22 Community Health, Safety and Security

22.1 Introduction

This chapter presents the baseline and an assessment of the potential impacts of the construction and operation of the Simandou Port on Community Health, Safety and Security. The chapter looks at ways in which the health and safety of the local community could be impacted during the Project life cycle as a result of both routine and non-routine activities. This includes consideration of disease transmission, access to health care and accidents and injuries. In addition, the Project needs to ensure that safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimises risks to the community’s safety and security. As such the assessment considers the following types of impacts:

- increased transmission of communicable diseases, in particular tuberculosis (TB) and acute respiratory infections which may result due to in-migration, housing pressure and the presence of an external workforce;
- increased transmission of malaria which may result due to changes in the environment creating breeding grounds and due to in-migration;
- transmission of other vector borne diseases in particular arboviral diseases due to environmental changes caused by factors such as worksite management and in-migration;
- impacts associated with water and sanitation in particular diarrhoeal diseases due to in-migration and decreased access to good quality water;
- HIV/AIDS and Sexually Transmitted Infections (STIs) due to changes in demographics, presence of a workforce and changes to socio-economic factors;
- increase in non-communicable diseases due to changes to lifestyle leading to chronic conditions including hypertension, diabetes etc;
- nutrition related diseases in particular with regards to anaemia and other malnutrition-related illnesses associated with changes in food security;
- zoonotic diseases - infection or infectious disease transmissible from vertebrate animals to humans in particular lassa fever recognising that other interactions are likely to be minimal;
- health impacts associated with hazardous materials in terms of the need to manage the handling of these materials appropriately to avoid non-routine events, such as spillages (for liquid hazardous products);
- increased pressure on health care services which are already insufficient for the needs of the existing community due to in-migration, worker health care needs and changes to community safety;
- impacts on community safety in particular road, rail or vessel accidents due to increased Project related movements; and
- impacts to community security covering interaction between security forces and the local community.

The following impacts have been addressed in other chapters and therefore have not been addressed here including:

- impacts associated with changes to air quality see Chapter 9: Air Quality and Chapter 21: Social Structures and Community Life;
• impacts associated with noise see Chapter 8: Noise and Vibration and Chapter 21: Social Structures and Community Life;

• impacts associated with waste management including hazardous waste see Chapter 11: Resources and Non-Mineral Waste Management;

• impacts associated with water quality and availability see Chapter 6: Water Environment;

• impacts associated with socio-economic changes that may affect health are considered in Chapter 20: Land Use and Livelihoods and Chapter 23: Labour and Working Conditions;

• impacts associated with in-migration are discussed in Chapter 19: In-Migration;

• impacts associated with ecosystems services are discussed in Chapter 24: Ecosystems Services; and

• impacts associated with human rights which may affect community health, safety or security are considered in Chapter 25: Human Rights.

The remainder of the chapter is organised as follows:

• Section 22.2 describes the assessment methodology;
• Section 22.3 presents the baseline situation;
• Section 22.4 present an assessment of impacts of the port prior to mitigation;
• Section 22.5 describes the planned approach to mitigation of these impacts and the resulting residual impacts; and
• Section 22.6 summarises the findings of the assessment.

22.2 Approach

22.2.1 Study Area

As with other socio-economic impacts, impacts resulting from a Project on community health, safety and security may occur at the national, regional (prefecture) and local level.

At the local to regional level the nature and extent of those impacts may vary depending on the nature of Project activities, the local community sensitivity, and the associated potential socio-economic changes. As such, communities have been grouped where impacts are likely to be similar in nature and scale, and each grouping is referred to as a potentially affected community (PACs) (1).

Table 22.1 provides an overview of PACs within the port study area as well as a brief discussion outlining the rationale for why each PAC has been included in the assessment. Figure 22.1 provides a map detailing the location of each PAC (by number).

(1) A PAC is a community where Project-related health impacts may reasonably be expected to occur.
<table>
<thead>
<tr>
<th>PAC</th>
<th>Geographic Location</th>
<th>Sub-prefecture</th>
<th>Communities per PAC</th>
<th>Rationale for Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAC 1 / PAC 2</td>
<td>Maféréinyah, Forécariah and surrounding area in proximity to the N4 highway. Includes Dandaya and surrounds.</td>
<td>Forécariah, Maféréinyah</td>
<td>Maféréinyah, Yoroaya, Madina Kondebounyi, Fandié, Sagoyah, Oula, Sori-Woula Carréfour, Baya, Morifínyah, Robotó, Allassoya, Tambayadi, Tambayagbé, Dandaya</td>
<td>The largest towns in the study area and highway that joins them. Area of focus for much Project facilities placement, such as employment and training centres and operational worker housing. Includes the likely location of logistic and worker camps for the port and rail developments. These facilities are shared with the rail component. PAC 2 is assessed in Volume II: Rail Component.</td>
</tr>
<tr>
<td>PAC 3</td>
<td>Villages located close to the secondary road, borrow pit (BP33) conveyor belt or rail loop, rail head yard and port.</td>
<td>Maféréinyah</td>
<td>Madinagbé Centre, Fesse Madina, Sougué Senni, Yindi, Soungaya, Bamboukhoun, Senguelen, Maligya, Kaléa, Kalaya, Touguiyiré hamlets, Fodeya, Koniahkori</td>
<td>Communities located close to the road, conveyor belt, rail head yard or port and impacted by project activities. This includes the communities as surveyed along the Touguiyiré-Maféréinyah Road in the baseline survey of Kaback and port area.</td>
</tr>
<tr>
<td>PAC 4</td>
<td>Communities who will be directly impacted by the port site development.</td>
<td>Maféréinyah</td>
<td>Moufoufanye (hamlet), also known as Fandiema</td>
<td>Communities that fall within the port footprint and boundaries and that will require physical resettlement either as part of MOF or port. This includes only the community of Fandiema.</td>
</tr>
<tr>
<td>PAC 5</td>
<td>Communities on Kakossa, in particular coastal villages.</td>
<td>Kakossa</td>
<td>Kiranère, Makayah, Yassoua, Sérah, Silémancing, Baridabon, Khilli, Von</td>
<td>Communities on the island of Kakossa that may be affected by the presence of the port in particular related to fishing grounds, access to the mainland and safety in the river / at sea. This includes the Kakossa communities surveyed in the rapid rural assessment of Kakossa.</td>
</tr>
<tr>
<td>PAC 6</td>
<td>Northern communities on Kaback and along the Morebaya River (alternately known as Moribeya). PAC 6 also includes communities which use the Morebaya River for fishing.</td>
<td>Kaback</td>
<td>Kaléyiré, Sangbon, Dabonkhoré, Friyah, Konimodoua, Matakang, Khounyi, Bossiminya, Manké, Tolomalon, Seydouya, Kënden, Këka, Tonguiron, Yélibanet, Yëtia</td>
<td>Communities located along the Morebaya River and in Kaback whose access to fishing grounds and fish stocks may be affected. This includes the fishing communities and agricultural communities surveyed in the baseline of Kaback and port area.</td>
</tr>
</tbody>
</table>
Figure 22.1
Zone d'étude locale et communautés affectées par le projet
Local Study Area and Project Affected Communities

Projection: WGS 1984 UTM Zone
In addition, the assessment considered vulnerable groups, who may be differentially affected by impacts as a result of the port development or at greater risk of certain health outcomes. These groups include:

- women and young girls;
- children;
- poorer households;
- elderly and disabled people; and
- those without access to or the ability to own land, such as migrants.

22.2.2 Legal and Other Requirements

This section outlines the key requirements relevant to community health, safety and security deriving from legislation, guidance and standards applying to the Project. Further details are presented in Chapter 1: Introduction and Annex 1C: Legislation, Standards and Administrative Framework.

22.2.2.1 Government of Guinea Requirements

Ordonnance N°045/PRG/87 of 28 May 1987, modified by Ordonnance N°022/PRG/89 of 10 March 1989, together known as “Code de la protection et de la mise en valeur de l’environnement; The Code for the Protection and Enhancement of the Environment”, set out the fundamental legal principles to be complied with to ensure the protection of environmental resources and the human environment. Article 82 of Title V states ‘evaluation of the direct and indirect impacts of the Project on the ecological equilibrium of the environment of Guinea, the quality of life of the people and the protection of the environment’. Therefore, while the environment code does not require a stand-alone health impact assessment to be undertaken the environmental code identifies a need to safeguard human health as well as preserve and promote quality of life.

22.2.2.2 International Standards

IFC Performance Standard 4 Community Health, Safety and Security

The IFC PS outlines the following requirements as needing to be met in order to minimise impacts to community health, safety and security.

- The client will evaluate the risks and impacts to the health and safety of the Affected Communities during the Project life-cycle and will establish preventive and control measures and where applicable develop an action plan which is disclosed to stakeholders.

- The client will design, construct, operate, and decommission the structural elements or components of the Project in accordance with Good International Industry Practice (GIIP), taking into consideration safety risks to third parties or Affected Communities.

- The client will avoid or minimise the potential for community exposure to hazardous materials and substances that may be released by the Project.

- The Project’s direct impacts on priority ecosystem services may result in adverse health and safety risks and impacts to Affected Communities.

- The client will avoid or minimise the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases that could result from Project activities, taking into consideration differentiated exposure to and higher sensitivity of vulnerable groups.

- The client will also assist and collaborate with the Affected Communities, local government agencies, and other relevant parties, in their preparations to respond effectively to emergency situations.

- Assess risks posed by its security arrangements to those within and outside the Project site.
**IFC General EHS Guidelines**

Covering a variety of issues related to Emergency Response Planning and Preparedness including fire prevention, Disease Prevention, Management and Transport of Hazardous Materials, Traffic Safety, General Site Hazards, Management of Change and Financing.

**IFC Port, Harbor and Terminals Sector Guidelines on Community Health and Safety**

Covering community health and safety specific to ports including port marine safety and security including consideration of vessel movements and protecting community members from activities that are taking place.

22.2.2.3 Rio Tinto’s Standards

**Rio Tinto’s Communities Standard**

Rio Tinto’s communities standard addresses the need to support health initiatives as part of community development where this is a development priority. The standard outlines the need for such initiatives to be sustainable and the value of working in partnership with other organisations. In addition the need for Business Resilience Management Plans (BRMP) is outlined. These plans ensure that incident response plans identify the communities that may be affected by an incident at site. The response plan will include how potentially affected communities will be informed of any incidents in a timely fashion.

**Rio Tinto Statement of Business Practice; ‘The Way We Work’**

The stated goal is that any community or society in which Rio Tinto operates should gain benefits from the activities of the company.

**Rio Tinto HSE Standard B11 HIV/AIDS**

The standard covers risk assessment, programme design and evaluation to ensure the effective management of the significant risks that HIV poses to workers, their dependents and communities in countries where the prevalence is higher than 1% as defined by UNAIDS.

22.2.3 Prediction and Evaluation of Impacts

The assessment includes identification and evaluation of the potential impacts on community health, safety and security associated with the port. It considers both direct and indirect impacts associated with the Project.

The assessment of community health, safety and security impacts has followed the overall impact assessment methodology described in Chapter 1: Introduction. The significance of the potential impacts was assessed by considering the factors shown in Table 22.2 and can be summarised as:

- the temporal and spatial scale of impact;
- its scale or severity; and
- the likelihood that the impact will occur.

The precautionary principle was applied during the process, particularly where uncertainties exist about whether and to what extent an impact will occur.
Table 22.2  Factors Influencing the Magnitude of Impacts

<table>
<thead>
<tr>
<th>Impact characteristics</th>
<th>Definition</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temporal scale</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short term</td>
<td>Short term &lt; 1-4 years</td>
<td></td>
</tr>
<tr>
<td>Medium term</td>
<td>Between 5 and 10 years</td>
<td></td>
</tr>
<tr>
<td>Long term</td>
<td>Between 10 and 25 years (generational) and from an individual human perspective permanent</td>
<td></td>
</tr>
<tr>
<td>Permanent</td>
<td>Over 25 years and resulting in a permanent and lasting change</td>
<td></td>
</tr>
<tr>
<td><strong>Spatial scale</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site / local</td>
<td>Site specific or confined to a sensitive receptor at the local scale</td>
<td></td>
</tr>
<tr>
<td>Local area</td>
<td>The proposed site and its surrounding area (sub-prefectural level)</td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td>Prefectural and Regional level</td>
<td></td>
</tr>
<tr>
<td>National / Cross boundary</td>
<td>National or influence across international borders</td>
<td></td>
</tr>
<tr>
<td><strong>Severity / benefit of impact</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negligible</td>
<td>Within prevailing baseline conditions</td>
<td></td>
</tr>
</tbody>
</table>
| Small                  | (-) Minor deterioration (nuisance, annoyance) in health or harm to receptors. The receptors will adapt with ease to the influence of the determinant and maintain pre-impact levels of health.  
(+ ) Minor improvement in the health and well-being of receptors. The changes are not significant and thresholds are maintained. No stakeholder approval or appreciation. |
| Medium                 | (-) Moderate / measurable deterioration in health or harm to receptors. Acute conditions. The influence of the determinant will result in some difficulty in adapting to the health effects, and maintaining pre-impact levels of health will require support. Moderate stakeholder concern. Moderate exceedance of thresholds.  
(+ ) Moderate improvement in the health and well-being of receptors. The changes are within or better than thresholds. Minimal stakeholder approval or appreciation. |
| Large                  | (-) Substantial deterioration in health or harm to receptors. The influence of the determinant will result in the inability to adapt to the health effects or to maintain a pre-impact level of health. Chronic or terminal conditions. There is substantial stakeholder concern. An identified threshold often exceeded.  
(+ ) Substantial improvement in the health and well-being of receptors. The changes are within or better than thresholds. Stakeholder approval / appreciation and favourable publicity. |
| **Probability of exposure** |            |          |
| Unlikely / Improbable  | The likelihood of these impacts occurring is low (<40% chance) |
| May occur / Possible   | The likelihood of these impacts occurring is possible (40-70% chance) |
| Probable               | These impacts are probable (>70%-90% chance) |
| Definite               | The likelihood is that these impacts will certainly or almost certainly occur (>90% chance) |

The sensitivity of receptors is based on their ability to respond and adapt to impacts and their vulnerability as a result of factors such as current health status, poverty, the availability of healthcare services, age, gender or level of knowledge.

Based on the above, an assessment has been made of the direction (positive or negative) and significance of the identified impact, taking into account already established and implemented Project policies and practices (ie prior to mitigation), as illustrated in Table 22.3 for adverse impacts. The same approach is adopted for evaluation of positive impacts which are colour coded in green.
## Table 22.3 Evaluation of Health, Safety and Security Impacts

<table>
<thead>
<tr>
<th>Sensitivity (vulnerability) of Receptors</th>
<th>Magnitude of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Change in health conditions is within the normal range of conditions found in the study area.</td>
</tr>
<tr>
<td>Negative Impacts</td>
<td>Negligible</td>
</tr>
<tr>
<td>Developed communities with greater capacity to adapt to change; Good access to healthcare, amenities, resources and services. Strong support networks; excellent overall health status, low levels of poverty, low vulnerability or disadvantaged groups, high education / skills base.</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Relatively developed communities with good capacity to adapt to change; Good access to healthcare, amenities, resources, services and support networks; good overall health status, few outbreaks of diseases; low levels of poverty, low vulnerability, high education / skills base.</td>
<td>Not Significant</td>
</tr>
<tr>
<td>More developed communities with capacity to change; Some access to healthcare, amenities, resources, services and support networks; medium levels of poverty, some levels of vulnerability, varying levels of education.</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Less developed communities with lower resilience to change; Very limited access to healthcare, amenities resources, services and support networks; poor health status; acute and chronic illnesses; common, high levels of poverty, greater vulnerability or otherwise disadvantaged people eg poor, women, old, minorities, low education / skills base.</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>
22.3 Baseline

22.3.1 Introduction

The baseline presented in this chapter is drawn from primary and secondary data. The main sources used include:

- Shape Consulting (2012) Health Impact Assessment – Entomological Assessment for the Port Area;
- Shape Consulting Limited (2011) Baseline Health Survey Simandou Project Port Development Area; and
- SNC Lavalin Environment (2010-12) Social and Environment Baseline Study – Simandou Project Port.

Additional studies from the wider Project have been draw upon where relevant, these include:

- Newfields (2010) Baseline Health Survey: Simandou Project Mining Area;
- SNC Lavalin Environment (2010) Social and Environment Baseline Study – Simandou Project Mine; and

In addition various health and social surveys carried out by the Project between 2010 and 2012 have been used to inform the baseline. These surveys were undertaken by the international consultancy Shape Consulting Ltd on behalf of the Project. In addition, the assessment of impacts to health draws upon work undertaken by Shape Consulting Ltd.

