

HEALTH IN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS OF DEVELOPMENT PROJECTS

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LIST OF ACRONYMS

AIDS	Acquired Immuno-deficiency Syndrome
As	arsenic
Cd	cadmium
CD	communicable disease
CN	cyanide
CO	carbon monoxide
CO ₂	carbon dioxide
Co	cobalt
COPD	Chronic Obstructive Pulmonary Disorder
Cr ^{vi}	hexavalent chrome
Cu	copper
EHS	environmental, health and social
EHSG	Environmental, Health and Safety Guidelines
ESAP	Environmental and Social Assessment Procedures
ESIA	environmental and social impact assessment
ESMP	environmental and social management plan
ESMS	environmental and social management system
GDP	Gross Domestic Product
GN	Guidance Note
HBV	Hepatitis B Virus
HDV	Hepatitis D Virus
Hg	mercury
HIA	health impact assessment
HIV	Human Immuno-deficiency Virus
HRA	health risk assessment
IAIA	International Association for Impact Assessment
ILO	International Labour Organisation
ISS	Integrated Safeguards System
MSD	musculo-skeletal disorder
MSDS	material safety data sheet
MSM	men who have sex with men
NCD	non-communicable disease
NGO	non-governmental organisation
OS	Operational Safeguard

Pb	lead
PM10	particulate matter less than 10 microns in diameter
PPE	personal protective equipment
PWID	people who inject drugs
Ra	radium
RAP	resettlement action plan
RBM	Roll Back Malaria
RMC	Regional Member Country
Rn	radon
SDG	Sustainable Development Goal
Se	selenium
SIA	social impact assessment
SO2	sulphur dioxide
SSA	sub-Saharan Africa
STI	sexually transmitted infection
TB	Tuberculosis
Th	thoron
ToR	terms of reference
U	uranium
USPMI	United States Presidential Malaria Initiative
V	vanadium
WBG	World Bank Group
WFP	World Food Programme
WHO	World Health Organisation
Zn	zinc

HEALTH IN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS OF DEVELOPMENT PROJECTS

BACKGROUND

Mainstreaming health in the Environmental and Social Impact Assessment (ESIA) process constitutes a unique opportunity for using the project design stage to improve the health of project workers and local communities, and to proactively mitigate project-induced health impacts. This is particularly true for large development projects such as hydropower schemes, dam development, roads and highways, mines, as well as large irrigation schemes. To attain the full benefits of this approach, project planners, environmental specialists and health professionals should consider the design process as an interactive and iterative process that can optimize the proponents' benefits while gaining broad community support and yielding better living conditions to neighbouring communities.

PURPOSE

The purpose of this Guidance Note is to provide background information and guidance on health issues normally associated with the construction and operation of large capital projects. It is intended to be used primarily by African Development Bank (AfDB) staff, the Bank's Regional Member Countries (RMCs) and their consultants to ensure that health issues are integrated into the ESIA and environmental and social management plans (ESMPs) prepared for AfDB-financed projects, as well as for auditing project compliance. It is expected that borrowers will appoint suitably qualified environmental and social consultants who will adhere to national and international standards of best practice.

SCOPE OF THIS GUIDANCE NOTE

This Guidance Note (GN) focusses on health issues associated with large capital projects and how communicable and non-communicable diseases need to be integrated into the ESIA process. The scope of the GN has been informed by AfDB's Operational Safeguard 1 (OS1), in which socio-economic and cultural impacts are identified as those impacts on, or associated with, livelihoods, resettlement, community structure, gender, vulnerable groups, **health**, safety, cultural property and ecosystem services.

In line with the Bank's policy on gender mainstreaming, this GN on health is premised on the fact that projects have different impacts on the health of men, women and children owing to their different socio-economic and cultural roles and their varying degrees of exposure to health risks. It is also important to note that the term 'social' in OS1 includes, *inter alia*, gender, while the determination of vulnerable groups also includes gender as one of the criteria which can make a person or group more vulnerable to risks. As a result, gender issues are *implicitly* included in any reference to 'social' and 'vulnerable groups'.

A note on occupational health and safety (OHS): none of the environmental laws in sub-Saharan Africa (SSA) include OHS within the ambit of an ESIA, because OHS issues are covered by different laws and government ministries. Therefore environmental authorities **cannot** adjudicate, comment on, or approve findings and recommendations in an ESIA relating to OHS as this is beyond their mandated

powers and responsibilities. Furthermore, monitoring compliance with OHS issues is a specialist field in which most environmental practitioners and regulatory authorities are not qualified. Therefore, as a rule, OHS issues are omitted from ESIA for those reasons. The AfDB addresses labour conditions, health and safety in OS5, and IFIs like the IFC/WB include OHS issues in their operational policies and guidelines, **but this does not mean** that these issues have to be covered in the ESIA – only that they need to be addressed by the Borrower. Nevertheless, an ESIA would not be complete if it did not consider all project-related impacts on health, including that of the workforce. Therefore, this GN provides a short overview of the common occupational health issues that are associated with the construction and operation of large infrastructure projects.

OS REQUIREMENTS ON HEALTH

In Operational Safeguard 1 (OS1) in AfDB's Integrated Safeguards System (ISS), social issues are identified as: livelihoods, resettlement, community, social structure, gender, vulnerable groups, **health**, safety, cultural property and ecosystem services. Thus health and gender form part of the social dimension of the environment meaning that all the social safeguards *implicitly* include health issues. Please also refer to Guidance Note 2.2 on Vulnerable Groups.

Explicit requirements for consideration of health issues are found within each of the Operational Safeguards:

OS1 states that project scoping should cover all relevant direct and indirect environmental and social risks and impacts on the physical, biological, socio-economic and cultural, transboundary and global environments.

One of the special screening conditions identified in OS1 relates to where projects may affect local communities, especially those that may be particularly vulnerable to change¹; in these instances, the Borrower must give particular attention to assessing the risks and potentially adverse impacts of the project on these communities, including the direct and indirect impacts on their **health** and safety. In these situations, the Borrower must implement preventative and management measures which are consistent with internationally recognised good practice as described for example in the World Bank Group's (WBG's) Environmental Health and Safety Guidelines (EHSGs). Such measures must be differentiated according to gender, vulnerability or other factors to ensure that unavoidable adverse impacts do not fall disproportionately on vulnerable groups and that they are not disadvantaged when it comes to sharing the benefits of development e.g. improved roads, access to schools and health care facilities.

In OS2 on Involuntary Resettlement, the Borrower, in calculating the 'total economic cost' of the compensation package must factor in the social, **health**, environmental and **psychological** impacts of the project, as well as the costs of displacement which may disrupt productivity and social cohesion. If vulnerable groups are involved in involuntary resettlement, particular attention must be given to the health needs of these groups, especially women and children.

¹ Note that the vulnerable status of a community or group can be determined on the basis of, *inter alia*, their pre-existing **health** condition.

Borrowers must ensure that those affected by resettlement are provided with adequate access to health care facilities before, during and after the resettlement process. Again, differentiated mitigation measures are required to address the specific concerns and needs of vulnerable groups.

The importance of ecosystem services for nutrition, health, wellbeing and livelihoods, is stressed in OS3, thus underlining the inter-dependence between the biophysical and the socio-economic environments.

One of the main aims of OS4 is to manage and reduce pollutants resulting from a project so that they do not pose harmful risks to human health. OS4 is aligned with other international conventions and standards on pollution, including the WBG EHSs.

Specific health aspects mentioned in OS4 are in relation to the use of pesticides, the requirement to develop emergency preparedness and response plans to protect public health and safety and that the Borrower has an obligation to have a permanent, experienced environment, health and safety staff on site.

OS5 relates to Labour Conditions, Health and Safety at the workplace. Borrowers are required to provide workers with a safe and healthy work environment, taking into account the risks inherent in the specific type of work, including the physical, chemical, biological and radiological hazards. The requirements of OS5 extend to workers procured by third parties i.e. contractors, sub-contractors and workers contracted through labour brokers, as well as migrant workers. The measures proscribed in OS5 also include the supply chains and the Borrower is required to monitor the supply chain if there is a risk of worker abuse.

From the foregoing, it is clear that health issues are cross-cutting and trigger every OS contained in the Bank's ISS.

DEFINITIONS OF HEALTH AND HEALTH IMPACT ASSESSMENT IN THE CONTEXT OF CAPITAL PROJECTS

Health is a multi-dimensional concept which “encompasses a complete state of physical, mental, and social wellbeing and not merely the absence of disease or infirmity”². A health impact resulting from a project, plan or programme is a measurable change on the health status of an individual, group or population which may be attributable to the direct or indirect effects of a development. They may be intended or unintended and may not become apparent for many years after prolonged exposure, or due to long-term latency in the human body.

For the purposes of this Guidance Note, health impacts are categorised by causative factor or development impact, which is the way that impacts are assessed in an ESIA. For example, all health issues caused by pollution (inorganic or microbiological) are discussed under the heading ‘Pollution-induced Diseases and Disorders’. Using the same logic, while it can be argued that malaria is a communicable disease, the main cause of malaria is the occurrence of a suitable breeding ground for

² Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948. The Definition has not been amended since 1948.

Anopheles mosquitoes. During the construction and operation of many different types of projects, habitats may be created that are conducive to mosquitoes and bilharzia snails, thus the associated health issues are discussed under a separate category – ‘Vector-borne Diseases’.

Depending on the type and location of a project (or plan or programme), health impacts may fall into one of more of the following categories:

- Communicable diseases
- Non-communicable diseases
- Pollution-induced diseases and disorders (including water-borne diseases)
- Vector-borne diseases
- Physical injury (ex workplace)
- Occupational diseases
- Nutritional disorders
- Mental health.

