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As noted in UNICEF's Extractive Pilot report, "Children are more vulnerable to the localized environmental impacts of mining activity than adults – particularly water, air and soil pollution – due to their progressive and incomplete physical development; the fact that they spend more time playing than adults and hand-to-mouth behaviour that makes children more likely to ingest pollutants; and their varying stages of mental development, for example, inability to read hazard and warning signs."¹⁹

¹⁹ United Nations Children's Fund, *Children's Rights and the Mining Sector: UNICEF Extractive Pilot*, UNICEF, Geneva, March 2015, p. 13.

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Mining companies can take a wide range of actions to protect children from many of the environmentally related impacts of their operations.

Where does your company stand on respecting and advancing children's rights in environmental management? The figure below presents a continuum from the lack of effective planning and management systems to the fullest measures of corporate responsibility and proactive leadership.



Tool 5 offers mining companies a set of considerations for integration of a child rights perspective in environmental management plans, and is designed to complement the IFC Performance Standards.²⁰ For companies that are not implementing an approach to environmental management in line with international standards and guidance, addressing that gap will be the first priority.

Because child rights considerations for environmental management will need to be dealt with throughout the project cycle, the tool will help companies identify key child rights issues and design appropriate child-inclusive indicators and strategies in response.

²⁰ All of the IFC standards and guidance notes are available at <www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/IFC+Sustainability/Our+Approach/Risk+Management/Performance+Standards>.

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5.1 Overview of the issues and related standards

An environmental management plan is an approach for companies to assess, manage and mitigate impacts of operations on the physical environment of a project area. In regard to mining company assessments, there are a number of resources available to practitioners, for example, the comprehensive guidelines published by the Government of Australia.²¹

Although a specific stand-alone child rights impact assessment may not be required, it will be vital to integrate a children's rights perspective into each step of the environmental impact assessment. While the IFC Performance Standards provide the overall framework for assessment and management of environmental impacts, addressing the most pertinent issues for children begins by understanding how they are more vulnerable to the environmental impacts of mining than adults, especially between birth and age 5.

This is due to their physiology (small body size, higher metabolism, more rapid breathing rate) and behaviour (outdoor activity, hand-to-mouth habits), and their extended exposure to potentially hazardous environments. Many children live in environments polluted by mining rather than only being exposed for an eight-hour shift, as is the case with many workers. Annex C provides a detailed table of environmental impacts on children as related to air, land and water.

Children can be directly impacted by mining operations, such as through unsafe slopes and pits, or particles emitted during excavation. They can be indirectly affected as members of the household due to changes in income, livelihoods and food supplies, e.g., such as contamination of the food chain with heavy metals. Because managing the indirect impacts requires an approach that integrates social factors, ecological health and science, the company's impact assessment team should include members who have expertise and experience in these areas.

Resources for environment

IFC Performance Standards on Environmental and Social Sustainability, available at www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/IFC+Sustainability/Our+Approach/Risk+Management/Performance+Standards

Human Rights and the Mining and Metals Industry: Integrating human rights due diligence into corporate risk management processes, ICMM, open PDF from www.icmm.com/website/publications/pdfs/3308.pdf

'Ecosystem Services in Environmental Assessment: Help or hindrance?', J. Baker, et al., Environmental Impact Assessment Review, vol. 40, 2013

'The Ecosystem Approach', Parliamentary Office of Science and Technology, UK Houses of Parliament, PostNote, no. 377, May 2011, open PDF from www.parliament.uk/documents/post/postpn_377-ecosystem-approach.pdf

'Children's Environmental Health and the Precautionary Principle', D. Jarosinska and D. Gee, International Journal of Hygiene and Environmental Health, vol. 210, 2007

More resources can be found in UNICEF Background Paper: Children, mining and environmental impacts, forthcoming in 2017, available at www.unicef.org/csr/extractives

²¹ Following consultation with the Australian mining industry and other interest groups, the Leading Practice Sustainable Development Program for the Mining Industry developed 15 handbooks to address the key issues affecting sustainable development. The handbooks provide mine managers, communities and regulators with essential information on current sustainable mining practices, and are available from the Australian Government, Department of Industry, Innovation and Science, at www.industry.gov.au/resource/Programs/LPSD/Pages/LPSDhandbooks.aspx.