The Baseline Health Survey (BHS) for the port was carried out in 2011, at eight sentinel sites (settlements) selected through a tiered sampling methodology. Of the sites, four were on Ile Kaback and four on ‘the mainland’. The sites selected, number of people surveyed and rationale for doing so are presented in Table 22.4. However, the location of the port was refined following the surveys and as such some of the baseline data may not reflect communities located closest to the port site. Nevertheless, the information collected provides the strongest available evidence of the health profile of the area.

### Table 22.4 Sentinel Sites

<table>
<thead>
<tr>
<th>Sentinel Site</th>
<th>District</th>
<th>Estimated number of Households</th>
<th>HHold Questionnaires Administered</th>
<th>Clinical Field Unit – People tested</th>
<th>School Children Sampled</th>
<th>Reason for Inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terin Fanye</td>
<td>Fanye</td>
<td>40</td>
<td>26</td>
<td>93</td>
<td>30</td>
<td>Control Site</td>
</tr>
<tr>
<td>Sahrata Maférinyah</td>
<td>Maférinyah</td>
<td>80</td>
<td>34</td>
<td>93</td>
<td>30</td>
<td>Central Community of Maférinyah</td>
</tr>
<tr>
<td>Soungaya Maférinyah</td>
<td>Maférinyah</td>
<td>100</td>
<td>33</td>
<td>93</td>
<td>30</td>
<td>Community on the road from Ile Kaback to Maférinyah</td>
</tr>
<tr>
<td>Farmoriya – Yindi Village</td>
<td>Yindi</td>
<td>110</td>
<td>30</td>
<td>91</td>
<td>30</td>
<td>Close to proposed port/ rail infrastructure</td>
</tr>
<tr>
<td>Matakang Matakang</td>
<td>Matakang</td>
<td>200</td>
<td>30</td>
<td>84</td>
<td>30</td>
<td>Large community on Ile Kaback</td>
</tr>
<tr>
<td>Bossimiya</td>
<td>Bossimiya</td>
<td>40</td>
<td>33</td>
<td>106</td>
<td>30</td>
<td>Average community on Ile Kaback</td>
</tr>
<tr>
<td>Manké Centre</td>
<td>Manké</td>
<td>90</td>
<td>37</td>
<td>115</td>
<td>30</td>
<td>Community on Ile Kaback where health centre is located</td>
</tr>
<tr>
<td>Konimodiya</td>
<td>Yelibanet</td>
<td>150</td>
<td>31</td>
<td>94</td>
<td>30</td>
<td>Average community on Ile Kaback</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>810</td>
<td>254</td>
<td>769</td>
<td>240</td>
<td></td>
</tr>
</tbody>
</table>

Simandou SEIA Volume III Port  Chapter 22: Community Health, Safety and Security  22-9
Figure 22.2

Sites sentinelles pour enquête sur la santé / Health Survey Sentinel Sites

Projection: WGS 1984 UTM Zone
Date: 19/09/2012

Légende:
- Sites sentinelles indicatifs / Indicative Sentinel Sites
- Infrastructures portuaires / Port infrastructure
- Canal de dragage / Dredging Channel
- Tracé indicatif de la voie ferrée / Indicative Rail Alignment
- Dépôt terminus (sélection indicative) / Railhead Yard (Indicative)

Agglomération / Settlement:
- Chef lieu de préfecture / Prefecture Chief Town
- Chef lieu de sous-préfecture / Sub-Prefecture Chief Town
  - Village / Village
  - Hameau / Hamlet

Client: RioTinto
Taille: A4
Titre: Figure 22.2

Sites sentinelles indicatifs / Indicative Sentinel Sites
Infrastructures portuaires / Port infrastructure
Canal de dragage / Dredging Channel
Tracé indicatif de la voie ferrée / Indicative Rail Alignment
Dépôt terminus (sélection indicative) / Railhead Yard (Indicative)

G u i n e a
M a l i
S i e r r a
L e o n e
G u i n e a - B i s s a u
S e n e g a l
L i b e r i a
Sanegal
Guinea
Mali
Sierra Leone
Liberia

G u i n e a
M a l i
S i e r r a
L e o n e
G u i n e a - B i s s a u
S e n e g a l
L i b e r i a
At each of the sites the following data gathering activities (1) were undertaken.

- Household questionnaire survey: to assess knowledge, attitude and practices (KAPs) at the individual level in the adult population. The questionnaires included a wide variety of subjects which addressed both biophysical and social determinants of health. 384 surveys were undertaken representing approximately 31% of household across the eight Sentinel Sites.

- Clinical field unit: specific samples were taken from individuals linked to households selected in the KAP study. This included: (i) determination of the prevalence of malaria in children aged 6 - 59 months; (ii) determination of the prevalence and intensity of anaemia in children aged 6 - 59 months and in women of reproductive age (aged 15 - 49 years); (iii) determination of anthropometric measurements in children aged 6 - 59 months; (iv) determination of blood pressure in adults; and (v) determination of present or past syphilis infection in women of reproductive age. 769 individuals were sampled overall representing approximately 9% the selected population (ie children <5 years and adults>15 years).

- Parasitological survey in school children (aged 10 - 15 years) to determine the prevalence and intensity of schistosomiasis and soil-transmitted helminth infections. 240 stool and 240 urine samples were collected from children aged 10 - 15 years.

The sampling strategy for the various health issues was developed based on the known health trends as indicated by secondary data, however, consideration was also given as to the likely project impacts.

In addition, during the field survey end-user water quality analysis was undertaken to determine the level and origin of biological contamination in drinking water. A service and infrastructure assessment was also undertaken to assess facilities in the Project area. This included the evaluation of available services, availability of essential drugs and consumables, general infrastructure, human resources and patient load.

Key Informant Interviews were also undertaken with 13 institutions including NGO’s and health care providers at the prefecture, sub prefecture and local level. In addition, village chiefs and elders within each settlement were visited. Representatives from the following organisations were interviewed:

- Sous- Préfet Maférinyah;
- Sous- Préfet Kaback;
- Chef du secteur, Maférinyah Secteur Sarata;
- Direction Préfectorale de la Santé (DPS) de Forécariah;
- Chef de Poste de Santé de Matakang;
- Chargé du PEV et CPN au Centre de Santé de Kaback;
- Chef du Centre de Santé de Maférinyah;
- Chargé du PEV au Centre de Santé de Maférinyah;
- Chef de Poste de Santé de Manke;
- Community health officer – Kaback sub prefecture;
- Clinic Ambroise Pare;
- Helen Keller International Guinea; and
- Programme National de Lutte contre le Paludisme (PNLP).

Secondary data as collected by the Government of Guinea were used where available. A range of internationally recognised secondary data sources were used including reports publicised by the World Health Organisation (WHO), the United Nations Organisation (UNO) and selected non-governmental organisations (NGOs). These data have been collected using various methodologies and relate to different

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(1) The baseline study protocol as developed by SHAPE Consulting Limited was approved by the National Ethics Committee for Health Research (‘Le Comité National d’Ethique pour la Recherche en Santé’ (CNERS)). At the household level written informed consent was obtained. For the school survey the local education authorities and headmasters of the surveyed schools sought consent from parents/local guardians of the children. All participants were informed of their results. Individuals who tested positive for any of the tested diseases were treated according to national treatment guidelines, free of charge.
years and study areas; as such it has been used to build a picture of the health profile for Guinea but rates cannot be directly compared or used to predict trends.

A limitation of the health baseline is that data are not consistently available at each administrative level due to inconsistent data collection and record keeping. As such, for some health areas data may only be available at the national level or may be available for a district but not the neighbouring district. Where such inconsistencies have occurred the available data have been presented to allow for a picture of the health profile of communities to be developed. For these reasons the baseline is presented by topic rather than by administrative levels.

The primary data collection provides a snap-shot of the health of a representative sample of communities in the PACs. It is not feasible or possible to collect quantitative data on all health issues especially if diseases occur seasonally or in the form of outbreaks. It is also recognised that the findings of the BHS are not directly applicable to communities not sampled and that the approach used to collect data (ie the use of the sentinel sites) means that the data do not represent a regional average. In addition secondary data collected from key informant interviews at health centres may contain an element of bias due to limited diagnostics and reporting and recording errors. Community taboos around diseases and low levels of education and understanding regarding disease transmission, prevention and risk, as well as recall bias may also affect the accuracy of the primary collected data.

22.3.2 Overview

Guinea is ranked 178 (out of 187) countries according to the United Nations Development Programme (UNDP)'s human development index (HDI) (2011) (1). The HDI is a single statistic which provides a measure of social and economic development based on key indicators: life expectancy at birth; mean years of schooling for adults aged 25; expected years of schooling for children entering school; and gross national income per capita. As discussed in Chapter 16: Socio-Economic and Community Baseline, poverty is widespread across the country with 70% of the population living on less than a dollar per day. Other health indicators provided by the WHO (2) also show that there are significant health challenges as follows:

- life expectancy at birth was 49 years for males (African regional average: 52; global average: 66);
- life expectancy at birth was 55 years for females (African regional average: 56; global average: 71);
- the under 5 infant mortality rate is 142 per 1 000 live births (African regional average: 127 global average 60);
- health workforce is 1.0 physician per 10 000 persons (African regional average 2); and
- health workforce is 0.4 nurses and midwives for 10 000 persons (African regional average 9).

However, evidence from the Guinean Demographic and Health Survey (GDHS) suggests a sustained reduction in the Infant Mortality Rate since 1992 as well as the under-five mortality rate as shown in Figure 22.3. This is supported by data from UNICEF that estimated the under-five mortality rate in 2009 at 142 deaths per 1 000 live births (3).

(2) WHO (2009). Countries Profile Guinea Global Health Observatory data. Available at http://www.who.int/countries/gin/en/ -
The total disability-adjusted life year (DALY) in Guinea in 2004, was 3,930,000, of which 67.6% were attributed to communicable diseases, 24.4% to non-communicable diseases and 8% to injuries. In comparison, communicable diseases only contribute 5.6% of DALYs in high income countries. The key diseases in terms of contribution to the DALYs were:

- malaria: 13%;
- peri-natal conditions: 11.9%;
- respiratory infections: 11.5%; and
- diarrhoeal diseases: 8.6%.

**22.3.3 Health Care**

Guinea suffers from underfinancing in the health sector, with only 3% of the central government expenditures allocated to health from 1998-2008. However, since 2002 the health system in Guinea has been undergoing a programme of reform (termed ‘Horizon’) with the aim of improving maternal and child health, addressing HIV/AIDS, decreasing gender inequities and integrating environmental sustainability. This is an on-going process being driven by the Ministry of Health and Public Hygiene and no evaluation of the implemented reforms was available at the time of writing the SEIA.

The Ministry of Health standards regarding health infrastructure require: i) at least one hospital in each prefecture; ii) a health centre or community medical centre in each sub-prefecture, and iii) a health post in districts and large villages (based on geographical location and population size, if there are more than 3,000 people who are further than 10 km from a health centre). On average nationally there is 1 physician and 0.4 nurses or midwives per 10,000 population. This is lower than the Africa regional average of 2.3 and 9

(1) A measure of overall disease burden (expressed as the number of years lost due to ill-health, disability or early death).
respectively \(^{(1)}\). Based on the Ministry of Health standards regarding health infrastructure there are an adequate number of health facilities in the prefecture. However based on surveys undertaken, the communities of Bamboukhoun, Senguelen and Touguiyiré all reported inadequate access to available health facilities. Maférerinyah was reported as the main area where the community accessed health care services followed by the hospital at Forécariah. The development of health care facilities was identified as a key development priority by communities in the Prefecture.

Data collected during the BHS indicates that health services are limited affecting the health seeking behaviour, diagnostic accuracy and availability of treatment of a number of diseases that are common in the study area. The facilities are understaffed, lack basic equipment, have no electricity or running water and drugs are often out of stock. Patients are often required to procure their own supplies before they will be attended to or purchase it privately from staff at the clinic. The scope of services offered at these facilities is limited and there is often the need to refer patients at significant cost and time delays. Medical waste management is poor. Facilities in the area also reported at the time of the BHS in 2011 that they had run out of funding since a Presidential Decree where health services to children under five and pregnant women were to be provided free of charge.

Accessibility in some remote communities, especially on Ile Kaback where patients often have to cross by boat onto the 'mainland', is limited by distance and poor access roads, cost of transport, lack of formalised ambulance services (meaning patients often have to travel by motorbike) and limited public transport networks. However, the most common reason (73%) given by participants in the BHS for not attending a health facility was lack of money to pay for services at the health facility.

The poor services and relatively high costs, including transport costs, promote health seeking behaviour outside of the formal health sector such as clandestine pharmacies and traditional medicine practitioners. This is largely unregulated and often associated with poor practices. As such the use of local health facilities was very low, at 12% across the surveyed communities in the BHS with some communities not utilising public health services at all. Use of health centres was also low in communities that had a health centre within them (ranging from 7% at Matakang to 21% at Sahrata in Maférerinyah) according to household surveys undertaken as part of the BHS. Clandestine pharmacies were used by 73% of respondents for the last time their child was ill. This was despite women indicating in focus groups that their preference was to consult the public health sector. Furthermore 76% of households reported that a traditional healer was consulted at some stage the last time their child was ill.

Traditional medicine plays an important role in local culture and health seeking behaviour. Healers with plant medications are thought to be the most commonly used form of traditional medicine followed by village elders offering "maboro" (massaging a sick child’s body with medicinal plants soaked in water, while reciting verses). Marabouts (Islamic erudites often practicing as traditional healers) and Sorcerers were less commonly used. People in the BHS reported consulting outside of the formal public health service in the first instance due to a cultural preference for traditional medicine as well as limitations of the available public health care services including cost, distance and cost of travel. The quality and acceptability of the health service was also qualitatively reported as a limiting factor. Local health authorities indicated that there is poor collaboration and interaction between the health facilities and the local traditional healers, especially on Ile Kaback.

The health information systems in the prefecture and specifically the local health services are limited. The system relies on manual capturing and then collation of reports for central database entry and ultimate analysis. This coupled with the reliance on diagnosing based purely on symptoms means it is not possible to rely on statistics generated from the local health care services to provide an accurate health profile.

22.3.4 Communicable Diseases

Communicable diseases represent a major health challenge in Guinea. Communicable diseases that contribute significantly to years of life lost include diarrhoeal diseases; measles, respiratory infections and tuberculosis.\(^1\)

### 22.3.4.1 Diarrhoeal Diseases

Diarrhoeal diseases which account for 8.6% of all DALYs in Guinea are usually transmitted via the faecal–oral route and transmission is often via contaminated food or water, the disease is therefore discussed in Section 22.3.5. However, it is also possible for direct transmission of diarrhoeal diseases to occur eg certain types of dysentery.

### 22.3.4.2 Acute Respiratory Infections

Acute Respiratory Infections (ARIs) are a major issue in Guinea accounting for 11.5% of all DALYs, in 2006 it was reported that Acute Respiratory Infections were responsible for 21% of deaths in children under the age of 5 in Guinea. ARIs were reported as the second leading cause of morbidity in Forécariah prefecture. The prevalence of the disease is highest in the wet season. Furthermore, 68.1% of mothers across all sites in the BHS reported in the household survey that their child experienced some symptoms of an ARI during the two weeks preceding the survey which was undertaken in October 2011. This figure increased to 93.6% of mothers in Konimodiya (on Ile Kaback). The limited diagnostics services in the prefecture minimises the ability to identify the main pathogens responsible for transmission.

Pandemic influenza outbreaks (specifically novel H1N1 - swine flu) outbreaks have not been described in the prefecture or BHS and human cases of H5N1 avian flu have not been described in Guinea. However, influenza is known to occur in the area although the number of cases is unknown in part due to the limited diagnostic services available.

### 22.3.4.3 Tuberculosis

Tuberculosis (TB) is endemic in Guinea and the number of cases is increasing. The WHO defines a rate of >200 cases per 100 000 as a serious epidemic. In 2010 nationally the incidence and prevalence of TB was 525 and 334 per 100 000 population, respectively representing a doubling of the 1995 rate. Case detection rate and treatment success rates were reported to be 33% and 79% respectively in Guinea in 2009. The WHO recommends that these rates be at 70% and 85% respectively to slow an epidemic. There are limited data on TB incidence and prevalence within Forécariah prefecture due to limitations in case detection. Only the district hospital at Forécariah has appropriate equipment for the diagnosis of TB. The case detection rate is therefore extremely low, and the true burden of disease (BOD) unknown.

Treatment success rate was reported to be good in the limited number of cases that were diagnosed in the Forécariah prefecture. However, the treatment monitoring system or directly observed treatment short-course (DOTS) programme was weak. Evidence from the BHS undertaken indicates that there is poor awareness and knowledge of TB transmission and prevention within the eight communities surveyed.

