Worldbank, CommDev, 2008).

The health impacts of artisanal mining can be considerable, negative, and are most often borne by the weakest segments of society, i.e. poor men, women and children living and working in close proximity to this form of mineral resource extraction activities.

Common characteristics of artisanal mining that have implications for health include:

- Unsafe working conditions: Artisanal miners work under strenuous and unsafe conditions often for extended periods. Typical health problems associated with this work include injuries (e.g. from falls); burns, and a range of respiratory conditions (e.g. silicosis, tuberculosis), resulting from exposure to dust and other air-borne particles. Musculoskeletal issues are common particularly where miners engage in digging, heavy lifting, and manual crushing of the ore. Some forms of artisanal mining, in particular artisanal gold mining has associated chemical hazards, for example where mercury or cyanide is used for amalgamation of gold;
- Lack of access to basic social services, including health care: Many artisanal miners (and their families) do not have access to basic social protection instruments, including health insurance because of their "employment" in the informal sector. Cost, distance to health care facilities, and lack of awareness are additional barriers affecting access to health care.
- Environmental degradation and contamination: Artisanal mining is also associated with environmental degradation and pollution, which poses threats to health of the miners (and their families) as well as surrounding communities. For example, artisanal and small-scale gold mining (ASGM) has been identified as the largest single source of anthropogenic releases of mercury into the environment (UNEP, 2013)
- Difficult socio-economic conditions: Many artisanal miners are poor and lack alternative sources of income or livelihood. Artisanal mining sites, particularly ones that are informal and/or temporary/make-shift, often lack basic infrastructure and services, including security (civil protection). Corruption, crime, prostitution, and violence can be common. Child labour is also a concern in some contexts.

1.2. Rationale and context for the rapid assessment

For many Mongolians, artisanal and small-scale mining is an important source of income, particularly for the rural poor and unemployed. The World Bank estimated in 2006, that nearly 100,000 people – or 4% of the population at that time – were dependent on artisanal mining for their livelihoods (Navch, 2006). Anecdotal reports suggest that artisanal and small scale mining continues to be an important a source of income for many people.

Available information about the health conditions of ASM miners and their families in Mongolia is scanty and outdated. The most recent surveys were conducted in 2006 by the ILO, in 2007 UNFPA and School of Public Health, and in 2011 by the Sustainable Artisanal Mining Project, where health issues were considered as part of a wider socio-economic survey on ASM.

Given concerns about the importance of ASM as a source of income in Mongolia, and related concerns about the lack of update to date

information about associated environmental and health problems associated with ASM, a rapid assessment was undertaken.

The specific objective of the assessment was to generate insights about the current health situation of artisanal and small-scale miners (and their family members), so as to inform the development of a public health strategy or health sector response to the issue. Integral to this assessment was the need to consider: a) health concerns of relevance to ASM in a Mongolian context; b) health care seeking behaviour of artisanal and small-scale miners; and c) the relative readiness of the health system, to respond to ASM related health issues in particular at the local level where ASM activities are taking place.

This report provides details about the findings of the above described assessment.

- Linkages with the Minamata Convention on Mercury and related provisions on ASGM

Artisanal and small-scale gold mining (ASGM) is the predominant form of artisanal mining in Mongolia and accounts for nearly 80% of all ASM in Mongolia (National Statistics Office, 2013).

Studies conducted by WHO (2006) and by the Toxicology Department of the National Centre for Public Health (2011) documented cases of mercury poisoning among individuals involved in ASGM. Although banned from use, findings from these surveys suggest that mercury is still being used for gold amalgamation in Mongolia.

In October 2013, the first international environmental agreement on mercury - the Minamata Convention - was adopted.[1] Several articles under this agreement call for action, in particular by the health sector, to address the health impacts of exposure to mercury and mercury containing products. ASGM is the single largest anthropogenic source of mercury emissions to the environment (UNEP, 2013). For this reason, under the Convention, under Article 7, Parties to the Convention with more than insignificant amounts of artisanal and small-scale gold mining are required to develop and implement National Action Plans on ASGM. These National Action Plans or NAPs must also include a public health strategy on ASGM.[2]

The findings of this rapid health assessment are intended to inform the development of a public health strategy on artisanal and small-scale mining for Mongolia. Included within this will be specific measures to prevent and address health issues associated with exposure to mercury. In this way, although not initially conceived to facilitate implementation of the Minamata Convention provisions related to ASGM (because the project was initiated prior to its adoption), the results of this assessment may be relevant should Mongolia choose to develop a NAP in the future.

- Linkages with other activities on artisanal mining and health in Mongolia

In May 2013, the National Centre for Public Health under the auspices of the Ministry of Health, with technical and financial support from the WHO, delivered a training-of-trainers workshop for medical professionals on how to identify and address health issues associated with artisanal and small-scale mining. Participants were sensitized about how to identify and diagnose particular types of health problems, such as mercury and cyanide poisoning. They were also provided with information and guidance on how to raise awareness among ASM communities about opportunities to adopt safer and more environmentally friendly working practices. A special focus on environmental health issues of relevance to children was also included.

Included within the above course was a module on health systems readiness to respond to health issues associated with ASM. In this session, course participants – comprised approximately 40soum doctors working in 11 aimags host to ASM – were invited to share experiences and insights about opportunities to strengthen the health sector's institutional capacity to respond. Insights and recommendations provided by this group have been incorporated into the findings of this survey (WHO, 2013).

1. *Mongolia is a signatory to the Minamata Convention.*

2. *Under Article 7 of the Convention, as articulate in Annex C, item (h), National Action Plans must include a public health strategy on the exposure of ASGM miners and their communities to mercury. Such strategies should include, inter alia, the gathering of health data, training for health care workers and awareness-raising through health facilities.*

1.3. Structure of the report

Part 2 of the report provides an overview of the overall approach and research methods used to carry out the rapid assessment. The scope of coverage of the assessment and related limitations and assumptions are also clarified.

A description of the health situation of artisanal miners is provided in Part 3. Information provided represents the view of artisanal miners as well as the perspective of health care providers working in areas/locations host to ASM.

Part 4 describes ASM working conditions and miners perceptions of risk, including measures (behaviours) taken to address them.

Health systems readiness, in particular at the local level, to respond to health issues commonly associated with ASM is described in Part 5.

Key findings and recommendations are provided in Part 6 and Part 7 respectively.

In all sections, relevant quantitative and qualitative information is provided. Boxes with statements obtained during the key informant interviews and focus group discussions are also included where appropriate.

Copies of all tools used to gather data, including the interview guides, questionnaires, and health facility assessments included in Annex 4.

2. RESEARCH METHODS AND APPROACH

2.1. Scope of issues covered in the assessment

The scope of health issues considered primarily covers proximal environmental and occupational factors that are directly impacting on the health of miners and surrounding communities. Indirect (or distal) factors, for example related to the social environment (e.g. implications of poverty, education status, gender, lack of security/crime/corruption), were considered where relevant, but were not explored in detail as this was considered outside of the scope of the assessment.

The assessment was not intended to generate in-depth epidemiological data about the health impacts of ASM; i.e. it was not meant to be a baseline study. For this reason, bio-monitoring activities (e.g. hair, blood, urine sampling) were not undertaken.

As the primary aim of the rapid assessment was to inform the development of a health sector response to artisanal and small-scale mining, significant emphasis was placed on examining the interface between ASM miners and the health system. One the one hand this involved looking at demand for health care services among ASM miners, including factors that might influence their health care seeking behaviour. One the other hand, it involved looking at supply (availability and quality) of health care services, and in particular whether or not institutional structures in place were adequately set up to respond to health issues commonly associated with ASM.

In addition to the above, the survey also aimed to explore ASM miner's perceptions of their health and of the safety of their working practices and conditions.

While the findings and results of the survey are disaggregated by gender, and to some extent age, particular focus was not given to any one group (or role) within the ASM community. [3]

2.2. Information sources and data gathering approach

Quantitative and qualitative data was gathered from a variety of sources, including:

- Review of available literature and reports produced on ASM in Mongolia
- Key informant interviews with miners and with health care providers
- Focus group discussions
- Observation and site visits
- A survey using a standardized questionnaire
- A facility based survey using a standardized questionnaire (using an adapted version of the WHO Health Services Availability and Readiness Assessment or SARA tool)
- A review of available statistical data

Local level data collection activities took place between August and November 2013. The names and locations of participating aimags (provinces) and soums (districts) as well as details on survey sample sizes are described in the following section as well as in Annex 1.

The questionnaire and interview guides were pilot-tested and refined so as to ensure clarity of questions, timing, and acceptance by study participants. The survey tools were also reviewed by the project Steering Group and updated based on recommendations provided.

Quantitative data on ASM miners was obtained from statistical reports provided by the participating soums (districts).

2.3. Sample size and selection criteria

Key informant interviews were conducted with 52 individuals, representing the following stakeholder groups: Local government officials (e.g. district, soum governors and deputy governors); Environmental and Occupational Health Inspectors; Heads of Hospitals; Civil Society Organizations working on ASM related issues; and Miners'

[3] *While child labour has been raised as a particular concern in association with artisanal mining, including in the Mongolian context, this issue was not explicitly considered in the context of the survey. Several other development organizations, such as the ILO and World Vision were already working on this, and it was considered too complex (and too sensitive) an issue to tackle in the context of a health assessment.*

representatives. See Annex 4 for copies of the interview guides used for each stakeholder group.

A total of 28 focus group discussions took place involving a total of 167 people participants. These groups were largely comprised of health care professionals (physicians, nurses, public health workers, feldshers) and artisanal and small-scale miners and their family members, respectively. Discussion guides used by facilitators that conducted the focus group sessions are included in Annex 4.

While artisanal gold mining (ASGM) is the dominant form of artisanal mining in Mongolia, other types of artisanal mining, e.g. coal mining and mining for fluorite are also prevalent. These other forms of ASM have different, associated health considerations that would not have been captured if the survey were to have focused only on ASGM. Therefore a smaller, but representative sample of miners engaged in these other forms of artisanal and small scale mining were also included in the survey.

The majority of survey participants were selected using the chain, or snowball sampling method. The rationale for using this method was to try to select individuals that would be as information-rich as possible. A small proportion of survey participants were selected at random. In total, 288 ASM miners and 15 health care providers were interviewed using the standardized questionnaire.

"ASM miners" were defined as follows:

1. Currently engaged in mining activities;
2. Working in rock and placer gold deposits; or
3. Working in fluorite and coal deposits.

Fifteen (15) health care facilities were surveyed using a standardized questionnaire that was developed based on an adapted version of the WHO Service Availability and Readiness Assessment (SARA) tool. Additional questions were included within the existing SARA framework to determine readiness to deal with common environmental and occupational health problems associated with ASM. These included capacity to deal with poisonings, in particular mercury and cyanide poisoning, availability of basic occupational health services, and capacity to deal with trauma including burns. Basic laboratory capacity available was also considered. The adapted SARA tool used for the health facility survey is also included in Annex 3.

2.4. Analytical methods used

Data from the qualitative research was sorted by content meaning, similar ideas, and content interaction, and was combined into a single table. A master page was created and data analysis performed. Quantitative date gathered using the standardized questionnaires was processed using SPSS17.0.

2.5. Limitation of the study

Artisanal and small-scale mining activity in Mongolia is often seasonal. For example, the survey findings showed that coal miners tend not to work in the summer months, while gold and fluorspar miners tended to be active all year round. The timing of the survey was selected so as to ensure maximum access and movement of the survey team (it is difficult to travel to some of the more remote locations due to harsh weather conditions in the winter months) while at the same time trying to ensure that the survey would take place when there was the largest possible pool of miners that could be included in the survey. It is possible however, that the timing of the survey did not coincide with the "peak" season for some of the types of ASM considered.

In some locations, in particular Jargalant soum, artisanal miners were no longer active. Therefore, questionnaires were given to former miners.

It was assumed at the outset that the majority of miners were engaged in ASM activities on a transient and/or mobile basis. In other words, when the deposits were depleted, they would move to new sites thus becoming migrants. However, most of the miners surveyed were in fact resident in the areas in which they were mining. Therefore it was not possible to explore in depth issues relevant to migrant ASM miners.

There were difficulties in obtaining data from health care facilities on ASM miners' hospital admissions, morbidity, and related economic costs due to absence of specific data on these indicators. For example, the ''employment status'' of ASM miners was not always formally recorded as such, therefore, it was not possible to disaggregate specific figures for the ASM community. In some locations, e.g. Biger soum, Gobi-Altai aimag, some of desired statistical data was not obtained due to long-term absence of the medical statistician.

3. THE HEALTH SITUATION OF ARTISANAL AND SMALL-SCALE MINERS

This chapter provides an overview of key health issues associated with ASM as reported by miners and by health care providers.

3.1. Common health issues identified by the artisanal miners

Following is a list of common health issues reported by the miners interviewed. The information is not presented in order of priority or significance:

- Respiratory problems: including pneumoconiosis, dust allergy, constant cough and sputum, chronic respiratory disease, and tuberculosis (Case 9)[4]. Dust was cited as one of the most important causes of respiratory problems among ASM miners;
- Heat and cold related illnesses: some miners reported that they had developed "cold allergies" largely as a result of spending significant amounts of time working underground or in adverse weather/ temperature conditions;
- Musculoskeletal disorders and injuries; including low-back pain, joint disorders, and trauma resulting for example because of a fall, rock or land-slide or an accident associated with the use of equipment/ machinery;
- Urinary tract disorders: urinary tract infections, incontinence and kidney pain;
- Cardiovascular diseases: in particular high-blood pressure.

Some of the responses provided (about common health problems) varied depending on type of mining and activity. For example, gold miners reported health conditions associated with dust, hot and cold work environment, working deep underground for long hours, and washing and sorting gold (Statement 1). Fluorite and coal miners highlighted pneumoconiosis, pulmonary calcification, limb disorders, and urinary tract and kidney disorders as main concerns.

Responses provided also varied according to the age of the respondent. Younger miners generally perceived themselves to be in good health and did not report many health concerns. Older miners tended to report that they suffered from chronic diseases such as cardiovascular diseases.

> ***Statement 1***
>
> *Because we crush rocks inside the deep pits for many hours, there is a lot of dust and its cold and humid. Therefore we get sick with cough, pneumonia and kidney disease. I was recently diagnosed with tuberculosis and I am getting treatment. For now, I work in the kitchen.*
>
> *Interview with miners, Bayangol soum, Selenge aimag*

Overall, musculoskeletal problems were the most commonly reported symptom/complaint (Table 1). This finding is consistent with the findings from a 2012 survey conducted by the National Statistics Office which found low back pain to be the most common symptom reported by artisanal miners. When stratified by gender, back and joint pain tended to be reported more frequently among male miners than among female miners, possibly because of divisions in tasks/activities. Males tended to be more involved in crushing and carrying ore, while women were more involved in washing and sifting it once crushed. This observation is consistent with findings of a recent gender assessment of small-scale mining in Mongolia (The Asia Foundation, 2013).