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Box 7. Forthcoming thematic review of mining and environmental impacts on children

As part of its ongoing work with UNICEF, a stand-alone resource for mining companies is being developed by Synergy Global. Written by Daniel Limpitlaw, UNICEF Background Paper: Children, mining and environmental impacts will offer in-depth research and analysis, including factors for biophysical impact assessment and a bibliography of references to support a company's use of Tool 5.

This thematic review is scheduled to be published in 2017 and will be available at <www.unicef.org/csr/extractives>.

5.2 Scoping for environmental impact assessment and management plans

As noted in Section 1.3, the scoping phase is used to define the schedule, depth, breadth and thematic focus of the impact assessment, which are then documented in the terms of reference for consultants.²² To integrate child rights, the environmental impact assessment should begin with a brief scoping of whether children are a stakeholder group likely to be significantly affected by mining operations and whether further project data are needed to fill baseline information gaps.

The table of environmental impacts on children in Annex C can serve as a reference point for identifying the issues and impacts that could be raised during stakeholder engagement or researched in desk studies. After the preliminary identification of potential impacts, the key questions provided in Box 8 (below) can help practitioners gain clarity on data gaps, which can then enable them to scope the baseline and specialist studies and adjust plans accordingly.

Box 8. Key scoping questions for an environmental impact assessment

Water quality:

Do mining and beneficiation processes result in acidification of waste water?

Does the operation monitor heavy metals with the potential for biomagnification in local food chains?

Have water-quality objectives been established for receiving water bodies, e.g., rivers, lakes and groundwater?

How far downstream is water quality measured?

Which water quality standards are applied?

Dust:

Is dust monitoring conducted on site?

Is dust monitoring conducted along transport routes?

Are all roads used by mine-related traffic tarred/sealed?

Land cover:

What are the characteristics of the geographical area where mining takes place?

How is the area affected by mining surface operations and infrastructure, including roads?

Is concurrent rehabilitation conducted?

Are traditional land uses accommodated within the mining lease?

²² IPIECA and Danish Institute for Human Rights, *Integrating Human Rights into Environmental, Social and Health Impact Assessments: A practical guide for the oil and gas industry*, IPIECA and DIHR, London and Copenhagen, 2013, p. 13.

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Box 8. Key scoping questions for an environmental impact assessment (continued)

Threshold limit values:

Has the mine/plant set threshold limit values for pollutants released through production processes?

What are the thresholds?

Do they consider impacts beyond an 8-hour shift exposure?

Do they take the sensitivities of children and pregnant women into account?

Safety:

How are local people informed of hazardous areas?

What is the literacy rate in the workforce?

What is the literacy rate in the local community?

5.3 Baseline studies

Children should be a priority focus when studying exposure to environmental pollutants, or 'toxicants' – the human-made (synthetic) substances that "present a risk of death, disease, injury, or birth defects in living organisms through absorption, ingestion, inhalation, or by altering the organism's environment."²³ Consider the following points for baseline research:

- *Describe children's distinct vulnerabilities* to the environmental impacts of mining operations. When conducting the study, make sure the research includes vulnerable groups of children that were possibly overlooked during initial stakeholder engagement.
- *Carry out broader social and community health assessments*, based on the multiple factors that can affect children's health directly or through their parents and caregivers, e.g., employment, income, education, housing, environment, lifestyle and traditional land use.
- *Consider neurobehavioural (relationship between nerve functions and behaviour) assessments* to evaluate adverse health effects in association with relatively low levels of exposure to metals. Neurobehavioural impairments have been recorded in children who are exposed at levels considered to be safe for most people.²⁴ Subtle impairments, such as reduced dexterity or slower reaction time, are rarely noticed by people who are affected because they often struggle with other health problems such as malnutrition and infectious disease.
- *Measure biodiversity status and trends in the relevant ecosystems*. Integrate biophysical and social impact assessments, because the impacts are likely to be linked. Lowering of the water table, for example, can have severe socio-economic impacts such as water scarcity and shortages for communities, making agriculture and livestock production difficult or impossible.