The risk of developing tuberculosis is estimated to be between 20-37 times greater in people living with HIV than among those without HIV infection. In 2010, 51% of TB patients in Guinea had a known HIV positive status.\(^2\) Data relating to co-morbidity between TB and HIV is not available for the Forécariah prefecture.

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22.3.4.4 Vaccine Preventable Diseases

For all vaccine preventable diseases the diagnostic ability of health clinics and hospitals is limited and based on symptoms. As such, there is little accurate data on the prevalence of these diseases.

Measles outbreaks have not been reported in Forécariah prefecture and while the percentage vaccination coverage is not known for the prefecture, due to the lack of accurate record keeping, key informants considered that it was adequate.

Vaccine coverage for *Haemophilus influenzae* type B is limited in Forécariah prefecture and nationally and vaccination for pneumococcal disease is not available as part of the national expanded programme of immunisation schedule.

In 2004 Guinea was declared poliomyelitis-free. However, in 2009 42 cases were reported which were linked to cases in Nigeria which had spread across West Africa. No suspected or confirmed cases were reported in the PACs.

Forécariah prefecture is unlikely to be affected by seasonal meningitis outbreaks as it is located outside of the meningitis belt. There is the potential for sporadic cases to occur linked to living in close quarters in poor hygienic circumstances. However, diagnostic services are limited and cases are generally diagnosed based on symptoms due to the limited laboratory services. No vaccination programmes against meningitis are performed locally.

22.3.5 Vector Related Diseases

22.3.5.1 Malaria

Malaria is endemic in Guinea and is one of the leading causes of morbidity and mortality in the country \(^1\). In 2008, UNICEF estimated that 24% of children under the age of 5 died from the disease in Guinea.

The most common parasite in Guinea is *Plasmodium falciparum* which causes the most significant health effects including renal failure, cerebral malaria and severe anaemia. *Plasmodium vivax* is also present in Guinea. An entomology study \(^2\) in Forécariah prefecture indicated the presence of the mosquito *Anopheles gambiae* sp. and *Anopheles funestus* sp. which are the most efficient vectors of malaria and the most common species in sub-Saharan Africa. The mosquitoes in Forécariah prefecture are also sensitive to all four main classes of insecticide as recommended by the WHO.

As with other parts of Guinea, malaria is a significant public health challenge for communities in Forécariah prefecture. In the communities surveyed as part of the BHS malaria is the most common cause of morbidity treated by health centres accounting for between 70 - 90% of consultations \(^3\). Furthermore, malaria was raised as a significant concern by participants in the BHS.

In the BHS the point prevalence (ie rate of infection in the population sampled at that time) was determined amongst children aged 6 - 59 months across the eight communities surveyed as shown in Figure 22.4. The point prevalence rate was based on infection with the parasite *Plasmodium falciparum*, one of a number of carriers of malaria. In addition, 30.9% of the children were recorded as having malaria related anaemia, resulting in poorer health and affecting children’s overall nutrition and potentially contributing to stunting \(^4\). However, malnutrition is also a contributing factor to malaria related anaemia and morbidity.

\(^3\) Key Informant Interviews undertaken with health care practitioners as part of the BHS in 2011.
\(^4\) Stunting is defined as having a height-for-age of more than -2 SD below the median of a healthy population.
The health services in Forécariah prefecture are poorly equipped to diagnose and treat malaria due to a lack of appropriate equipment and medication. Health posts in the communities surveyed reported that medication needed to treat malaria is rarely in stock and staff had to improvise to treat patients. The lack of medication meant that the health posts would refer patients to small private pharmacies for treatment.

There is minimal institutional capacity to support malaria control activities in Forécariah prefecture or across the communities surveyed as part of the BHS. UNICEF has distributed Insecticide Treated Nets in communities on Ile Kaback and on the 'mainland'. However, coverage of the programme was mixed due to logistical challenges. As such, in the communities surveyed as part of the BHS only 50% of children had slept under a treated net the previous night. Furthermore, there is a lack of consistent knowledge amongst the communities surveyed about malaria transmission with only 10% of adults being aware that mosquitoes transmit malaria.
Other Vector Borne Diseases

Yellow fever, dengue fever and chikungunya fever are the biggest theoretical arboviral disease (disease transmitted by arthropod vectors) risks in the area as vectors needed for the transmission of these diseases are common in Forécariah prefecture \(^1\). However, cases of these diseases have not been detected in recent times in Forécariah prefecture \(^2\). The ability to diagnose, treat and manage arboviral diseases is limited and yellow fever vaccines are not routinely provided nationally or within Forécariah prefecture. There are ongoing yellow fever epidemics reported in neighbouring Sierra Leone although currently only in the southern province, which have the potential to spread into Guinea. The surveillance activities in the health centres in the communities covered in the survey do consider yellow fever. However, the limited diagnostic capacity is likely to result in cases being missed and lead to delayed notification of suspected cases to health authorities.

Human African Trypanosomiasis (commonly referred to as sleeping sickness) is endemic in Maritime Guinea and Forécariah prefecture has focal areas of transmission that extend into the study area \(^3\). The protozoal disease is transmitted by the bite of the tsetse fly (Glossina spp.). Areas where disease transmission occurs includes riverine vegetation or similar water sources (river crossing, washing points etc). Transmission is especially intense at the end of the dry season. Furthermore, domestic mammals such as cattle or pigs can serve as intermediary hosts carrying the disease into population centres. There are on-going elimination campaigns in Forécariah prefecture and active case detection activities are regularly conducted with the aim of eliminating the disease. Knowledge and awareness of HAT is limited with only 84% of men and 60% of women reported that they had heard of the disease during the BHS. Furthermore, 66% of men and 87% of women reported in the BHS that they did not know the cause of HAT.

Dracunculiasis (Guinea worm disease) and Onchocerciasis are reported to have been eradicated from Guinea. Lymphatic filariasis was not well described in the BHS, however community directed Ivermectin® mass-treatment is provided every six months as part of the national control programme to control the disease.

Sexually-transmitted Infections (STIs) including HIV/AIDS and High Risk Sexual Practices

In 2005, the Guinea Demographic Health Survey (GDHS) estimated that the national Human Immunodeficiency Virus (HIV) prevalence rate in Guinea was 1.5%, with a clear predominance in urban areas and amongst women. The 2007 ‘HIV/AIDS Behavioural and Biological Surveillance Report’ (ESCOMB) \(^4\) estimated the prevalence of HIV/AIDS in high risk groups based on blood tests for HIV/AIDS in a representative sample for each target group. The study estimated that the prevalence of HIV amongst mine workers increases to 5.2% compared to the national average. Higher prevalence rates were also recorded in commercial sex workers 34.4%; truck drivers 5.5% and uniformed men 6.5%.

There are no prevalence statistics available for HIV from either Forécariah prefecture or Ile Kaback. The prevalence rate for HIV in Kindia region is estimated to be 0.9% which is lower than the national average. The rate for Kindia region is however likely to be an underestimate due to limited diagnostics and social taboos around HIV/AIDS. Furthermore, the prevalence of HIV in pregnant women tested during antenatal care at the Maférinyah health centre was 2%.

The BHS indicates that there is a lack of consistent knowledge around transmission and prevention of HIV/AIDS in the communities surveyed as well as high levels of stigma around STIs and the use of condoms. Responses to the BHS across all eight sites indicate that:

- only 6% of men and 2% of women had consistent knowledge on HIV transmission and prevention;

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\(^1\) Shape Consulting (2012). Health Impact Assessment – Entomological Assessment for the Port Area.


\(^3\) Shape Consulting (2012). Health Impact Assessment – Entomological Assessment for the Port Area.

levels of stigma are very high with only 9.5% of men and 3% of women reporting that they would buy
fruit from a hypothetical shopkeeper known to be HIV-positive;

46% of men and 37% of women thought that HIV could be transmitted through mosquito bites;

50% of men and 46% of women thought that HIV could be transmitted through sharing food with a HIV
positive person;

73% of men and 57% of women had correct knowledge on HIV prevention methods;

55% of men and 19.8% of women knew where to source condoms but only 27% of men and 8% of
women reported ever using a condom indicating there is significant stigma around their use; and

only 21% of adult respondents had ever voluntarily undertaken a HIV test this was higher in men (12%)
compared to women (10%).

Women and young girls are more vulnerable to HIV/AIDS due to their limited education, limited ability to
negotiate safe sex practices for cultural and religious reasons, and the well-described higher risk that women
have in contracting HIV and STIs through unprotected sexual intercourse, compared to men.

STIs were the fifth leading cause of morbidity in Forécariah prefecture in 2007 and 2008, at 4.2% and 3.8%,
respectively and STIs were considered one of the leading causes of morbidity in Matakang and Maférinya
(1). However, the prevalence of syphilis was found to be low (prevalence 0.7%) in communities surveyed as part
of the BHS. STIs, in particular syphilis, if left untreated can have long term implication for uro-genital health
and can even result in fatalities. In addition, the presence of an STI can increase the risk of contracting other
STIs including HIV/AIDS.

Transactional sex work was reported in the BHS to occur in Forécariah (town), Maférinya, Touguiyiré and at
Matakang village. Respondents to the household survey undertaken as part of the BHS considered such
activities mainly take place in bars and by migrant workers. Despite transactional sex not being reported to
occur in all settlements in the BHS, about three-quarters of all respondents (76% of men and 74% of women)
thought that transactional sex work was a problem in their community. This indicates that transactional sex
is not considered to be socially acceptable reflecting the religious and cultural practices in the area.

22.3.7 Soil, Water and Waste Related Diseases

Access to potable water is a major issue both nationally but also across Forécariah prefecture. Access
varies by season; during the wet season people will drink rain water and wells will yield higher quality water.
In the port area, during the dry season many wells only yield brackish water due to their proximity to the
Morebaya River and tributaries or the sea. Other wells will dry up completely. People in the communities of
Bamboukhoun, Senguelen and Touguiyiré all reported inadequate or no access to suitable drinking water
sources. It was reported that the majority of the community collected water from a traditional open well
(41%), 18% from the river and 11% from streams. Only 14% collected water from improved standpipes
(forage) (2).

Data from the BHS found that household access to improved water sources was highest in Manké and
Sahrata, while Farmoriya-Yindi village had the lowest access. Access to improved sources was also low in
Matakang at 27% and 20% in the wet and dry season respectively. Access in coastal fishing villages is
lower as many have no boreholes. During the dry season people report that they would take their boats to
the mainland or Conakry to fetch water, or buy industrial “Coyah” water, which is sold in 0.5 litre plastic bags.
In addition, water is purchased from traders who collect water from the mainland (3).

(1) Findings based on data provided during key informant interviews undertaken during the baseline health survey 2011.
(2) Baseline studies – PARC Study.
(3) Social and Environmental Baseline Studies.
UNICEF in partnership with the Ministry of Hygiene and Public Health (MHPH) has initiated a household water treatment programme providing chlorine and education around its use and benefit. Communities that have benefited from the chlorination programme are more likely to treat their water than those who have not, as such treatment levels vary from 7 - 77% in communities in the BHS. Despite this, findings from the water testing indicate that only 2% of water was considered to be potable at use due to issues with collecting and storing water.

Within the communities surveyed as part of the BHS the majority of households (86%) use unimproved sanitation facilities. The most common type of sanitation facility was a pit-latrine without a slab, which was found in 68.9% while 11.4%, had a pit-latrine with a slab. Seventeen households (6.7%) said they use a shared facility. Households in the communities surveyed also reported using the bush (6.3%), while 4.3% stated they use a nearby water body (stream, river, lake or ocean) due to a lack of access to facilities. As such access to sanitation remains a challenge and is a public health concern.

The incidence of diarrhoeal diseases is high as a result of factors that include a lack of access to water, poor sanitation and hygiene practices and ad hoc waste disposal. Outbreaks of cholera have been reported in Forécariah prefecture including communities around the proposed port and in February 2012 an outbreak of cholera was reported on Ile Kaback. Children are at the highest risk of contracting diarrhoeal diseases.

Key Informant Interviews with health workers on Ile Kaback reported Soil Transmitted Helminths (STH) (parasitic worms) to be a common condition, and in 2008 they were the leading cause of morbidity in Forécariah prefecture, accounting for 11.9% of total morbidity. The prevalence of STH was also analysed in the BHS and 67% of school children sampled reported at least one helminth infection, classifying the area as highly endemic for STH. Hookworm was the most common parasite with a prevalence of 45.4%. The distribution of STH infection is shown in Figure 22.5.

Figure 22.5 Soil Transmitted Helminths Prevalence
The overall prevalence of *Schistosoma haematobium* (urogenital bilharzia) and *Schistosoma mansoni* (intestinal bilharzia) was low at 0.4% and 1.7% respectively across the school children surveyed. These rates classify the area as a low risk transmission area. Furthermore, the disease was only reported in schools sampled on the ‘mainland’ and was thus absent from Ile Kaback in the assessment made, further indicating low transmission rates.

Skin diseases are reported to be relatively common both in Guinea and in communities surveyed. Skin diseases are most likely to be fungal in nature and occur without a specific cause. The exception is Buruli Ulcer, caused by a bacterial infection, which is endemic in Guinea with Guinée Forestière region having the highest prevalence.

### 22.3.8 Non-communicable Diseases

Non-communicable diseases, including mental health diseases, are poorly recognised and managed within Guinea as:

- outside of the major urban centres there is limited ability to diagnose and effectively manage chronic diseases such as hypertension and diabetes;
- cancer sufferers generally seek medical treatment late and there is no functional register; and
- chronic respiratory diseases are generally not common and only really diagnosed and reported effectively at prefectural level hospitals.

As a result, there are few accurate statistics available on non-communicable diseases including mental health diseases. Furthermore, there are no preventive health programmes for non-communicable diseases in the study area and the institutional capacity to manage such diseases is weak.

Health statistics for Forécariah prefecture indicate only, 0.5% and 0.6% of the total morbidity in 2007 and 2008 (respectively) was due to hypertension (1). However, testing undertaken in the eight sentinel sites during the BHS found that 72% of men and 48% of women tested had some form of hypertension. This high prevalence rate highlights the lack of awareness and ability of health centres to diagnose non-communicable diseases which are mainly without symptoms.

### 22.3.9 Food and Nutrition

Malnutrition is a significant challenge in Guinea and longitudinal surveys have revealed that children’s nutritional status nationally has not improved since the first survey in 1999. Stunting (an indicator for chronic malnutrition) has increased from 26% in 1999 to 35% in 2005 with rural areas worst affected.

During key informant interviews undertaken as part of the BHS with health professionals, malnutrition was not cited as a challenge, potentially as it is not readily recognised due to the limited surveillance activities by the health authorities and due to the health seeking behaviours of people within the study area. However, in the BHS, 76% of men and 88% of women reported that malnutrition was a problem, due to the cost of food, insufficient food being grown and prevailing poverty. Furthermore:

- 1.9% of children were found to be severely wasted (2), in line with the national average of 1.8%;
- 14.5% of children were found to be severely stunted;
- 36.2% were found to be moderately stunted compared to the regional average of 34.5%; and
- 16.7% of children were found to be moderately underweight, which is lower than the regional average of 25.2%.

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(1) Data provided during key informant interviews undertaken as part of the BHS.
(2) Children, who are wasted, are those that have a low weight-for-height / length z-score which is below -2 SD, children who are severely wasted are below -3SD in from the median weight-for-height of the WHO reference population.
The communities surveyed as part of the BHS identified that most food is sourced from fishing activities, agricultural practices, including rice production, and market gardening. Insufficient food is grown to feed households throughout the year with July to November being cited as the lean period within which September is the worse month. These periods are considered to be the worse as no crops are harvested during time due to the growing and harvesting schedules.

Anaemia is a major concern in Guinea as in 2005, 77% of children under the age of 5 years were anaemic, 7% were severely anaemic, 47% had moderate anaemia, and 23% had mild anaemia (1). Anaemia was highest in children living in the poorest households. In the BHS across eight communities it was found that:

- 89% of children under 5 have some form of anaemia, 14.4% had severe anaemia, 60.1% had moderate anaemia and 14.1% had mild anaemia; and
- 59% of pregnant women were anaemic.

The distribution and severity of anaemia is shown in Figure 22.6 below which shows that most children have moderate anaemia in the communities studied.

Figure 22.6 Anaemia Prevalence and Severity

(1) Guinean Demographic and Health Survey (GDHS) 2005.
As such, anaemia is also a key concern in Forécariah prefecture. The causes of these high rates of anaemia are likely to be multifactorial including dietary intake of iron, chronic disease, blood disorders such as sickle cell anaemia, and infections such as intestinal parasites (hookworm) and malaria.

