

**Rapid Health
Impact
Assessment**

**Chinese National Offshore Oil
Company**

**Kingfisher Development Area
Project**

Republic of Uganda
June 2015



For Golder Associates Africa



www.shapeconsulting.org

**Authors:
Dr Mark Divall, Dr Izak Olivier and Dr Milka Owuor**



May 2015,

**Address all correspondence to Dr Mark Divall
mdivall@shapeconsulting.org**

This report has been prepared by SHAPE Consulting, with all reasonable skill, care and diligence within the terms of the contract with the client, and taking account of the resources devoted to it in the agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

© SHAPE Consulting. 2015. All rights reserved.

*This report is prepared solely for the benefit of, and use by **CNOOC Uganda Ltd, Golder Associates Africa** and may not be sold, reproduced or in any other way copied or transferred by the customer to anyone else, whether in whole or in part. SHAPE Consulting Limited owns and retains all intellectual property rights in this report including, without limiting the generality of foregoing, all copyrights.*

Executive Summary

Introduction

SHAPE Consulting Limited (SHAPE) has been subcontracted by Golder Associates Africa (Golder) to perform a rapid health impact assessment (HIA) for the China National Offshore Oil Company (CNOOC) Kingfisher Development Area (KDA) and associated crude oil pipeline feed Project (Project) in Hoima District, Western Uganda.

While the HIA is a standalone assessment, it is being conducted as part of the broader Environmental and Social Impact Assessment (ESIA), which supports the feasibility studies for the development of the Project. No specific laws or national regulations require that a HIA is performed for the Project, but concerns from interested and affected parties and the need to comply with good international industry practice and especially standards of Development Financing Institutions have prompted the assessment.

The form of the HIA has been based on a rapid approach, which by definition means that no new primary quantitative data has been collected as part of the assessment. However, any data gaps or opportunities will be highlighted in the proposed management measures as conditions subsequent to the impact assessment.

Health Impact Assessment Objectives and Methodology

A HIA seeks to identify and estimate the lasting or significant changes, of project activities, on the health status of a defined population by adopting a systematic approach to identifying different health and wellbeing impacts, both positive and negative. HIAs use available and commissioned qualitative and quantitative evidence, including the public and stakeholders' perceptions and experiences, as well as public health, epidemiological, toxicological knowledge to support the assessment. Further, HIA is concerned with the distribution of health effects across a population by taking into account social inequalities or vulnerabilities and how they might be influenced by a proposed project.

The HIA was conducted as a prospective assessment with the intent to use the outputs as a decision-making tool that identifies and estimates the lasting, or significant changes, of different actions on the health status of potentially affected communities (PACs), or populations, that may be impacted by the Project. This was achieved by adopting a systematic approach to identifying the different health and wellbeing impacts, and developing evidence-based recommendations to maximize potential positive health benefits

and avoid, prevent or mitigate any detrimental health impacts from the Project. Specific objective includes:

- Describing the prevailing baseline health conditions in the PACs, to understand specific vulnerabilities associated with direct and indirect Project factors.
- Consider stakeholder comments and concerns related to the existing state of community health and what potential human health impacts may be associated with the development and operation of the proposed Project.
- Based on identified vulnerabilities and stakeholder input identify and model specific health impacts that may potentially be generated by the Project and evaluate their significance during the different life cycles stages of the Project.
- Develop a Community Health Management and Monitoring Plan (CHMMP) based on the significance of the identified impacts, so that priority management measures can be developed and monitored.
- Evaluate opportunities to integrate the findings of the HIA into the ESIA and the CHMMP into the Projects Environmental and Social Management Plan (ESMP).

The methodology of the HIA was based on the Introduction to HIA Guidance Note as supported by the International Finance Corporation (IFC) and was chosen as it supports the IFC Performance Standards on environmental and social sustainability as well as the Equator Principles for Financing Institutions. IFC Performance Standard 4 (that addresses Community Health, Safety and Security) has particular relevance for the purposes of the HIA, with the approach supporting a systematic and consistent method to collecting and analysing health data through assessing 13 different environmental health areas (EHAs) as part of a structured 'reductionist model' framework.

Health Impact Assessment Activities

The following activities were performed to support the final development of the rapid HIA:

- An initial desktop literature of secondary data available in public domain from standard source and peer reviewed literature that was available in the public domain. This was based on internet searches and reading of any available Project documentation and reports. This supported the development of the baseline health description, and supported the development of survey instruments that were used in the field visit to focus on identified priorities. This was initiated in January 2015 and continued in an iterative manner until late May 2015.
- Two field visits including:

- A short scoping field visit (in March 2015) with the objective to understand the potential health impact areas of concern, view the study area and associated logistics, meet with key stakeholders and to plan the subsequent field work.
- A second field visit (in April 2015) that focussed on stakeholder engagement with district health authorities, village leadership structures and PACs. Data was collected by means of qualitative participatory data methods and review of secondary health data from district and health centre reports and statistics.

Key Health Determinants and Impacts

Table 1 presents a thematic summary of key health impacts so that cross cutting findings across the various EHAs can be presented, a description of the impact definition associated with that theme and recommended relevant management and mitigation measures.

Table 2 provides a summary of the major health impact areas of concern presented in the EHA framework. These are presented based on the inherent and residual significance of risk, so that these can easily be summarised into the overall ESIA or Project risk dashboard.

Table 1: Summary of potential health impacts and recommendations

| Key Health Impacts and Mitigation Measures | | |
|---|--|--|
| Impact Theme | Key Potential Health Impacts | Key Recommended Mitigation Measures |
| Project induced influx and unplanned settlements/ 'urbanization' | <p>Increased potential for communicable disease transmission through:</p> <ul style="list-style-type: none"> • Movement of people with introduction of disease or increased incidence of disease patterns, including the in-coming workforce. • Inability to plan for or provide basic services such as housing, provision of water and sanitation and general environmental hygiene; may promote transmission of diseases spread by various means (respiratory- tuberculosis, meningitis) (food and water- cholera, typhoid) • Increased mixing of people who have money may increase transactional or casual sexual relations and increase rates of Sexually Transmitted Infections (STIs), including HIV/AIDS. • Overcrowding and environmental degradation may increase the transmission of vector related disease and an increase in disease like malaria but also potentially arbo-viral disease and lymphatic filariasis. • Potential introduction of novel zoonotic diseases through movement of people and their domestic animals into the area, but also through altered an altered environment that may increase human: animal interactions. | <p>Develop influx management plans as part of the Project ESMP. These should include consideration of health determinants. Labour recruitment will be an essential element as work opportunities will be the major attractor to the Project, and contractor compliance with plans and policies are essential.</p> <p>Support capacity building for town planning in anticipation for Project induced influx and growth in existing settlements. This should be part of a broader district plan, but that has local relevance so that make-shift settlements do not develop and existing villages develop based on a clear plan. Ikamiro and communities on Buhuka Flats are particularly relevant for the Project.</p> <p>Develop communicable disease strategies to include tuberculosis, HIV, STI and malaria programmes, with the objective of promoting/protecting workplace and community health.</p> <p>Outbreak control risk assessment and planning for communicable disease such as influenza and meningitis.</p> <p>Ensure effective camp facilities management including the location of camps away from communities to prevent exposure to disease risks (such as malaria) and to exclude the workforce from the community. A closed camp status should be considered.</p> <p>Accommodation and facilities management should be well designed and planned in employee and contractor camps to prevent overcrowding and need to use accommodation developed in communities.</p> <p>Develop information, education and communication (IEC) programmes in the community to increase awareness and reduce communicable disease risks. Ideally, support the development of village health teams (VHTs) in the study area to deliver these (in partnership with the health department or non-governmental organisation).</p> <p>Support selected veterinary health programmes in the study area including vaccination of domestic animals for rabies and cattle for brucellosis. Support rodent control in settlements likely to receive the bulk of influx and ensure effective camp management to prevent attraction of rodents.</p> |
| | <p>Increased utilization and stress on basic, food and health services, including:</p> <ul style="list-style-type: none"> • Health services where access and quality of services is already limited. • Pressure on environmental hygiene through poor sanitation, waste disposal and limited supply of potable water. • Ecosystems services that support livelihoods, especially fishing from Lake Albert | <p>Develop and design appropriate site based medical services that can cater for all workplace health needs so the local health services are not overburdened with medical cases from the workplace. These should be developed based on the stages of the Project but it is strongly recommended to be developed prior to the bulk of the workforce arriving to reduce the need to refer locally. These plans should include all contractors and must avoid the need to refer patients</p> |

| Key Health Impacts and Mitigation Measures | | |
|--|--|---|
| Impact Theme | Key Potential Health Impacts | Key Recommended Mitigation Measures |
| | <p>and farming on the escarpment along the pipeline route.</p> <ul style="list-style-type: none"> • Pressure on education | <p>into the health system at the study area, but at least to Hoima or Kampala.</p> <p>Avoid the recruitment of local medical staff to work on Project medical services and work with the government to support ways to attract medical staff to work in the public health facilities in the study area.</p> <p>Evaluate opportunities for health systems strengthening (HHS) and support the development and implementation of a clear integrated district health strategy, which can plan for influx and requirements to upgrade health services in alignment with the government structures, but ideally focused at the entire district and especially the oil development nodes.</p> <p>CNOOC should have a partnership role to play in their study area, but solely in supporting the government to fulfil its mandate of providing public health services and not assuming this role. All HSS should be performed after a formal memorandum of understanding is concluded that defines each party's role and responsibilities and deliver timeframes. These agreements must be based on sound sustainability principles.</p> <p>As an element of town planning, support local authorities in the provision of basic services to cater for the anticipated demand, especially environmental health including water, sanitation and hygiene programmes.</p> <p>Support sustainable fishing practices through education, assisting with enforcement of fishing laws and economic interventions to manage demand so that overfishing is managed. In a similar way, support agriculture (such as conservation farming) to increase yields on land that will reduce in availability.</p> |
| | <p>Altered economy in the area with increased disposable income and potentially an increase in transactional sex. Women and young girls will be vulnerable groups.</p> | <p>IEC campaigns to especially the local workforce (and contractors) on financial management.</p> <p>Support to PACs and vulnerable groups on gender empowerment, local development programmes and health issues.</p> <p>Contractor management with policies and practices are implemented</p> |
| | <p>Inflation of housing and food prices, which may affect especially the indigenous population and vulnerable local groups.</p> | <p>Develop inflation management and monitoring programs. Support vulnerable groups</p> |
| | <p>Erosion of traditional values and social harmony that may give rise to social decay and associated ills such as crime, domestic violence, ethnic conflict, commercial sex work and substance abuse.</p> | <p>Evaluate opportunities to maintain local cultures and norms and build an equitable society, taking note of especially vulnerable groups.</p> |

| Key Health Impacts and Mitigation Measures | | |
|--|---|---|
| Impact Theme | Key Potential Health Impacts | Key Recommended Mitigation Measures |
| Workforce health impacts | <p>The incoming workforce has the potential to exacerbate the communicable disease burden associated with poor socio-economic and living conditions, especially those transmitted by close contact including TB, meningitis and viral diseases such as measles and influenza. The risk will increase if incoming people originate from areas that have higher prevalence of disease and social circumstances allow for the potential transmission of these conditions locally,</p> <p>The local health system caters for a predominantly rural remote section of the country and has limited capacity in terms of infrastructure and human capital to effectively manage a significant upsurge in communicable diseases, or indeed plan effective health prevention/promotion activities.</p> <p>The employed portion of the workforce may adapt their lifestyle and increase their risks for non-communicable diseases (NCDs).</p> | <p>Develop workplace health interventions including:</p> <ul style="list-style-type: none"> • Develop a workplace TB, HIV, STI and malaria management plan as part of the communicable disease strategy. • Evaluate the origin of any incoming contracted construction workforce and screen for TB and associated communicable diseases as part of the Projects fitness to work programme. • Support effective vaccine preventable disease programmes. • Develop effective design and planning of workplace accommodation to prevent overcrowding. • Develop effective workplace medical services. • Wellness programmes in workforce to prevent NCDs. <p>These plans must make provision for contractors or be part of formal contractor management plans.</p> |
| Sexually transmitted infections (STIs) and HIV/AIDS | <p>There is a risk of increasing STIs in the community from the workforce, with a number of risk factors:</p> <ul style="list-style-type: none"> • Mobility of the workforce, including transport workers and semi-skilled and skilled incoming migrant labour as particularly high-risk groups. • Due to the nature of occupations, men are likely to be in most of these high-risk groups, and being away from their family units prone to high-risk sexual behaviour. • Disposable income in both the incoming workforce, but also local people that may benefit from the Project has the potential to increase transactional sex practices. Young girls and women in the study area are particularly vulnerable to advances from men. | <ul style="list-style-type: none"> • Develop specific programmes for high-risk categories including transport workers. • Develop a code of conduct that prohibits sexual fraternisation within the workforce, especially women that originate from the local community. Maintain a closed camp status. • Screen for STIs as part of fitness to work programme in both the contracted and full time workforce.' • Support health systems strengthening activities with the local health authorities and other organisations to develop a co-ordinated approach to STI/HIV prevention and management in the broader area • Support IEC programmes on awareness and education, and use VHTs to spread messaging, as well as supporting HIV counselling/testing and referral for care/treatment. • HSS in the local health centres to be able to provide effective care and treatment services. • Support women and young girl empowerment programmes. |

| Key Health Impacts and Mitigation Measures | | |
|---|--|---|
| Impact Theme | Key Potential Health Impacts | Key Recommended Mitigation Measures |
| Environmental modifications | <p>Environmental health exposures related to the Project will be present in all lifecycle stages of the Project. These are effectively addressed in the various specialist biophysical studies conducted for the EIA and include the following potentials:</p> <ul style="list-style-type: none"> • Reduced air quality both from dust and emissions from the CPF. • Noise especially related to construction of Project infrastructure, operation of drill wells and production activity. • Pollution of surface and ground water sources, which is a sensitive factor as the community are vulnerable to impacts on water quality and quantity, given the poor supply in the area. • Visual intrusion. • Hazardous chemical substances will be used in various areas of the operations and may present as part of the waste stream. Domestic activities may also increase risks to exposure to potential chemical and biological hazards. | <p>As per recommended management measures from the EIA, including effective environmental management.</p> <p>Plan the FEED based on these determinants including need to relocate engineering portions of the Project or physically resettle communities.</p> <p>In addition, it will be important to develop a hazardous chemical substance management plan that includes procurement, storage, handling and disposal of all waste. This should be in alignment with IFC PS 3.</p> |
| | <p>The early works and construction phase will create a macro- habitat disturbance in Buhuka Flats, on the pipeline development corridor and any roads that are developed. This has the potential to increase breeding sites for mosquito proliferation that can increase diseases such as malaria.</p> | <p>Develop integrated malaria control programmes with source reduction as a key element of control. Prevent pooling of water where possible and conduct effective remediation where required after work has completed.</p> |
| Physical and economic resettlement | <p>The final requirements for physical and economic resettlement are still being determined based on the FEED. Impacts can include:</p> <ul style="list-style-type: none"> • Overcrowding and effective environmental hygiene in new settlements • Social discord due to improved houses and services in host sites compared to those who are not resettled. • Location of host sites and type of housing so as not to increase risk to vector related disease. | <p>Health inputs should be reviewed when planning the resettlement communities to ensure that these are addressed effectively. Communication and consultation as part of the resettlement action plan will be required and should include relevant social determinants of health.</p> |
| | <p>Disruption of social network and traditional values disruption</p> | <p>Develop programmes that maintain traditional values and cultural structures in communities.</p> |
| | <p>While the area of land will be relatively small, the loss of arable land (with loss of food and cash crops) may impact on the livelihoods of certain sectors of the community, and even influence nutrition and cause food insecurity.</p> <p>Reduced access to grazing on Buhuka Flats may also reduce ability to keep cattle locally or promote over-grazing in other areas reducing the long-term sustainability of cattle farming and impacts on livelihoods.</p> | <p>Design alignments of roads and the pipeline to minimize loss of arable land.</p> <p>Understand ownership or dependency factors on land, especially in vulnerable groups so they are not impacted by loss of access to land.</p> <p>Support adequate compensation and transitional support packages.</p> <p>Support the re-development of land after the pipeline has been developed and support initiatives to increase yields, with initiatives such as conservation farming.</p> |

| Key Health Impacts and Mitigation Measures | | |
|---|---|---|
| Impact Theme | Key Potential Health Impacts | Key Recommended Mitigation Measures |
| Altered Accessibility | <p>The new escarpment road will significantly enhance access to Buhuka Flats. This will promote trade and improved services to the area, but enable communities to access services outside of their immediate area.</p> <p>Access roads along the pipeline and other secondary roads are likely to improve prompting access to the area.</p> <p>The improved access may improve private transport networks and availability and probably also access to information through improve telecommunication networks.</p> <p>Improved access will also promote influx, and if well managed (see challenges above) can be a positive development as it will stimulate economic growth.</p> | <p>Evaluate opportunities to enhance improved access to the communities in the study area.</p> <p>Influx management.</p> <p>Support the benefits of improved access to information by considering the establishment of a local community radio station, and support use of technology in schools.</p> |
| | <p>Improved roads and economy in the study area will give rise to increased road traffic with the potential for accidents and injuries. Road traffic accidents may be associated with vehicles from the Project as well as from the community. Pedestrians and children are an especially vulnerable group.</p> | <p>Develop a community security and safety management plan for the Project.</p> <p>Traffic and transport mitigation measures including traffic calming, pedestrian safety etc.</p> <p>Management of mobile equipment and machinery within the framework of the Projects Occupational Health and Safety Management Plan, including fitness to drive and substance abuse programmes. Contractor management as part of this is essential.</p> <p>Develop effective IEC programs on road and pedestrian safety, especially in schools, more effective road traffic policing and support with HSS for effective emergency care for trauma cases.</p> |
| Accidents and injuries and urbanized lifestyle | <p>There is the potential that crime and domestic violence may increase in the study are due to influx, stress on limited resources, and altered sense of place and an erosion of traditional authority. Substance abuse may be an especially important contributing factor.</p> | |
| | <p>The improved economy in the study area may promote the development of an "urbanized society" with changes in lifestyle practices including smoking, alcohol consumption, sedentary lifestyle and poor diet. This may give rise to increased chronic diseases such as diabetes, hypertension and cancers. The local workforce is especially at risk and this should be a priority business interest to prevent chronic diseases in this cohort.</p> | <p>Support IEC programs related to NCD and modifiable risk factors in both the workforce and communities.</p> <p>Initiate wellness programs in the workplace for the prevention of chronic diseases.</p> |

| Key Health Impacts and Mitigation Measures | | |
|---|---|---|
| Impact Theme | Key Potential Health Impacts | Key Recommended Mitigation Measures |
| Data-gaps and monitoring of interventions | There is a lack of data for certain health indicators at the level of the study area. The data gaps limit the ability to describe a robust baseline. These gaps will limit the ability of the Project to report on changes in health impacts or success of health interventions from a clear point of departure. | Collect additional primary health data at the community level to support a robust baseline. This can be a condition subsequent to the HIA and included into the CHMMP or EMSP, but should ideally be expedited so that data is available before the Project alters the baseline much more. The baseline should ideally be completed before the early works phase starts at the CPF or along the pipeline so that it is complete well before construction starts. This data collection may be complex and can take up to 6 months to complete. |
| | The district routine health management information system (RH MIS) is weak and not well suited to support the surveillance of health indicators in the study area. In addition, the health centres in the study area are poorly resourced and capacitated and thus data fed back into the information system is similarly weak. | Support initiatives to improve the functionality of the RH MIS in the district. There are numerous bilateral agencies that have supported good systems, but this would require resources and capacity building. However, it is recommended that the Project develop its own community health information system (CHIS) to track key health indicators. Ideally, this should be part of the social/environmental management system and rely on collecting key data from health centres and village health teams. |

Table 2: Summary of inherent and residual health impacts

| Environmental Health Area | | Before Management | | | | After Management | | | |
|---------------------------|--|--------------------|-------------|-----------------|------------|------------------|-------------|-------------------|------------|
| | | Severity | Probability | Significance± | Direction* | Severity | Probability | Significance± | Direction* |
| EHA#1 | Communicable diseases linked to the living environment. | Major | Probable | Major | Negative | Moderate | Possible | Moderate | Negative |
| EHA#2.1 | Vector-related disease. Malaria and associated determinants. | Moderate | Probable | Major | Negative | Minor | Possible | Moderate | Benefit |
| EHA#2.2 | Arboviral and other vector related disease. | Moderate | Unlikely | Moderate | Negative | Moderate | Unlikely | Minor | Negative |
| EHA#3 | Soil, water and waste-related diseases. | Moderate | Possible | Moderate | Negative | Moderate | Probable | Moderate | Benefit |
| EHA#4 | Sexually transmitted Infections including HIV/AIDS. | Major | Probable | Critical | Negative | Moderate | Possible | Moderate | Negative |
| EHA#5 | Food and nutrition related issues. | Major | Possible | Major | Negative | Moderate | Possible | Moderate | Benefit |
| EHA#6 | Non-communicable diseases. | Major | Possible | Major | Negative | Moderate | Possible | Moderate | Negative |
| EHA#7.1 | Accidents, injuries and violence. | Major | Probable | Critical | Negative | Moderate | Unlikely | Moderate | Negative |
| EHA#7.2 | Work related illness and injury. | Major | Possible | Critical | Negative | Minor | Unlikely | Minor | Negative |
| EHA #8 | Veterinary medicine and zoonotic diseases | Moderate | Possible | Moderate | Negative | Minor | Unlikely | Minor | Negative |
| EHA #9 | Noise | Not ranked for HIA | | | | | | | |
| | Air Quality and malodours | Not ranked for HIA | | | | | | | |
| | Water quality/quantity | Not ranked for HIA | | | | | | | |
| | Visual intrusion | Not ranked for HIA | | | | | | | |
| | Hazardous chemical substances | Major | Possible | Major | Negative | Baseline | Unlikely | Minor | Negative |
| EHA#10.1 | Local economic development and employment | Minor | Possible | Minor | Benefit | Major | Possible | Very High | Benefit |
| EHA#10.2 | Social ills and gender inequality | Moderate | Possible | Moderate | Negative | Moderate | Possible | Moderate | Benefit |
| EHA#10.3 | Altered access | Moderate | Possible | Moderate | Benefit | Moderate | Probable | Major | Benefit |
| EHA#10.4 | Social harmony and project expectations | Moderate | Probable | Moderate | Negative | Minor | Possible | Minor | Negative |
| EHA #11 | Health seeking behaviour and cultural health issues | Minor | Possible | Moderate | Negative | Baseline | Unlikely | Negligible | Baseline |
| EHA #12 | Health systems and services | Moderate | Possible | Moderate | Negative | Moderate | Possible | Moderate | Benefit |
| EHA#13 | Health programmes and systems | Minor | Possible | Moderate | Negative | Moderate | Possible | Moderate | Benefit |

*Direction can be either negative (implying a negative impact) or beneficial (implying a positive impact)

± See appendix A for the categorization of significance rankings

Community Health Management and Monitoring Plan

The recommendations listed in Table 1 and in Chapter 8 form the basis for the development of the Community Health Management and Monitoring Plan (CHMMP), but this does require the these findings are discussed with the Project development team, and once the outcomes are agreed then a framework CHMMP will be developed that can integrate with the Projects ESMP. This framework will be presented to different stakeholders and once finalized the plan will be used to guide community health interventions for a defined period (to be determined as per each element of the plan). The framework will be used to develop detailed plans for the design, development, implementation and monitoring of specific health programmes outlined in the mitigation measures.