A Health Impact Assessment (HIA) should be included in the Environmental and Social Impact Assessment (ESIA) and may either form part of the Social Impact Assessment (SIA) for projects where health impacts are not expected to be significant, or may be a separate specialist study. The International Association for Impact Assessment (IAIA) defines HIA as *“the combination of procedures, methods and tools that systematically judges the potential, sometimes unintended consequences of a policy, plan, programme or project on the health of a population, including the distribution of those effects within the population, and identifies appropriate actions to manage those effects.”* (IAIA, 2006). HIA may be distinguished from occupational Health Risk Assessment (HRA), which tends to focus on managing health and safety within the workplace. A sample Terms of reference (ToR) for an HIA is included in Annex 1 of this Guidance Note.

This Guidance Note provides a description of the main health issues which are commonly associated with development projects and provides a checklist of health issues for Bank staff to consider at each stage of the project appraisal process.

HEALTH ISSUES IN Environmental and Social Impact Assessment

Communicable diseases

The main communicable or infectious diseases associated with capital projects are:

- Human Immuno-deficiency Virus (HIV);
- Sexually transmitted infections (STIs);
- Tuberculosis (TB);
- Hepatitis; and
- Meningitis.

For the purposes of this Guidance Note, HIV is discussed separately from other STIs due to the scale of the epidemic in Africa and the direct links that have been identified between the accelerated spread of HIV and development projects.³

HIV

HIV is spread through direct contact of bodily fluids from an infected person to an uninfected person primarily as a result of unprotected sexual intercourse, and from blood contamination resulting from direct contact, blood transfusions and shared needles. All infrastructure projects require a workforce to construct and operate them; thus the opportunities presented by the presence of a mostly male workforce, who may be far from home, with disposable income, can result in increased risky sexual behaviour with women from the communities surrounding large project sites e.g. energy projects, and along transportation corridors. The subsequent transmission of HIV has now been shown to have had significant long-term consequences in the affected communities – an impact that has largely been underestimated in most ESIAs.

In Sub-Saharan Africa, 59% of all people living with HIV are women due to a range of complex biological, behavioural, social and structural factors, which makes them more vulnerable to this disease.

Sexually transmitted infections

STIs are caused by more than 30 different bacteria, viruses and parasites and are spread predominantly by sexual contact, including vaginal, anal and oral sex. Eight of these pathogens have been linked to the greatest incidence of illness. Of these 8 infections, 4 are currently curable: syphilis, gonorrhoea, chlamydia and trichomoniasis. The other four viral infections are currently incurable (hepatitis B, herpes, HIV, and human papillomavirus), but can be mitigated or modulated through treatment and other mitigation measures. Of concern is that some STIs can increase the risk of HIV acquisition three-fold or more, and can have serious consequences beyond the immediate impact of the infection itself, through mother-to-child transmission of infections, foetal and neonatal deaths, cervical cancer and other chronic diseases (WHO, 2015).

As with HIV, the spread of STIs is exacerbated in the communities surrounding development projects due to risky sexual behaviour. Both men and women are vulnerable to STIs but women are most affected due to the same complex drivers as those driving the HIV epidemic and the fact that they are more likely to have HIV.

Tuberculosis

Although different forms of Tuberculosis (TB) have been identified, it is primarily a lung disease which has been present in the world for centuries. It is caused by bacteria (*Mycobacterium tuberculosis*) that most often affect the lungs⁴. Tuberculosis is curable and preventable. It is transmitted via direct contact with sputum and aerosol droplets from affected persons. The use of tobacco greatly increases

³ UNDP (2013). Guidance on Integrating HIV and Gender-related Issues into Environmental Assessment Processes in the SADC Region. Published by UNDP, New York.

⁴ This Guidance Note focusses on the most common form of TB relating to development scenarios i.e. the form of TB that affects the lungs. However, it should be noted that there are other forms of TB, such as laryngeal TB and various forms of extra-pulmonary TB.

the risk of TB, with more than 20% of cases globally being attributable to tobacco smoking (WHO, 2015). The TB epidemic is aggravated not only by smoking tobacco, but also by weakened immune systems. With the high prevalence of HIV in the sub-Saharan African (SSA) region, people who are HIV positive are 26-31 times more likely to get TB than healthy counterparts. In Africa as a whole, 41% of TB patients have HIV and in South Africa for instance, an average of 75% of those with TB are also HIV positive. In a further complication, TB accelerates progression to AIDS (National Institute for Communicable Diseases, 2015).

TB is a significant workplace challenge because of the airborne nature of the disease. In the workplace, employees can contract TB directly from actively infected persons or from breathing in air that contains the bacteria. The risk of workers contracting TB is higher in situations where they are in congregated settings, such as dormitory accommodation in construction camps and on transport systems. In the older age group (more than 30 years old), more men (55%) than women have TB, reflecting the fact that most mineworkers and hostel dwellers are men. However, recent trends show that in younger people (5-29 years old), more women than men have TB mirroring the HIV prevalence profile in most countries (National Institute for Communicable Diseases, 2015).

Hepatitis

According to the director of the World Health Organisation (WHO) Department of HIV/AIDS and Hepatitis, global mortality due to viral hepatitis is now outstripping deaths from HIV, tuberculosis or malaria, and whereas deaths as a result of HIV and malaria have been declining for several years due to improvements in prevention and treatment coverage, mortality due to hepatitis A, B and C is still rising. Approximately 80% of all deaths from liver cancer are a consequence of viral hepatitis (Address by Dr. Gottfried Hirnschall, at the World Hepatitis Summit in Glasgow, 2nd September 2015).

Hepatitis is an infectious disease which causes inflammation of the liver. Acute hepatitis can be self-healing with time or it can progress to fibrosis (scarring) cirrhosis or even cancer of the liver (WHO, 2015). In sub-Saharan Africa (SSA), Hepatitis A, B and C are the most common forms of hepatitis⁵.

Hepatitis A is transmitted by faecal contamination of water or food. It particularly affects children (who may play in contaminated water), poor areas with no formal sanitation systems, and men having sex with men (Webmed, 2015). It does not cause chronic liver disease and is rarely fatal (WHO Fact Sheet).

Hepatitis B (HBV) used to be the most common form of hepatitis globally until the introduction of effective vaccinations in the 1980s. Because the hepatitis B virus is transmitted via blood, semen or vaginal fluids, sex workers, men having sex with men (MSM), people who inject drugs (PWID) and health care workers are particularly at risk, especially if their immune system is already compromised e.g. with HIV (Webmed, 2015). Thus, as with HIV and STIs, risky sexual behaviour around project sites can result in an increase in hepatitis B in the male workforce and general population, with women in the latter being more vulnerable due to the likely presence of other communicable diseases. Hepatitis D (HDV) virus infections occur only in those who are infected with HBV. The dual infection of HDV and

⁵ Hepatitis E can also occur in developing countries, but is most prevalent in the developing countries of east and south Asia.

HBV can result in a more serious disease and worse outcome. Hepatitis B vaccines provide protection from HDV infection (WHO, 2016).

The causes of Hepatitis C transmission are less well known compared to Hepatitis B, but the virus is spread via blood, and thus health care workers, PWID and possibly those with multiple and concurrent partners are susceptible to the disease.

Meningitis

Meningococcal meningitis is a bacterial form of meningitis, a serious infection of the thin lining that surrounds the brain and spinal cord. The extended meningitis belt of SSA extending from Senegal in the west to Ethiopia in the east (26 countries), has the highest rates of the disease, but sporadic outbreaks of this disease occur throughout SSA.

The bacteria are transmitted from person-to-person through droplets of respiratory or throat secretions from carriers. Close and prolonged contact – such as kissing, sneezing or coughing on someone, or living in close quarters (such as in hostels, sharing eating or drinking utensils) with an infected person (a carrier) – facilitates the spread of the disease. Even when the disease is diagnosed early and adequate treatment is started, 5% to 10% of patients die, typically within 24 to 48 hours after the onset of symptoms (WHO Fact Sheet). Children are particularly at risk, but anyone (male or female) who may have an existing disease e.g. HIV, will be more vulnerable to contracting meningitis.

Non-communicable diseases

Non-communicable diseases (NCDs) kill approximately 38 million people per year, 75% of whom (28 million) live in low to middle income countries. Four conditions: cardiovascular disease (heart attack, stroke), cancer, respiratory diseases and diabetes account for 82% of all deaths (WHO, 2013 and 2014).

NCDs usually have a long duration and slow progression. The main drivers are: ageing, rapid and unplanned urbanisation and unhealthy lifestyles. The latter includes use of tobacco, unhealthy diet, lack of exercise and the harmful use of alcohol, which individually or together can cause:

- Raised blood pressure;
- High body mass and obesity;
- Hyperglycaemia (high blood glucose);
- Hyperlipidaemia (high blood fat).

While it may be difficult to attribute many NCDs directly to development projects, the effects of the latter may contribute indirectly to, or aggravate existing NCDs. Rapid development may cause unplanned informal settlements to spring up, where urban poverty can compel people to eat cheap, unhealthy foods, high in saturated fats, salt and carbohydrates. In these environments, alcohol and drug abuse can proliferate, which in turn can lead to gender-based violence and greater risk of some of the communicable diseases described above. As another example, stress associated with involuntary resettlement can cause hypertension.

Poverty is closely linked to NCDs due to increased vulnerability, greater risks of exposure to harmful substances and limited access to preventative health care services. The WHO has thus identified the rise in NCDs in low and middle income countries as a major threat to the achievement of the post-2015 Sustainable Development Goals (SDGs) (WHO, 2013).

Since the purpose of ESIA is to identify all direct and indirect social and health impacts (amongst others), it is incumbent on environmental consultants and Bank staff to consider these issues where relevant in the ESIA and ESMP.