### 22.3.10 Veterinary Medicine and Zoonotic Diseases

Zoonotic diseases, which are transmissible between humans and animals, can be associated with poor water and sanitation (i.e. faecal-oral transmission) while others are vector borne, the vectors being mainly rodents and insects. None of the following zoonotic diseases were reported in the prefecture: rabies, lassa-fever, leptospirosis, anthrax and brucellosis, probably due to a lack of awareness and underreporting of such diseases.

It is highly likely that brucellosis is common in the area due to the lack of a veterinary health system in Forécariah prefecture. Lassa fever is endemic in Guinea and while poorly recognised, modelling indicates the disease risk extends into Forécariah prefecture.

Rodents can also act as secondary vectors for many bacterial diseases (e.g. salmonella, campylobacter, E.coli etc) by transporting infectious agents on themselves then dwelling around areas that place them into contact with people.

### 22.3.11 Hazardous Materials, Noise and Malodours

In the BHS, questions were asked at the household level related to perceptions of noise and air pollution in their respective communities revealing that:

- 59% of the respondents considered that air pollution was a problem in the community with malodours and dust being commonly cited concerns; and
- 58% of respondents considered that noise pollution was a problem with communal noise being the main source.

Air quality monitoring shows that baseline concentrations of potential pollutants are substantially below the air quality standards for most of the year. However, exceedances in particulate matter concentrations can occur during the dry season. Baseline air quality conditions are presented in Chapter 9: Air Quality. Noise levels are also at acceptable levels as discussed in Chapter 8: Noise and Vibration. Hazardous materials are not currently widely used in the study area.

### 22.3.12 Lifestyle Indicators

Data from the BHS indicate that only 7.7% of male respondents consume alcohol with 10% of those who consume alcohol doing so on a daily basis. 45% of the sampled male population reported to smoke. Drug abuse in the form of marijuana was reported in the baseline survey as common in the area especially in Ile Kaback. The low levels of alcohol consumption are associated with religious beliefs and cultural practices in the communities surveyed.

In the BHS, domestic gender based violence was reported to be common. Evidence from key informant interviews with health practitioners indicated that it was an accepted practice in society and that domestic violence has been socialised to the extent that it was accepted, tolerated and even rationalised. Women interviewed as part of the BHS stated that a man was justified in beating their wife if she neglected the children, went out without telling him, argued with him or refused to have sex with him.

### 22.3.13 Maternal Health

In the BHS, 98% of women across all the communities surveyed attended some form of antenatal care which is higher than the regional average of 86%. Despite the high rates of antenatal care only 74% of women across all the communities gave birth in a health care facility. This is higher than the regional average where 69% of deliveries take place at home and only 38% of confinements assisted by a skilled health attendant.
22.3.14 Community Safety

Within communities surveyed as part of the BHS, awareness and education regarding safety hazards and safety risk management tended to be relatively low. High levels of illiteracy in many areas and linguistic diversity do not facilitate communication of safety messages to the public, for example with signage.

Work related accidents were reported to be the main cause for injury in the communities surveyed as part of the BHS, mainly associated with farming and fishing activities as the main livelihood sources.

Other risks to community safety include:

- fires – most notably bush fires;
- boat / fishing accidents; and
- road traffic accidents.

Fire was responsible for an estimated 6.9 deaths per 100 000 in Guinea and 26 000 Disability-Adjusted Life Years. Savanna areas are prone to bushfires resulting from slash and burn agricultural fires which often get out of control or as a result of natural events such as lightning strike. Several villages around the mine site have, in their histories, been burned to the ground by such bush fires and it is possible that such fires have occurred close to the port where slash and burn agriculture is also practised.

According to the WHO, accidents close to roads and involving vehicles are a significant issue in Guinea. Road Traffic Accidents are within the top ten causes of death and are responsible for 3% of all deaths annually or around 2 000 deaths and for 91 000 DALYs in 2002. Road traffic injuries in developing countries mostly affect pedestrians, vehicle passengers, and cyclists, but motorcycle accidents in the Project area are also reported to be increasing. The age groups most affected are the productive age group (15-44 years) and children.

Road traffic accidents do occur in Forécariah prefecture but are limited in most of the communities surveyed during baseline data collection due to the low levels of traffic. However, in Maférinyah motorcycle accidents were reported to be common and the main cause of injury in the area. There is little enforcement of traffic rules - including speeding, and lack of helmet use with motorcycles. There is reported to be poor knowledge of basic road safety amongst drivers and pedestrians. Children are especially at risk of being victims of traffic accidents. Cases are generally referred to Forécariah hospital. However, evidence from the capacity assessment of health care facilities undertaken as part of the BHS indicates that the capacity of the health services to effectively manage multiple trauma and casualties is limited.

Accidents at sea and in the rivers around the port are also common making transport or working on water hazardous. Such accidents affect not only fishermen in canoes (pirogue) and other boats but also ferries and boats used to transport goods. Accidents are caused for a variety of reasons including:

- boats are frequently overloaded (with people, goods or fish) increasing the risk of boats capsizing;
- small boats or canoes going further out to sea where the conditions are more hazardous;
- motors breaking down leaving boats without means of propulsion when out at sea;
- storms (squalls) leading to boats capsizing at sea; and
- vessels colliding due to poor visibility or being unable to haul anchor or manoeuvre quickly enough.

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(2) SNCL Mine Baseline Report
(5) DALY: measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death.
(6) HIA Scoping Study Port Site September 2010 prepared by Newfields.
When accidents occur injuries and fatalities are common. In June 2011 a ferry taking passengers from Conakry to Sierra Leone was lost during a storm resulting in over 150 fatalities. In October 2011 nine people were killed following the sinking of a motorboat travelling from Conakry to Freetown which also got caught in a storm. Reasons for the high levels of fatalities include the fact that many fishermen cannot swim, boats do not carry safety equipment (eg lifejackets or life rafts), passengers and crew are poorly trained and briefed in maritime safety, and vessels lack alternative means of propulsion.

Other common safety hazards include natural hazards such as dangerous fauna (eg snakes) and physical hazards such as uneven terrain.

### 22.3.15 Community Security

The security situation in the border regions of Guinea is influenced by a history of civil instability in the neighbouring countries of Sierra Leone, Liberia and Côte d’Ivoire. Fluxes of migrants and sometimes of armed groups across borders can cause concerns for security (1).

Within Guinea as a whole, violent crime has declined since the start of 2011, following the completion of presidential elections in November 2010. Crime rates are generally higher in towns and cities including Conakry as well as the borders with Côte d’Ivoire, Sierra Leone and Liberia.

Bandits operate on country roads near the borders. Rebel groups from neighbouring countries maintain smuggling routes through such area which can cause conflict with Guinean people in the area (2).

In addition, farmers and pastoralists from neighbouring countries often cross the borders to utilise better quality agricultural land. Such activities have led to damage to infrastructure, such as wells, and resulted in tension and violence between Guineans who live in these areas and those from neighbouring countries (3).

The need for security sector reform (SSR) in Guinea has been highlighted by various agencies. In 2004 a joint report on the need for SSR was written by Economic Community of West African States (ECOWAS), followed by a review by the African Union (AU) and the United Nations (UN) in 2010. Five sectors for reform have been identified the armed forces, the police, the justice sector, customs and conserving the environment. The key recommendations around SSR and Peace Building activities include (4):

- reconciling the army and the people of Guinea;
- improving the behaviour and general conduct of the security forces;
- strengthening the Guinean police;
- review legal texts and instruments;
- restore the capacity of the security sector within the rule of law;
- develop the transparency of customs officials;
- conserve the environment and natural resources of Guinea;
- strengthen civil society’s role in SSR (including in judicial reform);
- reverse the weakness of national institutions;
- increase civilian control;
- combating the arms trade in Guinea;
- offering opportunities for training and apprenticeship for younger members of the armed / security; and
- aim social and political reform toward sustainable development.

Cross-cutting issues such as gender and proliferation of small arms were also highlighted.

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(2) Ibid
(3) Ibid
22.3.16 Existing Project Related Programmes

At the port area the Project has trained 26 workers in malaria prevention and communication techniques and work plans have been developed for each person supervised by the health centre (in Maférinyah). Further activities are planned building on these initial programmes within the Social Management Framework (SMF). Community Health Safety and Security has been identified as a theme within the SMF with the aim of mitigating adverse impacts and providing benefits to communities. The activities will be guided by the Community Health, Safety, and Security Plan and are likely to focus on issues such as HIV/AIDS, malaria and access to water and sanitation as well as support to improve access to health care.

22.4 Assessment of Impacts

22.4.1 Overview

The following sections presents the potential impacts related to community health safety and security in relation to the port. Most of the impacts discussed will occur in all phases of the Project ie through construction and operation. Impacts discussed are:

- increased transmission of communicable diseases, in particular tuberculosis and acute respiratory infections which may result due to in-migration, housing pressure and the presence of an external workforce;

- increased transmission of malaria which may result due to changes in the environment creating breeding grounds and due to in-migration;

- transmission of other vector borne diseases in particular arboviral diseases due to environmental changes caused by factors such as worksite management and in-migration;

- impacts associated with water and sanitation in particular diarrhoeal diseases due to in-migration and decreased access to good quality water;

- HIV/AIDS and Sexually Transmitted Infections due to changes in demographics, presence of a workforce and changes to socio-economic factors;

- Increase in non-communicable diseases due to changes to lifestyle leading to chronic conditions including hypertension, diabetes etc;

- nutrition related diseases in particular with regards to anaemia and other malnutrition-related illnesses associated with changes in food security;

- zoonotic diseases - infection or infectious disease transmissible from vertebrate animals to humans in particular lassa fever recognising that other interactions are likely to be minimal;

- health impacts associated with hazardous materials in terms of the need to manage the handling of these materials appropriately to avoid non-routine events, such as spillages (for liquid hazardous products);

- increased pressure on health care services which are already insufficient for the needs of the existing community due to in-migration, worker health care needs and changes to community safety;

- impacts on community safety in particular road, rail or vessel accidents due to increased Project related movements; and

- impacts to community security covering interaction between security forces and the local community.
On completion of mining the port will be available for local use under the control of the Government and therefore there is no plan to remove the infrastructure once the Simandou Project has ended. As such, closure and decommissioning phases and activities are not included in this impact assessment.

22.4.2 Communicable Diseases

22.4.2.1 Impacts during Construction

The rate of spread of communicable diseases may increase within communities as a result of the construction of the port. This is largely due to:

- potential for overcrowding as a result of increased pressure on existing housing infrastructure from in-migration;
- influx of migrants to the area bringing novel diseases or varying disease profiles compared to the existing community;
- potential interactions between the workforce and local communities; and
- presence of sailors bringing new diseases or with varying disease profiles contributing to the transmission of communicable diseases.

Construction of the port components of the Project is expected to result in localised in-migration most notably in Maférinyah and Forécariah as the largest settlements but also close to Dandaya where worker accommodation and a Logistics Supply Centre will be located (this will be a shared facility with the rail component of the Project). In-migration could lead to increased pressure on housing in these communities with the potential to result in overcrowding, especially amongst the poorest in the community if families rent out rooms or poor quality housing is constructed in which multiple people rent accommodation. Overcrowding and poor housing is associated with the increased transmission of communicable diseases in particular acute respiratory infections, TB, influenza, and skin diseases notably fungal infections and scabies.

In addition, while the port is not within the seasonal meningitis belt, there is the risk for the outbreak of sporadic cases, especially in dense living / working environments. Similarly cases of polio or measles could also occur. The lack of access to health care facilities and effective case detection in these areas as well as lack of access to treatment could contribute to the rapid spread of diseases and poor health outcomes.

In-migration of people into the area from other parts of Guinea and from other countries also has the potential to introduce new diseases, including pandemic influenza, or increase transmission of existing diseases, such as acute respiratory infections and tuberculosis. The presence of the workforce also has the potential to increase the transmission of such diseases. The risk will be greatest if workers or migrants come from countries or areas of Guinea with a higher prevalence of such diseases.

Transmission can occur due to direct interaction between the community and non-local workers or as a result of non-local – local worker interactions as workers from the local community, will remain living in their homes, Conversely, during construction, members of the non-local workforce will be housed in managed camps. The International Maritime Organisation states that “Foreign crew members shall be allowed ashore by the public authorities while the ship on which they arrive is in port, provided that the formalities on arrival of the ship have been fulfilled and the public authorities have no reason to refuse permission to come ashore for reasons of public health, public safety or public order”. If sailors come on shore there is the potential for them to interact directly or indirectly through Project workers with the community leading to increased transmission of communicable diseases including novel diseases and influenza pandemics.

For existing communicable diseases, such as TB the workforce screening, which includes a pre-employment medical examination, will help reduce the potential for such diseases to be brought to site. However, these same preventive measures may not be as effective in reducing the introduction of new diseases, such as flu pandemics, as these are not necessarily included in the pre-employment screening process or cannot practically be screened for. Communicable diseases may not only spread from the workforce to community
members, but also quickly within Project accommodation given the close living arrangements that occur at camps.

Pressure on housing infrastructure, leading to overcrowding and people living in poor environmental conditions and in-migration is likely to commence with the start of construction activities (or sooner, due to the construction of the MOF prior to construction of the port) and is likely to continue for the duration of construction, if not beyond. In addition the presence of the construction workforce could also result in the introduction of novel diseases. As such there is likely to be medium term potential for increased transmission of communicable diseases resulting in the magnitude of the impact being considered as large. The impact has the potential to have long-term consequences (serious illness or deaths from an introduced disease, or disability) on the health of the communities in particular in Maférinyah and Forécariah but also across PACs 1-4. Furthermore, as there are low levels of understanding around communicable diseases and poor access to health care the sensitivity is high. The impact has therefore been assessed as **critical** prior to mitigation.

### 22.4.2.2 Impacts during Operation

During operation of the port, the potential for transmission of communicable diseases remains. A reduced number of ex-patriate or non-local workers will remain in the area living in Project housing which will be ‘open’ and allow these individuals to interact with the local community. The presence of a non-local workforce (potentially on rotation) provides an opportunity for the spread of communicable diseases including pandemic influenza due to the movement of people. However, the number of people will be reduced from the construction phase. Migrants may also remain in the area due to the potential for indirect economic activities and therefore contribute to urbanisation of the area and continued overcrowding and associated increased risk of disease transmission. Finally, as with during construction, the port could act as an entry point for disease transmission due to sailors interacting with local port workers; or if sailors are able to come ashore and thereby interact with the community.

Most of the impacts that have already occurred as a result of the construction of the port are likely to continue for the duration of the operation and can therefore be considered as long-term. Impacts are likely to occur mainly in communities close to the port or the larger centres of Maférinyah and Forécariah or close to permanent worker accommodation. The magnitude of the impact is therefore likely to be medium. The impact has the potential to have long-term consequences (serious illness or deaths from an introduced disease, or disability) on the health of the communities along the route which have low levels of understanding around communicable diseases and transmission pathways and who are unlikely or unable to seek appropriate health care and as such sensitivity is high. The impact has therefore been assessed as **major** prior to mitigation.

### 22.4.3 Malaria

#### 22.4.3.1 Impacts during Construction

Malaria is endemic in the area and is the most significant public health threat. The port component has the potential to impact, or be impacted by (through worker ill health) increased transmission of malaria. During construction of the port modifications to the environment and in-migration into the area are likely to increase the risk of transmission.

Modifications to the environment during construction (for example through the creation of borrow pits, car dumper pits and sedimentation ponds and dewatering activities) could lead to the creation of new breeding grounds. In addition small water pools in wheel ruts, footprints or man made containers could also lead to the creation of suitable breeding grounds. Changes to the mangroves and dredging activities which may affect tidal movements may also affect the breeding grounds of the mosquito *Anopheles melas*. Any increase in breeding grounds is likely to lead to increased mosquito densities and human-vector interaction
and as such transmission of malaria. Changes to surface water base flow and natural water regulation services are discussed in more detail Chapter 6: Water Environment and Chapter 24: Ecosystems Services. It is possible that changes to the environment may extend the breeding season of mosquitoes and lead to additional cases of malaria in the current low (dry) season.

Any influx of people into the area may play an indirect role in increasing the malaria burden. This may result from an increase in pressure on medical facilities, inadequate waste management and establishment of make-shift housing (reducing natural protection from mosquitoes) or environmental changes due to uncontrolled development leading to new breeding sites. The increased concentration of people, due to in-migration and workers, from outside the PACs may also increase the circulating pool of the malaria parasite and increase the risk for disease transmission. Part of the influx in population will be from the workforce. However, the Project will implement mitigation measures to reduce the risk of workers contracting malaria as it has at the mine site during the exploration phase.

The highly endemic nature of the disease means that the Project is unlikely to significantly add to the already high disease burden of the community during the wet season. However, modifications to the environment, during construction, may change the breeding patterns of mosquitoes extending the high risk season for transmission from its peak of June to October.

