Health impacts of small-scale and artisanal mining and the role of the health sector in responding to them

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Contents

- Basic overview of health impacts of ASM
- Role of health sector in responding to ASM
- WHO activities
Many different forms of ASM
– similar and different health-related issues

● Common issues:
  – Occupational health and safety
  – Environmental pollution/degradation
  – Social issues
  – Child labour

● Specific issues:
  – Gold, copper, silver
  – Coal
  – Gems (e.g. diamonds, sapphires, etc.)
  – Uranium
  – Etc.
Chemical exposure

e.g. toxic effects of mercury

- Neurotoxicity
  - Central nervous system

- Nephrotoxicity
  - Kidneys

- Teratogenicity:
  - MeHg is a teratogen (Minamata disease)

- Cardiovascular system:
  - Elevated risk of heart attack, hypertension

- Carcinogenicity:
  - MeHg is a possible human carcinogen

- Mutagenesis:
  - Hg seems not to be mutagen

- Reproduction:
  - No clear evidence of effect

- Immunotoxicity:
  - Under scientific discussion
Signs and symptoms of metallic Hg exposure typical in ASGM

- Tremor
- Disturbed body movement (Ataxia)
- Coordination problems
- Excessive salivation
- Metallic taste

Neuropsychological test (coordination) of a child in the Philippines

Courtesy of Dr. Stephan Boese-O'Reilly 1998-2013
Accidents and injuries

- Underground mining in unsafe tunnels
- Unprotected open pits
- Holes / unsafe grounds
- Explosives

Collapsing tunnels/walls
Severe and fatal accidents

Mining shafts in Nigeria, Zimbabwe and Guyana

Courtesy of Dr. Stephan Boese-O’Reilly 1998-2013
Dust

- Underground mining - rock dust
- Crushing ore in mills - fine dust
  - occupational lung diseases
    - Pneumoconiosis
    - Silicosis
    - Tuberculosis <-> Silicosis
- Example: mining industry in Mongolia
  - Dust induced bronchitis and pneumoconiosis
    main cause of occupational lung diseases.
    Accounted for 67% of cases reported from 1967-2004.

Photos courtesy of Dr. Stephan Boese-O’Reilly 1998-2013
Noise

- Crushing rocks in ball mills and stamp mills
- Working in open pit mines or tunnels
- Power generators

Few use personal protection

Result is hearing impairment

Stamp mills in Zimbabwe and Tanzania

Courtesy of Dr. Stephan Boese-O’Reilly 1998-2013
Environmental pollution/degradation

- Release of waste materials from extraction process
  - Impacts on quality of air, water and soil

- Land use changes
  - Impacts on local ecosystems, biodiversity
  - Water resources,
  - Availability (and utility) of land for agriculture

Threats to health:
- Chemical exposure/poisoning
- Vector borne disease
- Food security/nutritional security
Other health issues

- Lack of adequate water and sanitation
- Malaria and vector borne diseases
- Malnutrition
- Communicable diseases
- Violence
- Lack of access to health care
Social problems with implications for health

- Migrant workers/camps
- Alcoholism
- Prostitution
- Illegal mining
- Corruption
- Crime
- Child labour

Photo: Carlos Garcia Rawlins / Reuters
Children more vulnerable to environmental risks

- Not little adults
  - Physiology is different
  - Different exposure, because of places they spend time, activities they engage in, because of their behaviors
  - State of continual development
  - Longer life expectancy
  - Politically powerless

WHO
Role of health sector in responding to health impacts of ASM

- Diagnose and treat
- Report cases
- Enrich the evidence base
  - Research on health impacts
  - Effectiveness of interventions to address them
- Educate
  - Patients, families, communities
  - Colleagues
- Advocate

Training health care providers in Tanzania

Courtesy of Dr. Stephan Boese-O’Reilly 1998-2013
In order to play this part, health sector needs to be adequately capacitated

- Core competencies of health care providers at local level
- Adequate laboratory capacity
- Availability of treatment/medicines, e.g. for mercury poisoning
- Adequate case reporting
- Response capacity, e.g. for cyanide incidents
What is WHO doing on ASM?

1. Systematic review of health impacts of mercury use associated with ASGM
2. Training modules for health care providers on how to identify and address health impacts of ASM

In collaboration with the SDC:

3. Rapid survey tool to assess health situation of ASM miners and their families
4. Model public health action plan for addressing health impacts of ASM

Pilot in Mongolia in 2013/14 as model for replication elsewhere
extra slides
Case example: Heavy metal poisoning
ASM in Zamfara, Nigeria (ongoing)

- Event detected by international medical team.
- Over 1000 children poisoned. 207 deaths. In some villages, 10-30% of the children under 5 years old dead.
- Extraction of gold from ore with high lead content.
- Death + illness caused by lead exposure.
- In some villages, 70-100% of children need emergency medical treatment.
- Long-term health consequences, in particular for children.
Significance of ASM
- example of artisanal gold mining

- Artisanal small-scale gold mining worldwide:
  - > 70 countries
  - 10-15 million artisanal gold miners
  - 50-100 million people depend on artisanal gold mining business

- Resulting production of gold:
  - 400 tons of gold/year - 15% of the global gold production
  - 20 Billion US$
  - 2,000 US$/miner/year
Child labour

These children earn money after school or instead of school attendance by performing various kinds of work

- Working in tunnels
- Carrying sacks with ore
- Hammering ore to pieces
- Emptying ball mills
- Squeezing towels
- Searching for amalgam
- Smelting amalgam

Photos courtesy of Dr. Stephan Boese-O’Reilly 1998-2013
Exposure to hazardous chemicals e.g. mercury in ASGM

Crushing ore → Liquid mercury → Panning

Pollution from ASGM:
640 to 1.350 tons of mercury/year released to the environment
Small-scale and artisanal mining operations