Cardiovascular disease

Cardiovascular diseases such as heart attacks, strokes, high blood pressure etc., are caused by disorders of the heart and blood vessels. The main causes are: tobacco use, physical inactivity, unhealthy diet, obesity and harmful use of alcohol. Cardiovascular diseases are the primary causes of death globally (46% or 17.5 million deaths annually), 75% of which occur in low to middle income countries; this is causing a major social and economic burden, especially on top of already high communicable disease burdens⁶.

Prevention of cardiovascular diseases on project sites can be achieved by addressing the behavioural risk factors such as tobacco use, harmful use of alcohol, diet and exercise. Implementation of appropriate health and wellness programmes at project sites, combined with healthier canteen food, restrictions on alcohol and promotion of exercise and sport are some examples of the mitigation measures that could be implemented to reduce these health risks (see Annex 2)⁷.

Cancer

Another leading cause of morbidity and mortality worldwide is cancer, with approximately 14 million new cases diagnosed in 2012 and 8.2 million deaths in the same year (WHO, 2014). The prognosis does not look good; according to the WHO, the number of new cases is expected to increase by 70% over the next two decades i.e. to over 22 million cases per year – mostly in Africa, Asia and Central and South America. One third of all cancer deaths may be attributed to the four behavioural and dietary risks which apply equally to men and women: tobacco use, unhealthy diet (high carbohydrates and saturated fats), lack of exercise and harmful use of alcohol. Other causes of cancer include exposure to physical and chemical carcinogens through exposure to pollution (see below), biological carcinogens such as infections by certain viruses such as hepatitis B and C, ageing and preconditions, such as HIV and STIs, which increase the risks of cervical cancer in women.

Preventative measures include: avoidance of dietary and behavioural risk factors, vaccinations against hepatitis, limiting occupational exposure to carcinogens e.g. radiographers, some mine workers, reducing the emission of pollutants, and reduced exposure to the damaging ultra violet rays from the sun. All these measures can be implemented on project sites through the ESMP (see Annex 2).

⁶ Presentation by D Tarlton at the Second Regional Technical Meeting on Health, Gender Equality and Capital Projects in Africa, held in Centurion, South Africa, 8-10 June 2015)

⁷ Op. cit. Footnote 6.

Respiratory diseases

Respiratory diseases, also known collectively as Chronic Obstructive Pulmonary Disorders (COPD), include pneumonia, bronchitis, emphysema, and asthma. In advanced forms, these can be life threatening as they affect breathing. There are several different modes of exposure to COPD:

- Behavioural e.g. smoking tobacco;
- Socio-economic factors such as lack of access to grid electricity and thus reliance on fossil fuels and wood for heating and cooking leading to indoor air pollution;
- Exposure to fumes, gases, particulates (PM10) (see below);
- Childhood respiratory problems (not addressed here).

The primary cause of COPD is tobacco smoke, both directly through smoking and indirectly through inhalation of second-hand smoke. According to the WHO, the tobacco epidemic is one of the biggest public health threats the world has ever faced, killing around 6 million people a year (WHO, 2014). Nearly 80% of the more than 1 billion smokers worldwide live in low- and middle-income countries, where the burden of tobacco-related illness and death is heaviest. As mentioned in several places in this Guidance Note, tobacco smoking is one of the primary causes of cardiovascular disease and cancer, and is a significant aggravating factor in TB (WHO, 2014). Tobacco users who die prematurely deprive their families of income, raise the cost of health care and hinder economic development. Globally, about 40% of men smoke compared to nearly 9% of women, but the ratio varies considerably across countries; the proportion of women who smoke in low to middle income countries in SSA is far lower than the global average (WHO, 2105). Therefore, men are far more vulnerable to diseases directly related to smoking tobacco, while women and children may be more affected by the indirect effects of smoking.

Another cause of COPD is indoor air pollution; approximately 3 billion people cook and heat their homes using open fires and simple biomass-burning stoves (WHO Fact Sheet). Respiratory illnesses attributable to indoor air pollution such as pneumonia, cardiovascular diseases and cancer kill more than 4 million people per year, more than half of whom are children under 5 (WHO Fact Sheet). The highest burden occurs in low income countries where women and children are often most vulnerable due to existing diseases e.g. HIV and malaria, and who have little access to effective health care or alternative sources of cheap energy. One of the biggest problems occurs near coal mines where communities scavenge for, are given or sold poor quality coal for their own use. The smog effects around these communities, particularly in winter are particularly severe.

The use of wood and fossil fuels for cooking and heating has other indirect impacts on the social and biophysical environments: gathering fuel wood takes time and energy thus removing (mostly) women and children from other productive tasks and school respectively; black carbon and methane emitted by inefficient combustion contribute to climate change, and the lack of access to safe forms of power can lead to injuries, fires, poisoning and burns, amongst others.

Type 2 Diabetes

Diabetes may be classified as Type 1 and Type 2. The former is quite rare and usually occurs in children (thus it is often known as Juvenile Diabetes). Type 2 diabetes on the other hand can affect both men and women who have excess body weight, are inactive and have a poor diet. Diabetes is a chronic disease in which the pancreas does not produce enough insulin, or where the body cannot effectively

use all the insulin produced. Since insulin regulates the blood sugar levels in the body, an impaired system can lead to damage to the heart, blood vessels, eyes, kidneys and nerves. Blindness, kidney failure and limb amputation are common outcomes for people suffering from diabetes (WHO Fact Sheet).

Developments may either induce an influx of job seekers to a project causing a proliferation of informal settlements around the site or on the fringes of nearby towns and villages, or developments may displace people from the land on which they practised subsistence farming to urban areas. In both cases, dietary changes brought about by impoverished urban living – where people may have to resort to eating cheap, unhealthy foods (high in carbohydrates), can result in an escalation of diabetes. As with other NCDs, this is a common indirect impact of development, which is rarely described in ESIA's.

As with other NCDs, the main ways to prevent diabetes from occurring and to remedy it once present, are to maintain a healthy body weight, have regular exercise, keep to a healthy diet which is high in fibre and low in sugar and saturated fats, and avoiding the use of tobacco (WHO). An opportunity therefore exists to promote healthy living at all project sites.

Harmful use of alcohol

The harmful use of alcohol is the third-ranked global risk factor contributing to death, disease and injury (WHO, 2011). In 2004, the WHO estimated that six times more men than women died of alcohol-related illnesses and injuries. It not only adversely affects the drinker, but many other people may be indirectly affected. For the drinker of harmful quantities and types of alcohol, there are increased risks of alcohol dependence, liver cirrhosis, cancers, epilepsy, stroke and heart attack, and injuries (intentional and unintentional). However, persons under the influence of alcohol can cause significant impacts on other people through road traffic and workplace accidents and domestic abuse. Harmful alcohol consumption also adversely affects unborn babies (foetal alcohol syndrome) and can lead to a diminished responsibility regarding safe sex, with the resulting spread of HIV and other STIs. All of these health and social issues are extremely costly to society resulting in increased medical, societal, and psychological costs, lost productivity, crime and violence.

Lower socio-economic development and status generally means that the health problems related to the harmful use of alcohol are exacerbated; this is in part due to the fact that the risk factors for communicable diseases and NCDs are already high e.g. overcrowding, poor water quality and sanitation, malnutrition, unsafe working conditions, poor access to counselling and alcohol treatment clinics, etc. Alcohol consumption also weakens the human immune system, thus aggravating the spread of infectious diseases such as HIV, TB and STIs.

Pollution–induced diseases

This is a complex field, as the health effects depend on the contaminants involved, the concentrations of the contaminant, the period of exposure, and the mobility and pathway of the contaminant from its source to human beings.

The main sources of pollution include:

- Mines, quarries and smelters;
- Oil and gas exploration, production and refining;
- Industrial processes, e.g. paint, fertiliser and iron and steel manufacturing;
- Waste incineration and landfills;
- Transportation;
- Fossil fuel production;
- Energy generation and transmission;
- Commercial agriculture.

SSA is endowed with a range of minerals and hydrocarbon deposits; six of the world's ten fastest growing economies are found in this region, based on the exploitation of these commodities and others. However, weak environmental controls (legislative and institutional) and a lack of effective monitoring mean that pollution and its health side effects is a fast-growing issue in many rural and urban communities.

Pollution-induced health effects arising during project construction, operation and even closure will depend on the type of project e.g. in mining, the impacts from base metal mining and smelting will be significantly greater on health than those from stone quarrying due to the emission of heavy metals from the former, many of which can have chronic health outcomes. The various modes of power generation will also have very different health outcomes for nearby, affected communities and workers e.g. the health issues associated with a coal-fired, nuclear, hydro, solar or wind power station vary considerably.

The main pathways for environmental pollution to reach humans *outside the workplace* are via the water, air and soil. Table 1 shows the various direct and indirect ways people become exposed to pollution through the different environmental media. Men, women and children can all be affected depending on their different modes of exposure and the duration of such exposure, but anyone with an existing disease burden will be more susceptible to pollution-induced illnesses than their more healthy counterparts. In the SSA context, this makes women usually more vulnerable.

Table 1: Pollution exposure pathways

Medium	Direct exposure pathway	Indirect exposure pathway
Water	Ingestion of water; Skin contact with water.	Consumption of crops irrigated with contaminated water; Consumption of fish and other aquatic fauna from contaminated waters; Washing clothes in contaminated water (especially water with asbestos particles).
Air	Inhalation of particulate matter (PM10) and fumes/gases; Skin contact with particulates, vapour; Direct exposure to ionising radiation.	Deposition of particulates on soil and foliage, uptake by stock and wildlife, consumption of meat and milk products by people; Uptake by crops, consumption by people.
Soil	Direct contact with skin.	Consumption of crops grown in contaminated soil;

Consumption of products from animals which have consumed plants grown in contaminated soil.