Increased prevalence of malaria due to in-migration of people to the area and the potential creation of new breeding grounds and therefore increased vector densities is likely to have a medium term impact for the duration of construction across most of the PACs, and as such the magnitude of the impact is considered to be large. Due to the endemic nature of the disease the communities will be sensitive to these changes if transmission increases in the dry season. Again the lack of knowledge regarding the transmission of malaria and issues with accessing treatment means that the receptor sensitivity is considered to be high and the impact prior to mitigation is considered to be critical.

22.4.3.2 Impacts during Operation

During operation of the port it is unlikely that further significant changes to the environment will occur. The operation of rail loop, car dumpers, conveyor and port itself could support some additional mosquito breeding sites if poorly managed, but the likelihood of this is low. Furthermore, dampening of the ore in the event of stockpiling (if required) could also create breeding grounds, if pooling were to occur. The presence of in-migrants in the area may continue to contribute to vector density and human-vector interactions. However, it is anticipated that this would be during the wet season when the existing burden of disease is at its highest and would not significantly increase transmission during the dry season.

Increased prevalence of malaria due to in-migration of people to the area and the potential creation of new breeding grounds and therefore increased vector densities is likely to occur for the duration of operation and is therefore long term. Increased transmission could also occur across all of the PACs, and as such the magnitude of the impact is considered to be medium. Due to the endemic nature of the disease the communities will be sensitive to these changes if transmission increases in the dry season. Again the lack of knowledge regarding the transmission of malaria and issues with accessing treatment means that the receptor sensitivity is considered to be high and the impact prior to mitigation is considered to be major.

22.4 Transmission of Other Vector Borne Diseases

22.4.1 Impacts during Construction and Operation

Arboviruses have not been described recently in the Project area but the environment is suitable for the transmission of arboviruses and the vector (the *Aedes* mosquito species) is likely to be widely distributed. These vectors prefer to breed in man-made containers and the port component of the Project is likely to increase the amount of potential breeding sites in particular during construction but also during operation.
Yellow fever may be influenced by the Project through in-migration of people with the disease into communities around the port that are currently disease free. Project workers will be vaccinated and therefore unlikely to introduce the disease. Yellow fever has serious public health ramifications and one suspected case is considered to be an outbreak until proven otherwise. The disease is preventable through a vaccine but vaccination coverage of this is poor within Guinea.

The Project also has the potential to introduce dengue and chikungunya fever. The transmission of these diseases from endemic countries in Asia and South America has been associated with international shipping routes where infected larva and eggs are transferred in packaging materials that can collect water. When the larva or eggs emerge as mosquitoes they are already infected and able to transmit the disease directly.

The port could act as a point of entry for Arboviruses or other vector borne diseases particularly during construction that could then potentially spread throughout the other Project components and into the interior of Guinea. Furthermore, the limited healthcare infrastructure and weak associated surveillance systems mean that should outbreaks occur, there would be limited capacity to identify and manage any such outbreak.

The port component of the Project is unlikely to affect the transmission of Human African Trypanosomiasis as the environmental and demographic changes are unlikely to change its transmission pathways.

The duration of the impact could be short to long term depending on the extent of any outbreak and could occur at any point during construction and operation of the port affecting PACs 1-6 and potentially beyond resulting in moderate to severe health outcomes. However, the likelihood of an outbreak occurring is relatively low and may be attributable to other causes rather than the presence of the Project, resulting in a medium magnitude effect. Due to lack of healthcare facilities and the ability of communities to recognise the symptoms of such diseases, the sensitivity of the receptor can be considered to be high, resulting in a major impact during construction and operation.

22.4.5 HIV/AIDS and Sexually Transmitted Infections

22.4.5.1 Impacts during Construction and Operation

As described in the baseline health section HIV/AIDS and STIs are a major concern in the study area and there is a lack of institutional capacity for the prevention and treatment of HIV/AIDS and STIs. Furthermore, people are unwilling to seek treatment for STIs thereby increasing the risk of transmission of HIV and there is a high level of stigma around the use of condoms.

Activities by the Project are likely to influence the transmission patterns of HIV and STIs due to in-migration, changes to the social fabric of towns and transportation of goods and services into the area.

Development projects, such as large scale infrastructure projects or extractive industry projects, can contribute to an increase in transmission and prevalence of sexually transmitted infections and HIV/AIDS. The Project is likely to impact on transmission of HIV/AIDS throughout the duration and construction of the port in the PACs and across the affected Prefectures due to the following:

- transport drivers, who typically have higher rates of HIV or STIs then the general population, may engage in casual high risk sexual activity around the port area;
- in-migration resulting in the mixing of people with higher HIV or STI prevalence rates than the host community which may promote the transmission of STIs;
- presence of a mainly male workforce with disposable incomes who may engage in high risk sexual activities with commercial sex workers in the local community;
indirect economic activities may result in men in the community having increased disposable incomes to partake in forms of transactional sex. This is a particular risk for young women who may be unaware of the potential impacts of such activities or who due to existing levels of poverty may see this as a way to earn an income or access goods;

changes in the social make up of communities such as the “urbanisation” and presence of bars and guest houses at communities like Maférinyah, Forécariah and Touguiyiré may also influence casual sexual engagement practices;

commercial sex workers (CSW) may come from other areas of Guinea or other countries and therefore may have higher rates of HIV and while they are better able to negotiate safe sex practices they may waive this for a fee;

existing stigma and taboos around STIs and HIV/AIDS will make it challenging to negotiate safe sex practices such as the use of condoms (including the use of female condoms); and

sailors from visiting ships may come ashore while their vessels are docked in the port. As with truck drivers there is the risk that sailors may engage in sexual activities with commercial sex workers or members of the local community and as such increase the transmission of STIs including HIV.

Any increase in the prevalence of HIV/AIDS in the study area is also a business risk for the Project and can affect the health of the workforce and therefore their ability to do their job. There is little access to treatment for STIs in the PACs and as such any increased in prevalence could impact on the long term health of those who suffer infections. The stigma and taboos around STIs may also affect people accessing treatment in a timely manner which may also affect health outcomes.

The likelihood of increased transmission of STIs, including HIV/AIDS is considered to be high as it has been observed at other industrial sites in Africa. In addition, rates of HIV/AIDS in truck drivers and uniformed workers are already recorded to be higher than the general population in Guinea. Furthermore the use of CSWs, who also have higher prevalence rates of STIs, is already noted as a problem in communities throughout the PACs and it is likely that their presence will increase with increased urbanisation of communities. As such increased transmission can be expected throughout construction and operation and could affect communities across all the PACs. Due to the severe nature of the health outcomes of STIs and in particular HIV/AIDS, the magnitude of the impact is considered to be large. Given the low levels of understanding around transmission and prevention of STIs, the potential for affected people to be stigmatised and taking into account the fact that access to medication is limited in the PACs, the vulnerability of receptors is considered to be high resulting in a critical impact prior to mitigation.

22.4.6 Impacts associated with Water and Sanitation

22.4.6.1 Impacts during Construction and Operation

Impacts associated with water quality have been addressed in Chapter 6: Water Environment. However, an increase in the population as a result of in-migration may place additional pressure on the existing water resources used in communities. In addition the construction and operation of the port may impact on the ability of communities to access water sources that are used currently, either as a result of land take or through difficulties in crossing the river to access water sources. While many of these sources of water are poor quality they may in some cases be used due to a lack of viable alternatives.

Without appropriate mitigation the Project may also decrease the quantity of water available to the community if it abstracts water from community supplies and ground water for Project use including dust suppression and domestic use. Furthermore, in-migration may also place an additional burden on existing water sources, including potentially increased ground water abstraction. Increased abstraction could result in the use of poor quality brackish waters for communities in PAC 3 and 6 (for example Ile Kaback,
Senguelen, Bamboukhoun, Sounganya) which are closest to the port. Furthermore unplanned development in these areas could further contaminate surface water. This is also potentially an issue for communities in PAC 1 where a deterioration of sanitary conditions, could result in the shallow groundwater aquifer becoming polluted by \textit{E. coli}. As access to clean and potable water is already problematic, any further decrease in access is likely to result in an increase in diseases most notably diarrhoeal diseases. There is also the risk of contamination of water due to spillages most notably of hydrocarbons at the fuel transfer, storage and supply points. However, a major spillage significantly affecting groundwater would be a non-routine event and is considered unlikely.

Access to improved sanitation is limited in the PACs and may be exacerbated if in-migration places additional pressure on the limited available services. This may further increase the already high burden of disease and the potential for faecal contamination of water during collection and storage.

Diseases of particular concern due to access to water and poor sanitation include diarrhoeal diseases most notably cholera outbreaks which have occurred previously in communities around the port and can result in fatalities. These diseases are of particular concern in children or those with pre-existing health conditions including HIV and AIDS who are more vulnerable to the effects of the disease.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{Impact} & \textbf{Minor} \\
\hline
\textbf{Description} & Access to improved sanitation is limited in the PACs and may be exacerbated if in-migration places additional pressure on the limited available services. This may further increase the already high burden of disease and the potential for faecal contamination of water during collection and storage. \\
\hline
\textbf{Severity} & Minor \\
\hline
\end{tabular}
\caption{Impact of Access to Improved Sanitation}
\end{table}

\textbf{22.4.7 Non-communicable Diseases}

\textbf{22.4.7.1 Impacts during Construction and Operation}

There is limited information on the occurrence of non-communicable diseases in the PACs as they are poorly recognised. However, the WHO anticipates that the prevalence of non-communicable diseases will increase in Africa in the next 20 to 30 years due to increased urbanisation and development. Health facilities are currently ill-equipped to manage this potential increase and currently have little or no means or expertise to diagnose and manage these conditions.

Changes in the socio-economic status of some community members and urbanisation of some communities may result in changes to the way people live. Lifestyle factors can result in changes to diet and the adoption of a more sedentary lifestyle and other behaviours that are risk factors for non-communicable diseases. However, such changes are difficult to predict, slow to occur and are likely to be influenced by other socio-economic changes that occur, rather than solely the presence of the Project.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{Impact} & \textbf{Minor} \\
\hline
\textbf{Description} & Increased prevalence of non-communicable diseases are difficult to predict at the local level and the extent of any change will be influenced by other socio-economic changes at the prefecture and regional level. Any changes are likely to occur slowly over time and are unlikely to occur uniformly. Changes in the burden of disease are unlikely to be attributed solely to the port as such the impact magnitude is considered to be minor. Communities and health facilities are ill-equipped to recognise and manage non-communicable diseases. However, the high burden of disease associated with communicable and vector borne diseases are likely to be a greater factor in determining population health during construction and operation of the port. The receptor sensitivity in relation to non-communicable diseases is considered to be low. The impact prior to mitigation is therefore considered to be minor. \\
\hline
\textbf{Severity} & Minor \\
\hline
\end{tabular}
\caption{Impact of Non-communicable Diseases}
\end{table}
22.4.8 Food and Nutrition-related illnesses

22.4.8.1 Impacts during Construction and Operation

The local population in the Project area relies on local agricultural production and fishing, in particular subsistence farming, for nutrition. However, local agricultural yields are poor due to the lack of modern agricultural inputs and equipment, the small size of plots that are cultivated and issues with saline intrusion and seasonal rainfall. Access to markets to sell produce is also limited. Combined with the high burden of infection of soil transmitted helminths and other conditions which impact absorption of nutrients, malnutrition and anaemia are common in the PACs.

Fishing is a key source of protein within the PACs, especially PACs, 3, 5 and 6 as well as a key source of food, any loss of fishing grounds is likely to decrease access to fish with implications for food security and therefore access to nutrients.

Ecosystem services have implications for food security in the Project area including consumption of bushmeat this is discussed in detail in Chapter 24: Ecosystem Services.

Decreased food security may result in a number of health impacts associated with decreased access to nutrition through the following pathways:

- the Project footprint could reduce the access of the local community members to agricultural land in particular the important bogoni land with implications for food security and therefore access to nutrition;
- changes to water quality, supply / access and irrigation as a result of drainage schemes and dredging in particular at the Morebaya river which could lead to reduced fish yields;
- decreased access to fishing grounds or ability to fish as a result of Project activities in the river thereby reducing fish catch and the key source of protein for communities;
- increase in the local population due to in-migration, may place additional pressure on the already limited food crops and cost of fish resulting in the increases in the cost of food;
- land pressure and inflation in the cost of food may lead to the theft of crops, which in turn can lead to farmers harvesting their crops early when they provide less nutritional value;
- changes in employment patterns meaning that the youth and women, take up employment opportunities at the port rather than undertake farming or fishing leading to decreased yields of crops and decreased food security due to the lack of an established market economy;
- movement away from subsistence agriculture to a market economy, which the poorest may be unable to adapt to; and
- reduced access to protein sources from bushmeat due to the unsustainable hunting of these animals and increased demand.

Changes in access to food and therefore nutrition is predicted to affect all the PACs throughout construction and operation due to increased pressure on land associated with land take and in-migration and decreased access to fishing grounds. Malnutrition and anaemia are already prevalent in the Project area particularly affecting women of reproductive age and children under five. Poor nutrition can result in moderate to severe health outcomes and co-morbidity with other diseases. The magnitude of the impact is considered to be medium. Lack of skills to increase food production and increased cost of food mean that nutritional diseases will continue in particular in children and women. Those who are poorest are likely to be disproportionately affected as they are will be unable to afford increased food costs. Receptor sensitivity is therefore rated as high. The impact prior to mitigation is therefore considered to be major.
22.4.9 Zoonotic Diseases

22.4.9.1 Impacts during Construction and Operation

There is potential for a zoonotic disease outbreak in the PACs although it is difficult to predict the nature of any such outbreak. The local health facilities have minimal capacity to effectively recognise, diagnose and treat these conditions. Lassa fever, the biggest potential risk in the study area, is transmitted through contact with excreta (urine / faeces) from infected mice. Infestations may occur due to an influx of people and changes in environmental conditions which could lead to potential transmission routes. However, the risk is lower at the port site than in the interior of Guinea due to the existing geographic profile of the disease. Furthermore, it would be difficult to attribute such outbreaks solely to the activities or presence of the port.

It is unlikely that the port will influence or interact in a meaningful way with local animal husbandry or the movement of animals or livestock.

Should there be an outbreak of a zoonotic disease it is likely to be short term and relatively localised ie it may affect a PAC rather than all the PACs although PACs 1-6 would be at risk throughout the duration of construction and operation. The likelihood of such an outbreak occurring is very low and the severity of health outcomes is likely to be mixed. Given the low likelihood and the fact that any outbreak is unlikely to be solely attributable to the Project the magnitude of the impact is considered to be small. Communities will not have access to health care facilities and severe outcomes as such the sensitivity of receptors is considered to be high. As such the impact prior to mitigation is considered to be moderate.

22.4.10 Hazardous Materials

22.4.10.1 Impacts during Construction and Operation

There are a number of activities at the port site that involve the use of hazardous materials such as bulk fuel handling and storage. Another example is the use of pesticides in workplace vector control programmes. The products used will be approved by the WHO pesticide evaluation scheme and if handled using reasonable safety and environment protection measures, will generally pose a negligible toxicological risk to humans.

It is likely that some of the hazardous chemicals and hydrocarbons stored on-site may pose a human health risk if not managed appropriately. However, as the procurement, transport, storage and use of such chemicals and hydrocarbons is a dynamic process, it not intended that this section of the report will evaluate each product transported and stored on site individually. All hazardous chemicals and hydrocarbons will be procured, transported, stored and handled appropriately in line with Project standards and good industry practice for each individual chemical / hydrocarbon. In this way the potential for impacts to human health will be minimised and should an incident occur this would be a non-routine event.

Communities close to the port are likely to be concerned about the safety of hazardous including the potential for accidents and injuries which may affect their sense of wellbeing.

Incidents such as contamination of local water sources or fire resulting from accidents or spillages have the potential to have major negative health impacts including fatalities. These would be non-routine events and the likelihood of occurrence of incidents sufficient to harm health is assessed to be very low so that on balance the magnitude of impact, taking into account both consequence and probability is medium. Receptor sensitivity will be high due to the lack of awareness of the risks and poor access to appropriate health care facilities in the event of exposure. As such the impact prior to mitigation is rated as major.
22.4.11 Health Care

22.4.11.1 Impacts during Construction and Operation

The public health services in PACs, and in the prefecture and region are limited both in terms of capacity and availability of resources (personnel, medicine and equipment) even though they comply with the national requirements for health service provision.

The presence of the Project, change in demographics (associated with in-migration) and increase in the types and rates of diseases predicted is likely to place additional pressure on existing public health care facilities within the area. Due to the existing lack of personnel and limited ability to diagnose and treat people it is unlikely that health care facilities will be able to meet the additional demand. Any increase in pressure on the health care facilities is likely to lead to further difficulties in accessing care. The Government is unlikely to have the capacity to adapt health services rapidly due to Project induced population changes.