[4] *Some miners expressed concern that multi-drug resistant tuberculosis was also an issue.*

Table 1: Main health complaints (symptoms) reported by ASM miners

Indicators	Type of mining			Total
	Gold	Coal	Fluorite	
	% (n)	% (n)	% (n)	% (n)
Symptoms and complaints since started mining activities				
Tinnitus, or ringing of the ears	15.8 (31)	4.0 (1)	5.6(3)	12.7 (35)
Cough	19.9 (39)	**32.0 (8)**	**42.6 (23)**	**25.5 (70)**
Eye irritation, redness, dropping tears	**24.5 (48)**	0.0 (0)	11.1 (6)	19.6 (54)
Skin itching, rush	8.7 (17)	0.0 (0)	1.9 (1)	6.9 (19)
Swelling	13.3 (26)	4.0 (1)	7.4 (4)	11.3 (31)
Allergy	16.8 (33)	8.0 (2)	6 (11.1)	14.9 (41)
Frequent urination	14.8 (29)	4.0 (1)	3.7 (2)	11.3 (31)
Back pain	**54.1 (106)**	**32.0 (8)**	**51.9 (28)**	**51.6 (142)**
Joint pain	23.5 (46)	28.0 (7)	**33.3 (18)**	**32.7 (90)**
None	**26.5 (52)**	**32.0 (8)**	22.2 (12)	**25.5 (70)**
Other	2.6 (5)	0.0 (0)	0.0 (0)	1.8 (5)
Total	**100% (196)**	**100% (25)**	**100% (54)**	**100% (275)**

3.2. Common health issues identified by health care providers

Many of the health issues identified by the miners were similarly reported by health care providers. Medical professionals working in local areas (i.e. at the district/soum level) host to artisanal and small-scale mining activities identified the following (in addition to those listed in section 3.1):

- Reproductive health issues: including sexually transmitted infections, miscarriages and premature births. Many young people work seasonally on the mines, and STIs are reportedly a common problem presented to health clinics.[5] Pregnancy related issues were linked with excessive physical activity, e.g. heavy lifting;
- Non-communicable diseases: In addition to high-blood pressure and cardiovascular diseases identified by the miners, diabetes was also identified as a concern among older miners;
- Water and food borne diseases: Intestinal infections and food poisoning was identified as a common problem among miners children, particular in the summer months, when food storage and preservation (and transport) were cited as problematic (Statement 2);
- Eye problems: particularly eye redness and irritation.
- Dermal (skin) problems: including drying, cracking and abrasions;

[5] *The need for advocacy and training on reproductive health issues was similarly identified by female ASM miners working in one of the larger seasonal mining sites at Sharin Gol soum, in Darkhan-Uul aimag.*

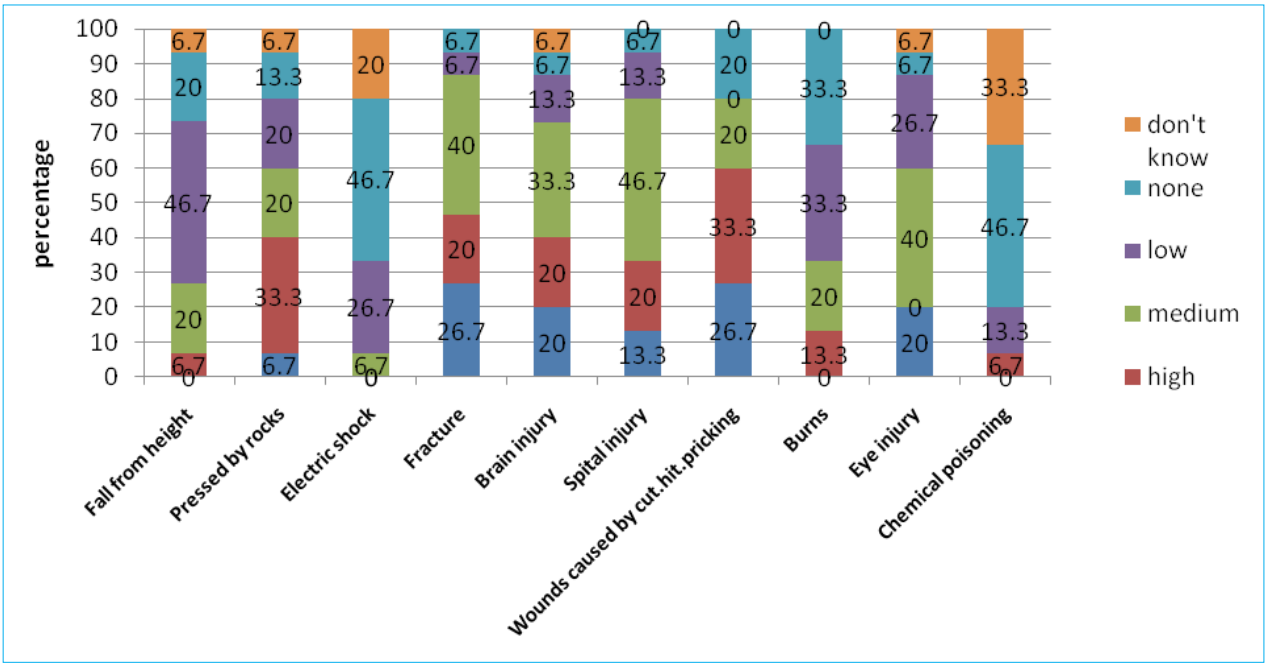
- Burns: primarily chemical burns resulting from the use of explosives in rock blasting;[6]
- Poisoning: for example from chemicals used for amalgamation of gold in ASGM (e.g. mercury, cyanide).[7]
- Accidents and injuries: including limb injury/ fracture, brain injury (head trauma), and wounds caused by cutting, hitting and pricking (Figure 1).

Statement 2

In summer children have diarrhea. Bag doctors themselves visit pregnant women and young children. Women have been having premature births.

Bumbugur soum hospital.
Bayankhongor aimag

Figure 1: Accidents and injuries among ASM miners, as reported by health care providers



[6] *The issue of burns was identified by participants (primarily soum doctors) in the WHO/MoH training workshop conducted in May 2013.*

[7] *Note: Previous surveys conducted by WHO (2006) and the Department of Toxicology at the National Centre for Public Health (2011) documented cases of mercury poisoning among artisanal and small-scale gold miners in Jargalant and Bornuur soums as well as in selected soums in Umnogobi. In the current survey, although specific details about poisoning cases were not provided, many health care providers consulted maintained the perception that chemicals (including mercury and cyanide) are still being used in artisanal and small-scale gold mining.*

4. OVERVIEW OF ASM WORKING CONDITIONS AND MINERS PERCEPTIONS OF RISK

Occupational health and safety was a key concern identified by virtually all stakeholder groups consulted as part of the rapid assessment, including the miners themselves.

The following chapter provides an overview of ASM related working conditions and practices (as reported by the miners).

- Nature of activities/work

The activities carried out by ASM miners that participated in the survey (Table 2) can be categorized as follows: 49% of miners carry and sift soil, 41% dig holes, 36.3% wash/pan for gold, 13% carry water, 10.9% crush rocks, and 2.1% use explosives.

Table 2: Types of activities carried out by ASM miners

Indicators	Type of mining			Total
	Gold	Coal	Fluorite	
	% (n)	% (n)	% (n)	% (n)
Digging holes	43.3 (85)	24 (6)	40.7 (22)	**41.0 (113)**
Carrying and sifting rock and soil	50.5 (99)	20 (5)	57.4 (31)	**49.0 (135)**
Washing/panning for gold	50.5 (99)	0 (0)	1.8 (1)	**36.3 (100)**
Explosion/detonation	2.5 (5)	0 (0)	1.8 (1)	2.1 (6)
Rock crushing	7.6 (15)	8.0 (2)	24 (13)	**10.9 (30)**
Extraction with mercury	2.0 (4)	0 (0)	0 (0)	1.4 (4)
Carrying water	14.2 (28)	0 (0)	14.8 (8)	13.0 (36)
Wage workers	7.6 (15)	20.0 (5)	0 (0)	7.2 (20)
Other	11.2 (22)	32.0 (8)	25.9 (14)	16.0 (44)
Total	**100% (196)**	**100% (25)**	**100% (54)**	**100% (275)**

Approximately one-third of individuals surveyed indicated that they spent significant amounts of time working underground. Of these, male gold miners spent an average 5.2 hours under ground, female gold miners 4.3 hours, male coal miners 8.0 hours, and male fluorite miners 6.6 hours, respectively.

Most miners surveyed (72.4%) only worked during the day, and rested for between 1 and 2 hours during their periods of work. Meals or sleep/rest was typically taken during rest periods.

Some individuals (26.9 %), primarily gold miners, reported that they worked both during the day and at night.

Most ASM miners (77.5%) reported that they had a hot meal at least once per day.

- Occupational health concerns and measures taken by the miners to address them

Key environmental (and occupational) health concerns identified by the ASM miners, listed in order of importance, and as shown in Table 3 below, included: dust and dirt; cold; humidity; heat, and noise.

Table 3: Occupational health risks (as reported by the miners)

Indicators	Type of mining			Total
	Gold	Coal	Fluorite	
	% (n)	% (n)	% (n)	% (n)
Most difficult working conditions				
Dust and dirt	73.4 (144)	76.0 (19)	79.6 (43)	74.9 (206)
Humidity	48.9 (96)	12.0 (3)	29.6 (16)	41.8 (115)
Heat	39.2 (77)	0 (0)	44.4 (24)	36.7 (101)
Cold	50.5 (99)	16.0 (4)	42.5 (23)	45.8 (126)
Noise	37.2 (73)	0 (0)	27.7 (15)	32.0 (88)
Dark	24.4 (48)	12.0 (3)	12.9 (7)	21.0 (58)
Lack of air	15.8 (31)	8.0 (2)	18.5 (10)	15.6 (43)
Stuffiness	10.2 (20)	0 (0)	18.5 (10)	10.9 (30)
Deep	11.7 (23)	4.0 (1)	20.3 (11)	12.7 (35)
Other	1.5 (3)	0(0)	0 (0)	1.0 (3)
Total	**100% (196)**	**100% (25)**	**100% (54)**	**100% (275)**

When asked about individual measures taken to protect against the above, most reported that they did not use personal protective equipment (PPE), apart from gloves – which were used by 98.1% of respondents.

Only one in two ASM miners used protective masks. Aprons and armlets were almost never used (Table 4).

Table 4: Use of personal protective clothing and equipment, by type of mining

Indicators	Type of mining			Total
	Gold	Coal	Fluorite	
	% (n)	% (n)	% (n)	% (n)
Types of personal protective clothing and equipment				
Helmets	34.5 (66)	23 (92.0)	83.0 (44)	49.4 (133)
Gloves	97.3 (186)	100 (25)	100 (53)	98.1 (264)
Masks	57.0 (109)	44.0 (11)	71.6 (38)	58.7 (158)
Particulate respirators	19.8 (38)	12.0 (3)	22.6 (12)	19.7 (53)
Armlets	4.1 (8)	4.0 (1)	11.3 (6)	5.5 (15)
Overalls	24.0 (46)	8.0 (2)	39.6 (21)	25.6 (69)
Fasteners	7.8 (15)	4.0 (1)	22.6 (12)	10.4 (28)
Fastening ropes	27.7 (53)	8.0 (2)	47.1 (25)	29.7 (80)
Aprons	3.1 (6)	0 (0)	0 (0)	2.2 (6)
Other	15.7 (3)	0 (0)	0 (0)	1.1 (3)
Total	**100% (196)**	**100% (25)**	**100% (54)**	**100% (275)**

The lack of use of PPE was also confirmed by the survey team who observed that few ASM miners work protective clothing, including dust masks.

Miners working deep underground reported that their nasal passages are often filled and clogged with dust and dirt and they clean the accumulated dust by digging it out by mechanical means. In spite of this problem, several reported that they did not wear masks.(Statement 3)

Statement 3

A friend of mine, 39 years old guy, died recently. He crushed rocks at the bottom of the over 50 meters deep pit in the mountain. When his nose was clogged with dust he used to clean it with a matchstick and the dust would come out in the form of a dust ball. He didnt use mask because it would make him feel stuffy. This dust clogged his lungs too and he died. In our place both young and old die because of the clogged lungs.

Interview with gold rock miners, Bayangol soum, Selenge aimag

When asked why they did not use personal protective equipment, different reasons were given. Responses ranged from not being accustomed to wearing them, cost, difficulty breathing, and interference with movement/ability to work.

When asked what was most needed in terms of personal protective equipment, 89.1% responded that it was gloves.

In spite of the fact that dust was identified as a primary occupational health hazard by the miners, only 58.7% and 19.7% of survey respondents indicated that they used masks and particulate respirators to prevent/limit inhalation of dust, respectively.

When posed questions posed about safety, and in particular risk for accidents and injuries, the majority (82.8%) reported that they had not had an accident or injury since they began artisanal and small scale mining. The majority also reported that the frequency of accidents was low– had occurred only once or twice in their ASM career.

The most commonly reported accidents were concussions (head injury) and trauma of the extremities (Table 5). When stratified by gender, male miners reported more frequent problems with trauma of the extremities. Females reported more problems concussions. These reports are consistent with the observations made by health care providers.

The main cause of work related accidents and injuries cited was poor (and unsafe) working conditions.

Table 5: Accidents and injuries among ASM miners (as reported by the miners)

Indicators	Gender		Total
	Men	Women	
	% (n)	% (n)	% (n)
Type of accident or injury			
Trauma of extremities	**43.3 (13)**	23.5 (4)	36.2 (17)
Burns	3.3 (1)	5.9 (1)	4.3 (2)
Falls from height	26.7 (8)	5.9 (1)	19.1 (9)
Concussion	36.7 (11)	**58.8 (10)**	44.7 (21)
Were hit	13.3 (4)	11.8 (2)	12.8 (6)
Were struck/pressed by falling rocks	6.7 (2)	0	4.3 (2)
Cause of accidents and injuries			
Related to working conditions	73.3 (22)	47.1 (8)	**63.8 (30)**
Caused by movement	13.3 (4)	29.4 (5)	19.1 (9)
Domestic injury	10.0 (3)	29.4 (5)	17.0 (8)
Related to excessive consumption of alcohol	3.3 (1)	0	2.1 (1)
Natural disaster	6.7 (2)	0	4.3 (2)
Total	**100% (30)**	**100% (17)**	**100% (47)**

5. ACCESSIBILITY AND QUALITY OF HEALTH SERVICES FOR ASM MINERS

This chapter provides insights about the interface between ASM miners (and their family members) and the health care system. Section 5.1 describes the conditions/circumstances under which miners seek health care (i.e. health seeking behaviour) and their perceptions about the availability (and quality) of services available.

The findings of the health systems readiness assessment are provided in Section 5.2. Included are comments about health care provider perceptions about the capacity of health systems to address ASM related health issues.

5.1. ASM miner health seeking behavior

58.5% of ASM miners reported that they received services from a medical facility in the past year. The majority of respondents (46.3%) obtained care at the soum (district) hospital, 27.0% at the aimag (provincial) hospital and 25.6% at a family health centre.

Most (71.3%) were first treated by a family physician (primary care doctor) or feldsher/nurse (35.3%). Table 6 below provides an overview of inpatient and outpatient services received by ASM miners.

Table 6: Types of medical services sought by ASM miners

Indicators	Type of mining			Total
	Gold	Coal	Fluorite	
	% (n)	% (n)	% (n)	% (n)
Emergency services via emergency calls	8.7 (17)	4.0 (1)	7.4 (4)	8.0 (22)
Went to soum family physician	56.1 (110)	68.0 (17)	57.4 (31)	57.5 (158)
Visited specialist	39.8 (78)	24.0 (6)	14.8 (8)	33.1 (91)
Was admitted to sanatorium	2.6 (5)	8.0 (2)	1.9 (1)	2.9 (8)
Was hospitalized	16.8 (33)	4.0 (1)	14.8 (8)	15.3 (42)
Received vaccine	1.5 (3)	0.0 (0)	0.0 (0)	1.1 (3)
Other	5.6 (11)	0.0 (0)	11 (20.4)	8.0 (22)
Never received medical care	3.6 (7)	0.0 (0)	1.9 (1)	2.9 (8)
Total	**100% (196)**	**100% (25)**	**100% (54)**	**100% (275)**

The majority (76.7%) of ASM miners said that it was possible to get timely medical help, i.e. within 1-2 hours.

For those that did experience problems in accessing health services, the main reasons cited included: lack of money (20.4%) and distance to health care facilities (16.4%).

Lack of health insurance was cited as a barrier for only 6.5% of respondents. As stated earlier, the sample size of uninsured ASM miners was too low to provide any substantive quantitative analysis. However, anecdotal reports gathered as part of discussions/ consultations convened as part of the survey suggest that lack of health insurance is an important barrier vis-a-vis access to health care services.[8] Data on health insurance coverage collected as part of the health care facility assessment provided (discussed in later in this report, Section 5.2.3) also indicate that health insurance coverage is a concern in several of the locations host to ASM that were included in the survey.

[8] *As indicated in the introductory section of this report, a key limitation of the assessment is that the vast majority of participants in the survey were found to be resident (and therefore registered) in the soums/locations in which they were working. As such, the survey was unable to sufficiently explore issues relevant for migrant populations.*

When asked for more details about cost related barriers, responses given were varied. Few indicated that they monitor spending on health care. They were however able to provide information about spending on (and cost of) food. The overall response rate to this question about spending on health care services was therefore too low to provide any meaningful analysis of ASM out-of-pocket payments for health care.

Distance to health care facilities was found to be more of an issue for artisanal gold miners than for coal and fluorite miners. This is likely a reflection of the fact that placer gold mining is taking place in more remote locations than the coal and fluorite mining.

81.5% of surveyed ASM miners responded that, although medical care is available, they still need specialized medical services, preventative physical examinations, medical examinations, and counselling. The need for trauma specialists particularly at the soum (district) hospital level (Statement 4) was one example cited. This comment is consistent with observations made by soum doctors, who also indicated that due to the frequency of accidents and injuries in ASM, more trauma surgeons/specialists were needed.

Statement 4

In case a bone is broken we have to bandage it somehow and go directly to Darkhan as there is no trauma surgeon in our soum, and neither is there someone to dress your wound if you break your bone. There is no doctor who can apply plaster. We have to travel to Darkhan for two hours to get medical help.

From focus group discussion, Sharin Gol miners, Darkhan-Uul aimag

Lack of supplies, in particular medicines, was another concern highlighted by ASM miners. Some reported that they had to bring their own medicines if/when in need of treatment(Statement 5). Soum doctors also confirmed that medicine shortages are a concern particularly in contexts were large numbers of unregistered patients seek services (Statement 6). Findings from the health services readiness assessment, which are discussed in greater detail in the next section, however, indicate that on average most essential medicines (84.4%) were available in the surveyed health care facilities. Further review/ analysis of the availability of medicines may be warranted as this latter finding is inconsistent with the reports provided during the interviews.

Statement 5

There was a rumour among our people that if you need to go to the hospital you better go there in the beginning of the month, otherwise, at the end of the month there would be no medications in the hospital. Lately, people have to bring with them their own medications. If you are lucky, you will be accepted to the hospital in the beginning of the month and there will be medicines available, otherwise later there will be none.

From focus group discussion, Sharin Gol miners, Darkhan-Uul aimag

Statement 6

Since there is no specific amendment for miners in the hospital budget, it is difficult to organize scheduled preventative medical examinations. Although the drug supply is 89%, it is clear that our soum hospital's capacity will not be able to keep up with the growing demands of the fluorite mine if it will be developed into a large enterprise.

Health centre of Huld soum, Dundgobi aimag

5.2. Health services readiness in areas host to ASM

The adapted WHO Health Services Availability and Readiness Assessment (SARA) was conducted in the 15 health care facilities that participated in the survey (See Annex 1 for an overview of health care facilities visited and Annex 2 for a copy of the survey).