Table 2 provides an indication of the common sources of pollution caused by development projects, the exposure pathways and the typical health effects.

Table 2: Typical pollution-induced health effects

Pollution type	Source	Pathway	Effect
Faecal pollution	Informal settlements, malfunctioning sewage treatment plants, lack of sanitation	Water	Cholera, typhoid, diarrhoea, giardia
Pesticides	Crop spraying	Water, air, soil	Congenital abnormalities, cancer
Indoor smoke (CO, CO ₂)	Burning of fuel indoors for cooking, heat, light	Air	COPD (lung diseases)
Gases (SO ₂ , NO _x , CO)	Thermal power stations, smelters, industrial processes, vehicles	Air	COPD
Heavy metals (Co, Cu, Hg, As, Cd, Pb, CN, Zn, Cr ^{VI}) - Particulates and fumes	Smelters, sewage sludge, tailings dumps, industrial processes, power plants, vehicles, incinerators (see Table 3 below for more detail)	Air, water, soil	Cancers, organ damage, neurotoxic effects, bone damage, skin lesions (see Table 3 below for more detail)
Ionising radiation (Rn, Th, Ra, U)	Uranium mines, heavy mineral mines, nuclear power plants, industrial processes	Air, water	Cancer
Asbestos	Mines, tailings dumps, old buildings, power stations	Air, water	Asbestosis (Mesothelioma)
Silica	Smelters, grit blasting, ore processing	Air	Silicosis

Some of the specific health impacts caused by heavy metals are summarised in Table 3.

Table 3: Typical health hazards associated with heavy metals

Heavy metal	Some typical sources	Health effects
Cadmium (Cd) (<i>global production increasing</i>)	Phosphate fertiliser manufacture Sewage sludge Non-ferrous metal smelters Fuel Mine waste dumps	Kidney damage Bone effects Possible carcinogen
Mercury (Hg)	Artisanal gold retorting	Neurological damage

Heavy metal	Some typical sources	Health effects
	Coal burning Non-ferrous metal smelters Chlor-alkali plants	
Lead (Pb)	Smelter emissions Petrol fumes from vehicles (especially along roads) Lead-based paints Mine waste dumps	Neurotoxic effects Developmental effects in children
Arsenic (As)	Pesticides Smelter emissions Thermal power plants Wood processing	Lung, bladder, kidney and skin cancers Disturbances to gastrointestinal, cardiovascular and central nervous systems Death
Copper (Cu)	Smelter emissions Mine waste dumps Sewage sludge	Wilson's Disease Renal damage Gastrointestinal disorders Central nervous system irritation
Cobalt (Co)	Smelter emissions Mine waste dumps	COPD Cardiac effects Congestion of the liver, kidneys, and conjunctiva Immunological effects
Vanadium (V)	Smelter emissions Mine waste dumps	Respiratory problems Central nervous system effects Skin irritation
Selenium (Se)	Pesticides	Respiratory problems Effects on skin, nails, teeth, hair Listlessness
Cyanide (CN)	Gold processing plants	Small amounts: central nervous system disorders, rapid breathing and heart rate. Large amounts: convulsions, loss of consciousness, low blood pressure, respiratory failure, death

Vector-borne diseases

The main vector-borne diseases in SSA associated with development projects are malaria and schistosomiasis.

Malaria

The risk of vector-borne diseases depends more on the location of the project i.e. in malarial or non-malarial areas rather than on differences in type of project. It is also known that women and children are often more susceptible due to their exposure to mosquito habitats when fetching water, doing laundry and if they already have an existing health issue. Both WHO and the affiliated Roll Back Malaria (RBM) partnership have identified a number of aggravating factors for the spread of malaria directly related to large capital projects. These include:

- Poor water management - pools of water (large or small) are breeding sites for mosquitoes;

- Creation of dams, weirs, reservoirs, but also excavations for mining and other capital works, where environments are created which are conducive to breeding mosquitoes. For example RBM have found that dams in semi-arid areas may intensify malaria transmission by more than 50%;
- Location (or resettlement) of people close to water resources for food security/economic purposes;
- Deforestation: an increase in deforestation of just 4% can increase malaria incidence by as much as 48% during the process;
- Perturbations in natural habitat and ecological processes can result in complex changes which affect predator-prey relations and vector distribution.

Furthermore, migration/mobility induced as a result of development, has a high impact on malaria transmission (i.e. it can also be considered a communicable disease). Below are some examples:

- Migrant workers, who have different immunity levels and can acquire malaria or carry vectors, are a threat to malaria elimination;
- Migrants often self-medicate themselves or use sub-standard drugs due to lack of access to health services creating risk of drug resistance;
- Relocated and displaced populations, particularly in areas where poverty levels are high and/or where people are already weakened through disease, have a much higher risk of contracting malaria.

Schistosomiasis

Schistosomiasis, also known as Bilharzia, is a chronic vector-borne disease which is endemic in many parts of Africa. It is caused by contact with water which contains the infected parasites or schistosomes which are carried by snail hosts. It can also be perpetuated from faeces of infected humans which enter water bodies, as these contain the parasite. The parasites infect the urinary tract and intestines, which if left untreated, can with time lead to liver damage, kidney failure, infertility or bladder cancer. It can also cause genital sores which make infected persons more vulnerable to HIV (WHO Fact Sheet). In children it can cause poor growth and learning difficulties. Children are particularly susceptible to the disease from swimming in infected water, but anyone who comes into contact with infected water while doing laundry, fishing, farming (especially irrigation workers) can contract the disease.

Information that should be made available for specifying design and operational techniques for control of aquatic snails and for preventing transmission of schistosomiasis in Africa are⁸:

- Amount of safe drinking water to avoid schistosome infections: in planning resettlement communities around proposed dams and reservoirs and irrigation projects, the location and amount of safe drinking water supplies can be used to reduce schistosome

⁸ Jobin WR, (1999) Dams and Disease, Ecological Design and Health Impacts of Large Dams, Canals and Irrigation Systems." Taylor and Francis Publishers. Section on Community Planning 21.4.5. Other general design parameters for snail control and for control of other vectors are also given in section 21.4.4.

transmission. The recommended amount of safe drinking water required for avoiding schistosome infections has been determined to be 70 liters/capita/day.

- Sudden reservoir drawdowns for snail control: the scheduling of sudden drawdowns of a dam or reservoir can be used to reduce aquatic snail populations.

If carefully incorporated into the design and operation of proposed reservoirs and dams, these two approaches can reduce the risk of schistosomiasis.

Physical injury

Physical injuries to the general public associated with large capital projects can be caused by an increase in road or rail traffic, unstable landforms and/or worker/community violence. Children are particularly at risk in areas with a legacy of un-rehabilitated mine infrastructure, such as mine shafts, adits, open pits, spoils, dumps and other structures. Injuries caused by falling, drowning, cuts and abrasion and smothering due to collapse of landforms, are unfortunately common around un-rehabilitated mine sites, artisanal mining areas, quarries, borrow pits and other excavations, dams and reservoirs. Increased rainfall and flooding caused by climate change can aggravate these risks.

One of the most overlooked aspects in many ESIA's is the impact of increased traffic. The risk is not only to other drivers, but to communities whose villages straddle rural roads, which suddenly become the main access route to a construction site or are upgraded to regional transportation corridors. A combination of high speed, poor road quality and a lack of awareness about traffic can lead to death or injury of people living, working and walking along those roads, especially children and road-side traders. An AfDB compliance audit of the Mozambique section of the Nacala Road Corridor noted that there was an increase in accidents after the new, faster road was completed, but it also found that in one section, all the new road signs had been stolen, further underlining the need for community sensitisation around road safety (Bella-Corbin, et al, 2015).

Occupational diseases

Unsafe and unhealthy working conditions are problematic everywhere, but the most critical sectors are agriculture, mining, construction and the informal sector. Occupational diseases carry an enormous cost – for workers and their families, as well as for economic and social development. The International Labour Organisation (ILO) (2013) estimates that occupational accidents and diseases result in an annual 4% loss in global gross domestic product (GDP), or about US\$2.8 trillion, in direct and indirect costs of injuries and diseases.

The types of occupational diseases vary from country to country and depend both on the nature of industry in each country, but also on the degree of monitoring and enforcement of workplace occupational health and safety standards by government authorities. Well-known occupational diseases, such as pneumoconiosis, remain widespread, while relatively new occupational diseases, such as mental and musculoskeletal disorders (MSDs), are on the rise (ILO, 2013)

Millions of workers (mostly men) continue to be at risk of pneumoconiosis (especially silicosis, coal-worker's pneumoconiosis, and asbestos-related diseases) due to widespread exposures to silica, coal,

asbestos and various mineral dusts in mining, quarrying, construction and other manufacturing processes. Pneumoconiosis has a long latency period and can often go undiagnosed and unreported. Their associated illnesses (chronic obstructive pulmonary disease, silico-tuberculosis, silica- and asbestos-related cancers) often cause permanent disability or premature death (ILO, 2013).

Occupational exposure to fumes, gas and respirable particulates (PM10) is also the cause of a range of respiratory system diseases and disorders. Mining, smelting, landfills, many industrial processes and agriculture are the main industries in which workers (mostly men) may be exposed to airborne pollutants hazardous to their health (see Tables 1-3). In most of the larger, listed companies, workers are afforded protection from exposure to health hazards, but in many smaller industries and mines in countries where there is little to no control over occupational health, workers are often exposed to pollutants at damaging concentrations. For example, illegal retorting of gold using mercury can lead to neurological damage and premature death.