It is noted that some interventions may present 'conditions or actions subsequent' to the HIA that will assist in the implementation of management measures or support monitoring activities. Further, it is recommended to develop and maintain an effective surveillance system to monitor health impacts and interventions, with data collected and analysed from primary sources as well as from longitudinal sources to be included in the surveillance system.

Table of Contents

| | |
|---|--------------|
| Executive Summary | II |
| Introduction | II |
| Health Impact Assessment Objectives and Methodology | II |
| Health Impact Assessment Activities..... | III |
| Key Health Determinants and Impacts | IV |
| Table of Contents | XIII |
| List of Figures | XVII |
| List of Tables | XVIII |
| Glossary and Acronyms | XIX |
| 1 Terms of Reference | 1 |
| 1.1 Objectives..... | 1 |
| 2 Project Description and Activities | 3 |
| 2.1 Project Ownership and Location | 3 |
| 2.2 Project Components | 4 |
| 2.2.1 Description of Project Components..... | 4 |
| 2.2.2 Project Process Flow | 6 |
| 2.2.3 Crude Oil Feeder Pipeline | 8 |
| 2.2.4 Spatial Boundaries | 8 |
| 2.2.5 Temporal Boundaries | 9 |
| 2.2.6 Construction Support..... | 10 |
| 2.2.7 Accommodation Camps..... | 10 |
| 2.2.8 Staff Requirements..... | 11 |
| 2.2.9 Access Roads and Transport..... | 12 |
| 2.2.10 Waste Management..... | 12 |
| 2.2.11 Electricity | 13 |
| 2.2.12 Water..... | 14 |
| 2.2.13 Resettlement and Land Take..... | 14 |
| 3 Relevant Legislation and Policies | 16 |
| 3.1 National Legislation | 16 |
| 3.1.1 The National Environment Act 1995 (Cap. 153)..... | 16 |
| 3.1.2 Public Health Act (Cap. 281 of 1935)..... | 17 |
| 3.1.3 The Water Act of 1997 (Cap. 152) | 19 |
| 3.1.4 Control of Smoking in Public Places Regulations, 2004 | 19 |
| 3.1.5 Employment Act, 2006..... | 20 |
| 3.1.6 Occupational Health and Safety | 20 |
| 3.2 National Plans and Strategies..... | 21 |
| 3.3 International Management Standards | 22 |
| 3.3.1 Development Financing Institution Guidelines | 22 |
| 3.3.2 International Conventions | 22 |
| 3.4 Company Management Standards | 24 |
| 4 Health Impact Assessment Framework and Methodology | 25 |
| 4.1 Introduction and Definitions | 25 |
| 4.2 Health Impact Assessment Methodology | 26 |
| 4.2.1 Form and Nature of Health Impact Assessment..... | 27 |

| | | |
|----------|--|------------|
| 4.2.2 | Environmental Health Areas | 28 |
| 4.2.3 | Community Profiling..... | 30 |
| 4.2.4 | Baseline Health Studies..... | 31 |
| 4.2.5 | Risk Assessment and Impact Categorization..... | 32 |
| 4.2.5.1 | Direct Versus Indirect Effects..... | 33 |
| 4.2.5.2 | Cumulative Effects..... | 33 |
| 4.2.6 | Management and Mitigation..... | 33 |
| 4.2.7 | Monitoring and Audit..... | 35 |
| 4.2.8 | Stakeholder Consultation..... | 36 |
| 5 | Health Impact Assessment Process and Activities | 37 |
| 5.1 | Introduction..... | 37 |
| 5.2 | Health Impact Assessment Process and Activities..... | 37 |
| 5.2.1 | Level of Health Impact Assessment..... | 37 |
| 5.2.2 | Completed Health Impact Assessment Activities | 38 |
| 5.2.2.1 | Desktop Literature Review..... | 38 |
| 5.2.2.2 | Field Work and Stakeholder Engagement..... | 38 |
| 6 | Community Profile | 44 |
| 6.1 | Socio-Demographic Profile of the Study Area | 44 |
| 6.2 | Relevant Topography and Climatic Factors | 46 |
| 6.3 | Project Potentially Affected Communities | 47 |
| 7 | Baseline Health Status | 50 |
| 7.1 | General Health Profile of the Country | 50 |
| 7.1.1 | Mortality and Burden of Disease | 51 |
| 7.1.2 | Health System in Uganda | 52 |
| 7.1.3 | Health Profile of the District and Study Area | 55 |
| 7.1.4 | Impacts of Oil Discovery in Lake Albert Basin..... | 57 |
| 7.2 | Environmental Health Areas | 59 |
| 7.2.1 | EHA #1 Communicable diseases linked to the living environment | 60 |
| 7.2.2 | EHA #2 – Vector-related Diseases | 68 |
| 7.2.3 | EHA #3 – Soil-, Water- and Waste-related Diseases | 77 |
| 7.2.4 | EHA #4 – Sexually-transmitted Infections, including HIV/AIDS | 88 |
| 7.2.5 | EHA #5 – Food- and Nutrition-related Issues..... | 95 |
| 7.2.6 | EHA #6 – Non-communicable Diseases | 99 |
| 7.2.7 | EHA #7 – Accidents/ Injuries | 102 |
| 7.2.8 | EHA #8 – Veterinary Medicine and Zoonotic Diseases | 104 |
| 7.2.9 | EHA #9 – Potentially Hazardous Materials, Noise and Malodours | 110 |
| 7.2.10 | EHA #10 – Social Determinants of Health | 115 |
| 7.2.11 | EHA #11 – Health Seeking Behaviour and Cultural Health Practices..... | 120 |
| 7.2.12 | EHA #12 – Health Programmes, Services and Systems Infrastructure and Capacity..... | 121 |
| 8 | Impact Definition/Evaluation and Associated Mitigation Measures | 126 |
| 8.1 | EHA #1 – Communicable Diseases linked to the Living Environment | 128 |
| 8.2 | EHA #2 – Vector Related Diseases | 136 |
| 8.2.1 | Malaria and Associated Determinants | 136 |
| 8.2.2 | Arboviral and other Vector Related Diseases..... | 143 |
| 8.3 | EHA #3 – Soil-, Water- and Waste-related Diseases | 146 |

| | | |
|-----------|---|------------|
| 8.4 | EHA #4 – Sexually-transmitted Infections and High Risk Sexual Practices, including HIV/AIDS | 152 |
| 8.5 | EHA #5 – Food- and Nutrition-related Issues..... | 159 |
| 8.6 | EHA #6 – Non-communicable Diseases | 166 |
| 8.7 | EHA #7 – Accidents, Injuries and Violence | 169 |
| 8.7.1 | Accidental and Non-Accidental Injuries..... | 169 |
| 8.7.2 | Work related Illness and Injury..... | 173 |
| 8.8 | EHA #8– Veterinary Medicine and Zoonotic Diseases | 175 |
| 8.9 | EHA #9 – Environmental Health Determinants | 178 |
| 8.9.1 | Noise | 178 |
| 8.9.2 | Air Quality and Mal-odours | 180 |
| 8.9.3 | Water Quality/Quantity..... | 182 |
| 8.9.4 | Visual Intrusion..... | 183 |
| 8.9.5 | Hazardous Chemical Substances | 184 |
| 8.10 | EHA #10 – Social Determinants of Health | 186 |
| 8.10.1 | Local Economic Development and Employment..... | 186 |
| 8.10.2 | Social Ills and Gender Inequality | 189 |
| 8.10.3 | Altered Access..... | 190 |
| 8.10.4 | Social Harmony and Project Expectations | 192 |
| 8.11 | EHA #11– Cultural Health Practices and Health Seeking Behaviour | 194 |
| 8.12 | EHA #12 – Health Systems and Services | 196 |
| 8.13 | EHA #13 – Health Programmes and Systems..... | 200 |
| 9 | Data-gaps and Opportunities for Data Gap Closure | 204 |
| 10 | Assessment of Alternatives | 207 |
| 11 | References | 208 |
| 12 | Appendices | 215 |
| 12.1 | Appendix A: Methodology for Assessing and Categorizing the Significance of Impacts 215 | |
| 12.1.1 | Introduction..... | 215 |
| 12.1.2 | General Reporting | 215 |
| 12.1.3 | Impact Evaluation | 216 |
| 12.1.3.1 | Part A: Defining the Consequence or Effects of a Health Impact | 216 |
| 12.1.3.2 | Part B: Defining the Probability of a Health Impact | 217 |
| 12.1.3.3 | Part C: Determination of the Significance Ranking | 217 |
| 12.1.3.4 | Part D: Confidence Level..... | 218 |
| 12.1.3.5 | Reporting on Impacts..... | 221 |
| 12.2 | Appendix B: Progress Report of Preliminary Trip | 223 |
| 12.3 | Appendix C: Stakeholder Engagement with Hoima DHMT | 228 |
| 12.4 | Appendix D: Price list of selected commodities as of 14 October 2014 (Hoima Town) 231 | |
| 12.5 | Appendix E: Health Facility Assessments..... | 233 |
| 12.5.1 | Introduction..... | 233 |
| 12.5.2 | Findings..... | 234 |
| 12.5.2.1 | Human Resources: Capacity and Skills | 234 |
| 12.5.2.2 | Service Availability and Range of Services | 235 |
| 12.5.2.3 | Access to Referral Hospital | 236 |
| 12.5.2.4 | Readiness Indices | 237 |

| | | |
|--------|--|-----|
| 12.5.3 | Disease Profile from Key Informant Interviews at Health Facilities..... | 243 |
| 12.6 | Appendix F: Hoima District Health Data from Routine Health Management Information System | 244 |
| 12.7 | Appendix G: Baseline Socio-demographic and Health Indicators | 249 |

List of Figures

| | |
|--|-----|
| Figure 1: Project location | 4 |
| Figure 2: Location of EA3A, Kingfisher Project and pipeline | 5 |
| Figure 3: Project componenets on Buhuka Flats..... | 6 |
| Figure 4: Schematic process flow | 7 |
| Figure 5: Construction and implementation schedule..... | 10 |
| Figure 6: Strategic health assessment pillars..... | 26 |
| Figure 7: HIA flow chart | 27 |
| Figure 8:Key informant interview..... | 39 |
| Figure 9: Focus group discussion session with women in the study area, April 2015..... | 43 |
| Figure 10: Focus group discussion session with men in the study area, April 2015 | 43 |
| Figure 11: Estimated number of households in Buhuka Flats, 2013..... | 45 |
| Figure 12: PACs identified as relevant to the HIA | 48 |
| Figure 13: Rank of the leading causes of premature deaths in Uganda, 2010 | 52 |
| Figure 14: Typical housing at a community in Buhuka Flats..... | 66 |
| Figure 15: Outdoor cooking using biomass fuels..... | 66 |
| Figure 16: Uncommon use of solar power..... | 67 |
| Figure 17: Extensive local use of charcoal..... | 67 |
| Figure 18: Distribution of malaria in Uganda (current)..... | 73 |
| Figure 19: Rapid epidemiological mapping of onchocerciasis distribution in Uganda..... | 74 |
| Figure 20: Water dam in between houses in Kyarushesha | 75 |
| Figure 21: Clearing drainage ditches | 75 |
| Figure 22: Incorrect use of mosquito net..... | 76 |
| Figure 23: Distribution of Schistosoma mansoni in Uganda | 83 |
| Figure 24: Use of surface water in Kacunde | 84 |
| Figure 25: Non functional tap from gravity fed water scheme in Kacunde | 84 |
| Figure 26: Functional gravity fed water tap in Nsonga..... | 85 |
| Figure 27: Dirty environment in Nsonga..... | 86 |
| Figure 28: Community handpump well in Kyarujumba | 87 |
| Figure 29: Ventilated improved pit latrines in Kyarushesha..... | 87 |
| Figure 30: Regional HIV prevalence among adults (15-49 years) in Uganda, 2011 | 94 |
| Figure 31: New hotel in Nsonga..... | 94 |
| Figure 32: Trend in prevalence of underweight and stunting among children in Uganda..... | 97 |
| Figure 33: Fish drying in Kyakapere..... | 98 |
| Figure 34: Road side produce sales..... | 98 |
| Figure 35: Hippo grazing near Kacunde..... | 109 |
| Figure 36: Pyrethroid based pesticide..... | 114 |
| Figure 37: Drug that is smoked locally on Buhuka flats..... | 118 |
| Figure 38: Alcohol sachet | 119 |
| Figure 39: Development of housing for incoming migrants- Kiina..... | 119 |
| Figure 40: Relationship between malaria and water/extractive industry projects | 137 |
| Figure 41: Integrated workplace malaria control programme | 142 |
| Figure 42: Determinants of health..... | 186 |
| Figure 43: Framework of modulised baseline health surveys for HIA..... | 204 |
| Figure 44: Number and type of dedicated staff per health facility | 235 |
| Figure 45: Range of services provided at health facilities..... | 236 |
| Figure 46: Broken down ambulance at Kyangwali HC..... | 237 |
| Figure 47: Readiness scores of the health facilities | 237 |
| Figure 48: Basic amenities at evaluated health centers | 238 |
| Figure 49: Basic equipment at evaluated health centers..... | 239 |

| | |
|---|-----|
| Figure 50: Laboratory equipment and drugs at evaluated health centers | 239 |
| Figure 51: Antenatal readiness index of health facilities..... | 240 |
| Figure 52: Emergency obstetric care readiness index of health facilities..... | 241 |
| Figure 53: Malaria care and treatment service package of health facilities..... | 241 |
| Figure 54: HIV/TB care and treatment service package of health facilities | 242 |

List of Tables

| | |
|---|-----|
| Table 1: Summary of potential health impacts and recommendations..... | V |
| Table 2: Summary of inherent and residual health impacts..... | XI |
| Table 3: Levels of HIA..... | 28 |
| Table 4: Environmental health areas..... | 29 |
| Table 5: Sources of baseline health data | 31 |
| Table 6: List of key informants consulted at the district and local level..... | 40 |
| Table 7: Location, date, gender, age and number of participants of the FGDs..... | 42 |
| Table 8: Demographic indicators for Kyagwali Sub-County and Hoima District..... | 44 |
| Table 9: Key health and socio-demographic indicators for Uganda..... | 51 |
| Table 10: Structure, characteristics, and size of the health care system in Uganda, 2011 .. | 54 |
| Table 11: Densities of health workers per 1,000 population in Uganda (2005)..... | 55 |
| Table 12: Key health indicators for Hoima District, 2010/2011 | 55 |
| Table 13: Summary of health facilities in Hoima District, 2013 | 56 |
| Table 14: Immunisation coverage for Hoima District (%)...... | 125 |
| Table 15: Water and levels of service | 148 |
| Table 16: Selection of partner organizations within Hoima district..... | 201 |
| Table 17: Opportunities and risks for primary data collection | 205 |
| Table 18: Data gap and data-gap closure opportunities | 206 |
| Table 19: Activities undertaken in reporting period..... | 223 |
| Table 20: Planned activity | 224 |
| Table 21: Ranking profile of common diseases..... | 243 |

Glossary and Acronyms

Glossary

Food security: Defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences.

Health: A state of complete physical, mental, social and spiritual well-being and not merely the absence of disease or infirmity.

Health determinants: The range of personal, social, economic and environmental factors that determine the health status of individuals or populations.

Health impacts: A health impact can be both positive and negative. It refers to changes in community health that are attributable to a *Project*.

Health seeking behaviour: A series of actions undertaken by individuals who perceive themselves to have a health problem or to be ill for finding an appropriate remedy. This is influenced by a wide range of factors from personal beliefs about the health problem, past interactions with the health system as well as competing basic needs that may also require expenses.

Health Impact Assessment: A combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a *Project* on the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects.

Health outcomes: A change in the health status of an individual, group or population, which is attributable to a planned intervention, or series of interventions, regardless of whether such an intervention was intended to change health status.

Morbidity: Refers to a diseased state, disability, or poor health due to any cause.

Project: Refers to the *Project* concession and mining as well as associated support activities.

Stakeholders: All those who have rights or interests in the *Project* and/or are affected directly or indirectly, by the *Project*. Stakeholders can be individuals, communities, social groups, organizations, or administrative bodies.

Study area: The study area refers to the potentially affected communities (PACs) residing around the area of influence of the *Project* and who may be impacted either directly or indirectly.

Acronyms

| | |
|-------|--|
| ACT | Artemisinin-Based Combination Therapy |
| AFP | Acute Flaccid Paralysis |
| AIDS | Acquired immune deficiency syndrome |
| ALARP | As Low as Reasonably Practicable |
| ANC | Antenatal Care |
| ARI | Acute Respiratory Infection |
| ART | Anti-Retroviral Treatment |
| BOD | Burden of Disease |
| CCHF | Crimean-Congo haemorrhagic fever |
| CDTI | Community Directed Treatment with Ivermectin |
| CHMMP | Community Health Management and Monitoring Plan |
| CHIS | Community Health Information System |
| CLTS | Community Led Total Sanitation |
| CMP | Contractor Management Plans |
| CNOOC | Chinese National Offshore Oil Company |
| CPF | Central Processing Facility |
| CSW | Commercial Sex Workers |
| CVD | Cardiovascular Diseases |
| DALY | Disability-Adjusted Life Year |
| DFI | Development Financing Institutions |
| DHS | Demographic and Health Survey |
| DOTS | Directly Observed Treatment Short course Therapy |
| EA | Exploration Areas |
| EHA | Environmental Health Area |
| EIA | Environmental Impact Assessment |
| EPFI | Equator Principle Financing Institutions |
| EPI | Expanded Programme on Immunization |
| EVD | Ebola Virus Disease |
| ESIA | Environmental and Social Impact Assessment |
| ESMP | Environmental and Social Management Plan |
| FEED | Front End Engineering Design |
| FGD | Focus Group Discussion |
| FID | Financing Investment Decision |
| FP | Family Planning |

| | |
|--------|---|
| FTW | Fitness to Work |
| GBV | Gender Based Violence |
| GDP | Gross Domestic Product |
| GIIP | Good International Industry Practice |
| GPN | Good Practice Note |
| HAT | Human African Trypanosomiasis |
| HAV | Hepatitis A virus |
| HBV | Hepatitis B virus |
| HC | Health Centre |
| HCS | Hazardous Chemical Substances |
| HCT | HIV Counselling and Testing |
| HCW | Health Care Worker |
| HDI | Human Development Index |
| HIA | Health Impact Assessment |
| HIV | Human Immunodeficiency Virus |
| HMP | Health Monitoring Plan |
| HRA | Health Risk Assessment |
| HRH | Human Resources for Health |
| HRRH | Hoima Regional Referral Hospital |
| HSB | Health Seeking Behaviour |
| HSD | Health sub-districts |
| HSS | Health Systems Strengthening |
| IEC | Information, Education and Communication |
| IFC | International Finance Corporation |
| ILO | International Labour Organization |
| IMCI | Integrated Management of Childhood Illness |
| IPIECA | International Petroleum Industry Environmental Conservation Association Organization |
| IPTp | Intermittent Preventive Treatment in Pregnancy |
| IRS | Indoor Residual Spray |
| IV | Intravenous |
| KAP | Knowledge, Attitude and Practices |
| KDA | Kingfisher Development Area |
| KPI | Key Performance Indicator |
| KII | Key Informant Interview |

| | |
|--------|---|
| LF | Lymphatic Filariasis |
| LLIN | Long Lasting Insecticide Treated Bednet |
| MHP | Maternal Health Project |
| MICS | Multiple Cluster Indicator Study |
| MDG | Millennium Development Goal |
| MDR-TB | Multi-Drug Resistant TB |
| MoH | Ministry of Health |
| MOU | Memorandum of Understanding |
| NCD | Non-Communicable Disease |
| NGO | Non-Governmental organization |
| NHR | National Referral Hospitals |
| NHS | National Health System |
| NMCP | National Malaria Control Programme |
| NTD | Neglected Tropical Disease |
| OPD | Outpatient Department |
| OHS | Occupational Health and Safety |
| OHSMP | Occupational Health and Safety Management Plans |
| PAC | Potentially Affected Community |
| PHC | Primary Health Care |
| PLHIV | People Living with HIV |
| PM | Particulate Matter |
| PMI | Presidents Malaria Initiative |
| PMTCT | Prevention of Mother-to-Child Transmission |
| PPP | Public-private Partnership |
| PS | Performance Standard |
| RAP | Resettlement Action Plan |
| RDT | Rapid Diagnostic Tests |
| RHH | Regional Referral Hospital |
| RTA | Road Traffic Accident |
| RHIMS | Routine Health Information Management System |
| SDH | Social Determinants of Health |
| SMC | Safe Male Circumcision |
| SIA | Social Impact Assessment |
| SSA | Sub-Saharan Africa |
| STH | Soil-Transmitted Helminthiasis |

| | |
|-----------|---|
| STP | Sewerage Treatment Plant |
| STI | Sexually Transmitted Infection |
| TB | Tuberculosis |
| TBA | Traditional Birth Attendant |
| TH | Traditional Healer |
| TM | Traditional Medicine |
| TP | Target Population |
| TWC | Temporary Work Camp |
| UAIS | Uganda AIDS Indicator Survey |
| UDHS | Uganda Demographic and Health Survey |
| UNHS | Uganda National Household Survey |
| UMIS | Uganda Malaria Indicator Survey |
| UNHCR | United Nations High Commission for Refugees |
| UNICEF | The United Nations Children's Fund |
| USAID | United States Agency for International Development |
| VHF | Viral Haemorrhagic Fever |
| VHT | Village Health Team |
| VP SHR | Voluntary Principles on Security and Human Rights |
| WHO | World Health Organization |
| WHO- SARA | World Health Organization Service Availability and Readiness Assessment |
| YF | Yellow Fever |
| YLD | Years Lived with Disability |
| YLL | Years of Life Lost |
| WASH | Water, Sanitation and Hygiene |

1 Terms of Reference

1.1 Objectives

SHAPE Consulting Limited (SHAPE) has been subcontracted by Golder Associates Africa (Golder) to perform a rapid health impact assessment (HIA) for the China National Offshore Oil Company (CNOOC) Kingfisher Development Area (KDA) and associated crude oil pipeline feed Project (Project) in Hoima District, Western Uganda.