This may lead to increased use of traditional medicine practices which are already frequently used in preference to the public health system. Traditional healers are used despite there being little evidence that they are able to provide effective and safe treatment. Furthermore, as with the public health system, the increase in the variety and rate of diseases (communicable, non-communicable and vector borne diseases) means that existing traditional medicine practitioners will be unable to effectively or safely treat the types and numbers of disease cases that are likely to occur, further limiting the potential for positive health outcomes. As such, it will be important to educate communities about the need to use public health services alongside traditional medicine. In addition unregulated and illegal practitioners including pharmacies providing ‘fake’ prescription drugs and surgeons may also be used increasingly resulting in unfavourable health outcomes including death. Such practitioners are used due to access and cost issues associated with public health services.

The Project will need a significant number of medical staff to meet its occupational health requirement. Skilled medical staff are in short supply in Guinea and if they chose to join the Project due to higher wages this may have a detrimental effect access to health care for local people both within the region but also potentially across Guinea as a whole.

Finally it is possible that the Project may contribute to the development of health inequalities. Health inequalities could occur, due to the implementation of health initiatives in selected communities and not others leading to disparities in disease profiles locally. Furthermore, inequalities will result as employees / contractors and their dependants can access site based medical services which are better equipped and staffed than community based services.

Increased pressure and decreased access to health care facilities is likely to occur throughout construction and operation due to in-migration and due to changes in the disease profile in the PACs. As such the impact is likely to be long term and will affect communities in the PACs1-6 as well as the prefecture and region as a whole. The impact is considered to be certain to occur as the existing facilities are insufficient for the current needs of the community. Decreased access to health care facilities will result in worsening health outcomes as such the magnitude of the impact is considered to be large. Both the existing health care facilities and affected communities are considered to be highly vulnerable due to a lack of alternative health care services or the potential for increased reliance on Traditional Medicine. As such the sensitivity is considered to be high and the overall impact is considered critical prior to mitigation.
22.4.12 Community Safety

22.4.12.1 Impacts during Construction

Onshore

Road traffic accidents occur in the communities surveyed as part of the BHS. Amongst vehicle users and pedestrians there is poor road safety awareness and limited enforcement of traffic rules. Improvements to roads due to the Project could result in increased vehicle movements allowing all vehicles to travel at higher speeds. The Project will require the improvement of further roads and the development of additional new roads (as discussed in the Roads SEIA). Increased traffic movements will also occur due to the transport of construction equipment and materials using large trucks and potentially due to increased private ownership of vehicles especially motorcycles within communities, associated with increased incomes.

During construction it is anticipated that there will be of the order of 600 heavy goods road traffic movements per day on roads during daylight hours. Movements at night may occur, but will be subject to specific journey management plans. Vehicle speeds will be restricted in residential areas and night time road traffic movements will be avoided where possible. The Project already has in place traffic management procedures around vehicle movements, driver safety and awareness and speed restrictions. However, these will be expanded during construction.

The predicted increases in road traffic will increase the risk of road traffic accidents occurring which could result in injuries or fatalities to other road users or pedestrians. Children are generally considered to be at particular risk due to a lack of awareness of road traffic safety issues. In addition health facilities lack the capacity to treat multi trauma accidents. Risks of accidents occurring will be greatest along roads with the highest number of traffic movements such as the N4.

During construction, other community safety issues could arise from the following:

- site trespass resulting in accidents leading to injuries and even fatalities;
- fires, as a result of changes to the socio-economic and physical environment, this is discussed in more detail in Chapter 24: Ecosystem Services; and
- flooding due to changes to water flows this is discussed further in Chapter 6: Water Environment and Chapter 24: Ecosystem Services.

Offshore

In the port study area marine accidents are relatively common as a result of storms and engine failure. Many boats are paddle or sail powered and therefore limited in speed and manoeuvrability or use unreliable outboard motors. Smaller boats are also vulnerable to sea state and their crews are generally poorly equipped and not formally trained (see Figure 22.7 showing typical local craft). Fishing activities may require boats to temporarily anchor, or trawl nets or lines which may further reduce speed and manoeuvrability.
During construction and operation the number of vessel movements in the area will increase. Whilst there will be strict controls on Project vessel speed in some areas, there will be unrestricted areas and fast pilot and patrol boats may be common.

Larger vessels will be slower but may still move at a greater speed than small local paddle or sail craft. They will be restricted in their ability to manoeuvre due to draft, slowing distances and large turning circles, or may be engaged in trailer suction dredging operations and will have also have restricted visibility at close quarters as illustrated in Figure 22.8. Closer to shore large vessels will commonly be under tow which may involve the use of heavy cable between the tug and the vessel under tow. This can create hazards to other shipping and marine activities such as local fishing.
Local fishing and other vessels are unlikely to be operated by crew formally trained in accordance with the
standard maritime ‘rules of the road’ as covered by the International Regulations for Prevention of Collisions
at Sea, or with formal harbour pilotage schemes such as IALA buoyage systems. Therefore until trained and
familiar with the Project marine activities they are unlikely to behave in predictable ways in accordance with
nautical norms. They may not recognise hazard warning lighting configurations used by vessels engaged for
example in night time dredging. Local vessels are also less likely to be equipped with radar or radar
reflectors, communications systems such as VHF Radio or effective lighting at night. Fishing equipment
such as marker buoys and nets are also often not clearly marked and may be hard to see from large or fast
moving Project vessels. Figure 22.9 shows examples of safety provision on local boats.

Figure 22.9 Examples of Safety Provision on Local Boats

Local fishermen, equipped with buoyancy aids, but fishing
in an unlit pirogue and with a poorly marked net deployed
in the background. An outboard powered larger local fishing boat off Ile Matakang hauling fishing gear. The flag provides some
additional visibility but little at night.

The Project will introduce a new and diverse range of maritime activity to the area including small and large
shipping and maritime engineering work such as piling and dredging work. This change will be most
pronounced during the construction period when the increased activity will be new and at a much greater
intensity than the either the current baseline activities or the MOF construction and dredging work. This work
and activity will be undertaken in line with strict maritime law and Project safety requirements and the Project
will provide patrol vessels and implement other maritime safety measures where appropriate. However, it
will be outside the scope of experience of many local water users and vessel operators and crew leading to a
high potential for accidents to occur.

There is the potential for collisions of small vessels with Project vessels, especially those with limited
manoeuvrability and restricted line of site. Local marine users are unlikely to be able to judge closing speed
of large vessels and may attempt to cross in their path or fail to move out of their way in sufficient time.

Larger Project vessels in areas without speed restrictions may generate bow waves which could unsettle or
swamp unprepared boats. Poorly marked fishing gear may be overrun, potentially being lost or damaged,
causing damage to Project vessels and presenting a hazard to any vessels attached to or hauling the lines or
nets concerned.

Such incidents could place both local and Project vessels, equipment and crews at risk and incidents could
potentially cause smaller craft to capsize or for crew to be lost overboard. Project vessels are likely to be
more resilient due to their size, specification and the risk to personal safety but there is a real risk to
equipment such as in the case of fouling of propulsion or steerage systems by fishing nets and lines.
The main risk to public safety is associated with traffic (road and vessel) accidents throughout construction. In relation to road accidents these could occur throughout all the PACs as well as the Prefecture, while vessel accidents could occur either in the river or open sea and all accidents have the potential to have severe health outcomes affecting multiple people. Residents of PACs 4-6 are most likely to be affected due to fishing activities and the need to cross the Morebaya from Ile Kakossa. It is considered probable that accidents will occur taking into account the baseline conditions but that these may decline over time as communities understanding of the risks increases. As such the magnitude is considered to be large. Receptor sensitivity is considered to be high due to the lack of health care facilities and lack experience and exposure to enable communities to identify and assess the risks. The overall impact on community safety in the absence of mitigation is therefore considered to be critical.

22.4.12.2 Impacts during Operation

Onshore

There will be increased vehicles movements during the operation due to:

- transport of operational goods and personnel including trucks, light duty vehicles, buses and cars; and
- early ore production will start from Ouéléba in 2013 and an option is currently being investigated (1) to transport ore to the port by truck until the opening of the railway and start of full operations in 2015.

In addition, the Project will lead to increases in induced vehicle movements as a result of increased employment (direct and indirect), increased incomes leading to increased ownership of private vehicles (in particular motorcycles), and increased movements associated with other small businesses and movements of migrants. As with construction there is the potential for accidents to occur resulting in injuries and fatalities.

There is the potential for accidents occurring at the rail loop involving members of the community if they choose to cross the railway. The trains will be moving relatively slowly along the loop but would still be unable to stop if people or animals were on the line. As such there is the potential for injuries or even fatalities in the event of an accident. Access to other facilities and infrastructure such as conveyors should be strictly controlled within the Project boundary, preventing access under normal conditions.

Other community safety issues could arise from the following:

- site trespass resulting in accidents leading to injuries and even fatalities in particular, in relation to the conveyor belt, although the potential for this to occur is considered to be low due to fencing and the presence of security personnel;
- fires, as a result of changes to the forest which acts as natural barrier, this is discussed in more detail in Chapter 24: Ecosystem Services; and
- flooding due to changes to water flows this is discussed further in Chapter 6: Water Environment and Chapter 24: Ecosystem Services.

Offshore

Similar maritime safety risks are likely to exist during operations as those described above for construction. However, during operation marine engineering will be considerably reduced and although maintenance dredging will continue throughout the Project it will be at a lower intensity than during construction. The

(1) For the purposes of the assessment it is assumed that about ten truckloads will be exported per day involving twenty vehicle movements (ten inbound and ten outbound).
overall level of vessel traffic visiting the port is also likely to be lower and will consist mainly of ore carries, fuel tankers and occasional cargo vessels.

At the same time local communities should be better placed to evaluate risks due to experience and exposure to the operation of the port and shipping. They may also potentially be better trained and equipped as a result of Project outreach activities and local economic development and thus vessels may be more visible and less likely to be involved in accidents. Much of the sea faring community however are likely to continue to be poorly equipped and low skilled in maritime safety and therefore will continue to be highly vulnerable to marine Project operations which could pose a risk to life.

The main risk to public safety is associated with traffic (road, rail and vessel) accidents throughout operation. In relation to road accidents these could occur throughout all the PACs as well as the Prefecture, while boat accidents could occur either in the river or open sea and all accidents have the potential to have severe health outcomes affecting multiple people. Residents of PACs 4-6 are most likely to be affected due to fishing activities and the need to cross the Morebaya from Ile Kakossa. It is considered probable that accidents will occur taking into account the baseline conditions but that these may decline over time as communities understanding of the risks increases. As such the magnitude is considered to be large. Receptor sensitivity is considered to be high due to the lack of health care facilities and lack experience and exposure to enable communities to fully identify and assess the risks. The overall impact on community safety in the absence of mitigation is therefore considered to be \textit{critical}.

\subsection*{22.4.13 Community Security}

Facilities at the port including laydown yards, storage areas etc, will be patrolled by security personnel. Security will be provided by a national or international contractor that will be appointed following a tendering process. Security staff will then be employed by the contractor while locals will be hired preferentially in particular for unskilled tasks, non-locals with specific skills will also be employed. As part of the Project’s policy on security and human rights, security personnel will not be armed and all staff will be trained to abide by Rio Tinto Standards and in the Voluntary Principles on Security and Human Rights (2000) \textsuperscript{(1)}.

There is the potential for negative interactions between the community and any security forces used especially if community protests occur. The use of inappropriate force by security personnel in the event of any incident could compromise the safety and security of individuals from local communities. This in turn could have impacts on the reputation of the Project locally, nationally and internationally including eroding trust in the Project. However, the risk of use of inappropriate force by the Project’s security guards is likely to be minimised as guards will not be armed and will have received training.

However, in the event of a major incident or threat to the Project, Government authorities may decide to deploy the armed forces. Any excessive force that may be used by government security personnel could result in a threat to the safety and security of community members and could lead to injuries or fatalities.

The increased risk will occur over the long term \textit{ie} for the duration of port activities in communities closest to the port. However, any specific incident is likely to be localised and short term. The likelihood of incidents occurring is considered to be probable and the outcomes could be severe if injuries result. The magnitude of the impact is therefore considered to be medium. The sensitivity of the receptors is considered to be high as communities will have limited ability to adapt to negative changes due to capacity issues in law enforcement and will also potentially have fears around the consequences of reporting any such activities. The impact is therefore considered to be of \textit{major} significance.

\textsuperscript{(1)} Available at http://www.voluntaryprinciples.org/
22.5 Mitigation Measures and Residual Impacts

22.5.1 Overview

This section outlines the mitigation that will be required to manage the following impacts:

- increased transmission of communicable diseases, in particular tuberculosis and acute respiratory infections which may result due to in-migration, housing pressure and the presence of an external workforce;

- increased transmission of malaria which may result due to changes in the environment creating breeding grounds and due to in-migration;

- transmission of other vector borne diseases in particular arboviral diseases due to environmental changes caused by factors such as worksite management and in-migration;

- impacts associated with water and sanitation in particular diarrhoeal diseases due to in-migration and decreased access to good quality water;

- HIV/AIDS and Sexually Transmitted Infections due to changes in demographics, presence of a workforce and changes to socio-economic factors;

- Increase in non-communicable diseases due to changes to lifestyle leading to chronic conditions including hypertension, diabetes etc;

- nutrition related diseases in particular with regards to anaemia and other malnutrition-related illnesses associated with changes in food security;

- zoonotic diseases - infection or infectious disease transmissible from vertebrate animals to humans in particular lassa fever recognising that other interactions are likely to be minimal;

- health impacts associated with hazardous materials in terms of the need to manage the handling of these materials appropriately to avoid non-routine events, such as spillages (for liquid hazardous products);

- increased pressure on health care services which are already insufficient for the needs of the existing community due to in-migration, worker health care needs and changes to community safety;

- impacts on community safety in particular road, rail or vessel accidents due to increased Project related movements; and

- impacts to community security covering interaction between security forces and the local community.

Some mitigation is specific to the impacts detailed above and is described under each of the impact headings. However, some overarching mitigation measures will have benefits across a range of impacts and these are described first and are then taken into account in the assessment of residual impacts in the following paragraphs.

The mitigation will be implemented as part of the SMF to ensure a strategic approach to mitigation measures and the management of partner organisations so that the mitigation remains under the overarching control of the Project.

22.5.2 Overarching Mitigation Measures to be implemented by the Project

The following measures will be undertaken by the Project in partnership or collaboration with other agencies (development agencies, NGOs or health authorities) not only to mitigate health impacts but also as community development activities.
22.5.2.1 Workforce Health

To support the health of its workforce the Project, in addition to the measures outlined in Chapter 23: Labour and Working Conditions, will:

- adopt pre-employment health screening protocols for all Project personnel; this will be reviewed annually to ensure that it remains fit for purpose and will be updated as required;
- undertake health screening for all Project personnel; screening for STIs will be voluntary but encouraged through education and awareness raising programmes;
- provide adequate referral and support for on-going treatment programmes for Project personnel found to have treatable conditions as a result of health screening;
- develop a Worker Code of Conduct for all Project personnel that includes guidelines on worker-worker interactions, worker-community interactions, development of personal relationships with members of the local communities, alcohol consumption etc;
- explicitly forbid illegal activities by all Project personnel, including the use of commercial sex workers, transactional sex, and the use and/or trafficking of illegal substances;
- promote, as part of induction, awareness among Project personnel of transmission routes and methods of prevention of STIs, communicable diseases (eg TB) and vector borne diseases (eg malaria), and other diseases as appropriate; and
- design and operate accommodation camps in accordance with international good practice on workers’ accommodation, including IFC / EBRD standards.

22.5.2.2 Public and Community Health Development

The following measures will be undertaken by the Project in partnership or collaboration with other agencies (development agencies, NGOs or health authorities) not only to mitigate health impacts but also as community development activities. The Project will proactively seek and manage these partnerships to ensure that the mitigation is being delivered in a timely manner and will measure and monitor outcomes based on KPIs. Where these partnerships are not performing well against the KPIs the Project will develop corrective actions. These activities will be linked in with the Social Management Framework.