Emerging workplace health issues include poor ergonomic conditions – leading to musculoskeletal disorders such as carpal tunnel syndrome, exposure to electromagnetic radiation and psychosocial risks to mental health.

Additional guidance on occupational health issues can be found in OS5, the WBG's Environmental, Health and Safety Guidelines and from the ILO.

Nutritional disorders

Malnutrition occurs when a person is not getting enough food or not getting the right sort of food. Even if people get enough to eat, they will become malnourished if the food they eat does not provide the proper amounts of micronutrients - vitamins and minerals - to meet daily nutritional requirements. This affects childhood growth and development, disease resistance, work productivity and foetal development in malnourished mothers.

Disease and malnutrition are closely linked. Sometimes disease is the result of malnutrition, sometimes it is a contributing cause. In fact, malnutrition is the largest single contributor to disease in the world, according to the UN's Standing Committee on Nutrition.

Under-nourishment is usually caused by insufficient intake of high-quality food. This is often related to high food prices and poverty and may be aggravated by the presence of disease, which increases the body's nutrient requirements. Under-nutrition affects school performance and studies have shown it often leads to a lower income as an adult, thus perpetuating the poverty cycle. It also causes women to give birth to low birth-weight babies (World Food Programme).

There are many causes of malnutrition and under-nourishment, but those associated with development projects include for example: loss of land and access to indigenous natural products, economic displacement, involuntary resettlement, urban migration and climate change.

Over-eating or reliance on foods with high carbohydrate and saturated fats, can lead to obesity, diabetes and cardiovascular diseases (as discussed above).

Mental health

There are many aspects of development that can lead to stress, anxiety, depression and even suicide. The causes of these mental health conditions on and around the construction, operation and even closure of a development project include:

- Noise;
- Vibration;
- Loss of land and/or access to land;
- Loss of livelihoods;
- Resettlement and social upheaval;
- Loss of access to, or physical destruction of cultural and/or spiritual sites;
- Exhumation and relocation of graves;
- Influx of migrant workers and/or foreigners;
- Increased sickness and death;
- Uncertainty;
- Loss of sense of place;
- Visual impact.

Although many of these impacts are inherently known, there is very little hard evidence and monitoring data to demonstrate the severity and extent of mental illness which may be *directly attributable* to specific developments. The key issue is resilience: some groups or sectors of communities may be more resilient to change than others. Those who are more resilient will adapt their lives and livelihoods to accommodate the changes. These people are usually better educated, have various alternative livelihood options available and greater resources to make the adaptations required.

However, those who are less resilient and more vulnerable to change do not have the means and resources to adapt to perturbations in their lives, irrespective of whether change happens rapidly or over a longer period of time. While the more resilient group may suffer short-term stress and anxiety, it will recede once the necessary physical and mental adaptations have been made. The more vulnerable sectors of society on the other hand are likely to suffer chronic mental health issues, which often go undetected and undiagnosed. Furthermore, people who suffer from stress-related illnesses are also more prone to the communicable and non-communicable diseases discussed above.

INTEGRATION OF HEALTH INTO ESIA PROCESSES: ISSUES TO CONSIDER AT EACH STAGE OF THE PROJECT APPRAISAL PROCEDURE

ESAP Phase 2: Project Identification: screening and categorisation

In addition to the requirements listed in Annex 2 (Environmental and Social Screening Categorisation) of Volume 1 of the Bank's Environmental and Social Assessment Procedures (ESAP), Bank staff need to determine whether communities or groups within communities are vulnerable to health risks. To evaluate the degree of vulnerability and risk to communicable and non-communicable diseases,

vector-borne diseases, pollution-induced effects, malnutrition, injury and mental illness, a high level situation assessment needs to be performed to determine the following:

- The current prevalence rate for HIV, STIs and TB in the project-affected area, including along transportation corridors to and from the project site;
- The presence of malaria and/or the potential to create suitable habitat for malarial mosquitoes and bilharzia snails;
- The nutritional status, particularly amongst children, the elderly and pregnant women;
- Current levels of alcohol, tobacco and drug use in the project affected area;
- Unemployment levels in the project affected area and in the region and/or country (to determine the potential for an influx of male job seekers and the opportunities presented for young women and girls to earn money through commercial sex work);
- Need for involuntary resettlement;
- Whether livelihood options will be lost or diminished by the proposed development;
- Presence of cultural practices which disempower women and or create situations where women become more vulnerable to abuse and disease;
- Adequacy of health care facilities to test, diagnose and treat the range of diseases which might be directly or indirectly caused by the project;
- Levels of sexual health awareness including reproductive health;
- Potential for cumulative impacts on health such as the presence of existing or planned activities which are causing or could cause additive or antagonistic health effects or which could make people more vulnerable to disease, e.g.:
 - Air, soil or water pollution from existing/new mines, industries, agrichemicals, etc.;
 - Increased road traffic;
 - Presence of large numbers of migrant workers, job seekers, refugees or mobile contract workers in the project district;
 - High levels of indoor air pollution;
 - Cramped, unsanitary living conditions and/or informal housing where there is no formal sewerage or waste disposal system in place.

If any of these situations exist or are highly likely to occur, the proposed project should be deemed to have a significant social (health) risk and should therefore be categorised as a Category 1 project.

ESAP Phase 3: Project Preparation: development of Terms of Reference for ESIA and ESMP

Where ESIA studies have already been conducted prior to the Bank's involvement, sector departments shall review the existing ESIA and if significant environmental, social **or health** issues were omitted or inadequately addressed, Bank staff shall propose terms of reference (ToRs) for the additional studies (see Annex 1).

However, where the Bank is involved in project formulation from inception, Bank staff shall prepare ToRs for the environmental and social impact assessment. A sample ToR for a detailed health study is included in Annex 1. This should ensure that both the direct and indirect determinants of health described above are addressed in the ESIA. It should also be noted that there needs to be meaningful

consultation about the scope of the ToRs with all stakeholders – especially if vulnerable groups may be affected.

In addition to the direct drivers of health relating to development projects (described above), it is important to identify the social, economic, environmental and cultural factors – the living conditions – that indirectly affect health and wellbeing. These are known as the indirect determinants of health. Many of these are social conditions and basic human rights which, if not met, can give rise to negative impacts on people and their health. However, if these health determinants are met, it can lead to net positive impacts. The various health determinants that should be included in the ToRs for an integrated social and health impact assessment and the positive and negative consequences are shown in Table 4.

Table 4: Indirect determinants of health

Health determinant	Societal and health benefits	Negative social and health effects
Prosperity	Access to new goods and services Improved employment prospects Improved quality of life and living standards Increased access to amenities Access to better health care Improved nutrition	Changing societal roles and importance Breakdown in social cohesion Increased demand for commercial sex work Unemployment due to lack of adequate skills
Housing and shelter	New or improved accommodation Acquisition of land or house Home improvements Increased demand for rental	Housing shortages Price inflation Higher rentals Overcrowding Informal settlements
Water supply and sanitation	Improved water supply systems Improved water quality Improved sanitation Improved health Improved use of time	Pollution (malfunctioning sewage treatment plants) Impact on water flow and groundwater resources Reduced downstream water availability for other uses Impact on ecosystem services
Transportation and connectivity	Improved infrastructure Better, easier, quicker access to markets, schools, clinics, etc. Less wear and tear on vehicles	Increased traffic accidents Air pollution Noise Chemical spillages Polluted runoff Impedance of natural drainage systems affecting ecosystem services Increased human trafficking Spread of disease vectors Barriers to access (to fields, schools, services, other villages, etc)
Learning and education	Skills development Better employment prospects	Loss of traditional skills Employment ceases when project is completed

Health determinant	Societal and health benefits	Negative social and health effects
	Development/improvement of schools Construction of libraries and skills development centres (adult training) Girls and boys receive primary and secondary education	Unskilled, illiterate people lose out
Crime and safety	More employment therefore less need to commit crime	More money and goods in circulation therefore greater incentives to commit crime Increased abuse of alcohol and drugs leads to increase in crime and safety risks
Health, social care and public services	Increased funding Strengthened partnerships Better health care	Added pressures due to increase in population
Commercial goods and services	Wider range of medicines, food products and household goods	Increased cost of food Risk of increased consumption of unhealthy 'fast foods', alcohol, drugs, cigarettes Increased spending on gambling Increase in commercial sex work
Social capital and social cohesion	Increased prosperity for the whole community	Community tensions if there is inequitable distribution of jobs and wealth Influx of people Divisions between those for and against the project Cultural clashes
Governance and public policy	Can form strong public-private partnerships and augment government services if there is a sound system of governance in country	If there is weak governance, then more difficult to form partnerships and make a difference
Landscape change	Improved waste management services could improve aesthetics (less litter)	Impact on quality of life and wellbeing Cultural changes Impact on other economic activities if removed or displaced

Source: ICMM, 2010

It is clear from the above that the ToRs for the ESIA must stress the need for an integrated assessment of project impacts, focussing on the linkages between the social, economic, cultural and biophysical environments. It is also important to ensure that the ESIA team assesses not just the direct impacts, but the secondary and tertiary level effects which may in some cases be more significant than the direct impacts.

ESAP Phase 4: Project Appraisal (review of ESIA and ESMP documents)

Table 5 sets out a list of criteria to assist Bank staff when they are reviewing the inclusion of health issues in an ESIA and ESMP, including the specialist health impact assessment. Note that the process of carrying out a Resettlement Action Plan (RAP) and the contents of a RAP (including health issues) are detailed in a Guidance Note and are therefore not repeated here.