In order to assess health service availability and readiness, questions about services related to the management of the following ASM related environmental and occupational health issues were incorporated:

- Diagnosis and treatment of occupational diseases;
- Diagnosis and treatment of chemical poisoning, in particular mercury poisoning;
- Trauma care;
- Treatment/management of burns, in particular chemical burns;

- Capacity to respond to a chemical emergency, for example in the context of an accident involving acute cyanide poisoning.

Questions were asked about availability of human resources to support the above (both general and specialist capacity), availability of supplies (e.g. medicines, medical equipment), and laboratory and diagnostic capacity.

In addition to the above questions specifically focused on ASM related health services, a general service readiness assessment was carried out in the participating health care facilities.

5.2.1. Human resources capacity

- At the soum health centres

According to the soum health centre (SHC) structure and operational standards adopted in Mongolia, soum health centres are classified into three categories depending on the population size, distance from the aimag center, and the time required to travel to the aimag center (MNS55:2013). Based on these criteria, the number (and specialization) of medical professionals required for the SHC is determined. For example, this would specify the number of general practitioners, nurses, and specialist doctors (e.g. family and traditional doctors, paediatricians, surgeons, obstetricians and gynaecologists, facial and orthopaedic surgeons, and rehabilitation physicians) needed based on the SHC category, population size served, type of health care services provided, leading local causes of morbidity, and health care service needs.

Compared against these national standards, five or 1/3 of the soum health centres surveyed did not have adequate human resource capacity to provide general services. In terms of human resource capacity to address ASM related health issues, none of the health care facilities had specialist expertise in occupational health, toxicology, or trauma (accident/injury).While most health care facilities did have a laboratory technician, the functionality of these labs was quite limited. No laboratories surveyed had capacity to detect chemical poisoning, and in particular mercury poisoning.[9]

- At the family health centres

The Mongolia family health centre (FHC) structure and operational standards specify required human resources for FHCs based on the population size served. A ratio of one medical doctor per 1,800-2,000 people and 1-2 nurses per one doctor are indicated. Although the number of doctors and health workers in the 10 family health centres included in the survey met the number stipulated in the standards, the health care providers working in these FHCs indicated that the actual catchment population they are serving is much larger than the officially registered population due to the presence of a large number of non-registered/migrant ASM miners. [10]

5.2.2. Infrastructure and availability of basic supplies and equipment

- Information and communications technology (ICT)

Lack of telecommunications was not a problem in most of the health care facilities surveyed. 11 (73.3%) had a functioning land line telephone to receive emergency calls 24-hours a day. Eight (53.3%) used health centre provided cellular phones. All health centres had functioning computers, and all but one had access to the Internet.

- Power and energy

All health care facilities were connected to the central supply electricity grid. However, reliability of electricity was an issue. 10 or 66.7% experienced interrupted electricity for 2 hours and less at a time during health service delivery in the past 7 days. Six health centres used fuel operated generators for back-up power. One health centre used a battery operated generator. None of the health centres had a solar system.

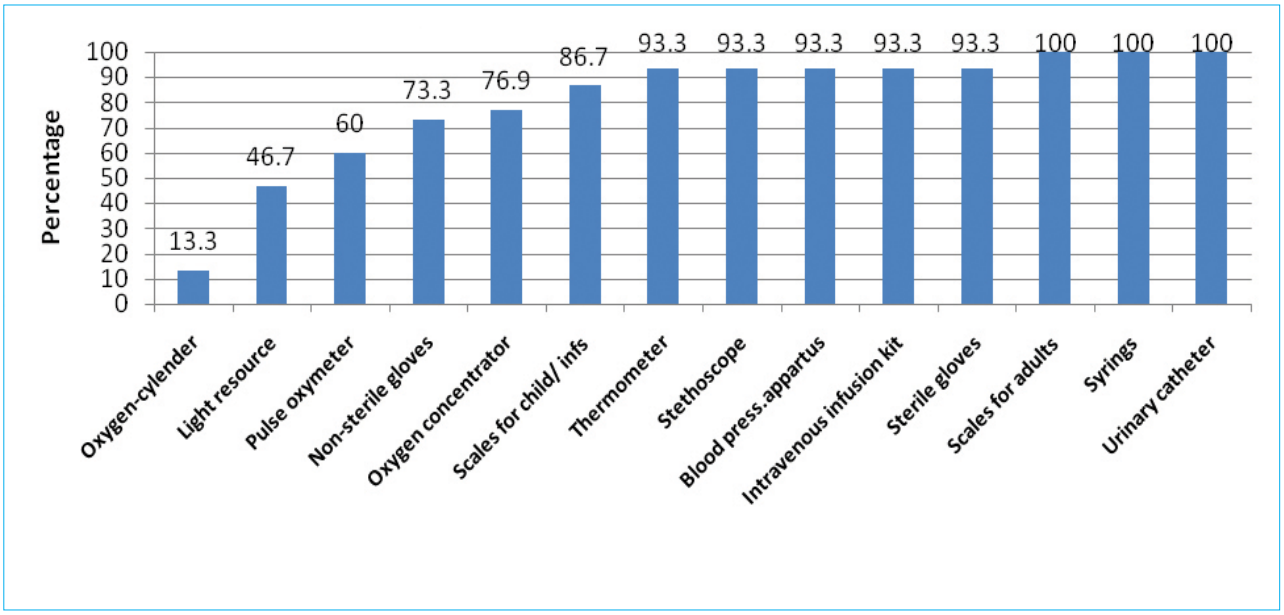
- Availability of basic medical equipment and supplies

Figure 2 provides an overview of data on basic equipment used in health centres. Oxygen cylinders, lighting were the main items missing in most facilities.

[9] *In 2008, WHO conducted a rapid assessment of national capacities in place to support the sound management of chemicals. At that time, several issues related to laboratory capacity for chemical analysis were identified and included: lack of equipment, maintenance/spare parts; need for training; limited quality control including lack of international accreditation.*

[10] *While the sample of miners included in the survey did not include a large number of uninsured and/or unregistered individuals, comments about the need to provide care to migrant populations were common among medical professionals, local government officers, and professional inspection officers suggesting that this is an issue that, while not reflected among the miner population surveyed, is an issue of concern.*

Figure 2: Availability of basic medical equipment and supplies



- Availability of essential medicines

The supply of total 32 essential drugs necessary for delivery of health care services by health centres was analyzed (Table 7). 27 or 84.4% out of 32 essential drugs were available on average across the facilities visited. However, some drugs such as glibenclamide, beclomethasone (inhaler), hydrocortisone, misoprostol, and insulin (injection) were not available in sufficient supply.

Table 7: Availability of essential medicines

№	Drugs and consumables available	Observed, %		Not observed, %		
		Valid	Expired	Reported available but not seen	Not available today	Never available
1	Metformin cap/tab	86.7				13.3
2	Glibenclamide cap/tab	40.0	6.7	6.7	20.0	26.7
3	Insulin injection	66.7	20.0			13.3
4	Glucose injectable solution	100.0				
5	Enalapril	86.7				13.3
6	Thiazides	73.3	6.7			20.0
7	Amlodipine	80.0				20.0
8	Aspirin cap/ tab	100.0				
9	Salbutamol inhaler	93.3			6.7	
10	Beclomethasone, inhaler	26.7	13.3	6.7	40.0	13.3
11	Prednizolone, tab	93.3	6.7			
12	Hydrocortizone, cap/tab	46.7	13.3	6.7	26.7	6.7
13	Adrenaline/ Epinephrine injection	73.3	6.7	6.7	13.3	
14	Amoxicillin 500mg	100.0				
15	Atenolol 50mg cap/tab	100.0				
16	Captopril 25mg cap/tab	93.3				6.7
17	Cefriaxone injection, 1g	80.0	6.7		13.3	
18	Ciprofloxacin, 500mg, cap/tab	86.7			6.7	6.7
19	Co-trimoxazole, suspension	80.0			13.3	6.7
20	Diazepam 5 mg cap/tab	100.0				
21	Diclofenac 50/75 mg cap/tab	100.0				
22	Omeprazole 20 mg cap/tab	93.3				6.7
23	Paracetamol	100.0				
24	Sodium chloride, injection	100.0				
25	Calcium gluconate, injection	100.0				
26	Marnesium, injection	100.0				
27	Ампicillin, injection	100.0				
28	Gentamycin, injection	93.3			6.7	
29	Metronidazol, injection	80.0		6.7	6.7	6.7
30	Misoprostol, cap/tab	40.0	20.0	6.7	13.3	20.0
31	Dexamethasone, injection	100.0				
32	Nifedipine cap/tab	100.0				

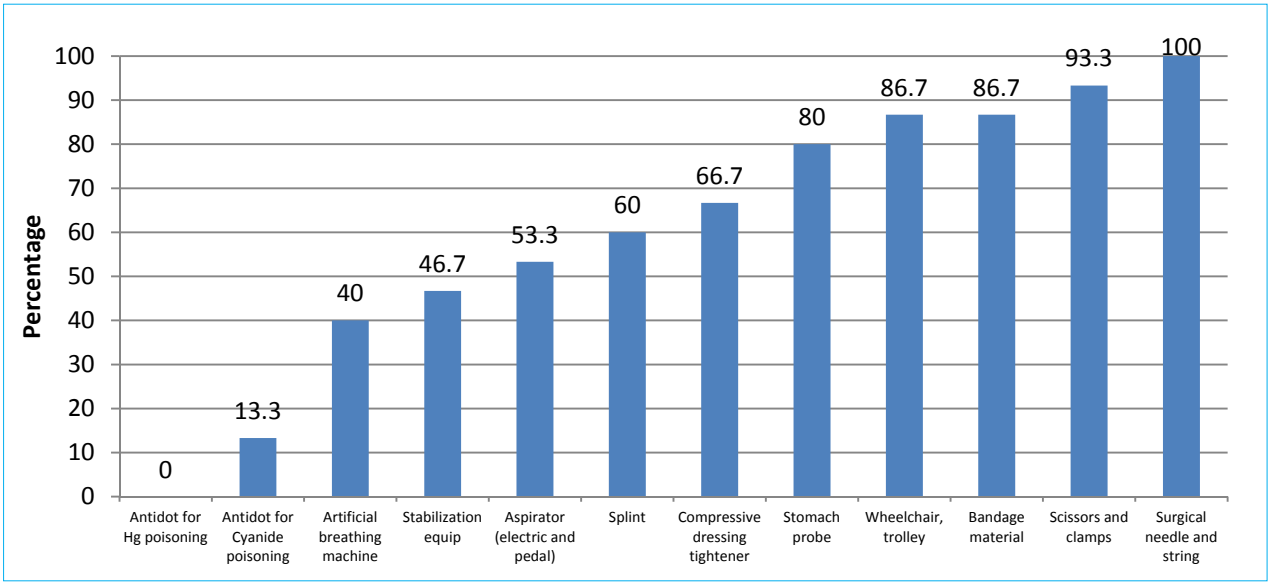
Shortages in availability of essential medicines for children under 5 years of age, in particular Paracetamol Syrup and zinc supplements were also identified.

- Availability of specialist equipment

Findings on supply of specialized equipment used to deliver medical care in case of accidents, injuries, and chemical poisoning are shown in the Figure 3. The responses from the health centres surveyed revealed that all centres lack mercury antidote, most (13) did not have cyanide antidote, 9 lacked artificial breathing equipment, 6 lacked splints and tongue elevators, 8 lacked stabilization equipments, 7 lacked aspirators, 2 lacked wheelchairs/trolleys and bandage material, 3 lacked stomach probes, and 5 lacked compressive dressing. The health centres surveyed were found to have insufficient capacity to provide emergency medical care in cases of accidents, injuries, and poisoning.

Lack of availability of medicines to treat mercury poisoning was also raised as a point of concern by health care providers both in focus group discussions and in the training-of-training course conducted in 2013. Reportedly one product, Unitol, manufactured in Russia was available in the past. However, as it is no longer on the national essential medicines list, it cannot be readily obtained (WHO, 2013)

Figure 3: Availability of specialist equipment relevant to ASM



5.2.3. Availability of outpatient services

All health centres surveyed provide diagnosis and treatment of diabetes, cardiovascular diseases, and chronic respiratory diseases.

Maternal and child care services were available in all health centres. 15 provided antenatal care, including giving out regularly iron supplements to pregnant women and performing blood pressure monitoring. 13 provided folic acid supplementation.

Delivery and newborn care services were available in all but two (2) family health centres. Postnatal services were provided by all FHCs including through home visits.

Normal delivery services, including assisted vaginal delivery, were available in 12 (80%) of soum health centres (80%). Only two (2) SHCs were able to provide delivery by caesarean section. Seven (46.6%) could provide blood transfusions.

Immunization services for children under 5 years of age were provided by both soum and family health centres. Soum health centres administered vaccines at the hospital and during home visits, while family health centres vaccinate at the hospital only. However, it is preferred to administer vaccines at the hospital. Soum and family health centres administer the following vaccines: measles vaccine, pentavaccine, poliovaccine, and BCG vaccine.

5.2.4.Availability of in-patient services

The number of beds in health centres of all soums surveyed met the requirements of the Soum health centre structure and operational standard MNS5292:2011.

The number of inpatient beds ranged from 5-20 depending on the health centre category, according to the soum health centre structure, and operational standards. The average number of inpatient beds was 10; the smallest was 7 (Huld soum); and the highest was 97 (Mandal soum).The soum health centers also had maternity (on average 1-2 beds) with the exception of Mandal soum which had12 maternity beds.

The average length of stay in the hospitals surveyed was7.5±0.98 (Median ±SD), with largest number of bed days, 9.3, in Bornuur soum of Tuv aimag, and the smallest number, 6.5, being in Bayangol soum of Selenge aimag.

5.2.5.Laboratory services& diagnostic capacity

14 health centres had capacity to perform blood glucose level test, 12 could assess urine protein levels, 7 could assess urine ketone level, 6 - liver function test, and in 9 health centres - renal function test, respectively. 5 health centres had a blood chemistry analyser; 11 had a centrifuge; 7 – specific assay kit for liver function test, and 5 - specific assay kit for renal function test, respectively. This was not considered to be sufficient.

11 health centres had light microscopes and 12 health centres had glass slides and cover slips. 14 health centres had a functioning refrigerator. 11 health centres were able to do abdominal ultrasound. Two (2) health centres had an ultrasound apparatus but it did not meet the requirements. One centre did not have an ultrasound apparatus. 8 health centres had a functioning ECG.

Nearly all health centres (14) responded that they were able to test hemoglobin levels and perform blood type tests on-site. 12 were able to perform full blood count and differential testing. Although 9 health centres had a hemoglobinometer, the survey team was not able to examine the instruments sets of 3 health centres. Only two health centres had a functioning HemoCue analyser.[11]

Ziehl-Neelson testing for TB was performed at 8 health centres. Only 3 health centres were able to test for Gram-negative bacteria.

None of the health centres surveyed had capacity to detect poisoning, in particular mercury poisoning. This was an issue of concern highlighted by several soum doctors (Statement 7).

Statement 7

There is no poisoning specialist; we acquired the mercury poisoning treatment set on our own. In case of poisoning emergency we get very nervous, we need to improve our knowledge and expertise about it.

... We need an additional study of the diagnosis and treatment of mining-related disorders and occupational diseases. We don't know how to diagnose chemical poisoning since we don't have a basic knowledge about it. If somebody comes to us with chemical poisoning, we are only able to treat the most obvious symptoms. If it's really necessary, we make a referral to the next, more specialized care.

Soum health centres of Gobi-Altai, Selenge, and Bayankhongor aimags

5.2.6. Emergency response services

All health care facilities had ambulances. However, availability of fuel/gasoline was a concern. Only 40% of the health care facilities had sufficient fuel for the ambulances. Aimag doctors working in areas where ASM activities are taking place in more remote locations, e.g. in Darkhan-Uul, Gobi-Altai, and Bayankhongor aimags, indicated that a substantial portion of their hospital budget is spent on gasoline for travel to answer emergency medical calls from ASM miners. In some locations the frequency of emergency calls was considered high. For example, in Airag soum, Dornogobi, 50% of the total emergency medical calls received in 2009-2010 were from artisanal fluorite miners. This number has reportedly decreased as the number of miners has decreased.