- The Project will work in partnership with government authorities to:
  - support improvements to existing health services to handle the increase in population numbers and changes to the existing health profile of the area, including facilities, quality of medical personnel, diagnostic capacity and treatment, and capacity to address epidemics and pandemics;
  - support government-led vaccination programmes including transport, storage and handling of vaccines to prevent degradation;
  - support antenatal care and delivery care programmes to reduce the risk of maternal and infant morbidity;
  - support local health centres to improve their capacity to collect, manage and maintain data related to health including disease prevalence and maintain and analyse longitudinal data to show trends; and
  - support voluntary counselling and testing, prevention of mother to child transmission, information and education campaigns, distribution of condoms (including female condoms), care and treatment for STIs and HIV, and other health development and health improvement activities.
• Working in conjunction with relevant partners (eg health authorities, NGOs, development agencies), the Project will develop information, education and communication campaigns around diseases and health practices including:

  • communicable diseases such as TB;
  • malaria;
  • HIV/AIDS and other STIs;
  • use of condoms (including female condoms) and safe sexual practices;
  • the risk of co-infection (eg HIV and TB) and co-morbidity (malaria and anaemia);
  • lassa fever and other zoonotic diseases as appropriate;
  • sanitation and hygiene (eg handling and storage of water to prevent contamination); and
  • responsible driving including speed management, vehicle safety and pedestrian safety.

• The Project will investigate in partnership with a development agency (such as the Global Fund) the development of a mobile health unit within the Project study area and provide services such as voluntary counselling and testing, prevention of mother to child transmission, information / communication campaigns, distribution of condoms (including female condoms), care and treatment for sexually transmitted infections and HIV as well as support other health development and health improvement activities.

22.5.2.3 In-Migration

The Project will develop an In-Migration Plan that addresses how the Project will seek to:

• minimise Project-induced in-migration as far as possible;
• manage and direct the flow of in-migrants in accordance with regional planning objectives; and
• implement mitigation measures to address the adverse environmental and social consequences, and maximise the benefits, of in-migration.

Details of this are presented in Chapter 19: In-Migration. It will include the following specific measures relevant to health, safety and security:

• the Project will maintain a clear security zone around all Project land to avoid informal settlement around the perimeter of Project activities, including accommodation camps and this will contribute to minimising risks to public safety from mining activities;

• the Project will operate employee bus services from local settlements to discourage people from moving from their village to locations closer to Project sites in search of jobs and improve existing roads and build new roads to facilitate access from larger centres to Project sites; this will assist in reducing risks of road traffic accidents; and

• the Project will work with local authorities and other partners to support upgrade of health, water and sanitation facilities in settlements affected by Project activities and in-migration.

The Project will carry out monitoring of settlements to determine patterns of in-migration, understand the origins, characteristics and motivations of in-migrants, and identify the impacts of in-migration, and will use the results to evaluate the success of its In-Migration Plan and revise it as required. Monitoring, evaluation and plan updating will be undertaken in partnership with In-Migration Committees, local administrations, village leaders, and the community.

22.5.3 Mitigation for Communicable Diseases

In addition to those measures outlined in Section 22.5.2 in order to mitigate the impact of communicable diseases the Project will monitor the emergence of major pandemics through WHO alerts. If the WHO Pandemic Alert Scale reaches level 4 the Project will implement the relevant Emergency Response Plans.
Pressure on housing infrastructure will be mitigated as far as possible through the management of in-migration through the implementation of the measures outlined. However, despite the Project’s best efforts it is likely that there will still be significant levels of in-migration which will contribute to the circulating pool of diseases. Monitoring of workforce health and education measures on transmission and prevention should minimise the risk of workers contributing to disease transmission. Despite the fact that the Project has appropriate measures in place to address communicable diseases (including outbreaks and pandemics) the possibility remains of such outbreaks occurring. Disease outbreaks could result in ill health, including fatalities, throughout the PACs and which could overwhelm health care facilities in the area. The risk of such outcomes occurring is greatest prior to the realisation of the benefits of measures to improve health care facilities and IEC campaigns. As such following the implementation of mitigation there will be a *minor negative* impact.

22.5.4 Mitigation for Transmission of Malaria

In addition to those measures outlined in Section 22.5.2 to minimise the risk of adding to the malaria burden in the Project area, the Project will draw on emerging best practice for malaria prevention to:

- implement measures to reduce the presence of standing water onsite through environmental controls and source reduction to avoid the creation of new breeding grounds;
- if warranted based on entomological surveillance, undertake larvaciding;
- monitor the incidence of malaria using available data, most notably the number of workforce cases that occur;
- maintain the current workplace malaria and vector control programmes and extend and modify these as appropriate throughout the life of the Project;
- continue its current indoor residual spray programmes and conduct space spray fogging at worker camps;
- continue to implement measures to reduce the potential for mosquito-human interactions in worker accommodation, office space and other buildings;
- implement appropriate information education and communication campaigns on malaria with the workforce including annual training sessions on malaria; and
- work with relevant partners (health authorities, NGOs, development agencies) to extend its existing community based malaria and vector control activities to additional communities prior to the commencement of construction and continue to implement such programmes throughout the life of the Project.

The implementation of the above mitigation in combination with existing malaria awareness programmes should result in a *moderate* positive to the communities. The proposed mitigation will increase awareness and knowledge around the transmission of malaria and preventative measures and ensure early recognition of symptoms. The use of ITNs will reduce the risk of exposure and access to treatment will improve. While it is anticipated that cases of malaria will continue to occur around the port site, due to the endemic nature of the disease, it is expected that the overall burden of disease associated with malaria will decline. A decline in the prevalence of malaria will also bring benefits due to reduced co-morbidity with other diseases such as anaemia helping to contribute to an overall improvement in health across the PACs over the longer term.
22.5.5 Mitigation for Transmission of Other Vector Borne Diseases

In addition to those measures outlined in Section 22.5.2 in order to mitigate the potential for increased transmission of vector borne diseases other than malaria the following measures will be adopted:

- develop and implement a risk-based assessment and procedures to identify working condition-specific vaccination and prophylaxis needs for Project personnel. All Project personnel will be vaccinated against yellow fever;
- develop and implement a vector control programme covering all relevant vectors to reduce the risk of transmission at source, avoid the creation of vector breeding grounds and reduce the transportation of vectors due to the movement of people or goods;
- ensure that there are appropriate medical protocols in place to screen for suspected arboviral diseases, including alerting health authorities and business continuity planning; and
- establish outbreak response plans for personnel covering vector borne diseases in collaboration with the local health authorities.

The risk of transmission of vector borne diseases will be reduced as a result of the mitigation measures throughout the PACs. In particular the development of vector control programmes. Furthermore, in the event of an outbreak the response should be rapid and appropriate to prevent widespread transmission. In addition, improvements in health care facilities along with IEC campaigns should reduce the sensitivity of communities around the port in the case of outbreaks. As such the impact is rated as not significant following the implementation of mitigation.

22.5.6 HIV/AIDS and Sexually Transmitted Infections

In addition to those measures outlined in Section 22.5.2 the following measures will be adopted in addition to the general measures outlined above to mitigate the increased transmission of HIV/AIDS and STIs. The Project will review and update its existing HIV/AIDS management strategy annually. The strategy will:

- regularly review and update as necessary its existing HIV/AIDS management strategy;
- provide awareness, counselling and testing (ACT) for all Project personnel, including voluntary testing for STIs and HIV/AIDS in pre-employment and on-going health screening. (Workers will not be denied employment or discriminated against in any way based on their HIV status);
- ensure that medical services have sufficient capacity and capability to implement the company’s policy on care and treatment of HIV-positive employees and nominated dependents;
- ensure there is access to free condoms (including female condoms) at all worker camp sites and accommodation;
- ensure that all Project personnel are trained in the Workforce Code of Conduct and disease awareness and are given specific HIV and STI prevention training;
- undertake information, education and communication campaigns around safe sexual practices and transmission of STIs and HIV/AIDS as well as condom distribution (including female condoms) at stopping locations on key transport routes targeting commercial sex workers and truck drivers;
- monitor the success of community programmes by regular surveys of awareness of HIV/AIDS; and
• support women’s empowerment and education programmes to promote women’s rights and safe sexual practices (including the use of condoms and female condoms) and support development of alternative livelihoods to minimise the risk of commercial sex transactions.

The mitigation should result in a **moderate** negative impact as while the measures will raise and awareness around transmission and symptoms and improve access to treatment, due to the existing prevalence levels and predicted changes there is still a high likelihood of the number of cases of HIV/AIDS and STIs increasing as has been evidenced in other areas. Furthermore, even with the provision of treatment, infection with HIV/AIDS still results in life long ill health and those infected are likely to be discriminated against at least in the short term due to existing taboos and perceptions around HIV/AIDS.

### 22.5.7 Impacts associated with Water and Sanitation

In addition to those measures outlined in Section 22.5.2, in order to mitigate the potential for diseases associated with access to water and sanitation facilities, the following measures will be adopted:

• conduct information, education and communication campaigns amongst Project Personnel on hygiene and sanitation;

• survey all settlements in the affected area to record the location, extent, and quality of water sources the size of the population reliant on water and its usage patterns, particularly with regard to seasonality, and differences in water use or access by vulnerable populations, including women;

• develop a programme in consultation with local communities to improve access to good quality potable water and determine preferred water infrastructure; and

• partner with local authorities and relevant organisations where available and appropriate (eg donors, civil society and NGOs) to facilitate delivery of sufficient supply, and adequate quality, of water to affected settlements (including at schools), as identified through on-going monitoring by the Project and the Village Support Programme (PACV). The Project will initially confirm the potable quality of water it provides against a range of WHO parameters, and then regularly monitor the water source using faecal coliforms (**E. Coli**) as an indicator.

While in-migration will occur the above mitigation measures should ensure that there is sufficient potable water for communities across the PACs and minimise the use of surface water sources for drinking and cooking. Furthermore, the IEC campaigns around hygiene, water and sanitation should help minimise the risk of contamination of water prior to point of use. Improvements in access to health care should reduce the sensitivity of receptors. The implementation of the mitigation in should result in a **moderate** positive to the communities, in particular children, as it will reduce the risk of exposure to diseases associated with lack of access to improved water and sanitation.

### 22.5.8 Non-Communicable Diseases

In addition to those measures outlined in Section 22.5.2 the following measures will be adopted in addition to the general measures outlined above to mitigate non-communicable diseases.

• The Project will conduct information, education and communication campaigns among Project personnel on risks associated with non-communicable diseases (eg anti-smoking, healthy eating, exercise and healthy lifestyles).
The mitigation measures will raise awareness regarding non-communicable diseases in workers that are considered to be at risk and where the Project could play a direct role in changing the potential burden of disease. Improvements in access to health care facilities as well as improvements in access to diagnostics and treatment are also likely to reduce the sensitivity of receptors to change. The implementation of mitigation in relation to non-communicable diseases is likely to result in a minor positive. These benefits are likely to occur throughout construction and operation, the benefits may take some time to be felt across the community.

22.5.9 Food and Nutrition Related Illnesses

In addition to those measures outlined in Section 22.5.2 the following measures will be adopted in addition to the general measures outlined above to mitigate nutrition related diseases.

- Support food security, improve access to sources of nutrition, and enhance livelihood opportunities by:
  - developing sustainable agricultural, fishing, and livestock-breeding programmes, as identified through needs-based assessments and community consultation, that aim to diversify and increase production in the Project area through best practice techniques. Needs based assessments and community consultation with take into account production activities by men, women, and youth;
  - providing training to farmers, fishermen, herders, and other key producers as appropriate in targeted locations to improve their technical capabilities and support the marketing and sale of produced goods;
  - supporting access to equipment and other inputs (including through microfinance);
  - helping establish market linkages between producers and potential customers, including the Project (eg support for cooperatives, local market infrastructure, procurement contracts); and
  - aligning agricultural, fishing, and livestock-breeding programmes with applicable conservation–based outcomes to support sustainable production.

The above mitigation measures have been designed to ensure ongoing food security and improve access to sources of nutrition. Measures that improve access to nutrition will result in in a minor positive impact due to the existing baseline conditions. Furthermore, improvements in access to health care facilities, diagnostics and treatments should also reduce the sensitivity of communities.

22.5.10 Zoonotic Diseases

In addition to those measures outlined in Section 22.5.2 the following measures will be adopted in addition to the general measures outlined above to mitigate Zoonotic diseases:

- implement a programme of rodent and insect control at Project Sites; and
- conduct information, education and communication campaigns among Project personnel on lassa fever and other zoonotic diseases as appropriate, covering transmission, prevention, symptoms and when to seek medical care.

Following the implementation of mitigation the residual impact for zoonotic diseases is considered to be not significant as the Project will minimise the potential for increase transmission. In addition, workers and communities will be better able to recognise symptoms of disease and therefore able to seek treatment in a timely manner.
22.5.11 Hazardous Materials

In addition to those measures outlined in Section 22.5.2 and in Chapter 11: Resources and Non-Mineral Waste Management to avoid and manage potential impacts related to hazardous substances, the port will comply with the Project Waste Management Strategy and Non-Mineral Waste Management Plan and will:

- develop management plans for all hazardous substances used on site that will include emergency response and clean up measures;
- train workers involved in the handling or use of hazardous materials on safe handling and on response in the event of incidents;
- ensure storage areas and fuelling stations will be situated at a safe distance from sensitive areas (eg surface water, river floodplain, water well) and supported by an appropriate design and risk assessment;
- develop appropriate operating procedures for the transport, storage and handling of explosives and for blasting activities and provide training for workers involved in the use of explosives; and
- adopt strict procedures for stock control and disposal of containers to ensure communities do not use containers from Project sites for collection or storage of water, foodstuffs, animal feed or other materials that may lead to human exposure.

The Project will ensure that loading, unloading, transport, storage, mixing and use of hazardous materials, including explosive, flammable and toxic substances, is conducted in accordance with international standards. Explosive substances will only be permitted in clearly designated and demarcated areas located a minimum of 500 m from receptors and purpose-built and certified by competent specialists to indicate that construction has been carried out in accordance with an appropriate design. Explosives facilities will be designed to:

- prevent unauthorised access to, or theft of explosives;
- provide appropriate earthing and lightning protection;
- minimise potential ingress of water (including rainwater, groundwater and surface water runoff);
- segregation of incompatible, combustible or explosive materials; and
- facilitate emergency response, containment and clean-up in the case of a fire, spill or other emergency.

The Project will also design and implement measures to minimise the risk of hazardous substances entering the environment. This will include:

- installation of oil water separators and grease traps as appropriate at fixed refuelling facilities, workshops, parking areas, fuel storage and containment areas;
- use of drip trays and other temporary measures during fuelling or servicing of vehicles and equipment on site;
- secure storage and labelling of hazardous substances in line with the manufacturer’s recommendations and measures to prevent contact with untrained personnel, birds, animals or fish;
- secondary containment using impervious, chemically resistant material and designed to prevent contact between incompatible materials in the event of a release; and
- location of all equipment, containers and distribution lines (including pipes, valves and taps), containing hazardous materials above ground and provision of appropriate containment to minimise the risk of uncontrolled or undetected releases of hazardous materials. Any below ground installations require appropriate risk assessment and Project approval.
The Project will develop Emergency Prevention, Preparedness and Response Plans to cover all other incidents presenting risks to public safety and the environment. These will take into account access to health care, major incidences, exposure to hazardous materials, multiple casualty events, epidemics and pandemics. They will be developed in consultation with local communities and where appropriate with national emergency providers and local health care facilities. The Project will conduct awareness-raising within local communities for those emergencies considered to be of higher risk.

Following the implementation of mitigation the impact from hazardous materials associated with routine operations is considered to be not significant as measures will be in place to prevent community exposure to such materials and to respond promptly in the event on non-routine events. However the risk of accidents occurring remains albeit with low likelihood and potentially across all of the PACs.

### 22.5.12 Health Care

In addition to those measures outlined in Section 22.5.2 the following measures will be adopted in addition to the general measures outlined above to mitigate impacts associated with access to health care:

- ensure sufficient health services are available to meet the needs of Project personnel without impacting on access to health care for communities;
- provide information and education on the use of traditional medicine versus public health services to ensure that people are seeking appropriate treatment in a timely manner; and
- the Project will develop a recruitment strategy for employment of medical staff at the port site to avoid taking resources from the local area to avoid having a negative impact on local clinical care.

The implementation of mitigation should result in a moderate positive for communities as it will improve access to basic health care for communities across all the PACs. Improved access to health care as well as diagnostics and treatment will reduce the sensitivity of communities to a range of diseases compared to the baseline conditions. Access to health cares should minimise a range of health impacts associated with the development of the Project by improving health outcomes and ensure that health inequalities do not arise as a result of the Project.

### 22.5.13 Community Safety

In addition to the measures outlined in Section 21.5.2, to mitigate community safety from road traffic, the Project will:

- promote road safety among Project personnel:
- develop a Traffic Management Plan covering vehicle safety, driver and passenger behaviour, use of drugs and alcohol, hours of operation, rest periods and accident reporting and investigations;
- strictly enforce drug and alcohol policies in relation to Project drivers and undertake regular and random testing of drivers and in response to suspicious behaviour;
- require Project drivers to be trained in defensive driving and provided regular refresher courses;
- propose road bypasses where there is a significant risk to public safety from road accidents;
- establish preparedness and response capabilities to deal with any road traffic or other accidents that may occur including multiple casualty events;
• in partnership with local authorities and the police, educate communities on road traffic laws and road safety; and

• road safety and other traffic related impacts will be addressed at the Port, in particular, for the villages along the Maférinyah road between the town of Maférinyah and the village of Senguelen. Community investment will be carried out to offset loss of amenity due to the increase in traffic.