TABLE 5: ESIA/ESMP REVIEW CRITERIA RELATING TO HEALTH	
ESIA Process and Decision-making	
<ul style="list-style-type: none"> • Does the ESIA comply with the approved ToR for the project, especially the ToR for the Health Impact Assessment? • Does the ESIA comply with the conditions of approval regarding health issued by the country's environmental authorities and the Bank's loan conditions? • Does the ESIA comply with the Bank's OSs, particularly those relating to health, and this Guidance Note? • Does the ESIA provide sufficient, quantitative, scientifically-derived information on the baseline health status and the potential short- and long-term, direct and indirect health impacts, to make an informed decision regarding the desirability of the project? • Does the environmental authority have the capacity (human, technical, financial) to monitor and enforce the implementation of health mitigation measures effectively? • Does the health ministry have the capacity to provide adequate health care facilities to test, diagnose and treat any new health issues that might arise due to the presence of the project? 	
Law and Policy	
<ul style="list-style-type: none"> • Does the ESIA comply with the national laws governing environmental assessment, particularly in addressing health issues? • Have the predicted impacts in the ESIA been contextualised in terms of the country's commitment to international goals, such as: SDGs, Three Ones, Getting to Zero, WHO Global Action Plan for the Prevention and Control of Non-communicable Diseases 2013-2020, WHO Framework Convention on Tobacco Control, WHO targets on TB, malaria, hepatitis and nutrition, ILO Conventions and Plan of Action, etc.? • Have the predicted impacts in the ESIA been contextualised in terms of the country's environmental and health policies and targets regarding: communicable diseases, non-communicable diseases, vector control, pollution and waste, chemicals, workplace health and safety? 	
Consultation	
<ul style="list-style-type: none"> • Were vulnerable groups identified in the stakeholder analysis? • If yes, were appropriate consultation methods employed to discuss their issues and concerns, especially those relating to health and gender? • Were the health concerns raised by the stakeholders meaningfully addressed in the ESIA? 	
Impact assessment (relating to health aspects)	
<u>General</u>	
<ul style="list-style-type: none"> • Does the ESIA contain detailed information on the source/origin of the workforce and the terms of employment as required in OS5 and detailed in the Guidance Note on International Labour Standards? • Is there a breakdown of the labour requirements per skill category and gender? • Are the accommodation, recreation and ablution arrangements for men and women described? 	

- Are worker transportation arrangements described?
- Is the location of the worker camp identified and described in relation to local communities?
- Does the ESIA identify all pollution and waste types and sources?
- Does the ESIA identify all the pollution exposure pathways – for workers and local communities (see also OS4 and GN on Pollution Prevention and Control)?
- Does the ESIA identify all the transportation routes to the project site and the affected communities along the route(s)?
- Is there an analysis of ecosystem service and the dependence of local communities on such services (see also OS3, GN on Biodiversity and Ecosystem Services, and GN on Environmental Flows)?
- Have the authors of the ESIA provided an integrated, concise synthesis of the linkages and interdependencies between the social, cultural, economic and biophysical environments?
- Have the indirect (secondary, tertiary) impacts been identified and assessed?
- Are the impacts analysed on a disaggregated basis according to the differential impacts which may be experienced by different segments of the community e.g. women and children, elderly, poor (see Guidance Note 2.2 on Vulnerable Groups)?

Social Impact Assessment

- Does the SIA include a gender assessment (if relevant)?
- Does the SIA include a cultural assessment (if relevant)?
- Does the SIA address broad human rights issues including the right to health?

Health Impact Assessment

- Is there a specialist study on health? If not, do the report authors provide reasons why not?
- Does the HIA describe any limitations or constraints for the study, list all the assumptions and identify data gaps and deficiencies?
- Does the HIA clearly describe the methodology used to undertake the health assessment, including the use of predictive models? (see Box 1)
- Are the findings and conclusions justified given the project type and location and/or previous Bank experience?
- Does the HIA provide an analysis of the local health care facilities and their capacity to cope with additional health issues arising directly and indirectly from the proposed project?
- Were key health professionals at country, region and district level consulted during the study?
- Have the most recent baseline health statistics on CDs, NCDs, vector-borne diseases, existing pollution-induced diseases and disorders, nutrition, maternal health and mental health for the project area been provided, disaggregated by gender?
- Have the key health drivers for each type of disease been identified?
- Have the predicted health impacts been quantified – short, and long-term, direct and indirect, temporary and permanent?
- Have the specific health impacts been disaggregated on the basis of gender and other vulnerable groups e.g. children, orphans, elderly, and poor?
- In cases where resettlement is planned, have the specific health issues associated with resettlement been addressed e.g. maternal health care, water-borne and vector-borne diseases, etc.?
- Have the health costs associated with resettlement been included in the compensation?

ESMP

- Does the ESMP set out for **each** health impact, the required mitigation actions, the goals/targets, the responsible persons, key performance indicators, timeframe and costs? (see Box 1)
- Are the proposed mitigation actions likely to be achieved and effective? (see Note below)

- Does the Borrower have the capacity to implement the specified mitigation plan?
- Does the ESMP include a detailed health monitoring plan which sets out what, where, why, when, how and by whom monitoring should be undertaken?
- In cases where third parties are contracted to carry out monitoring activities, have they been provided with sufficient budget and clear terms of reference?
- Does the ESMP specify that there will be permanent environmental and social officers on staff for each project phase?
- Does the ESMP include recommendations for ongoing engagement with the local community, including vulnerable groups e.g. women?

BOX 1: NOTE ON PHASE 4: PROJECT APPRAISAL OF HEALTH INFORMATION IN ESIA's

1. Computer simulation of malaria transmission around African dams and reservoirs

In Table 5 there is a specific question under Health Impact Assessment, asking “Does the HIA clearly describe the methodology...including the use of predictive models?”

There are numerous models available to predict malaria, but it is suggested that Bank staff require that any assessment for African water projects such as dams and irrigation systems, should be made with the HYDREMATS model, specifically developed and recently calibrated for African conditions around reservoirs.¹

Besides being highly relevant because it has been recently calibrated for African conditions, the HYDREMATS model not only includes weather and hydrologic conditions, as well as the locations and size of resettled communities, but it also includes the role of human immunity in malaria infections, a component not found in most malaria models currently available.

The HYDREMATS model is especially useful when considering the location and extent of resettlements related to the project, whether involuntary resettlement or induced settlement due to the attraction of the reservoir/dam for surrounding populations. In the model, alternative configurations of the location and size of settlements can be evaluated with respect to vector populations on reservoir shorelines.

2. Cost of malaria mitigation efforts

Often designers of a project will propose mitigation or remedial measures for the negative impacts of a project, as alternatives to project modifications which would avoid the negative impacts. The costs of these remedial measures are often very seriously under-estimated because they are based on limited data available from application of the current malaria strategy of WHO. Using these under-estimates of the cost of mitigation measures can lead to a mistaken preference for the remedial approach, when in fact improvements in project design or operation might be less expensive in the long-term.

More extensive and accurate recent data on malaria mitigation in Africa can be derived from reports of the US Presidential Malaria Initiative which has been suppressing malaria in a dozen African countries for several years. Unfortunately these reports show that the cost of the biocides used are escalating dramatically. Because of the rapidly escalating costs of malaria mitigation measures, the Bank should require up-to-date data on costs for malaria suppression from the large body of current information available from reports of the US Presidential Malaria Initiative (USPMI). Reported costs from the USPMI are continuing to rise rapidly due to increasing resistance of *Anopheles* mosquitoes to the more affordable biocides. The latest data indicated yearly operational costs exceeding \$10 per house, per year.¹

Furthermore the burden of remediation strategies must be covered from endlessly repeated measures covered under operational budgets of the Ministry of Health, already inadequate in most situations. The advantage of incorporating modifications in the proposed project to avoid malaria – or any other disease – is that the costs are covered in the project loan, on very favorable terms.

ESAP Phase 6: Project Implementation and Supervision

The audit of the project needs to be carried out to check compliance with the detailed ESMP, as well as with the specific conditions contained in any loan agreements and environmental permit/licence conditions. The compliance audit should include standard auditing procedures including: document review, inspections, observations and interviews with relevant project and community stakeholders.

Although the audit questions will need to be customised for each project site, some general questions are provided in Table 6.

TABLE 6: TYPICAL COMPLIANCE AUDIT QUESTIONS

Document review

- Is there an Environment, Health and Social (EHS) Policy in place?
- Is it prominently displayed?
- Is there an environmental and social management system (ESMS) (ISO 14001 compatible) and are the contents known and understood by EHS staff, management, resident engineer and the general workforce?
- Is this updated annually?
- Is a copy of the ESIA, ESMP, RAP (if required) available on site and are the contents of these documents known and understood by EHS staff, management and the resident engineer?
- Is there a detailed monitoring plan in place for relevant biophysical, socio-economic and health impacts?
- Is a monthly (or quarterly) EHS report compiled and tabled at management meetings?
- Does the monthly or quarterly report include monitoring data which have been analysed and interpreted in terms of the impacts on biophysical, socio-economic and health aspects?
- Are the site audit and incident reports on record, together with corrective action tracking activities?
- Is there an Emergency Preparedness and Response Plan and are its contents known and understood by all relevant staff?
- Is there a Waste Management Plan?
- Is there a workplace health, safety and wellness plan in place?
- Is there a record of employees' attendance at health and safety awareness training programmes?
- Is there a monitoring data base which is up to date and in a useable form (i.e. data can be extracted and analysed)?
- Are the monitoring data and units valid?
- Are there adequate data base access controls in place?
- Are the relevant Material Safety Data Sheets (MSDS) present in all workplaces where chemicals are used?
- Do the staff working with chemicals know and understand the contents of the MSDSs?
- Are there any health awareness posters present on site?
- Does each workplace have the correct EHS and personal protective equipment (PPE) signage in place?
- Are records kept of community forum meetings?
- Have all expenditures on health been documented and accounted for against budget?
- Is there a complaints log?