As per the scope of work, the HIA was conducted as a prospective assessment in a phased manner so that it is fit for purpose, and can be used as a decision making tool for the Project and ensure compliance with Development Financing Institution (DFI) performance standards. The assessment and output forms the health component for inclusion in an international standard environmental and social impact assessment (ESIA).

The ultimate goal is to support the development of evidence-based recommendations to maximize potential positive health benefits and avoid, prevent or mitigate any detrimental health impacts from the Project, and specifically includes:

- Description of the prevailing baseline health conditions in the potentially affected communities (PACs), so that the vulnerability of the population related to their existing Burden of Disease (BOD) and direct and indirect Project factors could be evaluated;
- Understand and take stakeholder comments and concerns into account related to potential human health impacts and needs associated with the development and operation of the proposed Project.
- Identification of community health impacts that may potentially be generated by the Project and evaluation of their magnitude and significance during the different life cycles stages of the Project.
- Consider specific management and mitigation options to manage any identified impact.
- Recommendations for alternatives from a pure health and well-being perspective.
- Develop a Community Health Management and Monitoring Plan (CHMMP) to manage identified impacts and monitor the success of these interventions and changing perceptions of health in the PACs and amongst other stakeholders.

The target audience for the HIA includes: i) the Project proponent and partners; ii) potential DFIs or lenders; iii) Ugandan authorities and regulator as required; and iv) interested and

affected parties in the community or elsewhere. Disclosure and dissemination of the report will consider this audience.

2 Project Description and Activities

The following section describes a summary of the proposed Project activities and their specific association to community health, but also a brief general overview so the reader can understand the Project. However, the reader is referred to the final Project description that will be produced for the ESIA, when it is available. The information below is summarised from the ESIA report

2.1 Project Ownership and Location

China National Offshore Oil Corporation Limited is a Chinese state-owned company with headquarters in Beijing. Founded in 1982, it has evolved from a purely upstream oil and gas exploration company to an international energy company with promising primary businesses and a complete industrial chain. The company is one of the largest independent oil and gas exploration and production companies in the world. It is currently listed on both the Hong Kong and New York Stock Exchanges [1].

In early 2012, CNOOC through its subsidiary CNOOC Uganda Limited purchased a one-third interest from Tullow Oil Plc (Tullow) in Exploration Areas (EA) 1, 2 and 3A of the Lake Albert Basin, with the intention that it would subsequently operate EA3A while Tullow and Total S.A. would operate EA2 and EA1 respectively. In September 2013, the Ugandan Government awarded the first oil production license to CNOOC Uganda Limited to start the development of the Kingfisher Field that lies within EA3A, with commercial production expected to commence in 2018 [2, 3]. The total lifespan of the Project is estimate at 25 years [3].

The Project (EA3A or KDA) lies on the south-eastern flank of the Lake Albert Basin, which is part of the western arm of the East African Rift System. The KDA is located in the area known as the Buhuka Flats, within the administrative boundary of Buhuka Parish, Kyangwali Sub-County in Hoima District. The study area comprise of two distinct areas as spatially shown in Figure 1 and Figure 2 [3]:

- The KDA is approximately 15.2 km long by 3.0 km wide and covers an oil area of 32.3 km². Most of the field lies under Lake Albert, but some of well basin lies under a narrow strip of land.
- The 55 km long Kingfisher field feeder pipeline. The pipeline extends to include Kyangwali, Butoole, Kaseeta and Kabale Parish.

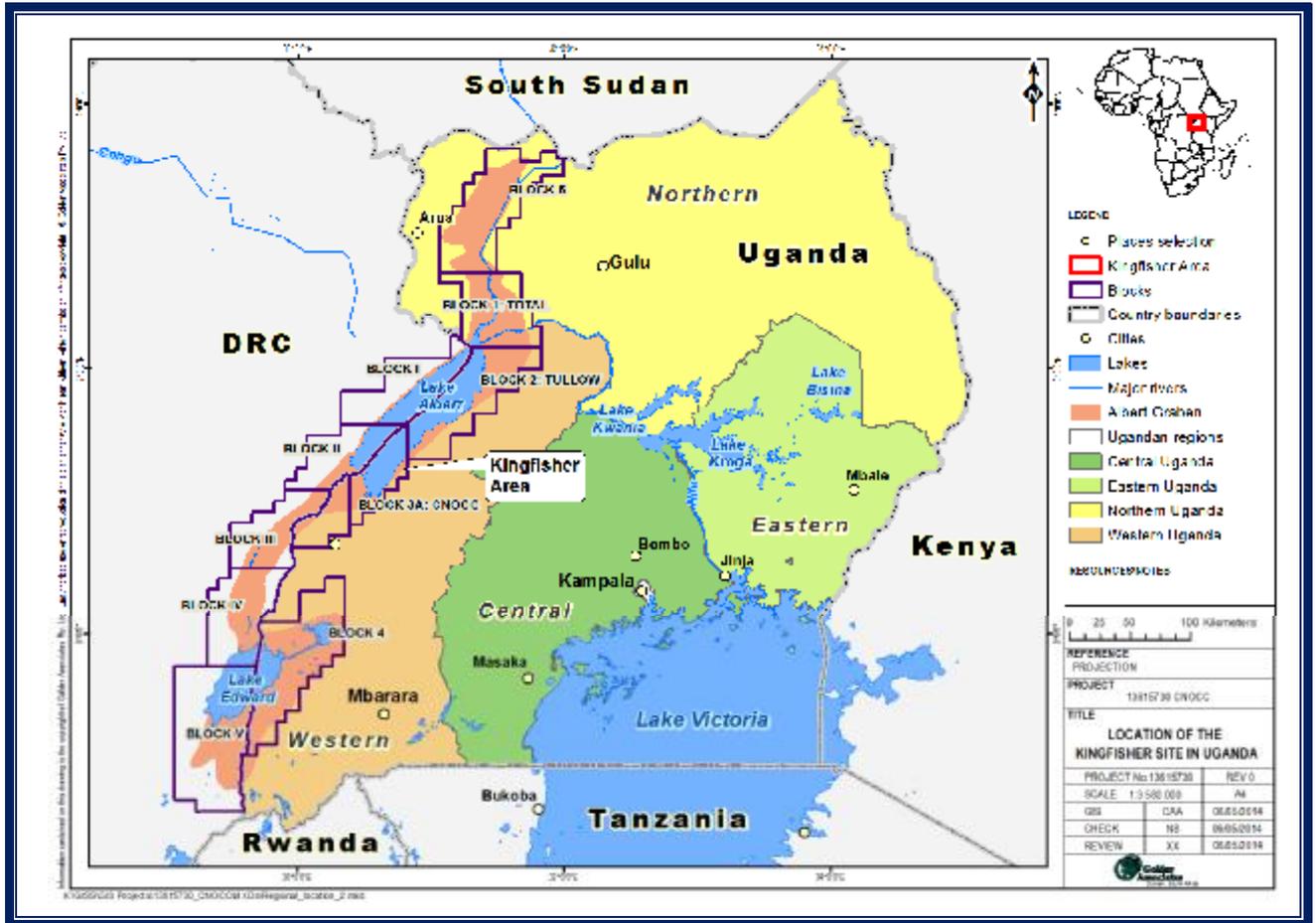


Figure 1: Project location

2.2 Project Components

2.2.1 Description of Project Components

The Project activities include three distinct elements, which are considered within the scope of the HIA [3]:

- The development of five onshore well pads (four well pads for Kingfisher Main (Pad 1, Pad 2, Pad 3 and Pad 5) and one well pad (Pad 4-2) for Kingfisher North with a total of 40 wells (27 producer wells and 13 water injection wells). Three of these wells currently exist (Kingfisher 1,2 and 3), but will require upgrades to fulfil the requirements for oil production. The well-fluids produced from the individual well pads will be transported via flowlines to a Central Processing Facility (CPF) to separate water and gas from the oil phase. These and the associated support infrastructure to produce to achieve a target of 40,000 barrels of oil per day (BOPD) will be located on the Buhuka Flats. This will include a lake water extraction system, accommodation camps and offices, a jetty, and an airstrip. These are shown spatially in Figure 3.

- This includes the escarpment road that links Buhuka Flats (close to well-pad 2) to the village of Ikamiro at the top of the escarpment.
- The transfer of stabilised crude oil through a 55 km long buried feedline (pipeline) to a delivery point near Kabaale village.
- Improvement of roads including an upgrade of the road that passes from Ikamiro village through the Bugoma Central Forest Reserve towards the tar road linking Hoima.

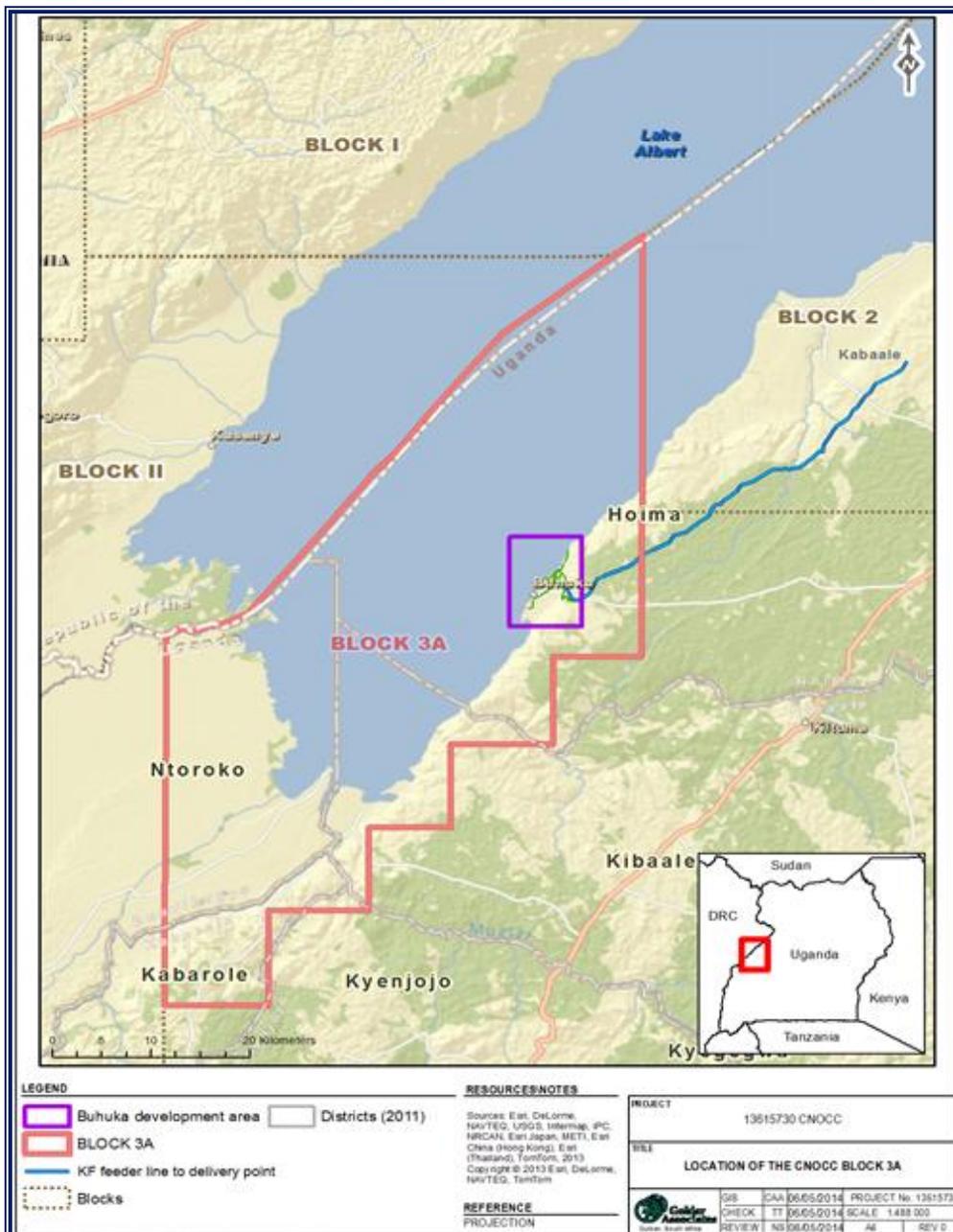


Figure 2: Location of EA3A, Kingfisher Project and pipeline

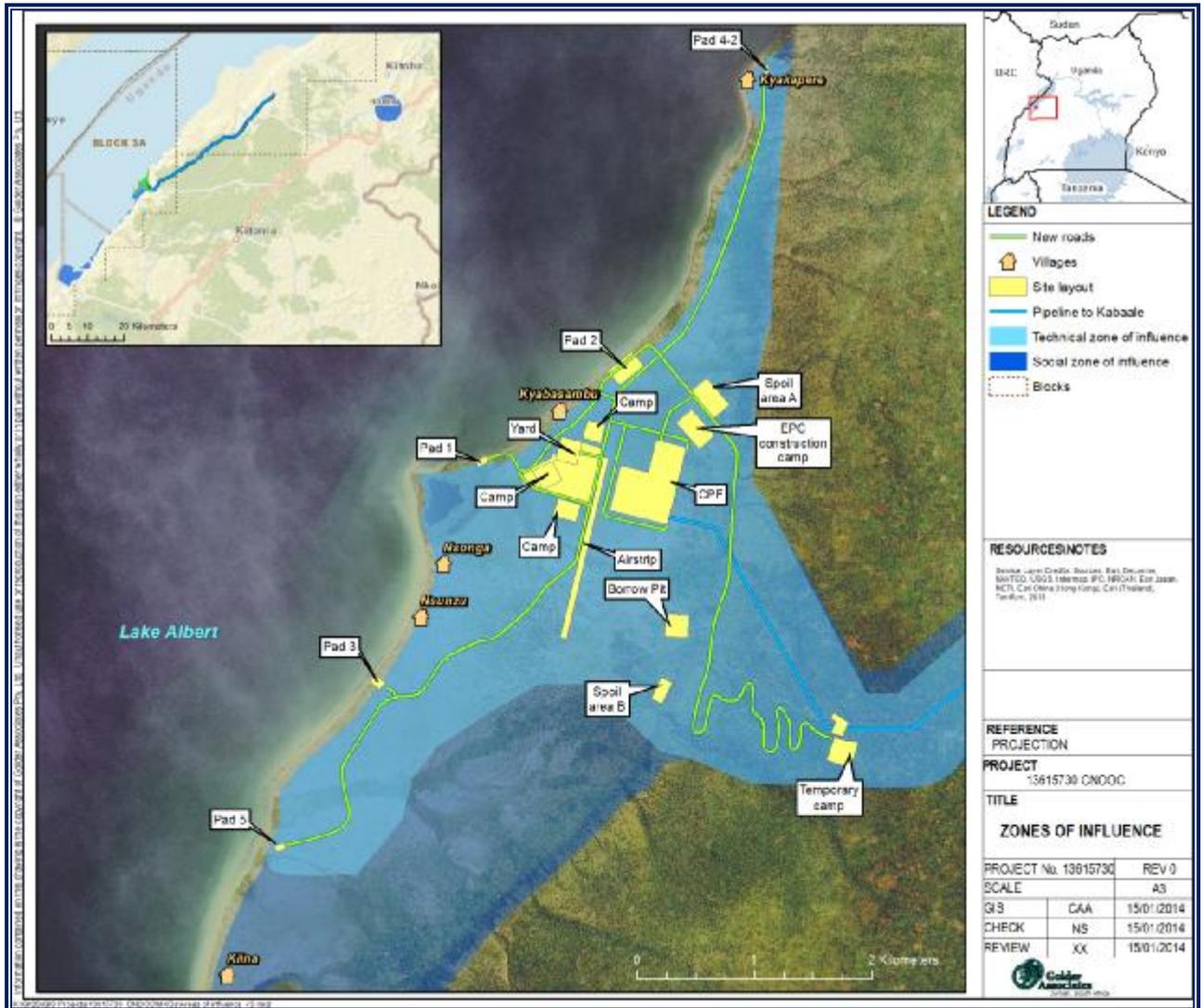


Figure 3: Project components on Buhuka Flats

2.2.2 Project Process Flow

- The process will begin with the drilling and construction of wells from the five onshore (proposed) well pads. A typical well pad will be approximately 260m x 180m in size and will include a rig and auxiliary facilities, drill waste pits, fuel tank storage area, drilling fluids preparation area and mud tank, flare pits for emergency use, control rooms, fence among others. All five well pads, including the three existing well pads, will be constructed and/or upgraded to meet well drilling requirements. All 40 wells are proposed to be drilled from the five onshore well pads. Drilling for oil will be very deep, at more than 2000m below the surface of Lake Albert [3].
- After well completion, the rig and the auxiliary facilities will be removed and feeder field pipeline will be installed to transfer the well-fluids from the well to the CPF.

- The well-fluids (mixture of gas, crude and water, etc.) will be sent to the CPF via infield flowlines from the individual well pads. The production flowlines, the water injection flowlines, and the water intake flowline will be constructed using certified carbon steel.
- The well-fluids will be processed in the CPF to separate formation water and associated gas from the oil phase. The oil will be stabilized, desalted and dehydrated to meet export specification to delivery point.
- Associated gas will be separated at the CPF and utilized for field requirements as fuel gas. A safety flare system will be developed in the CPF.
- A schematic diagram of the process flow is illustrated in Figure 4 below. This will be updated based on the final front-end engineering design (FEED).

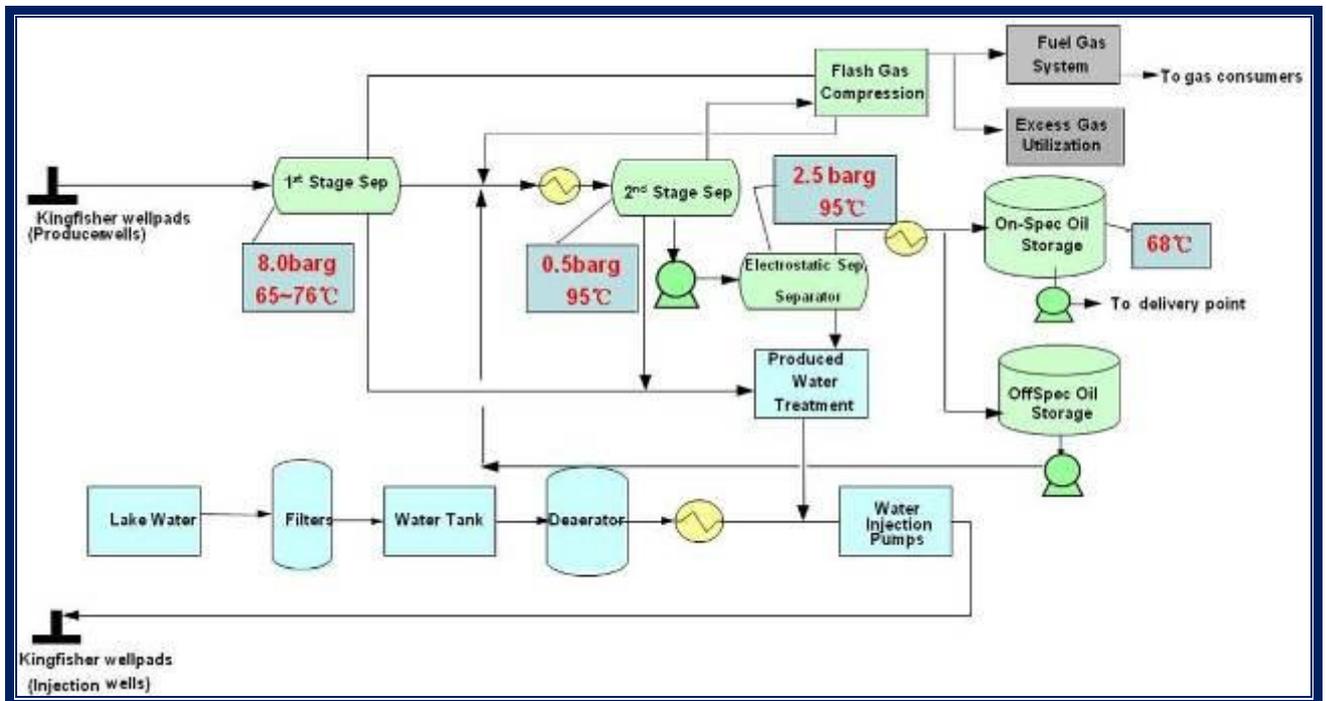


Figure 4: Schematic process flow

In addition to the processes described above, the CPF will include (final plans as part of FEED) [3]:

- Produced oil and off-spec oil tankage as storage.
- Fuel production for Project use.
- Diesel fuel storage.
- Transmission pipeline station.