Concern about lack of capacity (both training and materials/equipment) to respond to ASM related

[11] *Seven other health centres had a HemoCue analyser that was not functioning.*

accidents, particularly acute chemical emergencies for example if involving a mine tailing spill or mass cyanide poisoning, was raised on multiple occasions by soum and aimag doctors.[12]

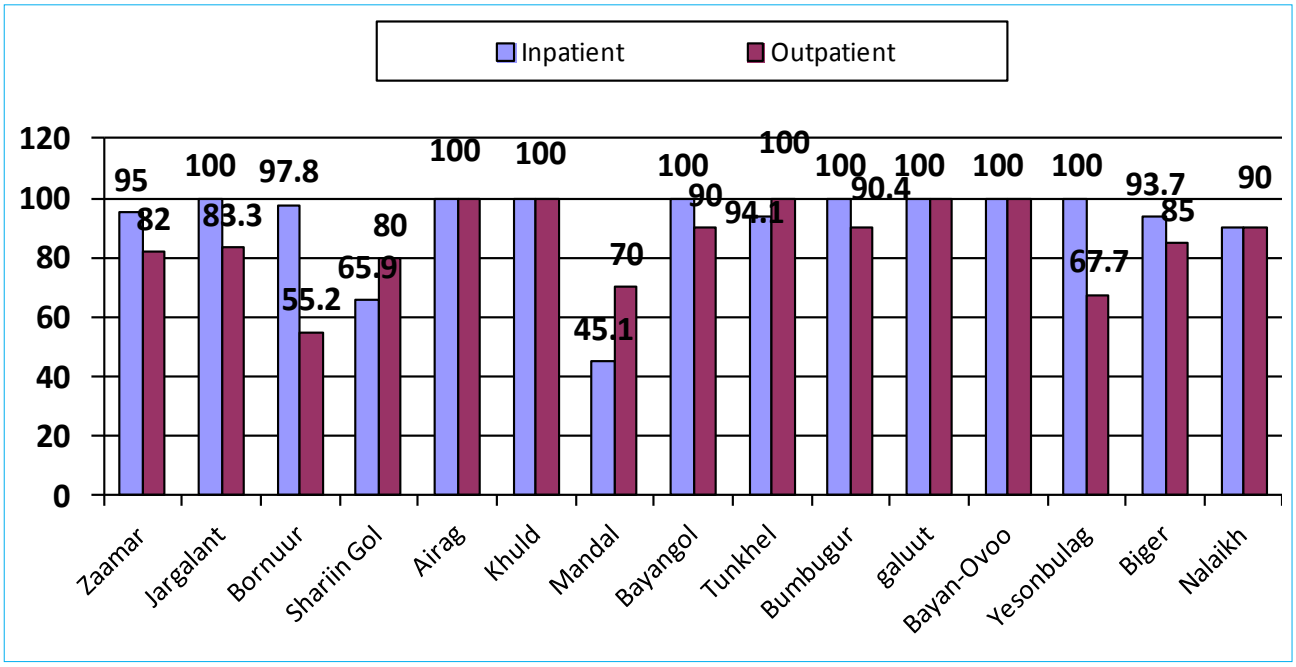
5.2.7. Financing

Financial resources for health care facilities are allocated on the basis of the size of (registered) catchment population. Funds are distributed centrally through aimag and soum levels.

In terms of spending, between 47.9-93.7 percent of total expenditures of family and soum health centres are spent on workers wages and social insurance contributions[12].During the interviews conducted among health centres managers all responded that there is a real shortage of financing, particularly for medicines.

Cost recovery (for health services rendered) is a problem particularly in areas serving uninsured populations. Figure 4 provides an overview of available hospital date showing insurance coverage among inpatient and outpatients.

Figure 4: Insurance coverage among inpatient and outpatients, by percentage



According to hospital records, health insurance coverage was considered to be at or around 89.5% for most areas surveyed, apart from Bornuur, Sharin Gol, and Mandal Soums. In these soums, coverage among inpatients and outpatients was significantly lower than in other locations.

Whether those uninsured are all ASM miner was not easy to determine. Statistical information on the number of ASM miners served by health centres was not easy to obtain. ASM miners mainly identified themselves as "self-employed" or "unemployed" during ambulatory visits. Therefore hospital records did not necessarily reflect this information.

Health insurance coverage among outpatients was reported to be significantly lower than among inpatients. This may have been due to the fact that there are provisions in the Mongolian Health Law (§24.6) which require that some outpatient services (primary care services) be provided regardless of residency and insurance status.

Some health care providers also indicated that the number of uninsured individuals in soums closer to urban areas may be higher than what is reflected the hospital data, as some may choose to seek health care from other, private health care facilities. In rural areas/soums, there are fewer private health care facilities; therefore utilization of the soum health centres is likely to be higher.

[12] *This was also a concern expressed by medical professionals that participated in the MoH/WHO training workshop on health and ASGM carried out in Ulaanbaatar in May 2013.*

Challenges associated with providing services to migrant (or mobile) populations, in particular because of cost implications, were highlighted on several occasions by health care providers and by local government officials. In Zaamar soum, Tuv aimag, doctors reported that their operating budget was calculated on the basis of the size of the registered catchment population (5,884 thousand). However, in reality they were providing services to an additional 4,000 to 5,000 people because of the mining activities. Drug expenditures, in particular, regularly exceeded funding allocations. (Statement 8)

Statement 8

It is challenging to provide health care services to miners. There is a bag hospital with 2 doctors and 6 health workers, with 5% of artisanal miners. The soum hospital does not serve artisanal miners, it shares budget with Khailaast bag hospital. In case of accidents they go directly to the city, said doctor. Our soum has a base population of 5,000 and receives budget according to that estimation. However, with migrant workers the total population becomes 10,000, which makes it more difficult to cover the expenses.

FCD with health centre of Zaamar soum, Tuv aimag

6. DISCUSSION AND KEY FINDINGS

Following are the main findings of the assessment, which also take into account and reflect additional comments raised by local government officials and other stakeholders (e.g. GASI inspectors) consulted.

- Promotion of occupational health and safety is a critical intervention area

Overall, the list of major health concerns identified by artisanal and small scale miners and by health care providers is very similar. Occupationally related health issues related to exposure to dust, musculoskeletal problems, and accidents and injuries were the predominant concern for both groups.

There were no significant differences in perspectives across different types of ASM. In other words the health concerns of gold miners were not so significantly different than the health issues identified by coal or fluorite miners. However, there were differences in perspectives according to age and gender. The older miners tended to highlight concerns about chronic diseases, while the younger miners largely perceived themselves to be in good health and did not identify many health issues. Some of the female miners on the other hand highlighted a need for reproductive health services. This latter point was also raised by several of the soum doctors interviewed.

ASM miners appear to be aware of occupational hazards of ASM. However, few take sufficient measures to protect themselves/prevent exposure. Cost and availability of personal protective equipment are not significant barriers. The main issue appears to be behavioural. Some individuals interviewed indicated that because of efforts made by some NGOs and by international organizations[13] to promote safer, more environmentally friendly working practices in ASM communities the situation has improved compared with 5-10 years ago. However, as evidence by the findings of the assessment, more work to raise awareness and influence ASM miner practices vis-a-vis occupational safety (and use of preventive measures like personal protective equipment) is clearly needed.

- Access to health services is an issue primarily for ASM miners in rural or remote areas and for migrants

Access to health services is a concern mainly for miners working in remote, rural areas and for mobile or migrant ASM communities.

All stakeholder groups consulted, e.g. miners, medical professionals, local inspectors, and local government officials indicated that the use of mobile medical services would facilitate delivery of emergency as well as routine (e.g. preventive, diagnostic services, treatment) services to harder to reach ASM communities. Mobile clinics, or Gers as was suggested in one focus group discussion, could also provide health promotion and awareness raising activities.

Health seeking behaviour and therefore use (and access) of health services is a low among younger miners. This may be due to the fact that younger miners may not be aware of the importance of regular/preventive health services or because they do not value them. This may also explain why, proportionally, fewer of the younger miners obtained health insurance. This is a concern and suggests that advocacy and outreach activities conducted to promote health and safety among ASM miners should include a special emphasis/ focus targeting younger ASM miners

- Health insurance coverage among ASM miners is a concern

Lack of health insurance is problematic for both miners (who may not obtain needed medical services without it) and for health care facilities (who incur debt because of the need to absorb the costs of care providing services to the uninsured).

As indicated earlier in this report, most of the miners surveyed reported that they had health insurance. Therefore the analysis was not able to meaningfully consider perspectives of uninsured ASM miners. However, as the issue was raised repeatedly by health care providers and local officials, it is clear that lack of insurance, particularly for migrant/ mobile ASM communities is an issue that warranting further review/investigation.

[13] *The Sustainable Artisanal Mining Project supported by the Swiss Development Cooperation was specifically highlighted in this regard.*

Disability coverage was another concern identified by miners and local professional inspectors. According to the latter group, disability coverage for ASM miners is not well articulated in current legislation related to ASM[14]. Therefore, miners suffering from long-term or chronic health problems associated with ASM are not entitled to disability benefits and occupational health services.

- Local health systems are not sufficiently capacitated to address ASM related health concerns.

Coverage of general health services in all areas surveyed is adequate. However, specialist services needed to respond to health care needs of ASM miners are not readily available at the soum health centres where the majority of ASM miners seek care.

Critical capacity gaps that need strengthening at the aimag or soum level as appropriate include:

- Placement/recruitment of trauma specialists and surgeons that can deal with accidents and injuries commonly associated with ASM;
- Provision of basic occupational health services, including preventive, diagnostic and therapeutic services;
- Strengthening of laboratory capacity, in particular to detect and report poisoning/ send specimens to a centralized lab/testing facility or poison centre as needed;
- Provision of specialist equipment and supplies, including laboratory as well as medicines (e.g. mercury antidotes) in areas host to more than insignificant amounts of ASM;
- Preparedness and response training to build capacity for engagement in an ASM related emergency, including one involving chemical exposure (e.g. such as cyanide).

Given that access to telecommunications services, and in most cases also internet, is very common, specialist advice for example in the area of toxicology, could be provided to soum and FHC level doctors using telemedicine or e-medicine. As there are many health systems strengthening initiatives focused on promoting and expanding the use of telemedicine and e-medicine in Mongolia, this may be an effective short-term solution to address some of the above capacity gaps.

Although data gathered using the adapted SARA tool indicated that availability of medicines was generally not a problem, because this issue was raised on several occasions, it may be an issue warranting further review, particularly in terms of availability during periods where ASM activities may fluctuate (e.g. where ASM is undertaken seasonally).

- The extent to which ASM miners are self-organized impacts on their access to health care and on the safety of their working practices.

The degree to which ASM miners are organized into groups also seems to impact on access to health services. The more organized they are, the easier it is for them to request/organize health check-ups and educational/health promotion activities. Some ASM groups, such as HAMOD, were even able to organize service agreements with soum hospitals to ensure regular delivery of health services to the ASM miners within their group.

ASM miners in Bayankhongor and Selenge aimags were also relatively well organized and reported good cooperation and monitoring activities. For example, Bayan-Bumbugur NGO in cooperation with Nalaikh district mine rescue group provided technical advice on personal protective equipment and engaged in technical consultations.

Larger groups of ASM miners also tended to have better access to equipment/machinery. In these cases, manual demolition and drilling have been replaced by excavators, dump trucks, and power hammers and drills. ASM miners were then just left to perform sorting, handling, and washing tasks, which are less "physically demanding" and therefore less likely to cause/exacerbate musculoskeletal problems.

- More inter-sectoral and multi-stakeholder engagement is needed to ensure the sustainability of programmes to promote safer and environmentally sound ASM.

Several examples were cited of programmes or initiatives implemented in partnership with local government officials, miners and local communities (some with the assistance of development partners and some without).For example, the Governor's Office of Zaamar soum in Tuv aimag involved miners in their "Healthy person" campaign and through this were able to organize specialist doctors

[14] *or example in the Government Resolution No. 308 of 2010 entitled "Regulations on extraction of mineral resources through small-scale mining" and the "Integrated occupational safety regulations for ASM miners."*

examinations for the entire aimag population, including the ASM communities.

Tripartite agreements between artisanal miners, soum Governor's Offices and health centres signed in some soums of Bayankhongor and Tuv aimags, were also effective for organizing activities such as medical examinations for miners and their families, on-the-job training and advocacy (e.g. demonstration classes), and drug revolving fund services.

In other soums, open forums with miners were organized to facilitate discussions on issues such as employment, labor protection, and management of workplace and environmental risks.

While many inspiring examples were provided, several comments were made about the lack of coherence between the activities of hospitals, governor's offices, environmental protection offices, and labor and social welfare agencies. Concern was also raised that some local actors tended to over-rely on international organizations to implement project activities, thus raising questions about the sustainability of programmes and interventions supported. Lack of follow-up, in particular monitoring, was also identified as an issue.

- Monitoring and reporting health statistics for ASM miners needs to be improved

While many health care providers working in soums host to ASM were able to provide substantive comments about the health situation of the ASM miners, statistical data on ASM specific health outcomes and health utilization patterns is very limited. Similarly costs associated with the provision of health services to ASM miners are also very limited. This makes quantification of the burden of disease associated with ASM very difficult. It also means that monitoring and reporting on trends and changes in the health status of ASM miners is very difficult, including in the context of interventions taken to address/improve their health.

7. RECOMMENDATIONS

I. National and sub-national campaigns to conduct advocacy and outreach to ASM miners, in particular on safer more environmentally friendly working practices, should be undertaken. Health promoting activities could also include additional messaging on environmental protection, food hygiene/safety, as well as on other issues as relevant to the particular situation. These campaigns should be implemented as multi-stakeholder initiatives that involve for example, local government officials, professional inspection agencies, health authorities, and civil society organizations working with ASM communities. The effects, i.e. resulting changes in ASM behaviour and practice, should be monitored over time so as to determine the need for additional advocacy and outreach campaigns. These campaigns could be conducted in concert with/as part of existing health promotion initiatives, for example as part of "healthy person", "healthy soum" or other similar programmes.

II. To the extent feasible, and in line with the needs of the particular area/location, mobile clinics (or another means to facilitate extension of health services) should be provided to ASM communities working in remote, hard to reach areas and in cases where there are large numbers of migrant/mobile ASM miners.

III. Financial and/or policy provisions should be made to ensure that costs incurred for provision of services to uninsured individuals are covered. Similarly, coverage of disability benefits in the existing legislation on occupational health and safety for ASM miners should be reviewed

IV. The following measures are proposed to facilitate strengthening of health systems capacities to respond to ASM related health issues:

- Recruitment and/or training of medical professionals to ensure availability of specialist capacity at the sub-national level in the following areas: trauma, occupational health and safety, and toxicology. In cases where this is not feasible, consideration of provision of specialist advice in the above areas using telemedicine and e-medicine should be considered.
- Build national and sub-national laboratory capacity to support the detection and reporting of chemical incidents (i.e. mercury poisoning) associated with ASM activities, in particular artisanal gold mining activities. This may include the establishment of (strengthening of) a national poison centre.
- Conduct general training for health care providers on how to identify and address, in particular environmental and occupational health issues associated with ASM. This could be done, for instance using the existing course materials developed and piloted by the National Center for Public Health/MoH and WHO.
- Develop standard operating procedures and conduct training (for example in partnership with NEMA), in particular at the sub-national level on emergency preparedness and response to an ASM related incident, including for scenarios involving chemicals such as cyanide. This could also be done under the framework of the International Health Regulations (IHR).
- Monitoring and reporting of ASM miner health statistics should be improved, in particular at the soum health facility level where the majority of miners seek medical services. Supplemental information could be included in the health care facility registration forms to allow/facilitate recording of more specific data on ASM miners. ASM related screening questions could also be included in the health history forms regularly used as part of patient registration.

V. Inter-sectoral cooperation and engagement on ASM related issues, including for health, at the national and sub-national levels should be strengthened. This could be done through the establishment of Committees or other formal working bodies that would be charged with responsibility to facilitate establishment, implementation, and monitoring of programmes for ASM communities.

8. REFERENCES

- 2012 Survey Report on Artisanal and Small- and Medium-Scale Miners. (2013). Mongolian National Statistics Office, The Academy of Sciences of Mongolia.
- Darby, S. and Lempa, K. (2006).Advancing the EITI in the Mining Sector: Implementation Issues. World Bank's Oil, Gas and Mining Policy and Operations Unit (COCPO).
- E.Zoljargal, L.Oyuntogos, B.Altanzagas et al. (2007). Survey on working conditions of artisanal gold miners. Journal of Health Sciences, 2007: 6:38-42.
- Family Health Centre structure and operational standards. MNS5292:2011
- Governmental Resolution No. 308 (2010). Regulations on extraction of mineral resources through small-scale mining.
- Hentschel T et al. (2002). Global Report on Artisanal & Small–Scale Mining. Minerals, Mining and Sustainable Development [MMSD].
- ICMM, CASM, Worldbank, CommDev. (2008). *Working together: how large-scale mining can engage with artisinal and small scale miners.* London: ICMM.
- ILO. (2001). *Safety and Health in Small Scale Surface Mines - a handbook.* Geneva: International Labour Organization.
- Jackson R, Oda RP, Bhandari RK, Mahon SB, Brenner M, Rockwood GA, Logue BA. (2014). Development of a fluorescence-based sensor for rapid diagnosis of cyanide exposure. Anal Chem. 2014 Feb 4;86(3):1845-52
- Kristensen AK, Thomsen JF, Mikkelsen S. (2013). A review of mercury exposure among artisanal small-scale gold miners in developing countries. Int Arch Occup Environ Health. 2013 Aug 27.
- Navch, T. B. (2006). *Informal Gold Mining in Monoglia: A baseline survey report covering Bornuur and Zaamar Soums, Tuv-Aimag.* Bangkok: International Labour Organization.
- Socioeconomic Situation of Migrants and Artisanal Gold Miners. (2007). Survey Report. UNFPA and School of Public Health, Ulaanbaatar.
- Soum Health Centre structure and operational standards. MNS55;2013
- The Asia Foundation. (2013). *Gender Assessment of Small Scale Mining in Mongolia.* Ulaanbaatar: The Asia Foundation.
- The Final Assessment Report. Project on strengthening of primary health care in Mongolia 2008-2013. (2012). Norwegian Agency for development Cooperation in Mongolia.
- UNEP. (2013). *Global Mercury Assessment.* Geneva: United Nations Environment Programme.
- What is Artisanal and Small-Scale Mining. (2012). Retrieved from http://www.miningfacts.org/Communities/What-is-Artisanal-and-Small-Scale-Mining/
- WHO. (2013). *Building capacity of health care providers in Mongolia to address environmental and occupational health impacts of artisanal and small-scale gold mining, including a special focus on children - Technical Report.* Ulaanbaatar: WHO (unpublished).