Table 12 lists key child rights indicators that can be integrated into environmental and health baselines. When taking a child rights perspective, it will often be essential to conduct cross-sector impact assessment. For example, there may be direct links between water shortages and educational opportunities available to children, or between contamination of agricultural fields and food insecurity. The process in this case would integrate biophysical and socio-economic impact assessment into the environmental and health baseline study.

²³ WebFinance Inc., 'Business Dictionary', Fairfax, Va., 2016, <www.businessdictionary.com/definition/toxicant.html>.

²⁴ Callan, Anna Carita, et al., 'Children's Exposure to Metals: A community-initiated study', *Archives of Environmental Contamination and Toxicology*, vol. 62, no. 4, May 2012, pp. 714–722.

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Table 12. Indicators for baseline studies

Assessing children's health status and vulnerabilities

Baseline studies should identify multiple social and health factors, and the ways these factors interact. For example, the presence of child labour, especially where children are involved in hard manual labour, e.g., artisanal mining, leads to health impacts such as back pain, reduced lung function and asthma.

Other factors that affect children's health can be identified by cross-referencing to the social impact assessment, including:

- food security
- presence of child-headed households
- child trafficking
- underage employment in the workforce.

Health indicators could include children's:

- nutrition status
- level and type of immunization
- prevalence of diseases
- drug and alcohol usage
- exposure to mining landscapes such as non-rehabilitated surfaces with potential for ponding, creating habitats for mosquitoes and other insects that spread disease.

(For general baseline indicators, see Tool 1, Tool 2 and Annex C.)

Focusing on children in studies of exposure to environmental pollutants

Cognitive and neurobehavioral changes have been reported in children exposed to low doses of trace metals that are considered to be safe for most people. Additional risk assessments will be required for mines and processes that are associated with the following:

- lead concentrations in local water supplies (direct impacts on health through consumption; indirect through irrigation)
- mercury concentrations in food sources, especially fish
- manganese levels in airborne dust
- nitrate concentrations in drinking-water sources
- chromium in dust and water sources
- nitrogen oxides concentration and particulate matter concentrations in the atmosphere
- blood, urine and hair metal concentration levels in children.²⁵

(For notes on monitoring for toxicants, see Section 5.5, below.)

Considering neurobehavioural assessments to evaluate adverse health effects

Relatively low levels of exposure to metals have been linked to neurobehavioural impairments in children. Among all populations, harm can result from exposure to toxicants generated by mining, but metals may also be ingested through other routes, e.g., food contaminated during household cooking. Social baseline surveys are key to identifying such additional sources of exposure to metals.

Environmental and health studies will examine reduced performance in:

- motor tests (reduced dexterity, slower reaction time)
- sensory tests
- cognitive functions (relative to a non-exposed reference population, significant differences reported as $p > 0.05$).

²⁵ Molina-Villalba, Isabel, et al., 'Biomonitoring of Arsenic, Cadmium, Lead, Manganese and Mercury in Urine and Hair of Children Living Near Mining and Industrial Areas', *Chemosphere*, vol. 124, no. 1, November 2014, pp. 83–91.

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Table 12. Indicators for baseline studies (continued)

Measuring the condition and trends of biodiversity in relevant ecosystems

Key indicators for examining ecosystem functions include changes in the number of:

- animal species present, and numbers within the species
- species on which the community depends for livelihoods/food security.

5.4 Impact identification and evaluation

Specifically considering vulnerable children during identification of affected stakeholders and potential impacts on children enables practitioners to more effectively prepare the scope of baseline and specialist studies. Because these data are frequently reflected in the consultant/specialist terms of reference for environmental impact assessments, it is important to include the key elements discovered during preliminary scoping.