- Flow-line receivers station.
- Open and closed drain systems.
- Integrated control safety and shutdown system as well as other plant safety equipment including fire and gas detectors, fire water storage, a fire water main with hydrants and monitors, CO₂ system, fire station equipped with fire engine(s) as required.
- Field instrumentation, including flow metering.
- Manned control room.
- Security with area lighting, closed circuit TV and fences/barriers.
- Maintenance workshop.
- Laboratory.
- Office and administration areas.

2.2.3 Crude Oil Feeder Pipeline

A 55 km long buried pipeline will be developed from the CPF to the refinery. The pipe will be made of carbon steel at a width of 30-35 cm, requiring a servitude of 30m². Other pipeline features include:

- Two block valve stations:
 - One at the CPF, from the delivery point to the pipeline.
 - Second, located at the top of the escarpment to manage the volume of potential leaks from the entire pipeline as it could be switched off from the CPF, and to manage pressure ratings created by the escarpment.
- The pipeline will be insulated to achieve and maintain flow temperatures, at or above pour point, plus 5 degrees Celsius (5°C).
- An electricity cable running parallel to the pipeline will provide power to the intermediate heating stations along the pipeline route. A fibre-optic cable will also run alongside the pipeline to support monitoring and safety requirements.
- Service roads will be required to allow for pipeline inspections in given sections.

2.2.4 Spatial Boundaries

The spatial boundaries for Project infrastructure are outlined in Figure 1 and Figure 2. For completeness, they include the following:

- Well-pads, CPF and associated infrastructure on Buhuka Flats. This is located within Buhuka Parish and consists of 11 villages in the local study area and directly within

the Project footprint (8 km either side (north or south) of the Project). These villages have an estimated population of 2,830 households, with a detailed description of village profiles provided in the SIA [2].

- Escarpment road from Buhuka Flats to Ikamiro village. This is still within Buhuka Parish, and includes the village of Ikamiro, as well as other villages in association with the Project (especially those on Buhuka Flats) as the new road will dramatically improve access into the study area.
- Stabilised crude oil pipeline from the CPF along a 55 km route to a refinery site near Kabaale. This includes 23 larger settlements with a detailed description of village profiles provided in the SIA [2].
- Upgrades to access roads from Hoima to Ikamiro.

2.2.5 Temporal Boundaries

The Project involves three phases: preparation phase, construction and drilling phase, and operation phase. A number of sequential steps in development need to be completed to support the other, as shown in Figure 5. The final plans will be part of the final FEED.

During the preparation phase, a range of geophysical survey, planning and designing work will be done. During the construction and drilling phase, a range of well pads, wells, pipelines, central processing facilities, camps, airstrip, road, jetty, and other infrastructural support facilities will be constructed.

Drilling operations of development wells shall continue after the onset of the first oil production, which is expected in 2018/2019. There is however a strong dependency on the development of the oil refinery to support the development of the Project. As mentioned, the Project will have an expected life span of 25 years once in operation [3].

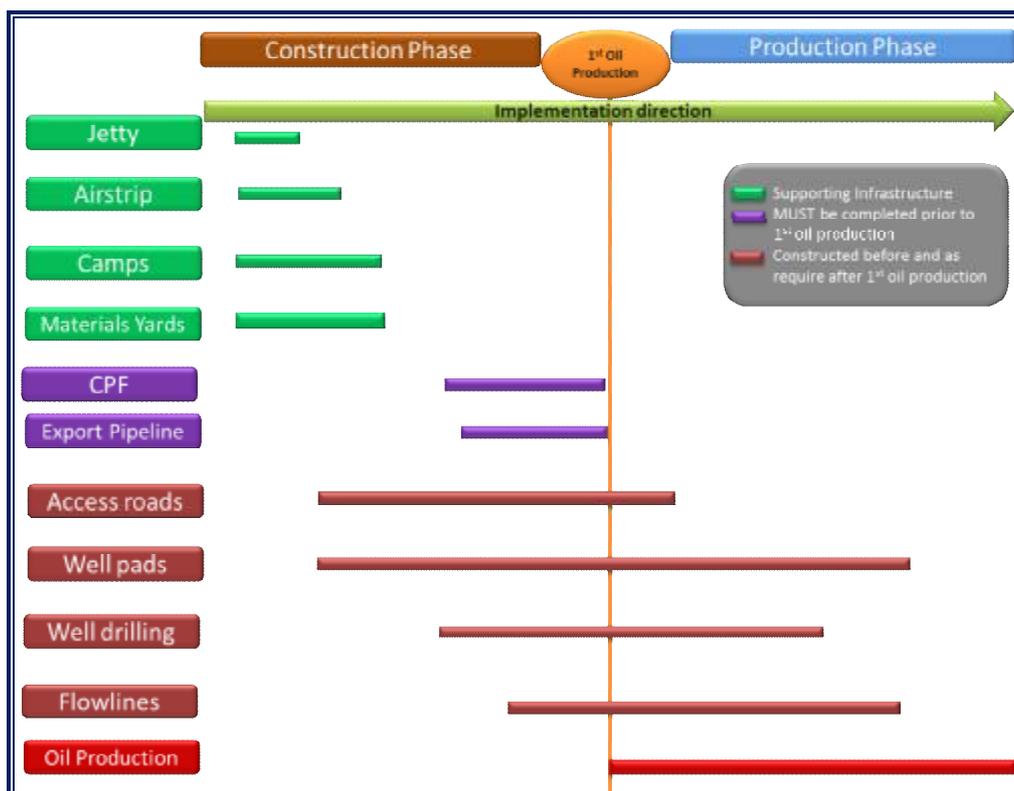


Figure 5: Construction and implementation schedule

2.2.6 Construction Support

A quarry will be developed to support the development of the CPF and related infrastructure. The location of this facility is not yet known and subject to on-going studies. It will be important to consider from an environmental health perspective with air quality, noise and vibration all potential impacts.

2.2.7 Accommodation Camps

A number of accommodation options will be developed for the Project:

- The drilling crew camp (drilling camp), which is the current Bugoma camp located near Kyabasambu village. The camp can accommodate a maximum of about 250 people.
- The permanent operators' accommodation camp (production camp). This will be similar to the drilling camp, with more permanent facilities. Based on initial estimates the camp would be sized for around 220 personnel, including operational, maintenance, support, security and other personnel.
- Two temporary construction camps will be required: One dedicated to the CPF and in-field facilities (will be located on the Buhuka Flats north of the CPF).

The other will be dedicated to the pipeline construction workforce, and while the exact location is yet to be determined, it is likely to be located around the mid-way point of the pipeline route. This will provide single accommodation and welfare facilities for the pipeline construction team and would be fully self-sufficient comprising power generation, water treatment and sewage, and waste disposal.

- There is a proposed consideration to maintain and upgrade the current escarpment road construction camp located near Ikamiro village. Due to its strategic location, it can be used as a security watchtower, evacuation base, or a stopover for very important persons visiting the Project.

The services in the camp are described in the ESIA scoping report and the final design and scope of service will be defined in the FEED, but include:

- Sleeping facilities of varying grades with ablution facilities.
- Messing and laundry services.
- Medical facility.
- Recreational facilities.
- Potable water production and storage facilities.
- Sewage water treatment plant.
- Fuel station and vehicle maintenance house and washing bay.
- Waste storage.
- Fire and security.
- Training rooms and offices.

2.2.8 Staff Requirements

Staff requirements are not known yet and will be subject to planning as part of the FEED.

The following are estimates of the number of people required:

- Construction phase:
 - CPF: 1500-2000
 - Pipeline: 200
- Operations phase:
 - Approximately 240 people.

Their respective origins and splits between expatriates, other country nationals and Ugandans are not known yet. However, CNOOC has a casual labour policy in place that

aims to comply with a 60% local resident employment target for casual job opportunities. Contractors will need to comply with this.

2.2.9 Access Roads and Transport

Access roads will be developed for the Project including the escarpment road, infield roads and regional roads [3].

The escarpment road has been subject to a separate ESIA process, and as the road construction was underway during the HIA, only future health impacts related to the road are be considered. The road connects Ikamiro to Buhuka Flats and will be about 7 kilometres long, 9 metres wide, and important aspects from a health perspective include:

- Two construction camps.
- Crusher plants.
- Borrow pits.
- Water abstraction points.
- Dumping of material onto stockpiles.
- Movement of heavy vehicles with excavation and material haulage.

The in-field roads were addressed in the same ESIA as the escarpment roads and include roads on Buhuka Flats. Regional roads include the upgrade of the road that links Ikamiro to the new tar road (near Hohwa) that further links Hoima.

The existing airstrip near Kyabasambu village will be upgraded in the construction phase.

2.2.10 Waste Management

A separate waste management specialist study has been completed as a portion of the Project ESIA [138]. Waste management is addressed under the Ugandan National Environment Management Authority and related guidelines, and international practices and safeguard policies for oil and gas management (including DFI standards), with the following key findings that have relevance to human health:

- The Project is located in a remote area, with no current landfill or waste disposal sites.
- General and hazardous waste generated during the construction of Project infrastructure will not be mixed, but stored separately before removal by a private

contractor for disposal at approved waste facilities. Waste will be recycled as far as possible. Potential hazardous waste material generated during construction may include solvents, paints, welding/grinding by products, oils and grease.

- Drilling waste streams cannot be pre-classified and can only be analysed once produced to determine their classification, and risk to human health. Evidence has shown the waste from drilling in Uganda has substances capable of polluting the environment, especially traces of heavy metals and residual hydrocarbons.
- It is anticipated that large volumes of potential hazardous material will be stored and handled at the CPF. There is the potential for spills of oil, fuel and chemicals if due care is not taken.
- Production waste streams that will be generated can also not be pre-classified and will be subject to analysis once the CPF and other aspects are operational. The specialist study has developed an estimated waste inventory that includes waste oil and other hydrocarbon waste, waste production water, metals soiled with oil, domestic waste from food, plastics etc., and domestic waste water effluent from the various camps. These various materials have either been classified as non-hazardous or hazardous with various treatment options:
 - Hazardous material in form of hydrocarbon or contaminated by hydrocarbon- offsite treatment by approved waste company.
 - Hazardous domestic wastewater effluent- treated on site and discharged back into environment based on accepted discharge limits.
 - Non-hazardous domestic waste- landfill storage for later disposal at a licensed offsite landfill, and recycling.
- Unauthorised disposal of waste is also addressed which is important as illegal disposal or open burning of waste can pose health impacts. This includes re-use of containers that previously contained hazardous material, for collecting or storing water.
- Management and mitigation measures have been proposed for the construction, operations and closure phase of the Project, which includes the development of a specific waste management plan.

2.2.11 Electricity

Electricity will be generated at the CPF from the gas generated from the processing of well-fluids. The excess gas will be adequate for all power generation needs, heating systems and

other utilities. Electrical switchgears (medium and high voltage) and a power supply distribution system shall be developed and provided to Project infrastructure including [3]:

- The CPF.
- CPF delivery point on the pipeline.
- Well-pads with a transformer and switchgear at the each well-pad.
- Water extraction (from the lake) pump station.
- Heating stations and block valve stations along the crude pipeline.
- Permanent accommodation area.

In addition, back-up power will be provided through fuel powered generators.

2.2.12 Water

Water for the process needs of the Project will be sourced from two main sources [3]:

- Water produced during the separation of well-fluids at the CPF. The water produced from the separators will be treated in three stages to meet the required standards for water injection into wells. The CPF will be designed to produce 110,600 barrels of water per day.
- Water from Lake Albert will be abstracted at an intake facility and pumped to the CPF via a dedicated flow-line. This water will also be treated to ensure that it is suitable for water injection into wells.

The CPF will have the capacity of processing 124,500 barrels of water per day for water injection into wells.

2.2.13 Resettlement and Land Take

Land acquisition and resettlement will be required for the Project and these will be addressed in the ESIA and the Resettlement Action Plan (RAP). This is a requirement under Ugandan legislation and DFI Performance Standards.

Based on information in the SIA, Project infrastructure is expected to result in the loss of approximately 91.4 ha of land in Buhuka Flats (approximately 6% of the available land area). Only 0.2 ha of cultivated land will be lost as the predominant crops are grown as “backyard gardens” (mainly vegetables) that will be retained. Lost grassland for cattle grazing will be a more significant impact as the area is already over grazed and less land will place even

more pressure on the available land for grazing [2]. This will be addressed as part of the livelihood restoration plan to be developed together with the RAP.

In addition to the loss of land, 6 household structures are located directly within the Project infrastructure footprint, with a further 217 structures located within 50 metres from all proposed infrastructure. A total of 569 structures are located within 200 metres of the Project, with substantial number (319) located close to pad 4-2 in Kyakapere village. To avoid this physical resettlement of households, it has been proposed to re-position pad 4-2 [2].

The pipeline is expected to require a construction servitude of 10 metres, which will result in the temporary loss of all crops during construction, until the land is rehabilitated. In addition, the pipeline may affect a substantial number of household structures, but the final alignment will endeavour to minimise impacts as much as possible [2].

The final RAP will need to include a review from a health perspective, but for the purposes of the HIA, general impacts related to physical resettlement and economic displacement will be considered.

3 Relevant Legislation and Policies

For the purposes of the HIA, it is relevant to consider the laws and regulations of Uganda as well as international principles, performance standards and best practices of the mining sector.

3.1 National Legislation

There were no specific references found that legally require the assessment of community health or the use of HIA as a specific requirement for Oil and Gas project developments.

Specific laws that relate to health will be addressed below and reference is made to key environmental legislation, which will be addressed in the relevant specialist studies. Most of these legislation can be found in Lexadin [4] and the Uganda Law Library [5] websites. While some of the laws do make specific reference to health, it is often limited to pollution or general safeguards but does not include any description of specific health outcomes or determinants to consider, or any approaches/methodology to adopt when accessing potential human health impacts.

3.1.1 *The National Environment Act 1995 (Cap. 153)*

An Act to provide for sustainable management of the environment and to establish an authority as a coordinating, monitoring and supervisor body for that purpose:

- **Section 24-32: Environmental standards**
 - Air quality standards.
 - Water quality standards.
 - Standards for the discharge of effluent into water.
 - Standards for the control of noxious smells.
 - Standards for the control of noise and vibration pollution.
 - Standards for subsonic vibrations.
 - Soil quality standards.
 - Standards for minimisation of radiation.
 - Other standards (for industrial products, solid waste disposal, etc.)

- **Section 34-57: Management of the environment and control of pollution**
 - Restrictions on the use of wetlands.

- Management of wetlands.
- Land use planning.
- Management of dangerous materials and processes.
- Duty to manage and minimise waste.
- Management of hazardous waste.
- Prohibition of discharge of hazardous substances, chemicals, oil, etc. into the environment and spiller's liability.
- Prohibition of pollution contrary to established standards.

3.1.2 Public Health Act (Cap. 281 of 1935)

This Act consolidates the law regarding the safeguarding and promotion of public health:

- **Section 28-35: Provisions regarding certain epidemic or endemic diseases.**
 - Applies to diseases such as plague, cholera, yellow fever, cerebrospinal meningitis, typhus, sleeping sickness or human trypanosomiasis and any other disease which by statutory order is declared a formidable epidemic disease.
 - Local authorities to report notification of formidable epidemic disease by expeditious means.
 - Power of Minister to make rules for prevention of disease.
- **Section 36: Prevention of introduction of infectious diseases**
 - For the purpose of preventing the introduction of infectious disease into Uganda, the Minister may by statutory order; (a) regulate, restrict or prohibit the entry into Uganda of any person or of persons of any specified class or description or from any specified country, locality or area; b) regulate, restrict or prohibit the introduction into Uganda or any specified part of Uganda of any animal, article or thing; c) impose requirements or conditions as regards the medical examination, detention, quarantine, disinfection, vaccination, isolation or medical surveillance or otherwise of persons entering, or the examination, detention or disinfection or otherwise of such persons as aforesaid or of articles or things introduced into any part of Uganda.
- **Section 54-73: Sanitation and housing**
 - Every local authority shall take all lawful, necessary and reasonably practicable measures for maintaining its area at all times in clean and sanitary condition, and for preventing the occurrence in the area of, or for remedying

or causing to be remedied, any nuisance or condition liable to be injurious or dangerous to health.

- What constitutes a nuisance (Clause 57).
- No person shall cause a nuisance, or shall suffer to exist on any land or premises owned or occupied by him or her or of which he or she is in charge, any nuisance or other condition liable to be injurious or dangerous to health.
- Rules as to buildings (Clause 71).
- A local authority or a medical officer of health may enter any building or premises for the purpose of examining as to the existence of any nuisance in the building or premises at all reasonable times.
- **Section 74-92: Sewerage and drainage**
 - Right of owners and occupiers within district of local authority to drain into public sewers.
 - New buildings to be provided with any necessary drains, etc.
 - Latrine accommodation to be provided for new buildings.
- **Section 93-99: Prevention and destruction of mosquitoes**
 - Any collection of water, sewage, rubbish, refuse, ordure or other fluid or solid substance, which permits or facilitates the breeding or multiplication of animal or vegetable parasites of human beings or domestic animals, or of insects or of other agents cause or facilitate the infection of human beings or domestic animals by such parasites; and
 - Any collection of water in any well, pool, gutter, channel, depression, excavation, barrel, tub, bucket or any other article, found to contain any of the immature stages of the mosquito; shall be nuisances liable to be dealt with in the manner provided in this Act for the treatment of nuisances.
 - Premises not to be overgrown to allow breeding of mosquitoes.
 - Wells and other water storage to be covered.
 - Where any of the immature stages of the mosquito are found on any premises in any collection of water in any cesspit, well, pool, channel, barrel, tub, bucket, etc, fallen or standing, immediate steps will be taken to destroy the immature stages of the mosquito by the application of oil or larvicide, or otherwise.

3.1.3 The Water Act of 1997 (Cap. 152)

The Water Act applies to the use, protection and management of water resources and supply.

- **Section 5-8: Right in water and water use**
 - All rights to investigate, control, protect and manage water in Uganda for any use is vested in the Government.
 - General rights to use of water (Clause 7).
 - Limitation on use of water (Clause 8).
- **Section 12-16: Water investigation**
 - The Minister may provide for the collection, collation and analysis of data concerning the occurrence, flow, characteristics, quality and use of any water or waste.
 - Power to enter land and investigate water resources.
 - Adherence to the National Water Action Plan.
- **Section 20: Water pollution**

A holder of a permit shall:

 - not cause or allow any water to be polluted;
 - prevent damage to the source from which water is taken or to which water is discharged after use; and
 - take precautions to ensure that no activities on the land where water is used result in the accumulation of any substance, which may render water less fit for the purpose for which it may be reasonably used.
- **Section 28: Waste discharge**
 - A person who is responsible for the production, storage, discharge or deposit of any waste shall not cause or permit any waste to be discharged directly or indirectly into any water, except in accordance with a waste discharge permit.

3.1.4 Control of Smoking in Public Places Regulations, 2004

This supplementary regulation can be found in section 107 of the National Environment Act (Cap. 153). It prohibits and controls the smoking of tobacco and tobacco products in public places.

- **Regulation 3 (1): Right to a smoke-free environment**

Every person has the right to a clean and healthy environment and the right to be protected from exposure to second hand smoke.

- **Regulation 3 (2): Duties**

Every person has a duty to observe measures to safeguard the health of non-smokers.

- **Regulation 4-6: Non-smoking and smoking areas**

Smoking is prohibited in enclosed, indoor area of a public place including public transport
The owner of a public place may designate a smoking area detached from non-smoking areas.

- **Regulation 7: Signage**

The non-smoking and smoking areas shall be marked with clearly legible and prominent signs as per this regulation.

3.1.5 Employment Act, 2006

- **Section 33: Medical examination**

The Minister may by regulations require persons over the age of 18 years seeking employment involving exposure to hazards specified by regulations to undergo medical examination before being engaged by an employer and at regular intervals thereafter.

- **Section 36: Employment of children**

A child under the age of 14 years shall not be employed in any business, undertaking or workplace, except for light work carried out under supervision of an adult aged over 18 years, and which does not affect the child's education.