9. LIST OF ACRONYMS

ASM – Artisanal and small-scale mining

ASGM – Artisanal and small-scale gold mining

CHD-Coronary Heart Disease

FHC – Family health centre

FGD-Focus Group discussion

HSUM –Health Sciences University of Mongolia

IHR – International Health Regulations

MOM - Ministry of Mining

MOH - Ministry of Health

MOEGD - Ministry of Environment and Green Development

MNUMS-Mongolian National University of Medical Sciences

NAP – National Action Plan

NGO – Non-governmental organization

NPHC – National Public Health Centre

NSO – National Statistics Office

PIA – Professional Inspection Agency

PPE – Personal protective equipment

SARA - Service Availability and Readiness Assessment

SD – Standard deviation

SDC - Swiss Agency for Development and Cooperation

SHC – Soum health centre

SPH – School of Public Health

10. ANNEXES

STDs – Sexually transmitted diseases
STIs – Sexually transmitted infections
WHO – World Health Organization

Annex 1

The survey data was collected from August through November 2013. The names of participated aimags (provinces) and soums (districts) and sample sizes are shown in the Table 1. In total, 288 artisanal small-scale miners were surveyed and incomplete and inadequate information from 12 questionnaires was removed.

Table A.1: Survey coverage

Name of aimag	Name of soum	Questionnaires		Statistical data	Key informant interviews	Focus group discussions
		ASM miners	Health careproviders			
Govi-Altai	Yesunbulag	26	1	1	4	2(13)*
	Biger	12	1	-	2	2(10)
Bayankhongor	Bayan-Ovoo	19	1	1	4	2(13)
	Bumbugur	21	1	1	4	2(14)
	Galuut	20	1	1	4	2(10)
Darkhan-Uul	Sharin Gol	28	1	1	4	2(13)
Dornogovi	Airag	30	1	1	4	2(10)
Dundgovi	Huld	24	1	1	4	2(13)
Selenge	Mandal	10	1	1	4	2(14)
	Bayangol	14	1	1	4	2(10)
	Tunkhel	9	1	1	4	2(13)
Tuv	Zaamar	28	1	1	4	2(12)
	Jargalant	10	1	1	1	1(7)
	Bornuur	12	1	1	3	1(6)
Ulaanbaatar	Nalaikh	25	1	1	2	2(12)
	Total	288	15	14	52	28(167)

* The number of ASM miners, doctors, and health workers participated in the focus group discussions

Annex 2

Table A.2: Characteristics of ASM

Indicators	Type of mining						Total	
	Gold		Coal		Fluorite			
	n	Percentage	n	Percentage	n	Percentage	n	Percentage
Age (SD)	38.03±10.21		41.40±9.47		39.26±9.93		38.57±10.11	
Gender								
Male	123	62.8	22	88.0	37	68.5	182	66.2
Female	73	37.2	3	12.0	17	31.5	93	33.8
Marital status								
Single	21	10.7	3	12.0	11	20.4	35	12.7
Married	152	77.6	21	84.0	38	70.4	211	76.7
Separated, divorced	9	4.6	1	4.0	3	5.6	13	4.7
Widowed	7	3.6	-	0	1	1.9	8	2.9
Living with a partner	7	3.6	-	0	1	1.9	8	2.9
Educational level								
Primary	16	8.2	1	4.0	1	1.9	18	6.5
Lower secondary	65	33.2	9	36.0	28	51.9	102	37.1
Secondary	82	41.8	9	36.0	17	31.5	108	39.3
Vocational or technical	20	10.2	2	8.0	5	9.3	27	9.8
Higher	13	6.6	4	16.0	3	5.6	20	7.3
Registered at the local civil registration office								
Yes	181	92.8	21	84.0	46	85.2	248	90.5
No	14	7.2	4	16.0	8	14.8	26	9.5
Total	**196**	**100**	**25**	**100**	**54**	**100**	**275**	**100**

Table A.3: ASM miners work schedules

Indicators	Type of mining						Total	
	Gold		Coal		Fluorite			
	n	Percent	n	Percent	n	Percent	n	Percent
Engaged in other than artisanal mining type of employment								
Yes	44	22.4	6	24.0	7	13.0	57	20.7
No	152	77.6	19	76.0	47	87.0	218	79.3
Interested in other type of employment								
Yes	156	79.6	14	56.0	35	64.8	205	74.5
No	40	20.4	11	44.0	19	35.2	70	25.5
Work shifts								
Day hours	131	66.8	22	88.0	46	85.2	199	72.4
Night hours	2	1.0	-	-	-	-	2	0.7
Day and night hours	63	32.1	3	12.0	8	14.8	74	26.9
Rest break time								
1 hour	84	42.9	18	72.0	21	38.9	123	44.7
2 hours	70	35.7	6	24.0	26	48.1	102	37.1
3 hours	16	8.2	-	-	4	7.4	20	7.3
4 hours and more	8	4.1	-	-	1	1.9	9	3.3
No break	18	9.2	1	4.0	2	3.7	21	7.6
Working season								
Winter	4	2.0	25	100.0	1	1.9	30	10.9
Spring	28	14.3	12	48.0	7	13.0	47	17.1
Summer	62	31.6	-	-	11	20.4	74	26.9
Autumn	57	29.1	14	56.0	7	13.0	78	28.4
Four seasons	123	62.8	-	-	41	75.9	164	59.6
Average daily working time (in hours)	8.5 ±2.2		9.5±1.6		8.1 ±1.8		8.5±2.1	
Total	196	100	25	100	54	100	275	100

Table A.4: Activities during rest breaks

Indicators	Type of mining			Total
	Gold	Coal	Fluorite	
	% (n)	% (n)	% (n)	% (n)
Activities during rest breaks				
Eat meal	88.8 (174)	88.0 (22)	98.1 (53)	90.5 (249)
Do household chores	14.2 (28)	12.0 (3)	11.1 (6)	13.4 (37)
Take care of children	3.0 (6)	0 (0)	1.8 (1)	2.5 (7)
Play table games (playing cards, dominoes, etc.)	7.1 (14)	0 (0)	3.7 (2)	5.8 (16)
Do physical exercise	2.0 (4)	0 (0)	0 (0)	1.4 (4)
Sleep and rest	26.0 (51)	4.0 (1)	38.8 (21)	26.5 (73)
Other	4.0 (8)	0 (0)	0 (0)	2.9 (8)
Total	**100% (196)**	**100% (25)**	**100% (54)**	**100% (275)**

Table A.5: Typical meal and rest schedule of ASM workers

Indicators	Type of mining			Total
	Gold	Coal	Fluorite	
Frequency of meals during a workday	% (n)	% (n)	% (n)	% (n)
One time	22.4 (44)	76.0 (19)	37.0 (20)	30.2 (83)
Two times	44.9 (88)	24.0 (6)	27.8 (15)	39.6 (109)
Three times	31.1 (61)	0.0 (0)	35.2 (19)	29.1 (80)
Four times	1.0 (2)	0.0 (0)	0.0 (0)	0.7 (2)
Five times	0.5 (1)	0.0 (0)	0.0 (0)	0.4 (1)
Cases of having a day without hot meal				
Yes	25.5 (50)	16.0 (4)	14.8 (8)	22.5 (62)
No	74.5 (146)	84.0 (21)	85.2 (46)	77.5 (213)
The frequency of not eating a hot meal during the day				
Every week	11.1 (7)	30.0 (3)	17.6 (3)	14.4 (13)
Almost every month	19.0 (12)	0.0 (0)	0.0 (0)	13.3 (12)
In some months	44.4 (28)	30.0 (3)	41.2 (7)	42.2 (38)
Once or twice a month	25.4 (16)	40.0 (4)	41.2 (7)	30.0 (27)
Average number of rest days per week				
One day	30.3 (59)	84.0 (21)	24.1 (13)	33.9 (93)
Two days	22.6 (44)	8.0 (2)	24.1 (13)	21.5 (59)
Three days	11.3 (22)	0.0 (0)	16.7 (9)	11.3 (31)
Other	35.9 (70)	8.0 (2)	35.2 (19)	33.2 (91)
Total	**100% (196)**	**100% (25)**	**100% (54)**	**100% (275)**

Table A.6: ASM miners' working tools

Indicators	Type of mining			Total
	Coal	Coal	Fluorite	
	% (n)	% (n)	% (n)	% (n)
Shovel	75.0 (147)	92.0 (23)	87.0 (47)	78.9 (217)
Pickaxe	52.0 (102)	64.0 (16)	31.4 (17)	49.0 (135)
Crowbar	41.3 (81)	44.0 (11)	83.3 (45)	49.8 (137)
Bucket	53.5 (105)	16.0 (4)	81.4 (44)	55.6 (153)
Bag	58.1 (114)	24.0 (6)	12.9 (7)	46.1 (127)
Pan	50.0 (98)	8.0 (2)	11.1 (6)	38.5 (106)
Sieve	36.2 (71)	12.0 (3)	3.7 (2)	27.6 (76)
Water gun	25.5 (50)	4.0 (1)	0 (0)	18.5 (51)
Fan	6.1 (12)	4.0 (1)	1.8 (1)	5.0 (14)
Electric hammer	7.6 (15)	16.0 (4)	16.6 (9)	10.1 (28)
Light	23.9 (47)	20.0 (5)	29.6 (16)	24.7 (68)
Compressor	19.3 (38)	20.0 (5)	59.2 (32)	27.2 (75)
Hose	2 (4)	0 (0)	3.7 (2)	2.1 (6)
Pump	0.5 (1)	0 (0)	3.7 (2)	1.8 (5)
Other	2 (4)	0 (0)	0 (0)	1.4 (4)
Total	**100% (196)**	**100% (25)**	**100% (54)**	**100% (275)**

Table A.7: Medical care received by ASM miners

Indicators	Type of mining			Total
	Gold	Coal	Fluorite	
	% (n)	% (n)	% (n)	% (n)
Sought medical care at the hospital in the past year				
Yes	62.8 (123)	44.0 (11)	50.0 (27)	58.5 (161)
No	37.2 (73)	56.0 (14)	50.0 (27)	41.5 (114)
Medical care provider				
Emergency care	3.6 (7)	4.2 (1)	3.8 (2)	3.7 (10)
Public hospital	5.2 (10)	8.3 (2)	9.4 (5)	6.3 (17)
Aimag hospital	33.2 (61)	8.3 (2)	13.2 (7)	27.0 (73)
Family hospital	23.3 (45)	62.5 (15)	17.0 (9)	25.6 (69)
Soum hospital	46.1 (89)	0.0 (0)	67.9 (36)	**46.3 (**125**)**
Private hospital	8.3 (16)	8.3 (2)	9.4 (5)	8.5 (23)
Doctors and nurses at mining site	0.0 (0)	8.3 (2)	0.0 (0)	0.7 (2)
Other	1.0 (2)	4.2 (1)	1.9 (1)	1.5 (4)
Whose help they seek when get sick				
Doctor	71.0 (140)	60.0 (15)	75.9 (41)	**71.3 (196)**
Feldsher, nurse	40.0 (79)	32.0 (8)	18.5 (10)	35.3 (97)
Health volunteer	1.5 (3)	8.0 (2)	0.0 (0)	1.8 (5)
Traditional healer, chiropractor	8.2 (16)	4.0 (1)	3.7 (2)	5.5 (15)
Lama (monk)	6.6 (13)	0.0 (0)	3.7 (2)	5.5 (15)
Family	11.7 (23)	8.0 (2)	20.4 (11)	12.4 (34)
Friends and relatives	9.2 (18)	4.0 (1)	5.6 (3)	8.0 (22)
Other	2.6 (5)	0.0 (0)	3.7 (2)	2.5 (7)
Total	**100% (196)**	**100% (25)**	**100% (54)**	**100% (275)**

Table A.8: Accidents and injuries among ASM miners

Indicators	Gender		Total
	Men	Women	
	% (n)	% (n)	% (n)
Had an accident or injury			
Yes	14.8 (27)	18.3 (17)	16.0 (44)
No	83.5 (152)	81.7 (76)	82.9 (228)
Do not know	1.7 (3)	0	1.1 (3)
Total	**100% (182)**	**100% (93)**	**100% (275)**
Frequency of accidents and injuries			
1-2 times	90.0 (27)	100.0 (17)	93.6 (43)
3-5 times	6.7 (2)	0	4.3 (2)
5 and more times	3.3 (1)	0	2.1 (1)
Type of accident or injury			
Trauma of extremities	43.3 (13)	23.5 (4)	36.2 (17)
Burns	3.3 (1)	5.9 (1)	4.3 (2)
Falls from height	26.7 (8)	5.9 (1)	19.1 (9)
Were vibrated/concussion	36.7 (11)	58.8 (10)	44.7 (21)

Were hit	13.3 (4)	11.8 (2)	12.8 (6)
Were struck/pressed by falling rocks	6.7 (2)	0	4.3 (2)
Cause of accidents and injuries			
Related to working conditions	73.3 (22)	47.1 (8)	63.8 (30)
Caused by movement	13.3 (4)	29.4 (5)	19.1 (9)
Domestic injury	10.0 (3)	29.4 (5)	17.0 (8)
Related to overdrinking of alcohol	3.3 (1)	0	2.1 (1)
Natural disaster	6.7 (2)	0	4.3 (2)
Total	**100% (30)**	**100% (17)**	**100% (47)**

Table A.9: Access to health care services

Indicators	Type of mining			Total
	Gold	Coal	Fluorite	
	% (n)	% (n)	% (n)	% (n)
Availabilty of health care				
Yes	78.1 (153)	88.0 (22)	90.7 (49)	81.5 (224)
No	18.9 (37)	8.0 (2)	3.7 (2)	14.9 (41)
Do not know	3.1 (6)	4.0 (1)	5.6 (3)	3.6 (10)
Necessary medical care				
Emergency health care services	9.2 (18)	12.0 (3)	11.1 (6)	10.2 (28)
Management of chronic diseases	13.8 (27)	24.0 (6)	9.3 (5)	13.8 (38)
Preventative physical examination	26.0 (51)	28.0 (7)	46.3 (25)	35.6 (98)
Examination and counselling by a doctor	23.5 (46)	8.0 (2)	16.7 (9)	20.7 (57)
Accident and injury prevention counselling	17.9 (35)	12.0 (3)	25.9 (14)	18.9 (52)
Health services by specialist doctors	55.1 (108)	44.0 (11)	59.3 (32)	54.9 (151)
Other	3.6 (7)	4.0 (1)	3.7 (2)	3.6 (10)
None	5.1 (10)	0	0	3.6 (10)
Availability of timely medical care				
Yes	71.9 (141)	80.0 (20)	92.6 (50)	76.7 (211)
No	24.5 (48)	12.0 (3)	3.7 (2)	19.3 (53)
Do not know	3.6 (7)	8.0 (2)	3.7 (2)	4.0 (11)
The shortest time of getting medical care				
Less than 2 hours	90.3 (177)	84.0 (21)	83.3 (45)	88.4 (243)
2-12 hours	97.7 (15)	8.0 (2)	14.8 (8)	9.1 (25)
12-24 hours	1.5 (3)	0	1.9 (1)	1.5 (4)
More than 3 days	0.5 (1)	8.0 (2)	0	1.1 (3)
Have health insurance				
Yes	85.2 (167)	72.0 (18)	83.3 (45)	83.6 (230)
No	14.3 (28)	28.0 (7)	16.7 (9)	16.0 (44)
Do not know	0.5 (1)	0	0	0.4 (1)
Total	**100% (196)**	**100% (25)**	**100% (54)**	**100% (275)**

Table A.10: Per capita household income, by type of mining

	Type of mining			Total
	Gold	Coal	Fluorite	
n	196	25	54	275
Average	175880,6	209800,0	210903,9	185841,4
Median	120000,0	160000,0	120000,0	125000,0
Standard deviation	235685,7	141971,3	272602,2	236471,9
P25	75000,0	110000,0	67500,0	75000,0
P75	186458,3	283333,3	212500,0	200000,0

Figure A.1: The reasons of working in artisanal mining

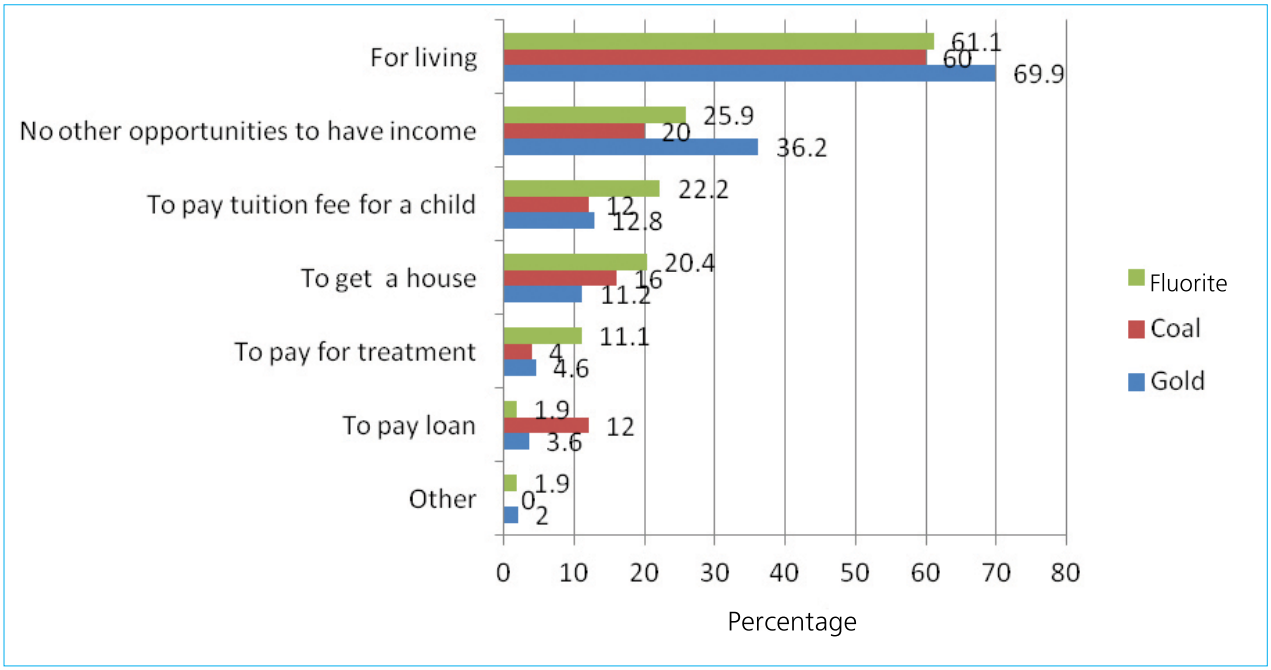


Figure A.2: Reasons for interest to find other employment among ASM miners.