Observations and inspections

- Is there a full-time environmental and social officer on site?
- Are the workers wearing correct PPE?
- Are First Aid kits present in all workplaces?
- Is work being conducted in a safe manner?
- Is there visible evidence of air, water and soil pollution occurring?
- Are there any visible measures in place to prevent such pollution?
- Are all hazardous chemicals being stored correctly (in a bunded, ventilated, locked room on hard standing)?
- Are all gas bottles being stored correctly (upright in an open-air, locked cage)?
- Are all hydrocarbons in above-ground storage tanks in a bunded area on hard standing?
- Do all active hydrocarbon drums have drip trays and adequate dispensing systems?
- Are unopened drums being stored correctly?
- Are there separate sites for non-hazardous and hazardous waste disposal?
- Is the hazardous waste disposal area lined with an impermeable liner?
- How good is litter control and general housekeeping on the site?
- Is the construction/permanent worker camp located sufficiently far away from sensitive receptors such as schools for girls?
- Are male and female condoms provided?
- Are there separate and adequate accommodation facilities for men and women?
- Are there separate and adequate ablution facilities for men and women?
- Are there different accommodation, medical, food and recreation systems for different ethnic groups and/or worker status (full-time, temporary, migrant, contractor, local, etc)?
- Is there a formal canteen arrangement?
- Is food conducive to healthy eating provided?
- Is there a medic, nurse or medical facility on site?
- Is the environmental monitoring equipment in good order?
- Has an informal settlement developed near the project site?
- Are there visible impacts on health and safety along the access road to the project site?

Interview questions: contractor

- Is there a community liaison forum in place to promote ongoing dialogue with local stakeholders?
- Have partnerships been formed with local government agencies to monitor social and health issues?
- Is the composition of the workforce (by gender and ethnicity) as per the commitments in the ESIA and ESMP?
- Check compliance with the specific ESMP mitigation measures, those listed in the Loan Agreement and those contained in the Letter of Environmental Authorisation (permit, licence) [obtain list of actions from project-specific documents].
- Have the commitments made in the RAP been fulfilled [obtain list of actions from project-specific RAP].
- Have the commitments made regarding the use of local contractors and sub-contractors been fulfilled?
- Have any gender sensitisation programmes been carried out?

Interview questions: local stakeholders

- Is there a community liaison forum in place?

- Has the contractor/operator formed a partnership with any local government agency or non-governmental organisation (NGO) to monitor health and social issues?
- Have you or your organisation benefitted in any way from this project? [obtain details]
- Has the contractor/operator delivered on his promises? [obtain details]
- Is there a complaints or grievance mechanism in place where you can raise issues and concerns?
- Is the local clinic coping with additional demand and has it been resourced accordingly?
- Has the incidence of disease gone up since the project started?
- Have the types of illnesses changed since the project started?
- Are you/your community able to access fields, grazing land, schools, churches, cultural and spiritual sites without hindrance?
- Has the risk of injury and traffic accidents increased as a result of the project?
- Has there been an increase in teenage pregnancy since the project started?
- Have the air, water, soil, vegetation, wildlife and crops been adversely affected by construction and operation of this project?
- Has the contractor or operator carried out any environmental awareness and sensitisation programmes in the community regarding health?
- Has there been an influx of migrants and job seekers into the community as a direct result of the project?
- Is the latter causing social stress and upheaval?
- Has there been an increase in the number of sex workers since the project started?
- Has there been an increase in the number of liquor outlets, taverns, shebeens, etc., since project inception?

ANNEX 1: SAMPLE TERMS OF REFERENCE FOR A HEALTH IMPACT ASSESSMENT

Introduction and project background

Introduce the project, its need and desirability, location, main inputs and outputs, overall time-frame etc.

Scope of work

Specify the spatial and temporal boundaries for the HIA.

Explicitly state what should be included and excluded.

The scope of work should be divided into four phases or activities:

1. A rapid appraisal or scoping;
2. Baseline health⁹ description;
3. Health impact assessment based on the baseline evidence;
4. Development of a community health management plan based on priority impacts.

The consultants are requested to provide a detailed description of the methodology they propose to use to undertake the following activities:

Rapid appraisal (scoping)

- Project definition from a health perspective. This will be carried out by reviewing all existing project documents and other available literature. This will include evaluating projects in similar settings in the country or region. Analyse any initial environment and social assessments, and review any meeting minutes or reports from stakeholder consultation.
- Review country-specific legal and policy frameworks for health/HIV which may affect the planned project, particularly the health targets which the country has committed to.
- Country and community health profiling:
 - Perform a literature review to describe the baseline health status at a national, regional and district level with a focus to detect project-attributable or general potential health hazards. This is desktop work.
 - Define and profile the communities that may be affected by the project development. This will be in relation to both directly and indirectly affected communities. This process must be aligned to the social and specialist studies and have a focus on communities that will be directly and indirectly impacted. This is field work.
- Produce a scoping report to feed into the overall project scoping report. The scoping report must include a detailed ToR for the specialist health impact assessment (HIA) to be conducted as part of the ESIA. The ToR for the HIA should include, but not be limited to, the following tasks:

Baseline health description

- Describe the baseline health status of communities in relation to the project. This will be based on the availability of data from the rapid appraisal and be supported by data collected in the social baseline and other specialist studies. To properly analyse the effects of the project on health, the baseline data on health and social indicators need to be:

⁹ The term 'health' in the context of development projects, and for the purposes of this ToR, includes: communicable diseases, non-communicable diseases, vector-borne diseases, pollution-induced diseases and disorders, occupational health, injuries, nutritional issues and mental health.

- as up to date as possible;
- in quantitative form if possible; and
- collected in both aggregated and dis-aggregated forms – for example, local health data, socio-economic statistics, health facility information etc. should be provided at country, regional and local level and by gender, where relevant;
- Conduct a gender assessment to determine the key drivers with regards to health issues:
 - Women's ability to express issues and concerns around their health;
 - Different responses to project impacts;
 - Employment on the project and what that means in terms of communicable diseases and other health issues;
 - Sexual behaviours (traditional and sex work);
 - Trafficking of women and children.
- Conduct a cultural assessment (or coordinate with the specialists undertaking such as study) to understand certain behaviours and customary practices which may increase the risks of communicable diseases (e.g. societal attitudes towards women, concurrent partners, condoms, HIV and inter-generational sex).
- Perform key informant interviews with local stakeholders in the project area to support the definition of the baseline health status. These could potentially include:
 - local medical officer – a key representative that can provide information and highlight relevant health challenges in the area;
 - district medical office;
 - regional, district and local authorities, particularly those involved with water, sanitation and health;
 - local/district/regional HIV and AIDS programme managers;
 - community health/social workers;
 - health care workers and peer educators;
 - managers of NGOs or aid agencies working in the area;
 - UNAIDS country representative or national AIDS council representative;
 - WHO/UNICEF country representatives; and
 - Rural development agencies.
- Conduct surveys on knowledge levels and attitudes about health issues, especially towards HIV/STIs, before project construction starts, mid-way through construction and at the end of construction to determine whether the mitigation measures have had the required positive effect.
- Time the surveys, key informant interviews and behaviour change communications programme to avoid peak agricultural periods such as sowing and harvesting because farmers and their families may not be available at those times.
- The social and specialist teams are likely to meet a similar range of key informants; therefore, the consultants need to hold a planning workshop to define their areas of study and to coordinate their meetings.

Impact assessment

- Consider the potential impacts of the proposed project on the health of the affected communities and relate them to the different life cycle stages of the project. Specific issues to be assessed include:
 - Increased prevalence of diseases and disorders as a result of the project;
 - Existing aggravating factors which may increase the risk of disease transmission in the project area, such as over-crowding, poor sanitation and waste management practices, existing disease burden e.g. HIV, malaria, existing high levels of air, water or soil pollution, poverty, inadequate health care facilities, post-conflict situations, etc;
 - the number of orphans in the project area; and
 - Effects of poor health on the business due to training and replacement costs of staff who may leave because of sick leave and compassionate leave.
- Consider alternative options and recommendations for mitigation/management of priority impacts. Recommend measures to avoid/mitigate negative health impacts and enhance benefits which may result from the project at each project stage (see Box 2 for examples relating to water projects).

BOX 2: EXAMPLES OF HOW TO MINIMISE AND MITIGATE HEALTH IMPACTS ASSOCIATED WITH WATER PROJECTS

- Provide comparison of impacts for 2-3 alternative designs of the project, including the 'No Project' situation. It is required that the planners submit more than one design. If it is a dam, it might be for various locations, or for various heights of the dam spillway and thus various elevations of the reservoir water. If it is a canal, it might be for various routes, or for different flow velocities. If it is an irrigation system it might be for various crops: rice vs sugar cane vs wheat, etc.
- Interact with planners on health issues. In order to enlist the creativity, knowledge and support of the planners, they should be given the issues, criteria and data which the assessment team will use in determining the impacts, thus the planners themselves can come up with safer alternative designs. For example in the blackfly belt in Nigeria, the engineering team designed a two-part spillway which only had high velocities - conducive to blackfly breeding - for very high flows which only occurred once every few years. But the normal flows went over a broad spillway with low velocities, which was not suitable for blackfly breeding.
- Design the resettlement plan properly. The component most often ignored or badly designed in large infrastructure projects (such as dams, irrigation systems or pipelines), is the Resettlement Plan. This requirement should be called out specifically, specifying settlement location, drinking water sources, waste disposal systems, and housing quality. In the case of water-associated diseases around reservoirs, the special linkage between schistosomiasis transmission, location of drinking water supplies, and daily contact with surface waters, as well as the linkage for malaria between housing location and insect-proofing, should also be required elements in the resettlement plans. The number of people expected to be drawn to water projects must be carefully developed, as it is usually severely underestimated.
- Design an associated drainage system. A second chronically neglected component - in proposed irrigation systems - is the provision of adequate drainage systems. Poor drainage results in breeding sites for snails and mosquitoes and thus become dangerous foci of disease transmission.