To mitigate risks associated with safety at the port the Project will:

• reasonable measures will be taken to discourage entry by the public into operational areas; and

• the Project and contracted vessel operators will undertake all maritime operations in line with International Maritime Law and safe practice, and with Project and Rio Tinto requirements. This will include measures such as:

  • use of patrol vessels to enforce work area zones of managed vessel traffic around structures or vessels, announce entry of large vessels and advise fishermen to vacate the area when necessary;

  • local fishermen will be informed about construction activities and the dangers of being in the vicinity of marine activities. Approach channels will be demarcated with buoys and navigation aids to warn fishermen using the channels; and

  • the Project will undertake an awareness raising campaign regarding the port marine operations, vessel movements and risk. This will run throughout the duration of construction and during the initial years of operation. These sessions will be aimed at fishermen and will include sessions also aimed at school children as well as community events.

The implementation of the above measures will ensure that the Project is minimising the risk of accidents occurring as a result of shipping accidents, road traffic accidents, or fires. Furthermore, improved access to health care should improve health outcomes in the event of an incident occurring across the PACs. However, despite the implementation of the above mitigation, the potential for accidents resulting in casualties or fatalities remains. Such events could happen throughout construction and operation and potentially on more than one occasion. As such the impact is considered to be moderate negative.

22.5.14 Community Security

To promote the security of the public and communities, the Project will ensure that:

• security arrangements comply with the Voluntary Principles on Security and Human Rights for the extractive sectors, Rio Tinto Standards and the Project workforce Code of Conduct;

• security personnel are unarmed;

• all security personnel receive training on Project expectations and procedures for security behaviour and practices on induction and annually;

• security personnel are screened prior to employment by means of detailed interviews and vetted in line with the ‘International Code of Conduct for Private Security Service Providers’ to avoid hiring those who have previously been involved in abuse or violation of human rights;

• appropriate supervision is provided to ensure that established procedures are being applied by security personnel;
• security arrangements are communicated to relevant stakeholders including workers and communities, without compromising the security of the Project;

• community grievances in relation to the conduct of security personnel or activities are addressed in accordance with the Project’s established Grievance Procedure;

• if unlawful or abusive acts are committed by security personnel immediate action is taken to prevent recurrence and report unlawful and abusive acts to public authorities;

• monitor the performance of security personnel through the use of a range of indicators including grievances; and

• there is agreement with government authorities on the principles to be followed in use of government forces, and on an appropriate response prior to any incident being attended by government forces.

The implementation of the above mentioned impacts will result in a moderate negative impact in relation to security. The measures should ensure that Project personnel comply with standards that will avoid impacts to community security. However, while measures are in place to avoid a negative impact there remains the potential for security issues on the ground to arise in the event of local unrest or intervention by third parties.
### Table 22.5 Summary of Residual Impacts and Mitigation

<table>
<thead>
<tr>
<th>Impact Issue</th>
<th>Phase</th>
<th>Impact Assessment</th>
<th>Proposed Specific Management Measures</th>
<th>Residual Impact</th>
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</table>
| **Communicable Diseases**           | **Construction** | **Critical Negative** | - The Project will monitor the emergence of major pandemics through WHO alerts. If the WHO Pandemic Alert Scale reaches level 4 the Project will implement the relevant Emergency Response Plans.  
- The Project will develop a site based communicable disease management policy and programme for the workforce covering TB, ARI and other diseases of relevance. | Minor Negative  |
| Increased levels of communicable diseases | **Operation** | **Major Negative** |                                                                                                                                                                                                                                         |                 |
| **Malaria**                         | **Construction** | **Critical Negative** | - Implement measures to reduce the presence of standing water onsite through strict environmental controls and source reduction to avoid the creation of new breeding grounds.  
- If warranted based on entomological surveillance, undertake larvaciding.  
- Monitor the incidence of malaria using available data, most notably the number of workforce cases that occur.  
- Maintain the current workplace malaria and vector control programmes and extend and modify these as appropriate throughout the life of the Project.  
- Continue its current indoor residual spray programmes and conduct space spray fogging at worker camps.  
- Continue to implement measures to reduce the potential for mosquito-human interactions in worker accommodation, office space and other buildings.  
- Implement appropriate information education and communication campaigns on malaria with the workforce including annual training sessions on malaria.  
- Work with relevant partners (health authorities, NGOs, development agencies) to extend its existing community based malaria and vector control activities to additional communities prior to the commencement of construction and continue to implement such programmes throughout the life of the Project. | Moderate Positive |
| Increased prevalence of Malaria     | **Operation** | **Major Negative** |                                                                                                                                                                                                                                         |                 |
| **Other Vector-borne Disease**      | **Construction** | **Major Negative** | - Develop and implement a risk-based assessment and procedures to identify working condition-specific vaccination and prophylaxis needs for Project personnel. All Project personnel will be vaccinated against yellow fever.  
- Develop and implement a vector control programme covering all relevant vectors to reduce the risk of transmission at source, avoid the creation of vector breeding grounds and reduce the transportation of | Not Significant |
<p>| Increased transmission of vector-borne diseases, most |                                           |                   |                                                                                                                                                                                                                                         |                 |</p>
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<tr>
<th>Impact Issue</th>
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</table>
| notably Yellow Fever                              | Operation | Major Negative    | - Ensure that there are appropriate medical protocols in place to screen for suspected arboviral diseases, including alerting health authorities and business continuity planning.  
- Establish outbreak response plans for personnel covering vector borne diseases in collaboration with the local health authorities.  
- Provide for emergency knock down fogging in the event of suspected arboviral disease outbreak. |                 |
| Transmission of HIV/AIDS & STIs                   | Construction | Critical Negative | - Regularly review and update as necessary the Project's existing HIV/AIDS management strategy.  
- Provide awareness, counselling and testing for all Project personnel, including voluntary testing for STIs and HIV/AIDS in pre-employment and on-going health screening. Workers will not be denied employment or discriminated against in any way based on their HIV status.  
- Ensure that medical services have sufficient capacity and capability to implement the company’s policy on care and treatment of HIV-positive employees and nominated dependents.  
- Ensure there is access to free condoms (including female condoms) at all worker camp sites and accommodation.  
- Ensure that all Project personnel are trained in the Worker Code of Conduct and disease awareness and are given specific HIV and STI prevention training.  
- Undertake information, education and communication campaigns around safe sexual practices and transmission of STIs and HIV/AIDS as well as condom distribution (including female condoms) at stopping locations on key transport routes targeting commercial sex workers and truck drivers.  
- Monitor the success of community programmes by regular surveys of awareness of HIV/AIDS.  
- Support women’s empowerment and education programmes to promote women’s rights and safe sexual practices (including the use of condoms and female condoms) and support development of alternative livelihoods to minimise the risk of commercial sex transactions. | Moderate Negative |
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<tbody>
<tr>
<td>Water and Sanitation</td>
<td>Construction</td>
<td>Critical Negative</td>
<td>• The Project will conduct information, education and communication campaigns amongst Project Personnel on hygiene and sanitation.</td>
<td>Moderate Positive</td>
</tr>
</tbody>
</table>
| Decreased access to water and sanitation | Operation | Critical Negative | • Survey all settlements in the affected area to record the location, extent, and quality of water sources the size of the population reliant on water and its usage patterns, particularly with regard to seasonality, and differences in water use or access by vulnerable populations, including women.  
• Develop a programme in consultation with local communities to improve access to good quality potable water and determine preferred water infrastructure.  
• Partner with local authorities and relevant organisations where available and appropriate (eg donors, civil society and NGOs) to facilitate delivery of sufficient supply, and adequate quality, of water to affected settlements (including at schools), as identified through on-going monitoring by the Project and the Village Support Programme (PACV). The Project will initially confirm the potable quality of water it provides against a range of WHO parameters, and then regularly monitor the water source using faecal coliforms (E.Coli) as an indicator.  
• In partnership with local authorities and relevant organisations where available and appropriate (eg donors, civil society and NGOs), the Project will assist in planning for anticipated increased demands on local infrastructure and services in communities that are significantly affected by in-migration due to Project activities. This assistance will include support for upgrading health, water and sanitation facilities in settlements affected by Project activities and in-migration. |                 |
<p>| Non-communicable Diseases            | Construction | Minor Negative | • The Project will conduct information, education and communication campaigns among Project personnel on risks associated with non-communicable diseases (eg anti-smoking, healthy eating, exercise and healthy lifestyles). | Minor Positive |
| Increased levels of non-communicable diseases | Operation | Minor Negative |                                                                                                                                  |                 |
| Food and Nutrition                   | Construction | Major Negative | • Develop agricultural, fishing, and livestock-breeding programmes, as identified through needs-based assessments and community consultation, that aim to diversify and increase production in the Project | Minor Positive |</p>
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| Decreased access to food and nutrition due to increased pressure on land   | Operation | Major Negative              | area through best practice techniques. Needs based assessments and community consultation with take into account production activities by men, women, and youth.  
  - Provide training to farmers, fishermen, herders, and other key producers as appropriate in targeted locations to improve their technical capabilities and support the marketing and sale of produced goods.  
  - Support access to equipment and other inputs (including through microfinance).  
  - Help establish market linkages between producers and potential customers, including the Project (eg, support for cooperatives, local market infrastructure, procurement contracts).  
  - Align agricultural, fishing, and livestock-breeding programmes with applicable conservation-based outcomes to support sustainable production. |                |
| associated with land take and in-migration                                 |        |                           |                                                                                                         |                |
| Zoonotic Diseases                                                          | Construction | Moderate Negative        | - Implement a programme of rodent and insect control at Project Sites.  
  - Conduct information, education and communication campaigns among Project personnel on lassa fever and other zoonotic diseases as appropriate, covering transmission, prevention, symptoms and when to seek medical care. | Not Significant |
<p>| Increased outbreaks of zoonotic diseases                                    | Operation | Moderate Negative         |                                                                                                         |                |</p>
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<tr>
<td>Hazardous Materials&lt;br&gt;Increased worker and community contact with hazardous materials leading to negative health impacts</td>
<td>Construction</td>
<td>Major Negative</td>
<td>• Develop management plans for all hazardous substances used on site that will include emergency response and clean up measures.&lt;br&gt;• Train workers involved in the handling or use of hazardous materials on safe handling and on response in the event of incidents.&lt;br&gt;• Ensure storage areas and fuelling stations will be situated at a safe distance from sensitive areas (e.g., surface water, river floodplain, water well) and supported by an appropriate design and risk assessment.&lt;br&gt;• Develop appropriate operating procedures for the transport, storage and handling of explosives and for blasting activities and provide training for workers involved in the use of explosives.&lt;br&gt;• Adopt strict procedures for stock control and disposal of containers to ensure communities do not use containers from Project sites for collection or storage of water, foodstuffs, animal feed or other materials that may lead to human exposure.&lt;br&gt;• The Project will ensure that loading, unloading, transport, storage, mixing and use of hazardous materials, including explosive, flammable and toxic substances, is conducted in accordance with international standards. Explosive substances will only be permitted in clearly designated and demarcated areas located a minimum of 500 m from receptors and purpose-built and certified by competent specialists to indicate that construction has been carried out in accordance with an appropriate design. Explosives facilities will be designed to:&lt;br&gt;  • prevent unauthorised access to, or theft of explosives;&lt;br&gt;  • provide appropriate earthing and lightning protection;&lt;br&gt;  • minimise potential ingress of water (including rainwater, groundwater and surface water runoff);</td>
<td>Not Significant</td>
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| Health Care  | Construct | Critical Negative | • Ensure sufficient health services are available to meet the needs of Project personnel without impacting on access to health care for communities.  
• Provide information and education on the use of traditional medicine versus public health services to ensure that people are seeking appropriate treatment in a timely manner. | Moderate Positive |
| Operation    | Major Negative | • segregation of incompatible, combustible or explosive materials; and  
• facilitate emergency response, containment and clean-up in the case of a fire, spill or other emergency.  
• The Project will design and implement measures to minimise the risk of hazardous substances entering the environment, including development of an Emergency Prevention, Preparedness and Response Plan for accidents involving release of hazardous substances to the environment. This will include:  
• Installation of oil water separators and grease traps as appropriate at fixed refuelling facilities, workshops, parking areas, fuel storage and containment areas.  
• Use of drip trays and other temporary measures to prevent entry of hazardous substances into the environment during fuelling or servicing of vehicles and equipment on site.  
• Secure storage and labelling of hazardous substances in line with the manufacturer's recommendations and measures to prevent contact with untrained personnel, birds, animals or fish.  
• Secondary containment using impervious, chemically resistant material and designed to prevent contact between incompatible materials in the event of a release.  
• Location of all equipment, containers and distribution lines (including pipes, valves and taps), containing hazardous materials above ground and provision of appropriate containment to minimise the risk of uncontrolled or undetected releases of hazardous materials.  
• The Project will develop Emergency Prevention, Preparedness and Response Plans to cover all other incidents presenting risks to public safety and the environment. These will take into account access to health care, major incidences, exposure to hazardous materials, multiple casualty events, epidemics and pandemics. They will be developed in consultation with local communities and where appropriate with national emergency providers and local health care facilities. The Project will conduct awareness-raising activities within local communities that are considered to be higher risks. |
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<tr>
<td>healthcare facilities</td>
<td>Operation</td>
<td>Critical Negative</td>
<td>- The Project will develop a recruitment strategy for employment of medical staff at the port to avoid taking resources from the local area to avoid having a negative impact on local clinical care.</td>
<td></td>
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</tbody>
</table>
| Community Safety             | Construction | Critical Negative | - Promote road safety among Project personnel:  
  - Develop a Traffic Management Plan covering vehicle safety, driver and passenger behaviour, use of drugs and alcohol, hours of operation, rest periods and accident reporting and investigations.  
  - Strictly enforce drug and alcohol policies in relation to Project drivers and undertake regular and random testing of drivers and in response to suspicious behavior.  
  - Require Project drivers to be trained in defensive driving and provided regular refresher courses.  
  - Propose road bypasses where there is a significant risk to public safety from road accidents.  
  - Establish preparedness and response capabilities to deal with any road traffic or other accidents that may occur including multiple casualty events.  
  - In partnership with local authorities and the police, educate communities on road traffic laws and road safety.  
  - Reasonable measures will be taken to discourage entry by the public into operational areas.  
  - Implement International, Rio Tinto and Project requirements for maritime operations.  
  - Patrol vessels will be used to enforce work area zones of managed vessel traffic around structures or vessels, announce entry of large vessels and advise fishermen to vacate the area when necessary.  
  - Local fishermen will be informed about construction activities and the dangers of being in the vicinity of marine activities. Approach channels will be demarcated with buoys and navigation aids to warn fishermen using the channels.  
  - The Project will undertake an awareness raising campaign regarding the port, vessel movements and risk. This will run throughout the duration of construction and during the initial years of operation. These sessions will be aimed at fishermen. | Moderate Negative |
<p>| Decreased community safety   | Operation | Critical Negative |                                                                                                                                  |                 |</p>
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</table>
| Community Security                                                          | Construction | Major Negative | • Security arrangements comply with the Voluntary Principles on Security and Human Rights for the extractive sectors and Rio Tinto Standards and Code of Conduct.  
• Security personnel are unarmed.  
• All security personnel receive training on Project expectations and procedures for security behaviour and practices on induction and annually.  
• Security personnel are screened prior to employment by means of detailed interviews and vetted in line with the ‘International Code of Conduct for Private Security Service Providers’ to avoid hiring those who have previously been involved in abuse or violation of human rights.  
• Appropriate supervision is provided by senior competent personnel to ensure that established procedures are being applied by security personnel.  
• Security arrangements are explicitly communicated to relevant stakeholders including workers and communities, without compromising the security of the Project.  
• Community grievances in relation to the conduct of security personnel or activities are addressed in accordance with the Project’s established Grievance Procedure.  
• If unlawful or abusive acts are committed by security personnel immediate action is taken to prevent recurrence and report unlawful and abusive acts to public authorities.  
• Monitor the performance of security personnel is monitored through the use of a range of indicators including grievances.  
• There is agreement with government authorities on the principles to be followed in use of government forces, and on an appropriate response prior to any incident being attended by government forces. | Moderate Negative |
| Decreased community security owing to community protests inappropriate use of force by security guards and deployment of armed forces | Operation | Major Negative    |                                                                                                        |                |