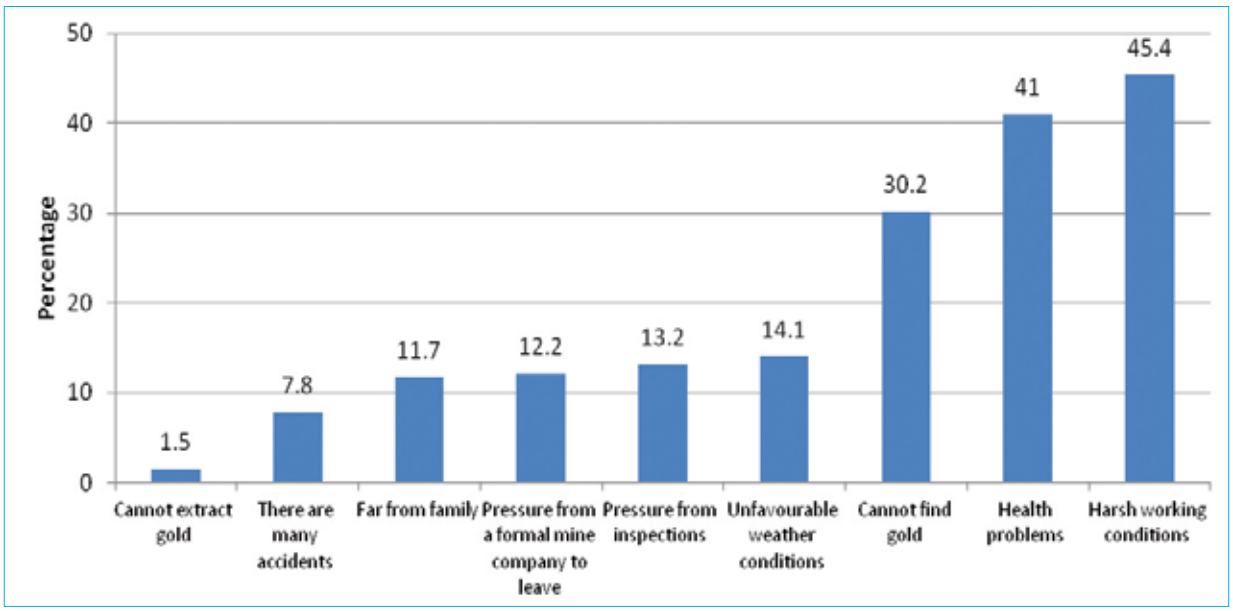


Figure A.3: ASM miners' essential and social needs

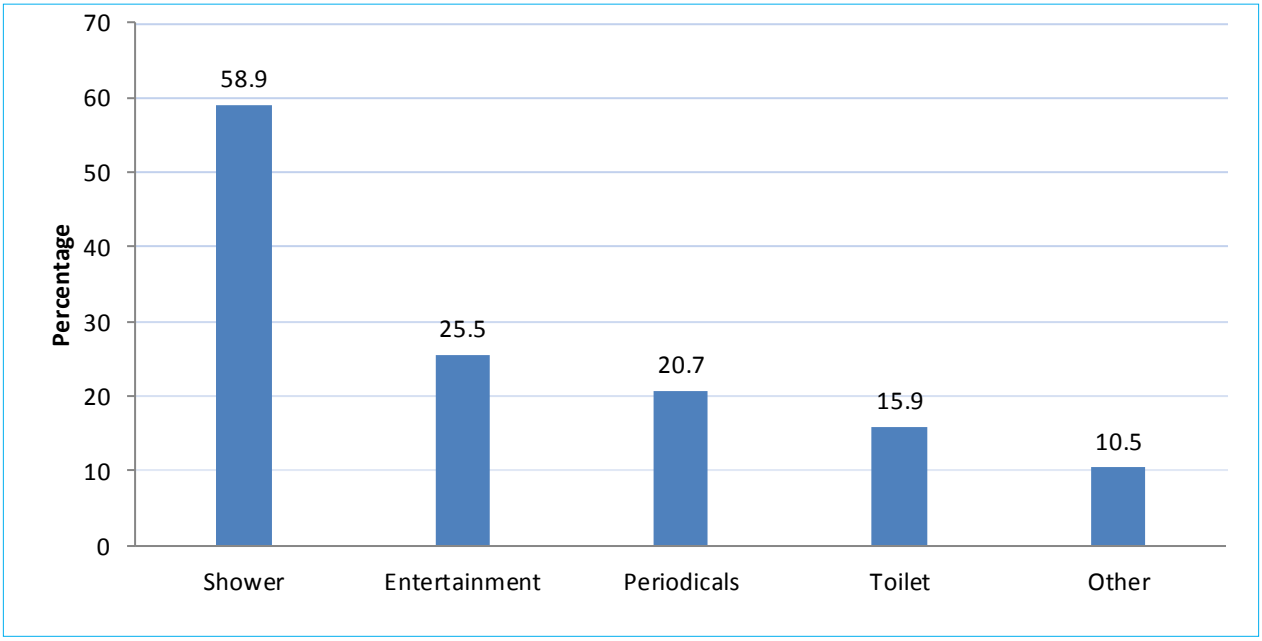
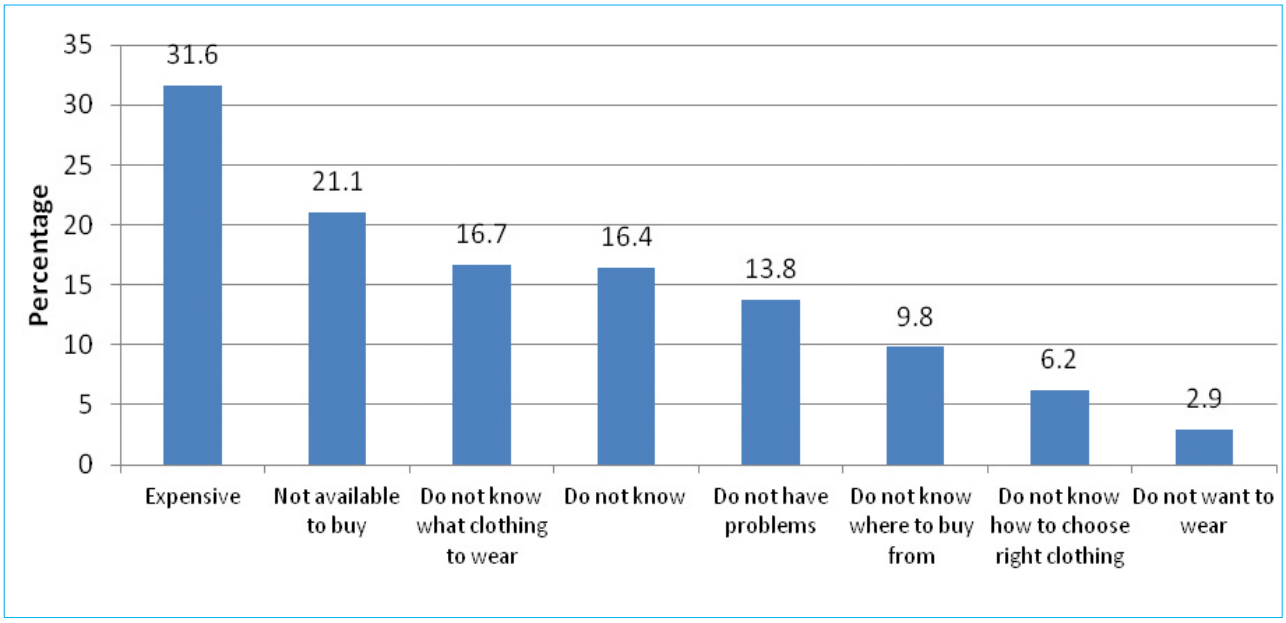


Figure A.4: Problems associated with the use of personal protective equipments



Annex 3

PUBLIC HEALTH ACTION PROPOSAL TO IMPROVE HEALTH CARE SERVICES FOR ASM MINERS AND THEIR FAMILIES

№	Activities	
	ONE. At policy level	
1	To develop and implement rules and regulations for work environment, occupational safety, risk assessment and risk reduction in ASM	A methodology for health risk assessment by type of ASM mining will be developed Guidelines for risk reduction and prevention will be developed According to the above guidelines a clear legal framework for ASM mining will be determined
2	To develop technical recommendations and guidelines for addressing health care needs of ASM miners at aimag, soum and local level	Increased service readiness of local health organizations to provide health care services to ASM-associated diseases and related health risks Increased capacity and improved methods of providing health care services
3	To create a database on health conditions and morbidity of ASM miners and their families	A registration form for miners health risks associated with ASM mining will be created A database will be created
	TWO. At local government and soum and rural hospital level	
1.	Local health organizations in cooperation with Citizens Representative Meetings and Rural Governors Offices are to establish an Advisory team and working group for improving health and working conditions of and providing support to ASM miners	An integrated system of operation will be established An opportunity to establish comprehensive measures for improving miners health and occupational safety and environmental protection will be created
2	To create a database on health conditions of miners and their families and use it to provide public health and medical care services to them	Databases will be created Health care needs of miners will be determined Health care services that meet the needs will be provided
3	To re-train and increase the capacity of soum and local public health and health care providers on medical care for poisoning, accidents, injuries, and occupational diseases related to ASM mining.	A core curriculum for training on ASM miners health care needs and the ways to address them will be developed Training will be organized Soums and rural areas will have a capacity to provide public health and medical care services meeting the needs of miners and their families
4	To provide professional advice and support services	Improved resource allocation, support and capacity building in rural hospitals
5	To involve ASM NGOs in public health activities	Improved cooperation Increased participation of NGOs
	THREE. At ASM miners and their families	
1.	To conduct training on health care seeking behavior and health seeking behavior	A training program for ASM miners and their families on health risks, prevention, protection, and promotion of positive behaviour related to ASM mining will be developed Training materials and brochures will be prepared and provided to ASM miners and their families Series of trainings will be organized
2	To involve miners and their families in interventions to determine their health conditions and risk assessment	ASM miners and their families will receive integrated medical examination and laboratory analyses services
3	To receive health-restoring and specialized medical care	ASM miners and their families will receive medical examination and assessment from a occupational disease specialist They will receive diagnosis and treatment services and behavior training

Annex 4

GUIDELINES FOR FACE TO FACE INTERVIEW WITH KEY INFORMANTS AND FGDS:

General principles:

- Introduce the goal and objectives of the assessment
- Briefly explain the importance of the survey
- Get consent to participate in the assessment
- Reassure that information collected will be treated anonymously (ensure confidentiality)
- Involve more than 5 people in a FGD from the target population
- Not to ask questions beyond the survey objectives.

Requirements for an interview venue/room:

1. Outsiders shall not distract the interview
2. Interview shall not be heard by a third person
3. An interviewer and an interviewee shall hear each other at sufficient level
4. Comfortable and with less noise possible
5. With no other intimidations.

Interview steps

1. Introduction
    a. Researcher and an interviewee are introduced to each other
    b. Describe goal, objectives, importance and outcome of the survey
    c. Inform why an interview could be valuable for the survey and what kind of people are taking part in it
2. Beginning
3. Actual interview
4. Closing

1. Introduction

1. Researcher/interviewer introduces him/helself.
2. Ask name and address of an interviewee
3. Describe survey goal.
4. Explain that the purpose of the interview is to learn to his/her opinion and comments on health problems that artisanal gold and small scale miners and their families face, needs for, accessibility and quality of health care services and ways to improve.
5. Inform that an interview will be recorded on the voice recorder.

2. Beginning

6. An interviewer shall begin by asking simple questions.
7. Ask questions that would provoke and facilitate the interview.

3. Actual interview

8. Ask the main question related to the topic and discuss.
9. Avoid asking closed questions that could be answered by 'yes' or 'no'.
10. An interviewer is prohibited to give ideas that influence an interviewee and to impose his/her opinion and ideas.

4. Closing

1. Go through the checklist for interview outputs and check questions missed and complete.
2. Researcher/interviewer concludes and presents the main points and opinion of an interviewee from the interview notes.
3. Unclear phrases and ideas and words with dual meaning that mentioned during the interview need to be clarified.
4. Thank the interviewee for sharing his/her thoughts and opinion and close by saying that his assistance will contribute to find solutions to overcome facing challenges. .

1. INTERVIEW QUESTIONS for a miner and their family members

Introduction

I am _____ (name) interviewing you in connection with _____ (name of the assessment) survey, to learn about health problems that health problems that artisanal gold and small scale miners and their families face, and what are needs for, accessibility and quality of health care services and ways to improve health services.

You are invited to give an interview representing miners and their families. I truly believe that it would be invaluable contribution from you to tell us health problems you have due to mining gold, fluorite and coal, what are your needs for health care, what difficulties and challenges you face when you need to get health services and to share your thoughts on how to further improve accessibility of health services.

Questions to begin

1. How many years have you been working in this field?
2. How many people from your family are working with you?
3. Who is working with you?

Interview main questions

A. Health status:

1. Do you have any health problem, disease or complaint now?
    a. If yes, what kind of disease
    b. What has caused it
    c. Did you get sick before, etc. Clarify whether an interviewee was sick earlier

2. Have you ever had an accident or got sick because of mining gold, fluorite and coal?
    a. If had accident:
        I. cause,
        II. type,
        III frequency
    b. Kidney and urinary diseases:
        I.Pain in the back
        II.Complaints like having frequent urine
    c. Cardiovascular diseases:
        I.High blood pressure,
        II.If yes, for how many years
        III.Whether have regular monitoring by a doctor

3. Is there someone in the family sick now, if yes what kind disease

B. Health services:

I. *Health service needs:*

a. Do you or does anyone in the family now need health care service?
b. If yes, what health service do you need (clarify what disease and what caused it):
   - Is pathology related to mining (accident, cardiovascular disease, etc.)
   - When asking about ANC, pregnancy, breast feeding, maternal and newborn care services and counseling, please clarify ANC, postnatal home visits of mothers and newborns, counseling on breast feeding by family doctors, supply of vitamins, iron supplements and immunization injections.
   - Ask about information, training and counseling on family planning, leaflets and brochures containing family planning information, supply of contraceptives, injectable contraceptives and free condom distribution when talking about family planning, contraceptives and information, education and communication.
   - Ask about counseling on prevention, diagnostics and treatment of Sexually transmitted diseases (STIs), IEC materials, free condoms and treatment of STIs for free of charge.

c. Where to get services from
d. Are you planning to go to soum, district hospital, which hospital are you planning to go to
e. Are you confident that you can get health care services that you want
f. Is it possible to get health services from soum health centre, if impossible why and where would you go to
g. How many times do you approach hospital, due to what reason do you get health care services
h. If you do not go to hospital, why?

II. *Accessibility of health services*

- Did you receive any health services from soum health, centre, district hospital, health alliance and Aimag general hospital for past 6 months
- If yes, who got what kind of health services
- Did you receive health services you wanted (hospitalization, get diagnostic test, etc., clarify)
- What kind of health services could you and your family members receive from a health centre for past 6 months
- How much money does it cost you to get health care?
  - How much is spent on transport/fuel?
  - Medicines
  - Hospital services?
- What kind of health services you could not receive, what obstacle did you have:
  - **Obstacles:**
    - From your side (Not insured, could not afford, no time to go)
    - From health centre side (lack of instruments and reactive for diagnostic tests, lack of human resource, need for additional funding, etc.)

III. *Obstacles faced to obtain health services:*

- Have you and your family ever faced obstacles to get health services, if yes what kind of obstacles and why:
  - From your side (Not insured, could not afford, no time to go)
  - From health centre side (lack of instruments and reactive for diagnostic tests, lack of human resource, need for additional funding, etc.)
- Can you talk about a case of any health losses caused by those obstacles and by delay of getting needed health services?

2. INTERVIEW QUESTIONS for soum and local administrators

Introduction

I am _____ (name) interviewing you in connection with _____ (name of the assessment) survey, to learn about health problems that artisanal gold and small scale miners and their families face, and what are needs for, accessibility and quality of health care services and ways to improve health services.

You are invited to give an interview representing soum governor's office and local administrators. I truly believe that it would be invaluable contribution for policy development to learn from you about health status of artisanal miners and their families, local problems and current stage of health service delivery and to share your thoughts on how to further improve accessibility of health services.