- **Section 55: Sick Pay**

An employee who has completed no less than one-month's continuous service with an employer and who is incapable of work because of sickness or injury is entitled to sick pay. Guidelines for the administration of this regulation are well outlined in subsequent sections of the Act.

3.1.6 Occupational Health and Safety

Laws and regulation in respect to occupational health are well described in the country's Occupational Safety and Health Act, 2006 [6]. Highlights include:

- Workplace to be kept clean.
- Healthy and safe working environment.
- Provision of adequate sanitary conveniences.
- Provision of adequate safe drinking water.
- Provision of protective gear.
- First aid at the workplace.

- Fire preparedness and adequate response.
- Safe use of machinery, plant and equipment.
- Handling of hazardous materials.
- Medical examination or supervision in certain processes.

3.2 National Plans and Strategies

A number of national strategies and plans that are operational and relevant to health include:

- National Health Policy II of 2010 – aims to attain a good standard of health for all people in Uganda in order to promote healthy and productive lives.
- Health Sector Strategic and Investment Plan 2010/11-2014/15 – aims to attain significant reduction of morbidity and mortality due to environmental health and unhygienic practices and other environmental health related conditions.
- The National Human Immuno-deficiency Virus (HIV) Prevention Strategy for Uganda 2011-15.
- National Strategic Plan for HIV and AIDS 2011/12-2014/15
- National Development Plan 2010/11-2014/15 - advocates for reduction of poverty, improved nutrition and food security, protection of the environment and sustainable use of natural resources, promotion of positive health seeking behaviour, etc.
- Uganda Nutrition Action Plan 2011-2016.
- The Uganda Gender Policy – advocates for women empowerment.
- The National Food and Nutrition Strategy 2005 – envisions a hunger free country without malnutrition in all segments of the population.

3.3 International Management Standards

3.3.1 Development Financing Institution Guidelines

There are a number of international guidelines or good international industry practice (GIIP) guidelines that support an approach to evaluating community health impacts linked to industrial development projects.

SHAPE follows the 2012 International Finance Corporation (IFC) Performance Standards (PS) on Environmental and Social Sustainability as the benchmark GIIP as this is supported as a well-established methodology published in the scientific literature and forms the default guidance for a number of multilateral financial institutions and industry trade associations [7]. These are generally the default standards that are used to support the Equator Principles for Financing Institutions (EPFI), which are a benchmark for the

IFC Performance Standard 4 (2012) “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 consistent with good international industry practice (GIIP), such as in the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) or other internationally recognized sources. The client will identify risks and impacts and propose mitigation measures that are commensurate with their nature and magnitude. These measures will favor the avoidance of risks and impacts over minimization.”

financial industry in order to ensure that the projects they finance are developed in a manner that is socially responsible and reflect sound environmental management practices. These standards are often used as GIIP, irrespective if the company requires external financing. PS 4 which deals specifically with Community Health, Safety and Security and the IFC “Introduction to HIA” Good Practice Note (GPN) will be followed throughout the HIA process [7, 8]. PS4 recognises the public authorities’ role in promoting health and safety of the public but addresses the client’s responsibility to avoid or minimise the risks and impacts on community health that may arise from Project related activities. A specific element focuses on addressing changes in ecosystems services and how these may affect human health.

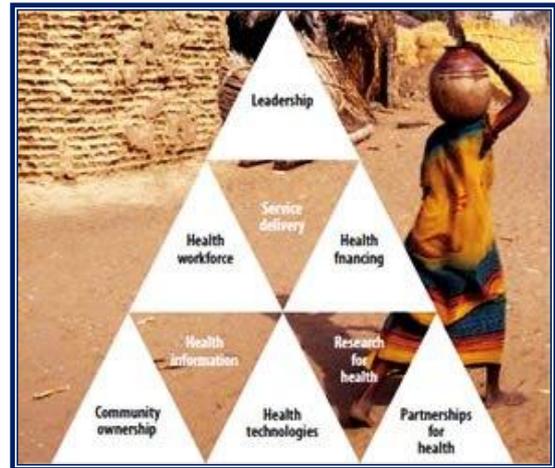
3.3.2 International Conventions

Uganda is a signatory to various international conventions and protocols that will be applicable to the Project and provide additional direction in the absence or limitation of local legislation or policy. These include:

- The International Labour Organization Conventions (ILO) with a broad range of standards. Uganda is a member of the ILO since 1963 and is a signatory to 31 ILO Conventions [9].

- The World Health Organization Framework Convention on Tobacco Control (adopted at 56th world health assembly, 21 May 2003).
- The Ramsar Convention on Wetlands of International Importance adopted in February 1971. Uganda entered the convention in 1988 and has 12 Ramsar Sites including the Murchison Falls- Lake Albert Delta Wetland System [10].
- United Nations Agencies including [10]:
 - International Health Regulations as promulgated by the World Health Organization (WHO).
 - United Nations Environmental Program including Stockholm Convention on Persistent Organic Pollutants (Resolution No. 19/96 of November 26, 1996).
 - United Nations Framework Convention on Climate Change.
 - Kyoto Protocol (Resolution No. 10/2004 of 28 July).
 - Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and Their Disposal (Resolution 18/96 to November 26, 1996).
 - United Nations Development Programme. Global and Inclusive Agreement 2002.
 - Convention on the Elimination of All Forms of Discrimination against Women.
 - International Convention on the Elimination of All Forms of Racial Discrimination.
 - International Covenant on Economic, Social and Cultural Rights.
 - Convention on the Rights of Persons with Disabilities.
 - Partner programmes such as the Millennium Development Goals (MDGs).
- The Algiers Declaration to Strengthen Research for Health was also adopted in June 2008, supported commitments to narrow knowledge gaps in order to improve health development and health equity in the region [11].
- The Ouagadougou Declaration on Primary Health Care and Health Systems in Africa: Achieving Better Health for Africa in the New Millennium (2008) [12]. This has declaration has nine major priority areas, namely:
 - leadership and governance for health;

- health services delivery;
- human resources for health;
- health financing;
- health information systems;
- health technologies;
- community ownership and participation;
- partnerships for health development; and
- research for health.



3.4 Company Management Standards

Based on information provided it was not evident that CNOOC had any specific management standard to address public or community health as part of project development or the ESIA process.

4 Health Impact Assessment Framework and Methodology

4.1 Introduction and Definitions

A HIA seeks to identify and estimate the lasting or significant changes of different actions on the health status of a defined population. HIA may be defined as “a combination of procedures, methods and tools by which a project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population”. The HIA identifies appropriate actions to manage those effects [13-15]. Thus, HIA has an important role as a key decision-making tool in development planning at the project level.

The WHO defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity [16]. This is influenced by a complex interaction of social, economic, genetic, and environmental factors. This follows a very social model of health, and a reductionist approach as described in section 4.2.2, and will be followed in this HIA [8, 17].

HIA assists extractive industry developments by understanding the existing health needs of the community and considering the consequences of different project processes and activities, and how these may influence community health as a decision making tool. These consequences will be formulated into a CHMMP so that the negative health effects are avoided or mitigated, and potential positive effects are enhanced.

HIA needs to be a participative process and inputs of various stakeholders are sought throughout. The process allows the views of different groups, including vulnerable ones, to be considered and to ensure that the proposed CHMMP is respectful of local cultures, perceptions and requirements. The potential for sustainable development is significantly increased through this process.

4.2 Health Impact Assessment Methodology

To ensure compliance with the IFC performance standards the methodology outlined in the IFCs GPN on HIA. The main elements of the GPN are discussed briefly, so the context and methodology of the HIA process is understood.

It is important that a distinction be made between HIA and Health Risk Assessment (HRA). HRA is concerned with the identification of hazards and risks to the workforce, which relate to occupational health and safety and engineering design. Generally, HRA is “within the fence” while HIA is “outside the fence” but there are distinct overlaps with HIA often taking a central position as workplace activities can affect community health and existing community health needs or disease burdens can effect workplace health. It is thus important that these assessments should not be placed into individual elements but integrated to support an overall strategic plan for the project as described in Figure 6. Workplace health is specifically out of scope of the HIA; however, it is important to understand which activities in the workplace can impact community health. This is important as the project activities can impart direct external influences on community health and as the workforce originates from the community workplace activities and potential exposures may be transferred back to the community at the end of shifts.

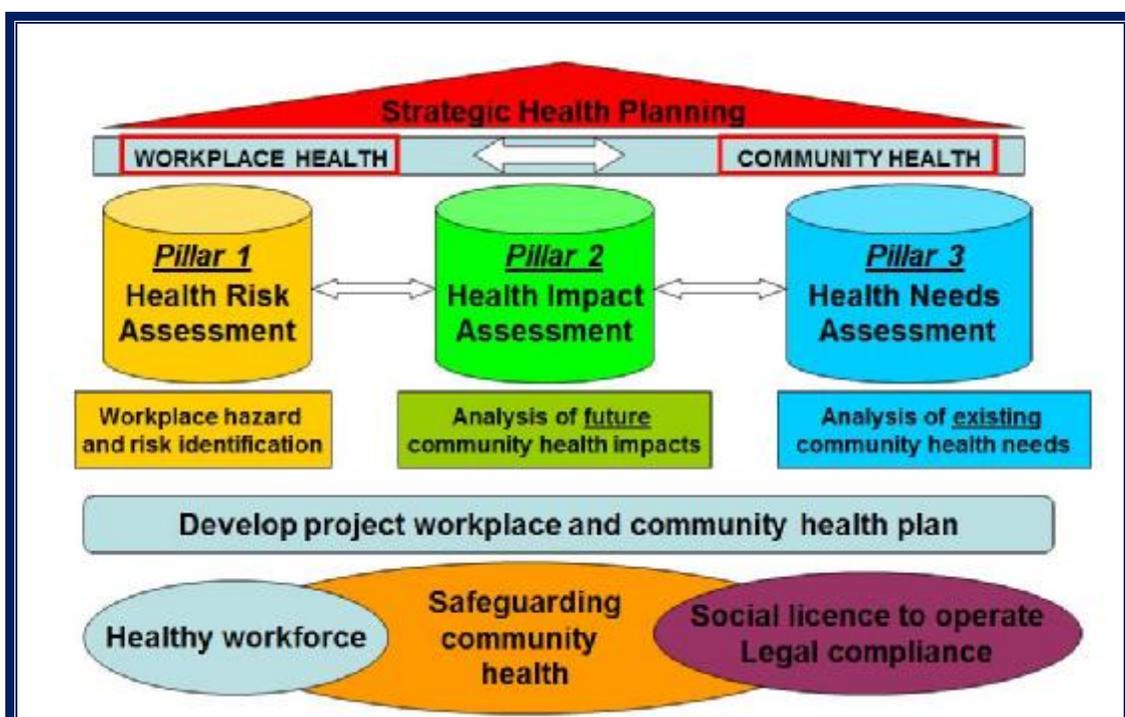


Figure 6: Strategic health assessment pillars

4.2.1 Form and Nature of Health Impact Assessment

Figure 7 outlines the six phase framework in the HIA process, which is based on a same approach followed the ESIA process, which allows for integration across studies as well as compliance with local regulations and GIIP. This integration allows for the development of a CHMMP that generally follows a similar framework to environmental and social management plan (ESMP).



Figure 7: HIA flow chart

HIAs are generally divided into three main levels as described in Table 3. These levels are generally determined at scoping by considering the following: (i) the range and magnitude of potential health impacts, (ii) the social sensitivity of the PACs, and (iii) the definition of the project and its areas of influence (project footprint) [8].

Table 3: Levels of HIA

| Level of HIA | Characteristics |
|---------------------|--|
| Desktop/Scoping HIA | <ul style="list-style-type: none"> • Provides a broad overview of possible health impacts. • Analysis of existing and accessible data. • No new Project specific survey data collection |
| Rapid Appraisal HIA | <ul style="list-style-type: none"> • Provides more detailed information of possible health impacts. • Analysis of existing data • Stakeholder and key informant analysis • No new Project specific survey data collection |
| Comprehensive HIA | <ul style="list-style-type: none"> • Provides a comprehensive assessment of potential health impacts. • Robust definition of impacts. • New Project specific survey data collection • Participatory approaches involving stakeholders and key informants. |

4.2.2 Environmental Health Areas

The IFC methodology uses 13 Environmental Health Areas (EHAs) to support the systematic analysis of health considerations based on an analysis performed and published by the World Bank, as summarized in Table 4 [17, 18]. The set of EHAs provides a linkage between project-related activities and potential positive or negative community-level impacts and incorporate a variety of biomedical and key social determinants of health (reductionist approach). In this integrated analysis, crosscutting environmental and social conditions that contain significant health components are identified instead of an HIA focusing primarily on disease-specific considerations.

While not every EHA may be relevant to a given project, it is still important to systematically analyse the potential for project-related impacts (positive, negative or neutral) across the various EHAs.

Table 4: Environmental health areas

| Environmental Health Areas (EHAs) | |
|--|--|
| 1. | Communicable diseases linked to the living environment – Transmission of communicable diseases (e.g. acute respiratory infections, pneumonia, tuberculosis, meningitis, plague, leprosy, etc.) that can be linked to inadequate housing design, overcrowding and housing inflation. It also considers indoor air pollution related to use of biomass fuels. |
| 2. | Vector-related diseases – Mosquito, fly, tick and lice-related diseases (e.g. malaria, dengue, yellow fever, lymphatic filariasis, rift valley fever, human African trypanosomiasis, onchocerciasis, etc.) |
| 3. | Soil-, water- and waste-related diseases – Diseases that are transmitted directly or indirectly through contaminated water, soil or non-hazardous waste (e.g. diarrheal diseases, schistosomiasis, hepatitis A and E, poliomyelitis, soil-transmitted helminthiasis, etc.) |
| 4. | Sexually-transmitted infections, including HIV/AIDS – Sexually-transmitted infections such as syphilis, gonorrhoea, chlamydia, hepatitis B and, most importantly, HIV/AIDS. Linkages of TB will be discussed where relevant under HIV, but often linked to EHA1. |
| 5. | Food- and nutrition-related issues – Adverse health effects such as malnutrition, anaemia or micronutrient deficiencies due to e.g. changes in agricultural and subsistence practices, or food inflation; gastroenteritis, food-borne trematodiasis, etc. This will also consider feeding behaviours and practices. Access to land plays a major role in developing subsistence farming contexts |
| 6. | Non-communicable diseases – Cardiovascular diseases, cancer, diabetes, obesity, etc. |
| 7. | Accidents/injuries – Road traffic or work-related accidents and injuries (home and project related); drowning |
| 8. | Veterinary medicine and zoonotic diseases – Diseases affecting animals (e.g. bovine tuberculosis, swinepox, avian influenza) or that can be transmitted from animal to human (e.g. rabies, brucellosis, Rift Valley fever, Lassa fever, leptospirosis, etc.) |
| 9. | Exposure to potentially hazardous materials, noise and malodours – This considers the environmental health determinants linked to the project and related activities. Noise, water and air pollution (indoor and outdoor) as well as visual impacts will be considered in this biophysical category. It can also include exposure to heavy metals and hazardous chemical substances and other compounds, solvents or spills and releases from road traffic and exposure to mal-odours. There is a significant overlap in the environmental impact assessment in this section. |
| 10. | Social determinants of health – Including psychosocial stress (due to e.g. resettlement, overcrowding, political or economic crisis), mental health, depression, gender issues, gender based domestic violence, suicide, ethnic conflicts, security concerns, substance misuse (drug, alcohol, smoking), family planning, HSB, etc. There is a significant overlap in the social impact assessment in this section. |
| 11. | Cultural health practices – Role of traditional medical providers, indigenous medicines, and unique cultural health practices. |
| 12. | Health services and systems capacity – Physical health infrastructure (e.g. capacity, equipment, staffing levels and competencies, future development plans) and institutional capacity within the health service. |
| 13. | Health programs - coordination and alignment of the project to existing national and provincial level health programs, (e.g., TB, HIV/AIDS, malaria), and future development plans. |

4.2.3 Community Profiling

To identify and quantify potential health impacts an accurate population profile is required and it is important to distinguish between differences in exposure and susceptibility. Thus, besides a demographic profile of the at-risk population and the identification of the most vulnerable groups, it is crucial to understand how the construction and operational activities are likely to impact at an individual, household and community level.

The key aspects when considering the potential influence of the project to the PACs is the exposure pathway of the potential health determinant, considering:

- Is there a hazard?
- Who or what may be exposed to this hazard (pathway and rate of exposure to estimate the concentration/extent to which human receptors may be exposed).
- The mode (air, water, food, vector, social determinants etc.) and route (inhalation, ingestion etc.) of exposure?
- What is the risk of exposure based on a likelihood and consequence analysis (magnitude, duration and length)- the impact assessment and modelling phase as discussed in section 4.2.5 and Appendix A;
- How sensitive or vulnerable the receptor is to the potential hazard or impact.

A PAC is a defined community within a clear geographical boundary where project-related health impacts may reasonably be expected to occur. PACs are inherently prospective and simply represent best professional judgments. PACs are likely to change over the course of project implementation; and there may be changes in the project design, and thus its longer-term implications are not fully known. This implies that the definition of PACs may need further adaptation as the project moves ahead; therefore, the specification of a PAC should be viewed as time-dependent as it will evolve over the project cycle. Findings of social and economic assessments, resettlement and influx management plans need to be carefully updated as this allows linkage between the PACs and key demographic determinants such as age structure and population numbers. Mitigation strategies may also require specific considerations for the different PACs. On the one hand, not all the EHAs may be of concern for mitigation for the individual PACs. On the other hand, a separate risk analysis for a PAC may be indicated due to a particular susceptibility to a specific health impact. However, at this stage of the impact assessment only limited risk analysis will be carried out for different PACs.

4.2.4 Baseline Health Studies

It is essential that a baseline against which the impacts of the project can be measured is developed to support the description of the prevailing health status in the communities, prior to project development. Baseline data collection needs to consider what data is available to inform the baseline; what (if any) new data may need to be collected; and if the data is adequate to support future monitoring and evaluation of potential impacts and mitigation/management measures. This is generally defined at scoping, or at the impact assessment process (especially in rapid HIAs), and may involve the additional collection of data, or additional data collection may be a 'condition subsequent' to the impact assessment.

The analysis of baseline data occurs within the framework of the EHAs as described above. This supports a systematic review of data and allows for flexibility in approach across the EHAs. Baseline data collection can be in the form of primary data collection as well as reviewing data from secondary sources. The potential sources of data are further described in Table 5.

Table 5: Sources of baseline health data

| Baseline Health Data Collection and Sources | | | |
|--|--|------------------------------------|--|
| Primary Data | | Secondary Data | |
| Type of data | Source of data | Type of data | Source of data |
| Qualitative from participatory discussions | Key informant interviews with broad range of stakeholders including health authorities, local authorities and agencies | Health data | Literature review of health data in public domain including: <ul style="list-style-type: none"> Standard open source literature (such as WHO reports etc.) Published peer review studies. Health statistics and records from national, regional and local sources. Health studies performed by agencies and NGOs |
| | Group meetings with local authorities and communities | Social data | <ul style="list-style-type: none"> Social baseline and impact assessment reports as well as community development reports Other data such as traffic and crime reports |
| | Focus group discussions with key sections of the community, including vulnerable groups | Environmental data | Project baseline data on potential environmental health determinants, including maps |
| | Direct visualisation of communities, prevailing environmental health, and social challenges. | Similar projects | Evaluating similar projects in similar settings and understanding their potential and actual impacts and what mitigation measures were applied |
| Quantitative | Epidemiological cross sectional baseline health surveys focussed at specific objectives | Stakeholder engagement and reports | Analysis of minutes or reports from stakeholder meetings |
| | Data sources from social and environmental baselines and impact assessments | | Community grievance or concerns register |
| | Routine health information systems | | |

4.2.5 Risk Assessment and Impact Categorization

This process analyses, models and ranks the potential impacts associated with the project and their potential influence on PACs through the different life cycle stages of the project. It includes the analysis of potential negative impacts and their management measures, but also the discussion of potential positive impacts and measures to enhance these. This is based on the evidence presented in the baseline health description, the project activities and information obtained from the ESIA process and other specialist reports/studies that are available.

A standardised risk assessment model was followed for the modelling of impacts and includes:

- identification of health related issues where project activities may impact on a variety of receptors;
- a prediction of what may happen to the PACs and health determinants as a result of the direct and indirect activities of the project- the impact definition; and
- the impact evaluation, which considers the significance of the health impacts, based on a consequence and likelihood modelling. This will need to consider an inherent ranking that considers the risks at baseline and the project related impacts without mitigation, as well as the residual risks after the successful implementation of proposed mitigation measures.

The precautionary principle was adopted in analysing and modelling impacts¹.

The evaluation of the significance of the impacts will also consider the confidence/uncertainty of the assessment. This will occur for both inherent and residual risks with the following considerations:

- the uncertainty analysis for the assessment of inherent risks will present the confidence of the assessor in determining the potential of the impacts to occur based on the evidence to hand; and

¹ If an action or policy has a suspected risk of causing harm to the public or to the environment, and in the absence of reliable evidence that the action or policy is harmful, then the burden of proof that it is *not* harmful falls on those taking the action.

- the uncertainty analysis for the assessment of residual risks will present the confidence of the assessor in determining how likely the mitigation measures are to succeed if properly implemented, as well as the ease and practicality of the proposed mitigation measures and the potential for them to be effectively sustained.

The risk assessment process is an entirely subjective process, and to reduce this subjectivity, a number of variables are considered in the assessment process as per the methodology described in Appendix A.