- Determine the health needs of the community based on health strategies, infrastructure, programmes, service priorities, delivery plans and challenges.

Community health management plan

- Seek to identify partners that may assist with any health support opportunities. These should include the local authorities, non-governmental agencies and even donor agencies.
- Develop a community health management plan based on the findings of the HIA and SIA. The team will evaluate the sustainability of all recommended actions and strategies, to assist the long term-planning.
- Recommend methods for monitoring and evaluating the potential impacts if this is possible from gathered data. Key indicators will be listed as part of the plan, together with a surveillance strategy.
- Collect additional baseline data to inform specific mitigation and management elements and support health impact surveillance.
- Develop a monitoring information system/database.
- Integrate the health management plan into the project ESMP.
- The HIA consultants must prepare a final report for inclusion in the overall ESIA report. The ESIA consultants will provide the HIA consultants with the impact assessment methodology to be followed.

Additional elements:

Workshops

A number of workshops to be attended by all the specialists will be conducted to support the project, including:

- planning workshop;
- workshop to support baseline data collection;
- impact assessment workshop; and
- community health and community development workshop.

The impact assessment consultants shall organize workshops with the engineering design team early on, so that comparisons can be made well before the final site is selected and the final costs and benefits are calculated.

Peer review

As the health impacts are considered to be extremely sensitive, the HIA and its deliverables will be peer reviewed by an external independent expert.

ANNEX 2: DISEASES, DEVELOPMENT TRIGGERS AND MITIGATION

Disease category	Examples of diseases	Development triggers	Possible mitigation measures
Infectious or communicable diseases	HIV, TB, hepatitis, sexually transmitted diseases (STDs), meningitis, influenza	Any project with workers; Influx of migrant workers; Cramped living and working conditions; Poor ventilation; Increased income to purchase alcohol, drugs and tobacco	<ul style="list-style-type: none"> • Recruit locally; • Conduct skills training to ensure a local source of labour; • Discourage hiring workers 'at the gate' and set up formal systems of employment; • Provide sufficiently sized accommodation facilities to meet the maximum expected capacity of workers on site; • Ensure adequate ventilation in accommodation, recreational and work areas; • Provide adequate transportation to site (prevent overcrowding); • Develop a wellness programme and increase worker health awareness e.g. smoking, diet, exercise, safe sex, hygiene and sanitation; • Roll out the ILO HIV workplace policy; • Provide time off to attend HIV VCT and TB screening; • Conduct more rigorous health baseline assessments, including for example, mapping of TB hotspots, especially in labour-sending areas; • Conduct pre-employment screening to ensure that TB-positive workers are not placed in high risk work areas and that they receive the correct medical treatment; • Greater use of TB 'passports' by migrant/mobile workers; • Employ a site health care professional; • Set up a community forum to ensure two-way dialogue about health issues; • Provide male and female condoms in all ablution blocks; • Develop a Behaviour Change Communications Plan to ensure that the message about communicable diseases is constantly new and received; • Promote VCT for all workers and within project-affected communities.

Disease category	Examples of diseases	Development triggers	Possible mitigation measures
Chronic diseases (non-communicable diseases)	Cardiovascular diseases, cancer, chronic obstructive pulmonary disorders (COPD), alcohol and drug addiction, diabetes	Tobacco smoking; Increased access to, and availability of alcohol, drugs, 'fast' food; Access to poor quality coal for cooking and heating	<ul style="list-style-type: none"> • Raise nutrition standards in canteen food; • Zero alcohol policy; • Prevent the establishment of bars/taverns next to workplace selling cheap branded and home-brew alcohol; • Develop a wellness programme and increase worker health awareness e.g. smoking, diet, exercise, alcohol and drug abuse; • Encourage participation in sports by creating football pitch and/or volleyball court, etc and sponsor teams and team events between developer and community teams; • Provide clean-burning fuel or solar cookers to local communities to reduce dependence on wood and low grade coal;
Pollution-induced diseases	Typhoid, cholera, hepatitis A, cancer, birth defects, congenital abnormalities, COPD, asthma, organ damage, neurological disorders	Water pollution from faecal contamination and heavy metals; Air pollution (gases, silica and heavy metal particulates) from smelters, waste dumps, landfills, industrial process; Asbestos waste; Soil and crop pollution from deposition of heavy metals, pesticides; Increased traffic; Presence of high voltage powerlines	<ul style="list-style-type: none"> • Ensure that sewage treatment plants or soakaways have sufficient capacity and are regularly pumped out to prevent overflow; • Provide improved water infrastructure for local population – especially if the existing water resources are being contaminated, and/or flow is reduced due to upstream abstraction by the project and/or groundwater levels and yields are affected by project activities; • Rehabilitate all disturbed areas as soon as possible to prevent dust and erosion; • Rehabilitation all tailings storage facilities and slimes dams as soon as possible to prevent dust and erosion of contaminated material into water courses; • Ensure that all stacks are designed according to latest technology with adequate filter and scrubbing systems to prevent emission of gases and heavy metal particulates;

Disease category	Examples of diseases	Development triggers	Possible mitigation measures
			<ul style="list-style-type: none"> • Ensure all wastes containing radioactive materials are adequately covered to prevent emission of radon gas and movement of radionuclides into the wider environment; • Prevent any settlements from being developed in the immediate downwind zone of any mine or industrial waste dump or within 50m of high voltage transmission lines; • Locate any resettled people in an environment which will not be within the zone of influence of any air-or water-borne pollution or within 50m of high voltage transmission lines; • Maintain strict health and safety protocols regarding the use of pesticides on crops and the disposal of containers and waste chemicals; • Ensure that all workers are provided with the correct Personal Protective Equipment (PPE) and are instructed in the correct use of such equipment; • Ensure that all workers use the required PPE at all times.
Vector-borne diseases	Malaria, schistosomiasis, giardia	Pools of water created by excavations; Nutrient enrichment of water bodies (causing more favourable conditions for some vectors)	<ul style="list-style-type: none"> • Provide treated mosquito nets in malarial areas; • Provide screens on all doors and windows; • Specify dam designs and dam operational processes to minimise mosquito habitat e.g. shoreline morphology, water level manipulation, prevent weed proliferation and dying vegetative matter, etc.; • Conduct participative health impact assessments and derive community-driven mitigation measures. For example, obtain community buy-in to ensure that people do not live within 1km of a newly created shoreline (as it has been shown that people living close to water bodies have a 20 times greater risk of infection than those residing more than 5km away); • Rehabilitate all road borrow pits and excavations to prevent ponding of water, or redirect storm water away from active pits using cut-off drains;

Disease category	Examples of diseases	Development triggers	Possible mitigation measures
			<ul style="list-style-type: none"> Specify that all disturbed areas should be re-vegetated, with reforestation programmes where appropriate; Ensure adequate levels of nutrition in camp canteens; Hold tool box talks and awareness campaigns about malaria causes and prevention; In resettlement projects, ensure that the new houses are less conducive to harbouring mosquitoes than traditional huts; Conduct regular risk assessments through the life of a project to ensure that malaria risks are properly identified at each project stage with appropriate, targeted, management actions;
Physical injury	Temporary and permanent disability, death	Increased traffic; Community violence; Access to active work sites; Access to un-rehabilitated sites where falling, drowning and other injuries are likely; Unstable landforms	<ul style="list-style-type: none"> Ongoing defensive driving training for all truck drivers including suppliers and sub-contractors; Construct speed humps in villages and other sensitive areas; Erect appropriate signage; Impose speed controls within construction areas; Ongoing rehabilitation of borrow pits, quarries and other excavations during construction to make safe; Construct dams, tailings dams, waste rock dumps and other large waste storage structures according to international safety guidance to prevent mass slope failure; Decommissioning, rehabilitation and site closure at the end of construction or operations to make the site safe
Nutritional disorders	Malnutrition, obesity, vitamin deficiency	Loss of agricultural land; Loss of livelihood; Availability of, and access to cheap high saturated fat, salt and carbohydrate foods	<ul style="list-style-type: none"> Provide adequate compensation for lost agricultural land or access to resources in terms of country or donor guidelines; Provide adequate compensation for loss of livelihood; Provide nutritious, healthy food in staff canteens; Promote healthy eating and diet;

Disease category	Examples of diseases	Development triggers	Possible mitigation measures
Mental health	Suicide, depression, stress and anxiety	Loss of land and livelihoods; Physical displacement and resettlement; Loss of spiritual and cultural sites; Powerlessness; Noise; Vibration; Lack of sleep; Visual and aesthetic impacts; Loss of sense of place and belonging	Provide adequate compensation for lost agricultural land or access to resources in terms of country or donor guidelines; Provide adequate compensation for loss of livelihood; Carry out grave removals and relocations according to local practices and/or national guidelines and with the consent of all those involved; Restrict noise levels to WHO standards in residential areas; Restrict working hours to daytime and weekdays; Monitor vibration levels and keep within accepted limits; Conduct building condition surveys of structures near to blast sites or where activities create vibration e.g. heavy rolling of road surfaces; Maintain a complaints log and address all complaints within 24 hours; Set up a 24 hour hotline; Appoint a community liaison officer; Maintain an open dialogue with all affected parties; Locate noisy activities away from schools, hospitals, old age homes and other sensitive sites; Carry out a visual impact assessment; Revegetate disturbed areas as soon as possible to reduce dust and visual scarring;