Questions to begin

- How many artisanal and small-scale mining do you have locally?
- Approximately how many people do work in those mining?

Interview main questions:

- How do you work with soum, local hospitals?
- What percentage of soum budget is spent for hospital and health services
- What are common issues of soum health centre that need support and decision from soum government and Citizens' Representatives meeting, how do they solved
- What health problems and diseases do miners have in your soum/area
- How have you been engaged to solve those problems
- In your opinion, what kind of health problems do artisanal gold and coal miners have, why do they have those health problems, what causes them
- Do you think that they receive all health services they need
- What kinds of health services are lacking, what is a reason
- How local government is going to assist in addressing those problems

3. INTERVIEW QUESTIONS for environmental and professional inspectors

Introduction

I am _____ (name) interviewing you in connection with _____ (name of the assessment) survey, to learn about health problems that artisanal gold and small scale miners and their families face, and what are needs for, accessibility and quality of health care services and ways to improve health services.

You are invited to give an interview representing local environment and professional inspection offices. I truly believe that it would be invaluable contribution for policy development to learn from you about health status of artisanal miners and their families, local problems and current stage of health service delivery and to share your thoughts on how to further improve accessibility of health services.

Questions to begin

- To what extent professional inspection agency monitors activities of small- and medium scale mining
- What kind of technical advice and support do you provide to miners

Interview main questions:

- What are damages to the environment due to activities of small and medium scale mining as of now
- What health problems and diseases do miners have in your soum/area, why and what are causes
- What are main risks of working condition that are harmful to their health
- What activities do you implement in regards to occupational safety, how do you involve ASM miners
- Can ASM miners and their families get health services locally
- If could not, how to make sure they get needed health services
- How to reduce health risks associated with employment
- How frequently do you see loss of working ability among miners
- If miners lost their working abilities, could they get compensation and benefit.

4. INTERVIEW QUESTIONS with doctors and health workers

Introduction

I am _____ (name) interviewing you in connection with _____ (name of the assessment) survey, to learn about health problems that artisanal gold and small scale miners and their families face, and what are needs for, accessibility and quality of health care services and ways to improve health services.

You are invited to give an interview representing the local health service provider. I truly believe that it would be invaluable contribution for policy development to learn from you about health status of artisanal miners and their families, local problems and current stage of health service delivery and to share your thoughts on how to further improve accessibility of health services.

Questions to begin

- What percentage of your clients does small- and medium scale miners occupy
- What kind of health services do they mostly use

Interview main questions:

- Common health problems among miners:
  - What diseases
  - Why
  - Who is at risk mostly
  - Who is most heavily impacted (e.g. miners, their spouses, children, etc.)? Why?

- What kind of health services do small and medium scale miners and their families mostly use
  - Types of services
  - Target group

- Do you organize preventative counseling, diagnostics and exams and information and education activities among them from the health centre
  - How many times
  - To whom
  - When
  - What kinds of

- What difficulties do you have in order to provide health services for miners
  - Hospital services
  - In terms of financing
  - Human resources
  - Lack of equipment/ medicine/ supplies
  - Lack of diagnostic/lab capacity

ASSESSMENT OF HEALTH CONDITION OF SMALL– AND MEDIUM SCALE MINERS AND FAMILIES

Interviewer keeps confidentiality of your responses in accordance with the Article 22.3 of the Mongolian Law on Statistics.

QUESTIONNAIRE FOR ARTISANAL GOLD AND COAL MINERS AND CITIZENS

SECTION I. ADDRESS

код

Aimag ..... ☐☐

Soum ..... ☐☐

Name of Mining, area ..... ☐☐☐

Started to work here ..... Year ☐☐☐☐☐ Month ☐☐ Day ☐☐

Mining type ..... **coal, gold, fluorite** ☐☐

gold rock, placer ☐☐

Household size ☐☐ Number of respondent ☐☐☐

Interviewed on: ..... Month ☐☐ Day ☐☐

Interviewer name ..... ☐☐

Name of team leader ..... ☐☐

Name of validating supervisor ..... ☐☐

Name of data entry person ..... ☐☐

SECTION II. GENERAL INFORMATION

No.	Questions	Result code	Skip
201	How old are you? (full age)	Age	
202	Gender	Male .....1 Female 2	
203	What is your marital status?	Never married.....1 Married .....3 Separated, divorced .....4 Widowed .....5 Living with a partner.....6	
204	Та ямар боловсролтой вэ?	Primary.....1 Lower secondary.....2 Complete secondary.....3 Vocational and technical.....4 Higher.....5 Uneducated: Literate.....6 Illiterate.....7	
205	What is your primary purpose to mine gold for you?	Pay tuition fee for a child.....1 Get a house.....2 Pay loan.....3 Need for treatment.....4 For living.....5 No other opportunities to have income.....6 Others.....7 wrire	→
206	Have you registered in the local civil registration office?	Yes.....1 No.....2	301
207	What are causes of not being registered at the local civil registration office?	Don't have referral letter.....A Don't have national ID.....B Could not pay service fee.....C Busy.....D Not good health condition.....E Don't know how to be registered.....F No wish to be registered.....G Other.....H	

SECTION III. EMPLOYMENT AND SCHEDULES FOR WORK AND REST

No.	Questions	Result code	Skip
301	What is your profession?	Agriculture.....A Education.....B Technical, vocational.....C Health.....D Economic.....E Public administration.....F Trade, service.....G Other.....H Specify	
302	How long have you been working as ASM miner to mine gold and coal? (months)	Years..... ☐☐☐ Months..... ☐☐	
303	What do you do now? (except artisanal gold mining)	Yes .....1 No.....2	
304	Do you have an interest in doing something else instead of artisanal gold and coal mining?	Yes .....1 No.....2	306
305	What are reasons to do different work?	Could not find gold.....A Health condition is deteriorating.....B Formal mining is asking to go away.....C Harsh climate condition.....D Tough working condition.....E Have a lot accidents.....F Pressure from inspection and control bodies.....G Far away from family.....H Could not extract gold.....I	
306	During which season do you extract gold and coal?	Winter.....1 Spring.....2 Summer.....3 Autumn.....4 4 seasons.....5	
307	How many hours do you work in average?	☐☐☐	
308	When do you work during the day?	Day hours.....1 Night hours.....2 Day and night hours.....3	
309	When you are working how long do you take a break?	1 hour.....1 2 hours.....2 3 hours.....3 More than 4 hours.....4 Don't have break.....5	
310	What do you do during break time?	Eat meal.....A Do housekeeping work.....B Take care of children.....C Play cards, domino, etc.....D Do physical exercise.....E Have some sleep and rest.....F Have some entertainment.....G Other.....H specify	
311	How many meals do you have during workdays?	1 time.....1 2 times.....2 3 times.....3 4 times.....4 5 times.....5 More than 5 times.....6	
312	Did you have a day without eating a hot meal due to some reason during past month?	Yes .....1 No.....2	314

No.	Questions	Result code	Skip
313	How often do you have a day without proper meal?	Every week.....1 Almost every month.....2 Sometimes.....3 Only in some months.....4	
314	How many days do you have a rest?	1 day.....1 2 days.....2 3 days.....3 Other.....4 specify	
315	What kind of work do you do?	Dig a hole.....A Carry and sieve rock and soil.....B Wash gold.....E Explosion.....F Break rocks and stones.....G Extract with mercury.....H Transport/carry water.....I Other.....K specify	
316	If you are the one who goes underground, how many hours do you work underground?	☐☐	
317	If you are the washer, how many kg rock do you wash per day?	☐☐☐☐	
318	What is the most difficult thing of the following?	Dust.....A Wet, water.....B Heat.....C Cold.....D Noise.....E Darkness.....F No air.....G Stuffy.....H Deep.....I Other.....J specify	
319	What instruments do you use?	Shovel.....A Pickax.....B Crowbar.....C Bucket.....D Bag.....E Pan.....F Siever.....G Water gun.....H Fan.....I Electric hammer.....J Light.....K Compressor.....L Hose.....M Pump.....N Other.....O specify	
320	What do you use to make explosion?		
321	What do you use to extract gold?	Water.....A Wind- Fan.....B Mercury.....C Amonium.....D Cyanide.....E Other.....F	
322	If you use chemical substance, where do you get them?	..... specify	
323	If you use mercury for how many years have you been using it?	☐☐	
324	How many grams of mercury do you use?	☐☐☐☐	
325	How do you extract gold by mercury?	On hands ..... In pot..... Other..... specify	

No.	Questions	Result code	Skip
326	Where do you store chemical substances you use?	At home..... In hole, outside..... Other..... specify	
327	How did you get chemical substances?	Formal mining.....A Individuals.....B Balck market.....C Organization.....D Other.....E specify	
328	Where do you throw water and dust with chemicals?	To river.....1 To ground.....2 To hole.....3 Waste dumping point.....4 Other.....5 specify	
329	Do you wear the followings when you work?	Helmut.....A Gloves.....B Mask.....C Muzzle.....D Armlet.....E Jumper.....F Hoe.....G Hoe robe.....H Apron.....I Other.....J specify	
330	What do you need most from the following work clothes?	Helmut.....A Gloves.....B Mask.....C Muzzle.....D Armlet.....E Jumper.....F Hoe.....G Hoe robe.....H Apron.....I Other.....J specify	
331	What difficulties do you face when wearing work clothes?	Don't know what to wear.....A Could not choose.....B Expensive.....C Don't know where to buy from.....D No intention to wear.....E Could not find.....F Don't know.....G	

SECTION IV. INCOME AND PRODUCTION

No.	Questions	Result code	Skip
401	How much do you earn per day in average? (please convert into monetary terms)	☐☐☐☐☐☐	
402	TWhat is average income for your family?	☐☐☐☐☐☐	
403	How much do you earn in average per month?	☐☐☐☐☐☐	
404	Have you saved money from income of extracting gold?	Yes .....1 No.....2	→ 406
405	Where do you keep your money savings?	Commercial bank.....1 Loan to others.....2 Send home.....3 Store here.....4 Other.....5 specify	
406	Do you have receivables from individuals and organizations since you have started extracting gold?	Yes .....1 No.....2	
407	Have you had loan since you have started extracting gold?	Yes .....1 No.....2	→ 409
408	What is average loan amount you had?	☐☐☐☐☐☐☐	
409	How do you sell extracted gold?	To ger shops.....A On site.....B Sell in aimag centre and city.....C Bank.....D Foreigners.....E Mongolians.....F	
410	What is the most convenient way to sell?	Mobile bank.....A Saving fund.....B Others.....C specify	
411	In relation to store gold/money	Stolen.....A To be robbed.....B Lack of possibility to send or transfer money.....C Others.....D specify	
412	How much you spend on the following health care services?	Medical examination fee..... ☐☐☐ Medicines..... ☐☐☐ Laboratory analysis..... ☐☐☐ Transport to health care facilities..... ☐☐☐ Others..... ☐☐☐ specify	
413	How much do you spend for food per month?	☐☐☐☐☐☐☐	
414	How much do you spend for hygienic and sanitation goods per month?	☐☐☐☐☐☐☐	
415	What do you need most?	Regular printed news.....A Shower.....B Entertainment.....C Toilet.....D Others.....E specify	

SECTION V. HEALTH SERVICES

No.	Questions	Result code	Skip
501	Did you go to see a doctor or nurse in past one year?	Yes.....1 No.....2 Don't know.....3	
502	Where do you go to get health services?	Emergency care.....1 Public hospital.....2 Aimag hospital.....3 Family health centre.....4 Soum health centre.....5 Private hospital.....6 Doctor, nurse, feldsher at Mining site.....7 Others.....8 specify	
503	Who do you go to when you feel sick?	Doctor.....A Feldsher, nurse.....B Health volunteer.....C Chiropractor.....D Lama.....E Family members.....F Friends and relatives.....G Others.....H specify	
504	What types of health services did you mostly receive?	Emergency services via emergency call.....A Went to see soum, family doctor.....B Saw specialist doctor.....C Was admitted to sanatorium.....D Hospitalized.....E Got vaccine.....F Others.....G specify	
505	Have you ever had any kind of disease complaints?	Tinnitus.....A Coughing.....B Red eye and dropping tears.....C Itchy skin, rash.....D Edema.....E Allergy.....F Frequent urine.....G Back pain.....H Pain in joints.....I None.....J Others.....K specify	
506	What are difficulties faced to get health services?	Distance is big to access health services.....A Not insured.....B Not included in the catchment area.....C Lack of communication.....D Lack of transportation.....E No money.....F Others.....G specify	
507	Have you had an accident since you have started extracting gold?	Yes.....1 No.....2 Don't know.....3	
508	How many times have you had accidents and injuries?	1 – 2 times.....1 3 - 5 times.....2 More than 5 times.....3	
509	What type of injury did you have?	Injured arms and legs.....A Burnt.....B Fell.....C Concussion.....D Was hit.....E	

No.	Questions	Result code	Skip
510	What was the cause of injury?	Connected with working condition.....A Caused by movement.....B Domestic injury.....C Overdrinking of alcohol.....D Natural disaster.....E Others.....F specify	
511	Is it possible to get health services?	Yes.....1 No.....2 Don't know.....3	→ 512
512	Please select necessary health services?	Emergency health care services.....A Management of chronic diseases.....B Preventative examination.....C Examination and counselling by a doctor.....D Counseling on injury prevention.....E Health services by specialist doctors.....F Others.....G specify	
513	Can you get timely health services (when needed)	Yes.....1 No.....2 Don't know.....3	
514	Do you have health insurance?	Yes.....1 No.....2 Don't know.....3	→ 517
515	Why you are not insured?	Unemployed.....A Lack of money.....B Not registered, no documents.....C I don't need.....D Don't know.....E Others.....F specify	
516	What is the shortest time to get medical care?	Within 2 hours.....1 2-12 hours.....2 12-24 hours.....3 More than 3 days.....4	

SECTION VI. SOCIAL WELFARE BENEFITS, SERVICES

No.	Questions	Result code	Skip
601	Do you receive any kind of benefits?	Receive pension.....1 Receive benefits.....2 Receive nothing.....3	
602	Where do you get your pension or benefit?	from local office here.....1 from local office at own former residence.....2	→ 804
603	Do you pay social insurance premium from income you earn from extracting gold?	yes.....1 no.....2	
604	If not, what is a reason not paying	could not afford.....1 don't know how to pay.....2 could not meet responsible officials and branch.....3 don't want to be insured.....4 don't know.....5	
605	What is the advantage of having social insurance?	to get pension.....1 to get benefit if working ability lost .....2 to get unemployment benefit.....3	
606	What kind of social welfare services can you receive while you are working as ASM gold miner?	pregnancy benefit benefit for mothers looking after baby	

HEALTH CARE SERVICES AVAILABLE FOR ASM MINERS AND THEIR FAMILIES

Interviewer keeps confidentiality of your responses in accordance with the Article 22.3 of the Mongolian Law on Statistics

QUESTIONNAIRE FOR A HEALTH WORKER

GENERAL INFORMATION

Aimag name ..... ☐☐

Soum name ..... ☐☐

Name of health institution ..... ☐☐

Interview taken: Year ☐☐☐☐☐ Month ☐☐ Day ☐☐

Interviewer name: ..... ☐☐

Name of team leader: ..... ☐☐

Name of validating supervisor: ..... ☐☐

Name of data entry person ..... ☐☐

MODULE I. HEALTH SERVICES

SECTION 1. Health services available for clients

No.	Question	Result		Skip
100	I would like to ask about the health services that are offered and are available in this facility.			
		YES	NO	
01	Family planning	1	2	
02	Antenatal care (ANC)	1	2	
03	Services for the prevention of mother-to-child transmission of HIV (PMTCT)	1	2	
04	Delivery and newborn care services	1	2	
05	Immunization services	1	2	
06	Health services for children under 5 years old	1	2	
07	Health services for children and adolescents	1	2	
08	HIV counselling services	1	2	
09	HIV testing services	1	2	
10	Diagnosis, treatment and treatment supervision of Tb	1	2	
11	Surigical services (including caesarean section)	1	2	
12	Diagnosis or management of non-communicable diseases, such as diabetes, cardiovascular disease, or chronic respiratory disease	1	2	
13	Diagnosis and treatment of occupational diseases	1	2	
14	Blood transfusion services	1	2	
15	Laboratory diagnostics (including any rapid diagnostic testing)	1	2	
16	Storage of medicines, vaccines, or contraceptive commodities	1	2	
17	Treatment of chemical poisoning	1	2	
18	Basic occupational health services	1	2	
19	Services in case of falls from height and explosion	1	2	

SECTION 2. Human resources

No.	Question	Result		Skip
200	I have a few questions on staffing for this facility. Please count how many full and part time doctors, nurses, technicians and other workers you have			
		a) Full time	b) Part time	
01	Generalist medical doctors			
02	Specialist medical doctors			
	IF INPATIENT ↓	IF OUTPATIENT →		200_03
02C	Number of ob/gyn doctors			
02D	Number of pediatricians			
02E	Number of psychiatrists			
02F	Number of surgeons			
03	Number of non physician/paramedical professionals			
04	Nurses			
05	Feldshers			
06	Cleaners			
07	Pharmacistsч			
08	Pharmaceutical technicians			
09	Laboratory technologists			
10	Laboratory assistants			
11	Public health worker			
12	Health workers not elsewhere classified			
13	Health management and administrative workers			
14	Medical specialist to help in case of falls from height and explosion			
15	Poisoning specialist			
15	Occupational health specialist			