4.2.5.1 Direct Versus Indirect Effects

There are two general categorizations of impact effects, namely (i) direct and (ii) indirect. A direct (primary) effect demonstrates a specific cause-and-effect relationship. An indirect effect is a secondary by-product of an interaction among multiple variables and may be a consequence of a direct effect. Indirect effects are often of equal or greater significance than the more obviously observable direct impacts. The HIA analyses both potential direct and indirect effects.

Theoretically, there are virtually a limitless number of indirect effects that could be hypothesized, and in order to manage this situation the following approach is considered:

- a set of most likely indirect effects will be constructed on the basis of past relevant experiences at similar projects; and
- a sufficiently robust monitoring and evaluation system will be developed in a CHMMP such that early detection of significant indirect effects is possible.

4.2.5.2 Cumulative Effects

In this HIA, cumulative impacts will be considered, but only in a qualitative fashion, as there is no formal agreed definition for cumulative impacts from an HIA perspective. For the purpose of this HIA, cumulative impacts are considered to be generated by multiple causes and pathways and may arise on a human receptor at any scale [19].

4.2.6 Management and Mitigation

Mitigation refers to measures that avoid, minimize, eliminate an adverse effect, or maximize a potential benefit. Although mitigation is presented as the final phase of the HIA, it should be viewed as an on-going process, beginning as the project is being conceptualised and

designed, and ending only when impacts from the project operations and final decommissioning have concluded. When there is a significant process change or development of new aspects of the project, it is important that potential health impacts be considered as part of this. Impacts and associated mitigation measures also require constant review and adjustment and thus the plan, do, check review management cycle must be followed, in sustainably addressing health impacts and associated management measures.

Recommendations for mitigation/management will focus on identification of measures that can be taken to reduce potential impacts to as low as reasonably practicable (ALARP) both from a technical and financial perspective. These are generally presented based on a hierarchy of controls with avoidance as the priority where possible, as presented in the following (in order of importance) list:

- avoid at source – remove the source of the impact;
- abate at source – reduce the source of the impact;
- attenuate – reduce the impact between the source and the receptor;
- abate at the receptor – reduce the impact at the receptor;
- remedy – repair the damage after it has occurred; and
- compensate – replace a lost or damaged resource with a similar or a different resource of equal value.

The measures described above promote pre-execution advice to the project which can be incorporated in the design phase and support the use of HIA as a decision making tool. This can include a range of alternatives for example location of specific project infrastructure and selection of equipment, social development priorities etc. It is easier to propose changes at the front end rather than promoting challenging and expensive retrofits.

For the purposes of the project, mitigation measures have been divided into three categories based on the focus of the intervention, namely:

- **Project impact mitigation:** Interventions required in order to mitigate the future health impacts of a project on PACs. Due to their influence, these mitigation measures are deemed as required and not merely voluntary contributions, and thus the precautionary principle will apply where relevant. These may also be regulatory requirements.

- **Occupational health, safety and environmental management:** Interventions aimed at ensuring a healthy, safe and productive workforce. In addition, it considers aspects that can be controlled in the workforce to prevent community health impacts occurring from a health, safety and environmental perspective.
- **Strategic community investments:** Interventions suggested that will improve the existing health status of the communities. These can be in the form of negotiated commitments made by the project proponents as well as extended benefits, which should bring about health benefits and improve social license to operate in the receptive communities. It should also promote project sustainability if developed based on sustainability principles.

The current HIA will have limited focus on these strategic community investments as it is anticipated that these will be developed as part of a community development plan, which is out of the current HIA scope. It is however noted that there is often an overlap between required mitigation measures and extended benefits, which are generally based on negotiated commitments to maximize potential health benefits in the potentially affected communities.

The management and mitigation measures proposed in the impact assessment will form part of the framework CHMMP that will form the final commitments to be included in the ESMP.

4.2.7 Monitoring and Audit

The CHMMP will ensure that the associated mitigation measures and interventions are meeting the desired objectives. Any monitoring system must have sufficiently sensitive and specific key performance indicators (KPIs) so that changes in key objective endpoints can be documented in an appropriate and timely manner.

Numerous KPIs have been established for monitoring health performance indicators and for the purposes of the HIA, these are divided into three categories [8]:

- **Structural-** buildings, equipment, drugs, medical supplies, and vehicles; personnel; money; and organizational arrangements;
- **Process-** assess the effectiveness of the actions, and identify who is involved and whether the various programmes are working; and

- **Outcome-** measures the long-term effects of a program. The five Ds (death, disease, disability, discomfort, and dissatisfaction) are typically considered outcome measures. The morbidity and mortality outcome indicators are calculated as rates.

4.2.8 Stakeholder Consultation

Stakeholder engagement and consultation is a crucial element of the HIA process. Project stakeholders are defined by the IFC as 'those individuals and groups that are affected by, or express an interest, in the Project' [7]. Stakeholder consultation in an impact assessment improves the quality and relevance of the findings by providing insights into the likely positive and negative health impacts both from stakeholder experience of the locality, as well as from their experiences of other projects [8]. Stakeholders can inform the project about what they value, as well as recommending, and potentially collaborating in the implementation of the most acceptable ways of mitigating, enhancing and monitoring the potential health and well-being impacts of any developments.

5 Health Impact Assessment Process and Activities

5.1 Introduction

This section describes the HIA activities for the Project and includes a description of desktop work, fieldwork and stakeholder engagement. As the process of HIA is inherently iterative, activities may continue beyond the current reporting in this document, with additional information and mitigation measures added, as they become available. However, for the purposes of the HIA the baseline data collected in the different activities and associated community health profile will serve as the point of departure for the assessment and subsequent surveillance efforts.

The HIA is considered a prospective assessment, although some direct and indirect impacts related to the exploration and early works of the Project are evident in KDA. These include the construction of the escarpment road and the influences of Project induced in-migration. These are discussed in the impact evaluation (section 8), but for the purposes of the HIA, the baseline data collected in the different activities and associated community health profile, will serve as the point of departure for the assessment and subsequent surveillance efforts.

5.2 Health Impact Assessment Process and Activities

5.2.1 Level of Health Impact Assessment

The form of the current HIA has followed a rapid appraisal approach (in yellow in Table 3), but this does not assume that a superficial process was followed, rather that no new Project specific primary quantitative data was collected and stakeholder participation was not extensive. The decision to select a rapid approach was based on timing and other constraints, but it was recognised that the Project met the criteria for a Category A Project (as defined by the IFC). Projects of this nature generally require the collection of robust primary data to support the required evidence to model impacts, and support surveillance activities to monitor and evaluate the predicted impacts and success of mitigation measures.

The current HIA has focussed on analysing available secondary data and primary qualitative data collected using participatory means. While this approach allows for a detailed description of the health baseline and an understanding of specific vulnerabilities in the study area, it does not describe specific indicators at the level of the PACs in detail. These data gaps and opportunities for data gap closure will be highlighted in the impact assessment

chapter as conditions subsequent to the HIA. This will include recommendations for primary quantitative data collection in the form of a cross sectional household survey including collection of biomedical, environmental health and questionnaire based data.

5.2.2 Completed Health Impact Assessment Activities

The HIA process was initiated in February 2015, and included desk and field components as discussed below.

5.2.2.1 Desktop Literature Review

The deskwork initiated in January 2015 and completed in April 2015, consisted of a literature review of secondary data from standard source literature that was available in the public domain. The review was conducted based on the preferred IFC ‘reductionist approach’ of evaluating thirteen EHAs to ensure the review was systematic.

The review focussed on the national, provincial, district and (where available) local level, in a step down fashion. Core documents that were consulted include the World Health Organisation Country Cooperation Strategy for Uganda [20], the Uganda Demographic and Health Survey 2011 (UDHS) [21], the Annual Health Sector Performance Report 2012/13 [22], Uganda AIDS Indicator Survey 2011 [23], Uganda Malaria Indicator Survey 2009 [24], the National Household Survey 2009/10 [25] , and the 2002 Population and Housing Census [26].

The findings are summarised in the baseline status presented in section 7.

5.2.2.2 Field Work and Stakeholder Engagement

A preliminary field visit was conducted by Dr Mark Divall and Dr Izak Olivier from the 16th to 20th March 2015 with an objective to understand the potential health impact areas of concern, logistics in the study area, meet with key stakeholders and to plan the subsequent field work. Activities included introductory meetings with senior management from CNOOC Uganda, the Hoima District Health Management Team (DHMT) and a field visit along the proposed pipeline route and to the KDA. In addition, communities in the study area were visited, which included an introductory meeting with the village leadership structures and a short walk through of public health facilities. Plans for follow up meetings and engagements

were made at this stage and an overall impression of the Project obtained. The activities of the preliminary activity are summarised in Appendix B (progress report).

A second field visit was completed by three consultants from SHAPE/Golder namely: Dr Izak Olivier, Dr Milka Owuor and Ms Annette Kobusingye, from the 25th April to 1st May 2015. They were supported by CNOOC site team including senior management, community liaison and health departments. The focus of the visit was collection of primary health data through participatory methods and continued stakeholder engagement at the district and community levels. Prior to the field visit, a formal letter was submitted to the Hoima DHMT to request for consultation and inform the stakeholders about the planned visit and the activities (attached in Appendix C).

Stakeholder workshop and key informant interviews

A consultation workshop with the Hoima DHMT was held on the 27th April 2015. A frank discussion was held on the existing health structures, health strategy, needs/challenges, and BOD in the district and the study area. In addition, the potential impacts of the Project were discussed.

The meeting also served as an opportunity to seek permission to conduct key informant interviews (KIIs) with focal programme staff in the district, as well as to gather and review health statistics and information from the district and local level. This also included an assessment of the health facilities in the study area.

A list of key informants consulted at the district and local levels is attached in Table 6.

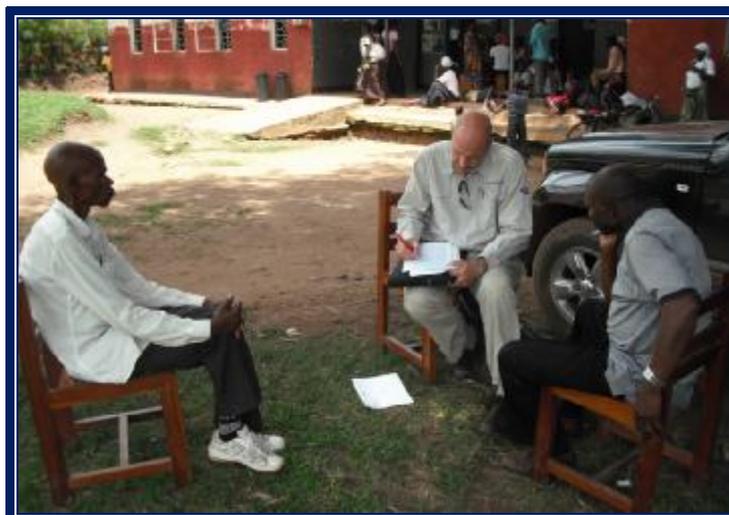


Figure 8:Key informant interview

Table 6: List of key informants consulted at the district and local level

| Name of Key Informant | Function of Key Informant | Date of Interview |
|---|---|--------------------------|
| HIA Introductory meeting - Hoima DHMT | | |
| Kiiza B. Deo | Secretary for Health, Hoima District | 17.03.2015 |
| Fredrick Byenume | District Health Inspector, Hoima District | |
| David Kabagambe | Bio-statistician, Hoima District | |
| Kiiza Byaruhanga | District councillor | |
| Fred Kugonza | In Charge - Buhanguzi Health Centre | |
| Patricia Asimwe | HMIS, Hoima DHMT | |
| Isaac Bitamale | CDO-Community Department | |
| HIA Introductory meeting - Kabaale Health Centre | | |
| Bachia Grace | Nursing Officer | 17.03.2015 |
| Hope Jamillah | Enrolled Nurse | |
| HIA Introductory meeting - Kaseeta Health Centre | | |
| Kunihira Mary | Enrolled Nurse | 17.03.2015 |
| HIA Introductory meeting - Kibale Community | | |
| Christus Ataremwe | Community representative | 17.03.2015 |
| HIA Introductory meeting – Ikamiro Community | | |
| Community Leadership | | 17.03.2015 |
| HIA Introductory meeting - Buhuka Health Centre | | |
| Ahaisibwe Innocent | Enrolled Nurse / In Charge | 18.03.2015 |
| HIA Introductory meeting – Nsonga Community | | |
| Kaahwa Godfrey | Chairman - LC II | 18.03.2015 |
| Kyaligorica David | S/LC I | |
| Businge John | Vice Chairman - LC I | |
| Kagooro Felsisters | Councillor | |
| HIA Introductory meeting – Kiina Community | | |
| Kasani Gaki Mozamil | Chairman - LC II | 18.03.2015 |
| HIA Introductory meeting Kyangwali Health Centre | | |
| Ayebale Apolo | Clinical Officer | 18.03.2015 |
| Kule Milton | Pharmacist assistant | |
| Hoima District Health Management Team Workshop | | |
| Dr Francis W Mulwany | Hospital Director - HRRH | 27.04.2015 |
| Beo Kiiza | Secretary for Health and Education – Hoima District | |

| Name of Key Informant | Function of Key Informant | Date of Interview |
|---|--|-------------------|
| Mabwia Flavia | Assistant CA | |
| Annette Mutaganye | District HIV Focal Person | |
| David Timbigamba | DDI – Hoima District | |
| Conrad Mvume | Monitoring and Evaluation officer | |
| Annah Muhave | Marie Stopes Uganda | |
| Lutigard Nyamahunge | Bujumbura Health Centre | |
| Banage Jane | Bugahya HSD | |
| Patricia Assimwe | Hoima HMIS | |
| John Williams Byakagaba | Hoima District Planner | |
| Frederick Byemume | District Health Inspector | |
| Fred Kungonza | In Charge - Buhaguzi Health Centre | |
| Solomon Kwebiiha | Buhaguzi Health centre | |
| Dr Ddungo Mark | Infectious Disease Institute | |
| M Nakafeero | Infectious Disease Institute | |
| Joseph Kasuruba | Bunyoro Television | |
| Kamba Isaac | Agricultural program manager - Worldvision | 27.04.2015 |
| Wilfred Ndozireho | HMC Health Inspector | |
| Moses Rubanga | DHMT member | |
| Odong Saladin David | Malaria Consortium | |
| Kabaale Health Centre Assessment | | |
| Innocent Kusuma | Senior Clinical Officer / In Charge | 27.04.2015 |
| Isingoma James | Chairman – Kabaale village | |
| Hoima Regional Referral Hospital Assessment (HRRH) | | |
| Dr FW Mulwany | Hospital Director - HRRH | 28.04.2015 |
| Sr Rita Mbabazi | Senior Nursing Official | |
| Were Mbalaka | Hospital Administrator | |
| Kyangwali Health Centre Assessment | | |
| Nkenga Hakim | Senior Clinical Officer / In Charge | 28.04.2015 |
| Mwesigwa Amon | Public Health Dental Officer | |
| Gumisiza Peter | Medical Laboratory Assistant | |
| Ayesiga Willington | Medical Records Assistant | |
| Buhuka Health Centre Assessment | | |
| Ahaisibwe Innocent | Enrolled Nurse / In Charge | 29.04.2015 |
| Kaseeta Health Centre Assessment | | |
| Byaruwanga Swinous | Senior Clinical Officer / In Charge | 30.04.2015 |
| Bilia Festus | Health Representative - Kaseeta Council | |

Focus group discussions

In addition, focus group discussions (FGDs) were conducted in the study area. The FGDs served as an opportunity to understand how the communities form opinions on health, as well as providing an assessment of the health status and the health knowledge of local people. These were held with women and men. Where possible the groups were separated into older (30 years and above) and younger/youth groups.

The groups were interviewed using a semi-structured questionnaire, which allowed issues of concern to be addressed in a more efficient way. Responses were rapidly analysed to determine the major health themes. This approach allowed for a high-level understanding of the health challenges from both a biophysical and social health perspective. The FGDs were conducted primarily in the local languages and translators were used when necessary. 19 FGDs were conducted with details as shown in Table 7. Figure 9 and Figure 10 shows some images from the FGD sessions.

Table 7: Location, date, gender, age and number of participants of the FGDs

| Location | Date | Gender of participants | Number of participants | Age range of participants |
|---|------------|------------------------|------------------------|---------------------------|
| Nsonga village (including participants from Nsunzu village) | 27.04.2015 | Females (older) | 12 | 35-65 years |
| | | Females (young) | 18 | 16-29 years |
| | | Males (mixed) | 17 | 18-60 years |
| Kiina village | 27.04.2015 | Females (mixed) | 19 | 21- 50 years |
| | | Males (mixed) | 20 | 17-48 years |
| Kyakapere village | 28.04.2015 | Females (older) | 17 | 30-60 years |
| | | Females (youth) | 17 | 15-26 years |
| | | Males (older) | 19 | 30-78 years |
| | | Males (youth) | 17 | 17-24 years |
| Ikamiro village | 28.04.2015 | Males (mixed) | 18 | 24-68 years |
| Ngoma village | 28.04.2015 | Females (mixed) | 21 | 20-64 years |
| Kacunde village | 29.04.2015 | Females (older) | 15 | 27-63 years |
| | | Females (youth) | 15 | 15-29 years |
| | | Males (older) | 13 | 32-56 years |
| | | Males (youth) | 12 | 19-30 years |
| Kyarushesha village | 30.04.2015 | Females (mixed) | 14 | 18-46 years |
| | | Males (mixed) | 18 | 31-53 years |
| Kyarujumba village | 30.04.2015 | Females (mixed) | 12 | 21-52 years |
| | | Males (mixed) | 16 | 22-65 years |



Figure 9: Focus group discussion session with women in the study area, April 2015



Figure 10: Focus group discussion session with men in the study area, April 2015

6 Community Profile

6.1 Socio-Demographic Profile of the Study Area

In the 2002 national population census, Hoima District recorded a total population of 343,618 persons, comprising 50.5% males and 49.5% females (in total 1.4% of the national population) [27]. Of these, 92% were Ugandan nationals and 8% were foreigners. The district recorded a population growth rate of 4.7% between 1991 and 2002, higher than the national rate of 3.2% [27]. Provisional results from the 2014 national population and housing census shows that the district population has increased to 573,903 persons, with a growth rate of 4.3% between 2002 and 2014 [28]. In the same period, Hoima Municipality recorded a population growth rate of 10.7%, the second highest nationally [28]. The district's population is projected to increase to 659,700 by 2016. The rapid increase in the population has been attributed to the high fertility rates, early marriage patterns (2% of males and 3% of females are married between the age 10 to 14) and immigration. The current population density in the district is estimated at 145 persons/km² [2].

The population of the district is predominantly rural and young, with children (under 18 years of age) comprising 55.3% of the total population. Nearly half of the population (46%) is younger than 15 years. The youth age-group (18-30 years) comprise approximately 23% of the district population [29]. A summary of the demographic statistics for Hoima District and Kyangwali Sub-County is shown in Table 8.

Table 8: Demographic indicators for Kyangwali Sub-County and Hoima District

| Indicator | Year | Kyangwali Sub-County | Hoima District |
|--|-----------|----------------------|----------------|
| Population (No.) | 2002 | 42,331 | 343,618 |
| | 2014 | 97,366 | 573,903 |
| Population growth rate per annum (%) | 1991-2002 | - | 4.7 |
| | 2002-2014 | - | 4.3 |
| Sex ratio (No. of males per 100 females) | 2014 | 104 | 99.8 |
| Total households (No.) | 2002 | 6,345 | 70,286 |
| | 2014 | 20,911 | 125,907 |
| Average household size (No.) | 2002 | 4.3 | 4.6 |
| | 2014 | 4.6 | 4.5 |

Based on census data from the Uganda Bureau of Statistics [26-28].

According to the SIA (2013), the number of households in the Buhuka Flats was estimated at 2,831. Household size ranged from 1 to 11 persons, with an average of 8 members per

household. The majority of households (68%) had 6-8 persons, to an estimate of 22,000 people [2].

| | Village Name | Estimated household count |
|----|--------------|---------------------------|
| 1 | Nsonga | 361 |
| 2 | Nsunzu | 598 |
| 3 | Kyabasambu | 127 |
| 4 | Kyakapere | 469 |
| 5 | Kiina | 273 |
| 6 | Busigi | 117 |
| 7 | Kyenyanja | 135 |
| 8 | Ususa | 261 |
| 9 | Kacunde | 231 |
| 10 | Senjonjo | 150 |
| 11 | Sangarao | 109 |
| | Total | 2,831 |

Figure 11: Estimated number of households in Buhuka Flats, 2013

The district is ethnically rich with nearly every tribe in Uganda represented. The Banyoro and Bagungu are the dominant tribes (about 77%), followed by the Alur and Jonam (7%), Bakiga (4%), and Lugbara and Aringa (3%) [2]. These patterns however differ in Buhuka Parish, where the main tribes are the Alur (44%), Bagungu (28%), Banyoro (11%) and Banyankole (5%). Others include the Congolese, Bakonjo and the Iteso [2]. The area is quickly becoming cosmopolitan because of influx of national and foreign population following the emerging developments in the oil industry. Importantly, the social baseline reported that over a third of respondents in the survey had moved into the area in the preceding 10 years. In addition, it was reported that tensions were on the increase between some tribal groups in the study area, driven by issues surrounding village leadership and land disputes. The majority tribal group in the social baseline was the Alur group (69%).