Companies can find general guidance on how to include a child rights lens in impact identification and evaluation in *Tool 1. Impact Assessment*. Common mistakes and useful suggestions regarding companies' assessment of environmental impacts on children include the following:

- *Although an eight-hour shift threshold limit value can generally be applied to workers regarding 'occupational exposure', children living in polluted environments are likely to experience 24-hour residential exposure.* It is vital to understand the influence of environment and environmental agents on human health, based on knowledge of relevant epidemiological, toxicological and exposure factors. To ensure that this approach is integrated into impact assessments, state the threshold limit values that are being applied for specific groups when assessing the risk of exposure to environmental contaminants. By doing this, errors in the risk assessment will be easier to detect.
- *Take the increased physiological vulnerability of children to toxicants into account, rather than applying exposure limits designed for adults.* While it is not possible to present specific threshold limit guidance for the thousands of known toxicants that could potentially impact on children around mining sites, it is important to understand the limitations of the published limits. As a general rule, unless the threshold limit has been specifically developed for environmental (as opposed to occupational) exposure of children (as opposed to adults), great care should be exercised when applying the threshold. In such cases, it is prudent to apply the precautionary principle and adopt a more conservative limit.
- *Take behavioural differences between children and adults into account when assessing potential exposure pathways.* Adults are far less likely to ingest contaminated soil during the course of a day, while children typically engage in hand-to-mouth contact with multiple elements of their physical environment.
- *Assess the determinants of health rather than the health impacts.* Complex relationships between environmental change and health make quantification and prediction of project impacts challenging. Such assessment must weigh the evidence for likely changes in health determinants, and then outline whether the net effect of these changes will be positive or negative for identified communities.

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- *Do not ignore the links between social, environmental and health impacts.* For example, land disturbance may be linked to lower crop yields, which may be linked to greater effort levels by farmers to produce enough food, possibly leading to diminished school attendance or adult supervision, with increased risks of injuries for children.

5.5 Monitoring, evaluating and reporting

The key to effective monitoring is to have a comprehensive baseline that encompasses specific data on children's vulnerabilities, both for socio-economic and for biophysical factors.

In regard to communities that depend on fishing, for example, understanding historical metal concentrations in rivers draining a mine site, coupled with species composition and data on fishing and use of river water by communities, will enable an effective monitoring programme to be devised. This programme should detect changes in fish species and numbers, and be able to disaggregate seasonal variations to effectively assess the progress of related impacts on children, according to their vulnerabilities, nutritional needs and dependencies.

Note that such evaluations will often require specialized expertise. Mercury, for example, is known to affect human nervous, digestive and immune systems and, even in small amounts, can threaten a child's development.²⁶ It is concentrated in fish, but very difficult to measure in humans. It is therefore crucial to use certified laboratories, standardized sampling protocols and well-trained staff for collecting samples.

Community health monitoring for toxicants also faces challenges, because it places stress on children when blood samples are required, is expensive and invasive, and often requires laboratory facilities located only in industrialized countries. Consequently, it is typically used as a last resort.

To protect children from exposure to contaminated water or fish, regular monitoring of run-off from tailings storage facilities, coupled with a detailed baseline and understanding of links from the mining company's environmental and social impact assessments, should enable site management to proactively prevent exposure and respond if pollution occurs.

Key environmental quality indicators – such as water quality in a river draining from a site and used by a village – should be reported methodically to the regulating authorities, the company's board and the relevant communities. This requires close operational cooperation between the community managers and the environmental monitoring managers. Where a community is at risk from a pollution event, steps should be taken to reduce this risk, for example, replacing river water use with borehole water.

The company's monitoring system should be linked to an emergency response process that includes local communities. The Awareness and Preparedness for Emergencies at Local Level (APELL) programme developed by the United Nations Environment Programme in partnership with governments and industry, is one such mechanism that aims to minimize the occurrence and harmful effects of technological accidents and environmental emergencies.²⁷

²⁶ World Health Organization, 'Mercury and Health: Fact sheet', WHO, January 2016, <www.who.int/mediacentre/factsheets/fs361/en>.

²⁷ See: United Nations Environment Programme, APELL, <www.unep.org/apell>.