SECTION 3. Service accessibility

No.	Question	Result	Skip
300	Do you have inpatient services?	Yes.....1 No.....2 →	307
301	How many inpatient beds in total do you have? (pediatrics and adult)	Inpatient beds	
302	How many maternity beds do you have?	Maternity beds	
303	What is your annual average length of stay?		
304	Total number of inpatients (annual average)		
01	Of which number of insured inpatients		
305	What is percentage of ASM miners in total inpatients?		
306	Of which number of insured inpatients		
307	Number of total patients (annual average)		
01	Of which number of insured inpatients		
308	What is percentage of ASM miners in total patients?		
01	Of which number of insured inpatients		
309	Number of emergency calls on accidents (monthly average)		
01	Of which, number of accidents among ASM miners		

MODULE 2. SERVICE READINESS

SECTION 4. Infrastructure

No.	Question	Result		Skip
400	Does this facility have a functioning land line telephone that is available for 24 hours to receive emergency calls?	yes.....1 no.....2		
401	Does this facility have a functioning cellular telephone or a private cellular phone that is supported by the facility?	yes.....1 no.....2		
402	Does this facility have a functioning short-wave radio for radio calls?	yes.....1 no.....2		
403	Does this facility have a functioning computer?	yes.....1 no.....2		
404	Is there access to internet within the facility?	yes.....1 no.....2		
405	Does this facility have a functional ambulance or other vehicle?	yes.....1 no.....2		
406	Is fuel available?	Yes.....1 No.....2 Don't know.....98		
407	Is this facility connected to the central supply electricity grid?	Yes.....1 No.....2 Don't know.....98		
408	During the past 7 days, was electricity interrupted for more than two hours at a time?	Yes.....1 No.....2 Don't know.....98		
410	What is the source of your electricity?	yes	no	
01	Fuel operated generator	1	2	
02	Battery operated generator	1	2	
03	Solar system	1	2	
04	Others	1	2	

SECTION 5. Health services available for clients

A. Health services available for inpatient care
I would like ask about health services available for clients in general.

BASIC EQUIPMENT

No.	Question	Result		
500	I would like to ask whether the following instruments and equipment could be used today and functioning.	a) Functioning or available to use		
		Yes	No	do not know
01	Scale for adults	1	2	8
02	Scale for children/infants, with 100 gr accuracy	1	2	8
03	Thermometer	1	2	8
04	Stethoscope	1	2	8
05	Blood pressure apparatus	1	2	8
06	Pulse oximeter	1	2	8
07	Oxygen concentrator	1	2	8
08	Oxygen cylinders	1	2	8
09	Light source	1	2	8
10	Intravenous infusion kit	1	2	8
11	Syringes	1	2	8
12	Urine catheter	1	2	8
13	Sterile gloves	1	2	8
14	Non-sterile gloves	1	2	8

SPECIALIZED SERVICES

No.	Question	Result		
500	I would like to ask whether the following instruments and equipment could be used today and functioning.	a) Functioning or available to use		
		Yes	No	do not know
15	Antidote for mercury poisoning	1	2	8
16	Antidote to be used during cyanide poisoning	1	2	8
17	Artificial breathing machine	1	2	8
18	Limb directs	1	2	8
19	Headrest	1	2	8
20	Aspirator (electric, pedal)	1	2	8
21	Tongue elevator through mouth and nose	1	2	8
22	Wheelchair, trolley	1	2	8
23	Stomach probe	1	2	8
24	Surgical needle and string	1	2	8
25	Scissors and clamps	1	2	8
26	Bandage material	1	2	8
27	Compressive dressing tightener	1	2	8

MATERNAL AND NEWBORN CARE

No.	Question	Result		Skip
600	TANC	DOES NOT PROVIDE ANC		→ 700
601	Do the following services available for ANC?	YES	NO	
		1	2	
01	Iron supplementation	1	2	
02	Folic acid supplementation	1	2	
03	Blood pressure monitoring	1	2	
700	OBSTETRIC, NEWBORN CARE SERVICES OFFERED	DOES NOT PROVIDE OOBSTETRIC, NEWBORN CARE SERVICES		→ 800
701	Do you provide normal delivery services?	Yes .....1 No 2		
702	Does your facility provide the following services?	YES	NO	
		1	2	
01	Assited vaginal delivery	1	2	
02	Manual removal of placenta	1	2	
03	Removal of retained products after delivery	1	2	
04	Neonatal resuscitation	1	2	
05	Caesarean section	1	2	
06	Blood transfusion	1	2	

CHILD HEALTH

No.	Question	Result				Skip
800	PROVIDES IMMUNIZATION SERVICES	DOES NOT PROVIDE IMMUNIZATION SERVICES				→ 802
801	Does this facility provide any of the following immunization services for children under 5 years of age: IF YES, ASK: Is the service provided in the facility only, as outreach only, or both?	AT THE HOSPITAL		AT HOME		
		Yes	No	Yes	No	
01	Measles vaccination	1	2	1	2	
02	Pentavaccine	1	2	1	2	
03	Poliovaccine	1	2	1	2	
04	BCG vaccine	1	2	1	2	

		YES	NO	
802	Diagnose and/or treat child malnutrition	1	2	
803	Provide vitamin A supplementation	1	2	
804	Provide iron supplementation	1	2	
805	Provide ORS and zinc supplementation to children with diarrhea	1	2	
806	Child growth monitoring	1	2	
807	Length/height measuring equipment	1	2	

		Observed available		Not observed		
808	I would like to know if the following drugs and consumables are available in this service area today	Valid	Expired	Reported available but not seen	Not availabale today	Never available
01	Oral rehydration salts (ORS) sachets	1	2	3	4	5
02	Amoxicillin syrup/suspension	1	2	3	4	5
03	Co-trimoxazole syrup/suspension	1	2	3	4	5
04	Paracetamol syrup/suspension	1	2	3	4	5
05	Vitamin A capsules	1	2	3	4	5
06	Zinc, capsules	1	2	3	4	5

NON-COMMUNICABLE DISEASES

No.	Question	Result	Skip
900	NCD services offered	NCD services are not offered →	906
901	Do providers in this facility diagnose and/or manage diabetes in patients?	yes.....1 no.....2	
902	If yes, is prevalence of diabetes among ASM miners?	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
902	Do providers in this facility diagnose and/or manage cardiovascular diseases?	yes.....1 no.....2	
903	If yes, is prevalence of cardiovascular diseases among ASM miners?	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
904	Do providers in this facility diagnose and/or manage chronic respiratory diseases in patients?	yes.....1 no.....2	
905	If yes, is prevalence of respiratory chronic diseases among ASM miners?	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	

COMMON DISEASES PREVALENCE AMONG ASM MINERS

I would like to ask about common diseases among ASM miners. Please consider diseases prevalent among ASM miners who have come to and have hospitalized at yout hospital.

No.	Question	Result	Skip
906	Pneumoconiosis	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
907	Loss of hearing, deafness	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
908	Diseases of urinary tract organs	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
909	Sexually transmitted diseases	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
910	Vibrating illness	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	

INJURIES AND TRAUMAS

911	Falling down from high	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
912	Pressed by rocks	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
913	Electric shock	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
914	Limb, bone fracture	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	

915	Brain injury	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
916	Spinal injury	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
917	Wounds caused by cutting, hitting and sticking	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
918	Burns	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
919	Eye injury	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	
920	Chemical poisoning	very high.....1 high.....2 medium.....3 low.....4 none.....5 do not know.....6	

DRUG SUPPLY

921	Do you have suplly of the following drugs and consumables?	Observed:		Not obeserved:		
		vaild	expired	Reported available but not seen	Not available today	Never available
1	Metformin cap/tab	1	2	3	4	5
2	Glibenclamide cap/tab	1	2	3	4	5
3	Insulin injection	1	2	3	4	5
4	Glucose injectable solution	1	2	3	4	5
5	ACE inhibitors (e.g. enalapril)	1	2	3	4	5
6	Thiazides	1	2	3	4	5
7	Calcium channel blockers (e.g. amlodipine)	1	2	3	4	5
8	Aspirin cap/ tab	1	2	3	4	5
9	Salbutamol inhaler	1	2	3	4	5
10	Beclomethasone, inhaler	1	2	3	4	5
11	Prednisolone cap/tab	1	2	3	4	5
12	Hydrocortisone , cap/tab	1	2	3	4	5
13	Epinephrine injection	1	2	3	4	5

14	Amoxicillin 500mg (bacterial infection)	1	2	3	4	5
15	Atenolol 50mg cap/tab(beta-blocker, angina, hypertension)	1	2	3	4	5
16	Captopril 25mg cap/tab (vasodilatation, cardial hypertension)	1	2	3	4	5
17	Cefriaxone injection, 1g (antibiotic injection)	1	2	3	4	5
18	Ciprofloxacin, 500mg, cap/tab	1	2	3	4	5
19	Ko-trimoxazole, suspension	1	2	3	4	5
20	Diazepam 5 mg cap/tab	1	2	3	4	5
21	Diclofenac 50/75 mg cap/tab	1	2	3	4	5
22	Omeprazole 20 mg cap/tab	1	2	3	4	5
23	Paracetamol	1	2	3	4	5
24	Sddium chloride injectable solution	1	2	3	4	5
25	Calcium gluconate injection	1	2	3	4	5
26	Marnesium, injection	1	2	3	4	5
27	Ампicillin, injection	1	2	3	4	5
28	Gentamycin, injection	1	2	3	4	5
29	Metronidazol, injection	1	2	3	4	5
30	Mesoprostol, cap/tab	1	2	3	4	5
31	Betamethpsone/Dexamethasone injection	1	2	3	4	5
32	Nifedipine cap/tab	1	2	3	4	5

SECTION 6. Diagnostics

CLINICAL CHEMISTRY

No.	Question	Result					Skip
1000	Does your facility do the following diagnostic tests?	If not →					1010
1001	Do you measure blood glucose level?	Yes.....1 No.....2					
1002	Do you measure urine protein level?	Yes.....1 No.....2					
1003	Does this facility do urine ketone dipstick tests?	Yes.....1 No.....2					
1004	Does this facility do liver function tests?	Yes.....1 No.....2					
1005	Does this facility do renal function tests?	Yes.....1 No.....2					
If you responeded 'Yes' to questions # 1003-1005 please circle in the followings:							
	The following equipment and/or items are functioning:	a) Available			b) Functioning		
		Observed	Reported not seen	not available	yes	no	do not know
1006	Blood chemistry analyzer	1	2	3	1	2	3
1007	Centrifuge	1	2	3	1	2	3
1008	Specific assay kit- liver function test	1	2	3	1	2	3
1009	Specific assay kit- renal function test	1	2	3	1	2	3

HEMATOLOGY

No.	Question	Result					Skip
1010	Does this facility do haemoglobin testing? IF YES: Ask onsite or offsite.	yes, on site.....1 yes, offsite.....2 no.....3					→ 1015 → 1015
		a) Available			b) Functioning		
		Observed	Reported not seen	not available	yes	no	do not know
1011	Do you use colorimeter or haemoglobinometer?	1	2	3	1	2	3
1012	Do you use HemoCue?	1	2	3	1	2	3
1013	Do you do full blood count and differential testing?	yes, on site.....1 yes, offsite.....2 no.....3					
1014	Does this facility do ABO blood grouping testing?	yes, on site.....1 yes, offsite.....2 no.....3					

BACTERIOLOGY

1015	Do you do Ziehl-Neelson testing for TB (AFB)?	yes, on site.....1 yes, offsite.....2 no.....3	
1016	Do you do Gram stains?	yes, on site.....1 yes, offsite.....2 no.....3	

OTHERS

		a) Available			b) Functioning		
		Observed	Reported not seen	not available	yes	no	do not know
1017	Light microscopy	1	2	3	1	2	3
1018	Glass slides and cover slips	1	2	3	1	2	3
1019	Refrigerator	1	2	3	1	2	3
1020	Do you do abdominal ultrasound?	Yes.....1 Yes, but not functioning.....2 No.....3					
1021	Do you have ECG?	Yes.....1 Yes, but not functioning.....2 No.....3					

SHEET TO RECORD INFORMATION RELATED TO HEALTH SERVICES

This sheet will be used to obtain information about health status of ASM gold, coal and fluorite miners and health services utilized by them from health statistics data at soum, aimag hospitals and district health centres. The sheet will be filled out by an official like a health statistician or manager who is capable to provide the necessary health information.

	Aimag ..... Soum ..... Mining site name:			
	Mining type: 1. Coal 2. Gold (placer, rock), circle 3. Fluorite 4. Other			
		2011	2012	First half of 2013
ONE. General information about health centre				
1.1.	Total number of doctors			
1.2.	Total number of nurses			
1.3.	Total number of hospital beds			
1.4.	Average length of stay			
1.5.	Number of inpatients			
1.6	Of which: number of mining workers			
1.8.	Number of outpatient clients			
1.9	Of which: number of mining workers			
1.10	Early ANC rate			
TWO. Health service cost and expenditure				
2.1.	Annual total budget			
2.2.	Percentage of insured among clients			
2.3.	Total number of population in the catchment area			
2.4	Number of clients who do not belong to the catchment area			
2.5	Number of ASM and small- and medium scale miners (if known)			
2.6	Amount spent for health services for ASM and small- and medium scale miners			
2.7	Annual total budget			
3.	**Common diseases prevalent among small- and medium scale miners and their family members**			
3.1.	Number of clients hospitalized due to cardiovascular diseases: - miners - family members			
3.2	Number of clients hospitalized due to kidney and urinary tract diseases: - miners - family members			
3.3	Number of clients hospitalized due to respiratory diseases: - miners - family members			
	Number of clients hospitalized due to low back disorders: - miners - family members			
3.4	Total number of injuries and accidents			
3.5	Of which, number of injuries and accidents of: - miners - family members			
3.6	Number of clients with occupational diseases: - miners - family members			
4. Information about local small- and medium scale mining				
4.1.	Total number of mines			
4.2	Number of gold miners, of which: - local residents - non-residents			

Additional information:

INFORMED CONSENT FORM

Name of the survey: **Assessment of health situation of ASM miners and their families**
Researchers' names, positions, addresses, telephone numbers:
O. Chimedsuren, HSUM, SPH, Director, telephone 329126
E. Erdenechimeg, HSUM, SPH, telephone 99166419

Introduction
The number of artisanal and small-scale miners has been increasing in Mongolia, particularly in rural areas where this type of mining is becoming an important source of income for unemployed and poor people. Miners work in harsh, unsafe working conditions for long periods of time. There are a lot of accidents and injuries among artisanal miners, such as falls from height, burns, muscle and joint disorders, pneumoconiosis and other air particle-related respiratory disorders. Research studies show that the health care services provided to ASM miners are inadequate, provided by difficult to access remote health facilities, and miners are not covered by health insurance.
We are conducting this survey with purpose to examine health situation of artisanal small-scale miners and their families, determine their health care seeking behavior, and assess access to and quality of health care services provided to them, and, consequently, develop recommendations to address these challenges and improve the current situation.
Your participation in this research is entirely voluntary. You may change your mind later and stop participating even in the middle of the study. Your participation will be confidential. We will ask you the questions about problems and challenges faced by artisanal miners in terms of health, occupational safety and social issues.

Risks
This research will not pose any risks to its participants, will not bear health risks and will not affect the reputation of the participants.

Benefits
Your participation in this research will contribute to resolving health problems of artisanal miners.

Costs of participation in the survey
You will not pay any costs for participating in this research.

Confidentiality
The confidentiality of your information is important to us. The name on the questionnaire and the Informed Consent Form will be hidden. With purpose to protect the personal information, we will use a code when inputting the information and your name and other personal information will not be shared with anyone. Your name will not be mentioned in the research findings. The information about you will not be shared with all researchers; they will be able to access your information only after signing the page verifying that they will not share your name with anyone. Your personal information will be kept strictly private and kept in the room with a lock.

Certificate of Consent:
I have read and understood the Informed Consent Form and I consent voluntarily to be a participant in this study by signing this page.

PARTICIPANT'S FULL NAME: .....
SIGNATURE:.....
Date:.....

Зураг 1. Дорноговь аймгийн Айраг суман дах жоншны бичил уурхай
Photo 1. Artisanal fluorite mine in Airag soum, Dornogobi aimag

Зураг 2. Шарын гол суман дах алтны бичил уурхайд хэрэглэж буй гар хийцийн багаж
Photo 2. Handmade tool used by Artisanal gold miners in Shariin-Gol soun, Darkhan-Uul aimag

Зураг 3. Төв аймгийн Борнуур суман дах алт баяжуулах үйлдвэр
Photo3. Small scale gold processing plant in Bornuur soum, Tuv aimag

Зураг 4. Баянхонгор аймаг дах алтны бичил уурхай
Photo 4. Artisanal gold mine in Bayanhongor aimag

Зураг 5. Бичил уурхайчдын алт олборлох, баяжуулах үйл явц
Photo 5. Gold extracting and processing by artisanal miners

Зураг 6. Улаанбаатар хотын Налайх дүүрэгт хувиараа нүүрс олборлож буй байдал
Photo 6. Artisanal coal mine in Nalaikh district, Ulaanbaatar

Зураг 7. Баянхонгор аймаг дах алтны бичил уурхай эрхлэгчдийн гэр бүл
Photo 7. Artisanal miners' family at mining site, Bayankhongor aimag

Зураг 8. Судалгааны баг бичил уурхайн талбарт судалгааны өгөгдөл цуглуулж буй агшин
Photo 8. The research team is at artisanal mining site for collecting study data