Agriculture (crop farming and livestock keeping) is the main economic activity, with over 80% of the households being actively engaged in it. Main food crops include bananas, sweet potatoes, pigeon peas, finger millet, sorghum, maize, cassava, beans, soya beans, cowpeas, groundnuts, yams and Irish potatoes. Cash crops grown in the area include tobacco, cotton, tea and coffee. Reliance on rain-fed agriculture limits production, with other challenges including; vermin, crop disease, poor farming practices and environmental degradation. Being richly endowed with natural water resources, fishing is another major economic activity, especially for communities in Buhuka Parish. The communities in Buhuka

flats were reported to be dependent on fishing for their livelihood and a number of challenges were noted including overfishing, destructive fishing techniques and general lack of controls. Small-scale industry (such as brick making, metal and wood works, etc.) and tourism also contribute to the local economy [2, 30].

The study area generally has a low level of social infrastructure provision, with limited accessibility to basic health care, education, clean water, electricity and sanitation [2].

6.2 Relevant Topography and Climatic Factors

The topography of Hoima District is generally undulating with relatively flat low-lying areas alternating with broad hills. Altitudes range between 900 m in the west near Lake Albert and 1,100 m in the eastern part of the district. Along the shores of Lake Albert there is a steep rocky escarpment separating the high lands and the narrow low lying strip along the lake at an altitude of 622 m [29]. The district has an area of 5,932km², of which 38% is occupied by surface water (mainly Lake Albert) and 12% (712.3km²) is forest. Other water bodies in the district include perennial rivers Kafu, Howa, Wambabya, Hoima and Waki [29]. There are also seasonal streams and rivers. A series of erosion valleys and gullies cut the escarpment and discharge runoff from the escarpment to the valley.

Lake Albert is an international waterway supporting a range of different livelihood activities, including fisheries and tourism, and is surrounded by an extremely sensitive ecosystem. Annual rainfall in the district ranges between 700 and 1,000 mm with a bi-modal distribution (March-May and August-November). Temperatures are high and vegetation varies from medium altitude moist forests, forest-savannah mosaic, to savannah and swamps [30].

The KDA lies in a rain shadow and has the least amount of rainfall in the district, typically less than 800mm, with the highest temperatures, typically reaching 30°C. Rainfall rises rapidly above the escarpment ranging from 1250-1500mm per annum before tapering off to 1000mm. Temperatures at the escarpment are generally lower than on the lakeshore, typically 18-25°C. The mean annual precipitation in the middle of Lake Albert is around 700 mm and 1200 mm at the top of the escarpment. Winds generally blow in southern and northern directions along Lake Albert. During rain seasons however, afternoon storms are characterized by easterly winds. Wind speeds of up to 20m/s are common in the area [3].

6.3 Project Potentially Affected Communities

Based on the information to hand, the PACs are divided into seven different groups. These divisions have been created based on the heterogeneity of different potential impacts. Potential health impacts are likely to differ between the construction and operations phase, but there is unlikely to be a marked difference in the PACs, noting that the evaluation of potentially impacted areas requiring continued re-evaluation and revision as required.

The PACs are divided into the following groups below and shown spatially in Figure 12.

Immediate Study Area (KDA):

- PAC 1: Communities that is immediate proximity to KDA on Buhuka Flats, with communities either requiring physical resettlement or who will experience economic displacement. These include the villages of Nsunzu, Nsonga and Kyabasambu.
- PAC2: Communities that is immediate proximity to KDA on Buhuka Flats, with communities not requiring physical resettlement or who will not experience economic displacement.
- PAC 3: Communities outside of the immediate KDA, but located on Buhuka Flats. These include the larger settlements of Kiina and Kyakapere, as well as smaller settlements of Baghdad and Juba.

Broader Area:

- PAC 4: Communities located near the Lake Albert shoreline, but not in the KDA or Buhuka Flats. These include communities to the north and south of Buhuka Flats such as Busigi, Kyenyanja, Ususa, Kacunde, Senjonjo and Sangarao

Immediate Study Area Escarpment and Pipeline route:

- PAC 5: Communities located at the top of the escarpment on the access road to the KDA. These communities have experienced influx and the area is likely to be the main location where additional Project induced influx is likely to occur. It includes the communities of Ikamiro, Ngoma and other smaller settlements around Kyangwali. Ngoma is the main trading post for the villagers from Buhuka Flats so has an important location.

Broad Study Area Escarpment, Pipeline route and Access Roads:

- PAC 6: Communities located at the top of the escarpment on the pipeline construction route to the proposed refinery site near Kabaale, and who will be physically relocated or economically displaced by the pipeline.
- PAC 7: Communities located at the top of the escarpment on the pipeline construction route to the proposed refinery site near Kabaale, who will have construction camps or roads in close proximity to the settlements.
- PAC 8: Communities located along the various transport corridors from Hoima to the KDA.

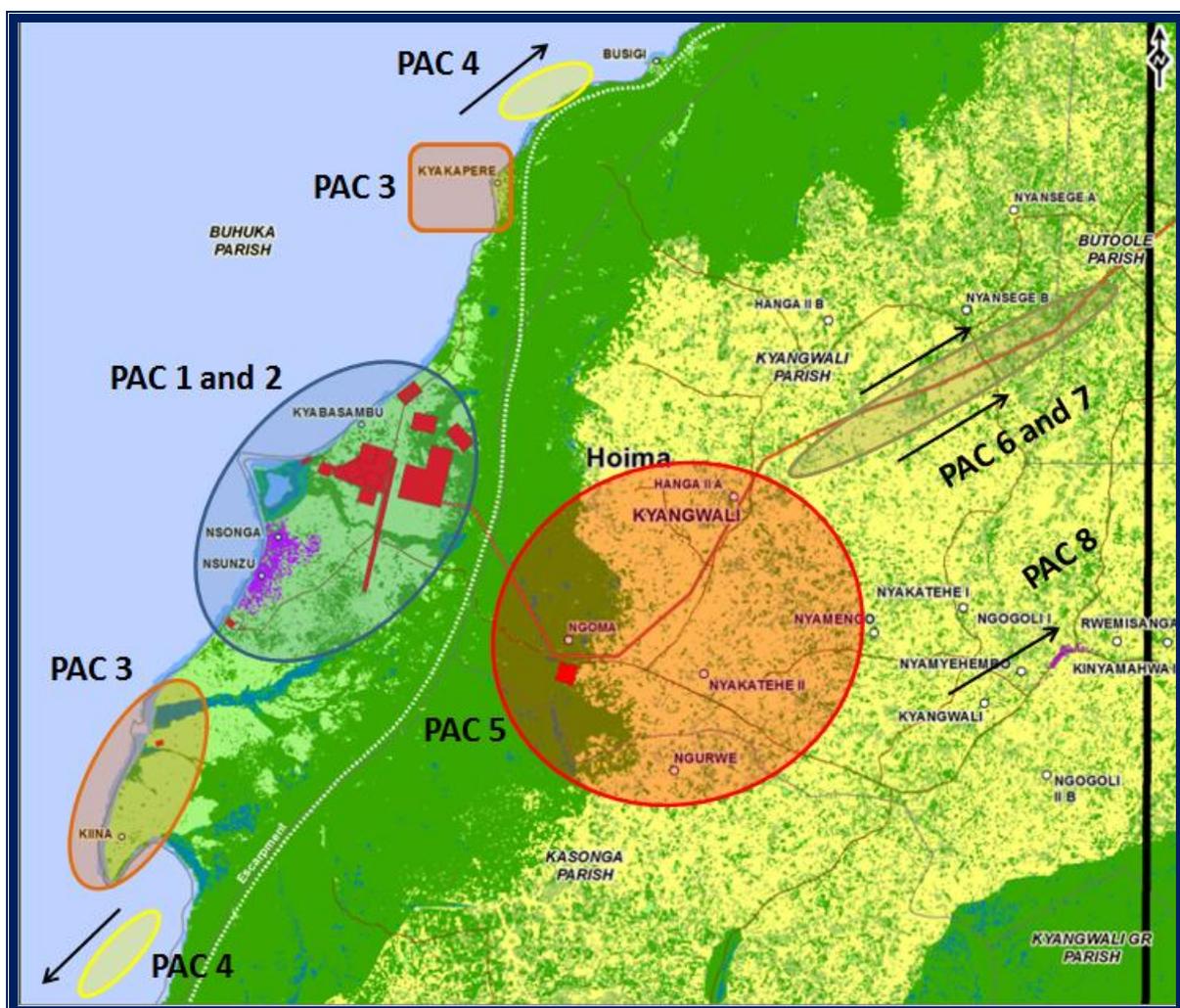


Figure 12: PACs identified as relevant to the HIA

Based on information from the SIA and considering potential health impacts, the following groups were considered as vulnerable [2]:

- Females and young girls are seen as particularly vulnerable groups in the local setting due to cultural practices;
- single mothers and widows;
- orphans;
- elderly
- physically disabled;
- migrants without access to land;
- ethnic minorities; and
- very poor people.

7 Baseline Health Status

7.1 General Health Profile of the Country

In the 2002 national population census, Uganda recorded a population of 24.4 million with a gender ratio of 95 males per 100 females, and an annual population growth rate of 3.3% [26]. Provisional results from the 2014 national census put the population at nearly 35 million people [28] - almost double that of 1990. The population is predominantly young (49% below 15 years) and rural (only 16% live in urban areas) [31].

Uganda has experienced two decades of strong economic growth, with poverty decreasing significantly from 31% in 2005-06, to 22% in 2012-13 [32]. However, with a Gross Domestic Product (GDP) per capita of \$570, Uganda remains a very poor country and far from the middle income status it aspires to achieve [32]. It ranks in the low Human Development Index (HDI)² category, at position 164 out of 187 ranked countries [33].

The country has made good progress towards achieving the MDGs such as promoting gender equality and empowering women, ensuring environmental sustainability and developing a global partnership for development. However, health-related MDGs, including child and maternal mortality rates, remain slow, while progress that had been achieved in regards to HIV/AIDS, malaria and tuberculosis control has reversed in some aspects. Uganda is also off-track on the MDGs related to universal primary education. Performance differs across regions of the country, with the North and Northeast lagging in most indicators, while the Southwest performs worst on health-related indicators. A significant percentage of the population relies on subsistence agriculture, a major source of vulnerability [32].

The BOD in Uganda remains predominantly through communicable diseases, although there is a growing burden of non-communicable diseases (NCDs) including mental health disorders. Maternal and perinatal conditions also contribute to the high mortality. Neglected tropical diseases (NTDs) remain a big problem in the country affecting mainly rural poor communities. Furthermore, there are wide disparities in health status of the population, closely linked to underlying socio-

² The HDI is a summary measure for assessing long-term progress in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living.

economic, gender and geographical disparities [20]. Table 9 provides a brief summary of the health profile of the country in comparison to the African and global contexts [31, 34].

Table 9: Key health and socio-demographic indicators for Uganda

| Indicator | Year | Uganda | Africa average | Global average |
|--|------|---------|----------------|----------------|
| Population size (millions) | 2014 | 34.9 | - | - |
| Life expectancy at birth (years) | 2012 | 57 | 58 | 70 |
| Healthy life expectancy at birth (years) | 2012 | 49 | 50 | 62 |
| Population living in urban areas (%) | 2012 | 16 | 39 | 53 |
| Gross national income per capita (PPP int. \$) | 2012 | 1,120 | 2,594 | 12,018 |
| Total fertility rate (per woman) | 2012 | 6.0 | 5.0 | 2.5 |
| Adult mortality rate (probability of dying between 15 and 60 years per 1000 population) male: female | 2012 | 389:360 | 343:298 | 187:124 |
| Infant (under-1) mortality rate (per 1000 live births) | 2012 | 45 | - | - |
| Under-5 mortality rate (per 1000 live births) | 2012 | 69 | 95 | 48 |
| Maternal mortality ratio (per 100,000 live births) | 2012 | 360 | 500 | 210 |
| Adult literacy rate (%) | 2012 | 73 | - | - |
| Incidence of malaria (%) | 2012 | 24.6 | 18.6 | 3.8 |
| HIV prevalence (%) | 2012 | 4.3 | 2.8 | 0.5 |
| TB prevalence (per 100,000 population) | 2012 | 175 | 303 | 169 |

Compiled from various sources including World Bank [32], WHO [31], UNICEF [34], Uganda Bureau of Statistics [28, 35], and Uganda Demographic and Health Survey [21].

7.1.1 Mortality and Burden of Disease

The disability-adjusted life year (DALY) is a measure of overall disease burden. It is designed to quantify the impact of premature death and disability on a population by combining them into a single, comparable measure. The DALY is an important indicator as it is a health gap measure that extends the concept of potential years of life lost (YLL) due to premature death to include equivalent years of 'healthy' life lost by virtue of being in state of poor health or disability, quantified as years lived with disability (YLD).

The BOD in the country is reflected in the fact that 68% of premature deaths are due to communicable diseases, 18% are due to NCDs, while the rest (13%) are due to injuries [31].

According to the 2010 global BOD estimates, the leading causes of disease burden and premature deaths in Uganda are HIV/AIDS, malaria, and lower respiratory infections, respectively [36]. Compared to a baseline of 1990, diarrhoeal diseases, sleeping sickness, measles and tetanus recorded the greatest decline in cause of mortality, while road injury and interpersonal violence showed the highest increase (Figure 13).

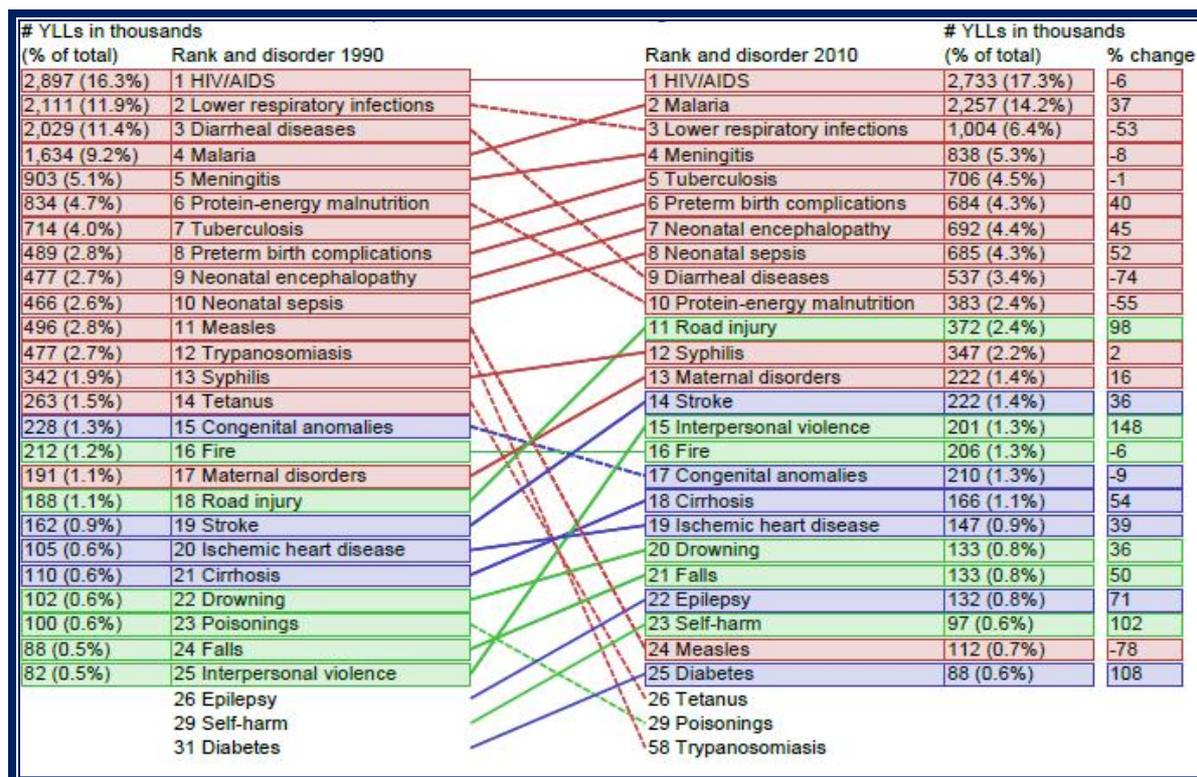


Figure 13: Rank of the leading causes of premature deaths in Uganda, 2010

7.1.2 Health System in Uganda

Human resources and health infrastructure are the most important pillars of a health system. The World Health Report released in 2006 highlighted that while Africa is plagued with 24% of the world's disease burden, it only has 3% of the world's health workers [37].

Health infrastructure

The National Health System (NHS) in Uganda is made up of the public and private sectors. The public sector includes all government health facilities while the private health sector consists of the private not for profit providers, private health practitioners, and the traditional and

complementary medicine practitioners. The private sector contributes to about 50% of the health care delivery [38].

Public health provision is decentralised with districts and health sub-districts (HSDs) playing a key role in the delivery and management of health services at those levels. Service delivery is organised in tiers starting from the community level up to the national level as described below [38]:

- i) Health Centre I/Village Health Teams (VHTs) are the first level of health care delivery and mainly consist of volunteers in villages facilitating health promotion, service delivery, community participation, and empowerment.
- ii) The next level are the Health Centres (HCs) II, III and IV. HC IIs provide a first level of interaction between the formal health sector and communities. They provide outpatient and community outreach services as well as linkages with VHTs. HC IIIs provide basic preventive, promotive and curative services. HC IVs provide HC III broad services plus some emergency care. HC IVs were introduced in some areas as a strategy to address poor access to health care services.
- iii) At the third level are the general hospitals, which provide HC III broad services such as in-patient, surgeries and blood transfusions. They also conduct research and training.
- iv) The fourth level consists of the Regional Referral Hospitals (RRHs) which provide more specialized clinical services and are also involved in teaching and research.
- v) The National Referral Hospitals (NRHs) are the highest and most comprehensive level. They provide advanced tertiary services in addition to all the other clinical services.

All hospitals are expected to provide support supervision to lower levels and to maintain linkages with communities through Community Health Departments. In 2011, the country had 64 public hospitals: 2 NRHs, 11 RRHs and 51 general hospitals (Table 10). The referral system is from the lowest to the highest level of care [38, 39].

Table 10: Structure, characteristics, and size of the health care system in Uganda, 2011

| Type of Facility | Physical Structure and Services | Clinical Personnel | Location | Population Served | | Number of Facilities | | | |
|--|---|------------------------|------------|-------------------|------------|----------------------|-------------------------------|---------------------------|--------------|
| | | | | Standard | Current | Gover- n- Ment | Private Not-For- Profit | Private For- Profit | Total |
| Health Center I (A.K.A. Village Health Team) | None | N/A | Village | 1,000 | N/A | N/A | N/A | N/A | N/A |
| Health Center II | Stand-Alone Facility, Outpatient Services | Nurse | Parish | 5,000 | 14,940 | 1562 | 480 | 964 | 3,006 |
| Health Center III | Inpatient Facilities (Maternity and General Ward) and Laboratory/Microscopy | Clinical Officer | Sub-County | 20,000 | 84,507 | 832 | 226 | 24 | 1,082 |
| Health Center IV | Outpatient and Inpatient Services, Wards, Operating Theatre, Laboratory and Blood Transfusion Services | Doctor | County | 100,000 | 187,500 | 12 | 1 | 177 | 190 |
| General Hospital | Hospital, Laboratory, and X- Ray | Doctor | District | 500,000 | 263,157 | 64 | 56 | 9 | 129 |
| Regional Referral Hospital | Specialists Services | Doctor, Specialists | Region | 3,000,000 | 2,307,692 | | | | |
| National Referral Hospital | Advanced Tertiary Care | Doctor, Specialists | National | 10,000,000 | 30,000,000 | | | | |
| Totals | | | | | | 2,470 | 763 | 1,174 | 4,407 |

Source: Government of Uganda, Health Sector Strategic Plan, 2009/11–2014/15; HSSP 2010/11–2014/15.

Human resource for health

The government of Uganda and the Ministry of Health (MoH) were among the first health systems in Africa to recognise the importance of human resources for health (HRH) and the crisis presented by the situation with regard to HRH numbers, distribution, and management. To meet the MDGs, the WHO has determined that 23 skilled clinical health workers per 10,000 population is the minimum ratio required to provide a basic standard of health care. In 2011, the HRH ratio in the country stood at approximately 18/10,000. While this ratio represents a considerable improvement over the recent years (compared to 13/10,000 in 2005), human resource is still a major challenge for the country with the deficit (in 2011) standing at approximately 11,000 skilled health workers [38, 39].

A summary of the HRH in Uganda compared to the Africa Region is provided in Table 11 [40].

Table 11: Densities of health workers per 1,000 population in Uganda (2005)

| HRH Category | Number | Density per 10,000 population (Uganda) | Density per 10,000 population (Africa Region) |
|-----------------------------|---------------|--|---|
| Physicians/doctors | 2,209 | 0.8 | 2.2 |
| Nurses and midwives | 19,325 | 7.2 | 11.7 |
| Dentists and technicians | 363 | 0.1 | 0.4 |
| Pharmacists and technicians | 688 | 0.3 | 0.6 |
| Environ, and public health | 1,042 | 0.4 | 0.5 |
| Laboratory technicians | 1,702 | 0.6 | 0.6 |
| Other health workers | 3,617 | 1.4 | 1.7 |
| Management and support | 6,499 | 2.4 | 4.1 |
| Total | 35,445 | 13.3 | 26.3 |

7.1.3 Health Profile of the District and Study Area

In 2013, Hoima District had a total of 54 health units including a government RRH with capacity for 200 beds [2]. Despite the high number of health units, access to health care in the district remains a key challenge and is hampered by factors including geographical barriers such as steep escarpments and poor road infrastructure. Table 12 [2, 29] and Appendix G gives a summary of the health profile of the district compared to the national average. The more detailed section in Appendix G represents data reviewed from the district health reports and statistics.

Table 12: Key health indicators for Hoima District, 2010/2011

| Indicator | Hoima District | Uganda |
|--|----------------|--------|
| Life expectancy at birth (years) | 51.7 | 46.3 |
| Fertility rate (%) | 6.9 | 6.6 |
| Infant Mortality Rate (per 1000) | 88 | 88 |
| Child Mortality (under 5 years/1000) | 85 | 129 |
| Maternal Mortality (per 100 000) | 437 | 505 |
| Percentage of females aged 15-49 years (%) | 21.6 | 43.6 |
| Stunting prevalence (%) | 26.5 | 39 |
| Wasting prevalence (%) | 8.5 | 4 |
| Under weight prevalence (%) | 19.5 | 24.5 |
| Total goitre rate (%) | 25.7 | 33.8 |
| HIV prevalence rate (%) | 6.4 | 6.1 |
| Population per doctor | 49,920 | 15,678 |

Appendix F outlines a summary of data collected from district routine health management information system (RHMIS). It was only possible to get data from 2012-2014 and there were numerous challenges in harmonizing the data. Analysis and a narrative on the data are presented in the description the EHAs in section 7.2.

A summary of the distribution between the different levels and ownership of the health facilities is shown in Table 13.

The challenges to the district's health sector as reported in the current District Development Plan (2011/12-2015/16) include [29]:

- Understaffing for health facilities and the district health office.
- Lack of proper accommodation for medical staff at health facilities.
- Limited funding of the sector despite inflation and population growth.
- Physical inaccessibility to some places, which have the highest disease burden.
- Lack of medical equipment.
- Poor referral system and lack of transport for referred emergency patients
- Lack of community ownership/involvement in health related activities

Table 13: Summary of health facilities in Hoima District, 2013

| Facility level/ Ownership | Government | NGO | Private | Total |
|----------------------------------|-------------------|------------|----------------|--------------|
| Regional Referral Hospital (RRH) | 1 | 0 | 0 | 1 |
| Health Centre IV (HCIV) | 2 | 0 | 0 | 2 |
| Health Centre III (HCIII) | 27 | 5 | 1 | 33 |
| Health Centre II (HCII) | 12 | 6 | 0 | 18 |
| Total | 42 | 11 | 1 | 54 |

N/B: Village Health Teams (VHT) with limited diagnostic, curative and health education responsibilities are designated as level I HCs.

Local health infrastructure:

The study area specifically is served by four level III HCs – Kabaale HC, Kaseeta HC, Kyangwali HC and Buhuka HC. At the time of this survey, Kyangwali HC was in the process of being upgraded to a HC- level IV, with the transition complete in July 2015. More detailed description of the local facilities is described in section 7.2, and Appendix E.

7.1.4 Impacts of Oil Discovery in Lake Albert Basin

Uganda's oil was first discovered in 1938 [41, 42], but it is only in recent years (specifically in 2006) that commercial viability of the resource was confirmed, making oil production a near reality. The main focus is the Albertine Graben (Rift Basin) about 500 km long and 45 km wide, in the Western region of the country [41, 42]. Production is not expected to start until 2016-17, but oil is already central to the country's long term planning agenda, as well as a prominent political issue. Legislation is being passed, and the government is presenting a vision of a country transformed by oil [42]. There is a lot of optimism from the population with calls to emulate Norway's and Botswana's success [43], and avoid the 'resource curse' that has been associated with renowned oil producing countries in Africa, where the link between resource wealth and conflict is well documented [41].

Tullow Oil Plc, Total, and CNOOC are currently the three key oil companies involved in Uganda's oil industry [41, 42]. Founded in Ireland in 1985, Tullow is listed on the London and Irish Stock Exchanges and has operations in Europe, South America, Asia, and Africa. CNOOC Uganda Limited is a subsidiary of CNOOC Limited, a Chinese state-owned oil company formed in 1982. It is currently listed on both the Hong Kong and New York Stock Exchanges and has grown to be a major player in the oil industry with operations or properties in Asia (primarily China), Iraq, Australia, Nigeria, USA, Canada and Argentina. Present in Uganda as Total Exploration and Production, the outfit is a subsidiary of the global oil giant Total, a French company founded in 1924 and listed on the Paris and New York Stock Exchanges [42]. The three companies share a one-third stake across three oil blocks in the Lake Albert region.

While the oil discovery has come with a lot of excitement and hope, there are already concerns and impacts attributed to it. These are largely social impacts as highlighted below.

Governance, economy and domestic expectations

Oil discovery in Uganda has brought to light a range of governance challenges [41] and high domestic expectations [41, 43]. At the national level, there are expectations of increased prosperity as a result of development of socio-economic infrastructure, improved quality of life, and future economic sovereignty [43]. The local communities are particularly concerned with maintaining and protecting land rights as well as the equitable distribution of oil revenues and hope that the government delivers effective programmes, laws and interventions that work for

the community [44]. In response, the government has developed laws and policies to address the technical issues and guide the emerging oil sector. The National Oil and Gas Policy of 2008, has the eradication of poverty and creation of lasting value to society as its two overarching goals. It has pledged to take into account the interests of local communities where oil and gas production is undertaken. There are also calls to keep the economy diversified and avoid future over-reliance and dependency on oil [43].

Land, food security, employment and livelihood

Reports [45, 46] indicate that the oil discovery has already led to changes in ownership of land, conflict, and displacement. Communities in the Albertine region are dependent on crop agriculture, livestock rearing, hunting, fishing and forestry, all of which are impacted by the oil activities. Due to the high level of poverty in the area, (38% depend on less than 1 USD per day), the communities are vulnerable to economic shifts and are slow to adopt alternative livelihood sources.

Population influx

The region is experiencing population influx of migrants looking for opportunities in the emerging oil sector. A study by the National Land Alliance in 2011 found that 39% of the participants had migrated into the area in the preceding 5 years [45]. Influx can trigger population growth, increase land pressure, and escalate competition for limited social services such as education, health and access to potable water and sanitation.

Community cohesion and dynamics

Because of the oil discovery and the ongoing developments, a large number of men have been employed to support construction activities. This has attracted a camp following of commercial sex workers, mostly women and young girls. According to Hoima Municipality Mayor, “Sex trade was there before, but it was not evident. Now that there is oil, the trade is booming” [47]. Studies have documented the increase in transactional sex in the region, with clients coming from within and outside the country. Gender issues have also been highlighted, ranging from limited employment opportunities for women, patriarchy, to social tensions and conflicts [48]. These impacts can be attributed to changes in community structure, social cohesion and dynamics.

Benefits of the oil discovery include [45, 49]:

- Roads have been constructed or improved.
- Health centres and schools have been constructed.
- Improved local water sources because of construction of boreholes for the communities.
- Livelihood diversification projects including agro-enterprise, tree planting, training and capacity building etc.
- Employment, development projects and business opportunities have been created:
 - Investors and firms have opened branches in the area. Start-ups by local businessmen are also coming up.
 - Hoima municipality is already a beneficiary of a 150 million-dollar World Bank project for infrastructural development.
 - Electricity generation projects.
- Improved land value.
- Greater market for local produce.

7.2 Environmental Health Areas

The next section describes the baseline health status in relation to the proposed Project with reference to the EHA framework. This is based on the national, regional and local baseline health data that was identified in desk and fieldwork and subsequent validation activities. The findings are summarised in the tables hereafter to provide a more succinct description of large amounts of data.

7.2.1 EHA #1 Communicable diseases linked to the living environment

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|--|--------------------------------------|---|--|
| Communicable diseases linked to the living environment | Housing and environmental conditions | <ul style="list-style-type: none"> Communicable diseases (e.g., acute respiratory infections, pneumonia, tuberculosis, meningitis, plague, leprosy, etc.) rely on fluid exchange, contaminated substances, or close contact to travel from an infected carrier to a healthy individual. Therefore, they are directly linked to housing design, overcrowding and housing inflation. <p><u>National and regional findings include:</u></p> <ul style="list-style-type: none"> In the 2009/10 National Household Survey (UNHS) [25], the average household size was recorded at 5.0 persons and this has remained more or less the same when compared with previous surveys. The average household size in the Western region was recorded at 5.1. Rural households are slightly larger than urban. The type of construction material (for a floor, roof or wall) of a dwelling can be viewed as an indicator of the quality of housing as well as an indicator of health risk. Floor materials such as earth, sand, and animal dung pose a health problem because they can act as breeding grounds for pests and may also be a source of dust. Findings from the 2011 UDHS showed that more than two thirds (69%) of housing in the country have floors made of earth, sand, or animal dung [21]. Only 1 in every 7 households (15%) in the country has access to electricity, with a large disparity between urban and rural households (55% versus 5%, respectively) [21]. The number of rooms used for sleeping gives an indication of the extent of crowding in households. Overcrowding increases the risks of contracting communicable diseases. Nationally, a sleeping room with more than two persons is considered to be overcrowded. The 2009/10 UNHS found that 44% of households used only one room for sleeping and that the average number of persons per sleeping room was 3.4. Only 3 out of every 10 households in the Western region had adequate number of sleeping rooms relative to the household | <p><u>Direct observation:</u></p> <ul style="list-style-type: none"> Housing in the Buhuka Flats predominantly consisted of traditional structures made of grass-thatched roofs, mud walls and earth floors (Figure 14). A few semi-permanent structures (made of iron-sheet roofing and mud/sand walls) could be seen, especially at the village centres. Most of the houses were small structures consisting of one or two rooms. The houses also appeared cramped together, poorly ventilated and with a potential risk for overcrowding. Housing in communities at the escarpments consisted of a mixture of traditional and semi-permanent structures - some made of brick walls and tin-sheet roofing. Away from the village centres, the structures were more traditional, detached and separated by farms. Cooking arrangements varied between households, with indoor (in a separate structure to sleeping rooms) and outdoor practices noted (Figure 15). There was extensive charcoal use (Figure 17). <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> Nearly all households in the study area used firewood for cooking, either indoors or outdoors. The area had no access to mains electricity supply, the main source of lighting being kerosene lamp. A few houses had small solar panels for electricity. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> The housing in the study area was generally of poor construction with poor quality materials being |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <p>population [25].</p> <ul style="list-style-type: none"> • Under 3% of all households in the district are connected or have access to electricity from the national grid. • Majority (96%) of the population use solid fuels (e.g., charcoal, wood, straw, shrubs, grass, crop residues, and animal dung) for cooking [21]. Cooking and heating with solid fuels can lead to high levels of indoor smoke, which consists of a complex mix of pollutants that can increase the risk of contracting respiratory infections. Children under-5 years are particularly vulnerable [50, 51]. • In the socio-economic baselines from KDA, it was reported that 99% of households use wood/charcoal as a source of energy. | <p>used. The majority of people reside in mud-and-wood walled houses with thatched roofs.</p> <ul style="list-style-type: none"> • Migratory communities living on the escarpment were reported to have much more basic tarpaulin covered structures. • Overcrowding was common in all areas with average densities of 6 to 8 people living in households reported. This was especially evident in the migrant population that includes Ugandan nationals from elsewhere as well as migrants from the DRC and Rwanda. • Significant influx was noted by most stakeholders in the health sector with the Hoima District population growth rate reported to be 4.7% in comparison with the national growth rate of 3.2%. This aligns well with the findings reported in the social baseline studies. • Kyarushesha and Kyangwali were singled out as two areas that are experiencing significant influx. • Influx was highlighted as one of the major health challenges in the Hoima District by both district health officials as well as health centre staff in the rural health centres. • Major impacts were identified as overcrowding and increase in communicable diseases. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> • On average, the four rural health centres that serve the study area recorded a 24% increase in outpatient load during the period from 2013 to 2014, with Buhuka HC and Kaseeta HC recording increases of 39% and 37% respectively. • During the same period, all rural health centres recorded an increase in ARI with Buhuka Health Centre recording an increase of 67% in pure patient numbers. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|--|--|
| | Tuberculosis | <ul style="list-style-type: none"> • Tuberculosis (TB) is an infectious bacterial disease, which most commonly affects the lungs. Transmission is through airborne droplet nuclei containing the infectious bacteria produced in the course of speaking, sneezing, and particularly coughing. • Crowding, poor ventilation, and duration of exposure increase the risk of transmission. HIV, malnutrition, and poverty are important risk factors for development of active TB disease. • National statistics include: <ul style="list-style-type: none"> ○ TB remains a major public health challenge with an annual incidence of 166 cases of all forms and a prevalence of 154 per 100,000 in 2013 [52]. The country is listed among the 22 high burden countries, which account for 80% of the global TB burden [53]. ○ Like most countries in sub-Saharan Africa (SSA), the country is battling with the dual epidemic of TB and HIV/AIDS. It is estimated that about 48%-54% of TB patients in the country are co-infected with HIV/AIDS [54, 55]. ○ The country has realised a slow but steady decline in TB incidence and prevalence rates and has achieved all its 2015 MDG targets for reductions in TB cases and deaths. ○ The 2014 global TB report indicates that Uganda recorded lower rates of treatment success at 77%, missing the WHO target of 85% [52]. However, this represented an improvement from 69% recorded in 2012 [53]. ○ On a positive note, Uganda exceeded the 90% target of enrolling HIV-positive TB patients on treatment [53]. ○ MDR-TB is also an emerging challenge, at a prevalence of 1.4% among new cases, and 12% of retreatment cases in 2013 [52]. The country has achieved relatively good treatment success rates for MDR-TB cases, estimated at 77% in 2013, surpassing the WHO target of 75% [52]. ○ TB services are well integrated into the general health care system and are further decentralised to community | <p><u>Findings from the FGDs:</u></p> <ul style="list-style-type: none"> • TB was not specifically mentioned among the leading disease concerns in the study area. However, due to the limited access to health care including TB diagnostics, the true burden of this illness in the local study area is not known, and may be under-estimated. • With the reported high prevalence of respiratory illnesses, the perceived high prevalence of HIV, and the potential risk of overcrowding in the communities, TB remains a top concern. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • Despite the ability to diagnose TB by microscopy in all but one (Buhuka HC) of the rural health centres evaluated, the majority of health workers did not consider TB to be a major health concern at present. • All health care workers (HCWs) did, however, voice concern about the possible increase in TB cases associated with the rising prevalence of HIV, population influx and poor housing conditions. • Only passive TB case detection was performed at all health centres at the time of the evaluation. • MDR-TB remains largely unrecognised with only one case reported in the Kyangwali Sub-County in 2014/2015. • In addition to low detection rates, anecdotal evidence suggests that between 30% to 40% of all TB cases default treatment. • The DOTS treatment program is no longer supported in study area due to lack of human resources and difficulty in accessing health care. Instead, TB patients are provided with a monthly supply of drugs. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|--|--|
| | | <p>level to ensure active community involvement and ownership. The country adopted the Directly Observed Treatment Short-course (DOTS) strategy in the year 2000 [54].</p> <ul style="list-style-type: none"> ○ A National TB and Leprosy Programme (NTLP) oversees the provision and management of TB and leprosy services in the country. The NTLP management structure consists of central (national), regional (zonal) and district levels [54]. ○ Nearly two-thirds (62%) of the country's TB budget is financed by international partners, 7% is funded domestically, while 31% remains unfunded [56]. ○ Separate studies in rural and urban Uganda [55, 57] have revealed deficiencies in the public health awareness and health provider knowledge gap about TB symptoms, diagnosis and treatment. The studies have also highlighted the need for health system strengthening, including referral systems and implementation of the DOTS strategy. <ul style="list-style-type: none"> • Regional findings include: <ul style="list-style-type: none"> ○ TB care in Western Uganda faces a myriad of challenges including delays in diagnosis and initiation of treatment, knowledge gap among health workers in regards to TB management, poor referral practices between health units and lack of adequate funding resulting in the abandonment of some DOTS programmes [55]. ○ In Hoima District, VHT's have been identified as an important factor to the success of DOTS programmes [58]. | <p><u>RHMIS data</u></p> <ul style="list-style-type: none"> • According to RHIMS data the district BCG coverage is attaining between 65% and 116% of intended target populations in the 2014/2015 period. This is down from the limited data available from the 2013/2014 period that reflected coverage ranging from 112% to 120%. • Reported TB cases ranged from 25 reported by Kyangwali HC to 9 reported by Kaseeta HC and 15 reported by Kabaale HC. |
| | Leprosy | <ul style="list-style-type: none"> • Leprosy is a disease of poverty and overcrowding. The disease is caused by the slow-growing bacillus <i>Mycobacterium leprae</i>, which is not highly infectious. The incubation period of the disease is about 5 years but symptoms can take up to 20 years to appear [59]. The exact mechanism of transmission is not well known, but has been | <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • According to health officials in the study area, leprosy was not a major health concern. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> • Both Kyangwali and Kabaale HCs reported |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--|--|--|
| | | <p>linked to the respiratory route.</p> <ul style="list-style-type: none"> Whereas Uganda has achieved the target of elimination of leprosy as a public health problem, a number of new cases continue to be notified annually. The NTLP reports that at least 400 new cases of the disease are registered each year, though little attention is paid at health centres in terms of diagnosis [54, 60]. About two-thirds of the cases occur mainly in 11 districts in the South-eastern, North, and North-western regions of the country. New cases are unevenly distributed and this complicates control efforts [54, 60]. | <p>leprosy cases in the 2012/2013 and 2013/2014 periods.</p> <ul style="list-style-type: none"> Kabaale HC reported 1208 cases of leprosy during the 2012/2013 period, raising serious concern regarding the validity and accuracy of the RHIMS as this would represent the highest incidence of leprosy, worldwide. Kyangwali HC reported 320 cases of leprosy in the 2013/2014 period. |
| | Acute Respiratory Infections, Measles and Meningitis | <p><u>Acute Respiratory Infection (ARIs)</u></p> <ul style="list-style-type: none"> Pneumonia, a form of ARI that affects the lungs is the leading cause of death in children worldwide and affects adults of all ages. The most serious cases of pneumonia are bacterial (e.g., <i>Streptococcus pneumoniae</i>, <i>Haemophilus influenzae</i>, <i>Staphylococcus aureus</i>), but viral and fungal cases also occur [61]. Lower respiratory infection is a significant cause of disease burden nationally [36]. The burden is even greater among young children in whom ARIs particularly pneumonia, is the leading cause of death [31]. Statistics from the 2011 UDHS indicate that [21]: <ul style="list-style-type: none"> About 15% of children under-5 years showed symptoms of ARI in the two weeks preceding the survey. ARI symptoms were most reported in children aged 6-11 months (21%). The proportion of children with ARI symptoms ranged from 9%-12% in the Central region, 17% in the Western region, to 22% in the North region. <p><u>Measles</u></p> <ul style="list-style-type: none"> Measles is a highly contagious, serious viral disease transmitted through inhalation of airborne respiratory droplets from an infected person's cough or sneeze. A safe and cost-effective measles vaccine is available. | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> ARIs were consistently listed among the top five health conditions in the study area. In a few instances, pneumonia was specifically mentioned. Measles was reported to be quite common especially in the Buhuka Flats communities. Participants reported the condition as contagious and without a cure. Children under-5 years were most affected, and in some cases, death would occur due to limited access to health care. There was no mention of meningitis as a concern. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> Communicable, respiratory infections linked to living environment deemed to be the second most common cause of morbidity in the study area. ARIs place a significant burden on health services and personnel. Measles were reported to be common in most areas and communities served by the four rural HCs. Most HCs reported sporadic cases, but that occur regularly The last reported outbreak of measles occurred in Senjonjo in 2014. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|--|--|
| | | <ul style="list-style-type: none"> Measles immunisation coverage nationally is estimated at ~82% [34]. The country reported 2,027 cases in 2012, a decrease from 3,212 cases in 2011 [62]. Hoima District is prone to measles outbreaks; the latest occurred in February 2014 with at least 39 confirmed cases [63]. <p><u>Meningitis</u></p> <ul style="list-style-type: none"> Meningitis, an infection of the thin lining around the brain and spinal cord is transmitted through direct contact with respiratory droplets and it can be viral, bacterial or fungal in origin [64]. The highest burden of meningococcal disease occurs in an area of SSA known as the 'meningitis belt', which stretches from Senegal and Guinea in the West to Ethiopia in the East, with an estimated total population of 300 million people at risk [65]. The belt, experiences meningitis cycles whenever the dry season sets in, dust being a predisposing factor. A section of northern Uganda lies in the meningitis belt. This border area and adjacent districts have experienced frequent outbreaks of the disease. The most recent outbreak occurred in West Nile districts (March 2014) [66]. In 2009, a major outbreak of the disease in north-western Uganda resulted in at least 47 cases and 13 deaths in Hoima District [67]. | <ul style="list-style-type: none"> Meningitis is considered to be rare and meningococcal meningitis specifically has not been recognised in the study area. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> ARI (including pneumonia) account for 25% to 55% of OPD visits to the rural health centres in the study area. Buhuka HC specifically, demonstrated a high burden of disease with ARI representing 55% of the OPD case load while also recording an increase in case load of 67% from 2012/2013 to the same period in 2013/2014. Despite being included on the national expanded programme of immunisation (EPI) in 2013, none of the rural HC evaluated, had stock of the pneumococcal conjugate vaccine . Measles cases are sporadically recorded in all regions of the study area. Available RHMIS data reflected a measles immunization coverage of 87% as opposed to the national average of 82%. None of the key informants believed meningococcal meningitis to be a major risk in the study area. Only one case of bacterial meningitis was reported in the study area during the 2013/2014 period (Kyangwali HC) with 7 cases reported in the whole of Hoima District. This is likely to be under reported or diagnosed. Only one case of "Other Types of Meningitis" had been reported in the study area in the 2013/2014 period with 1376 cases reported in the whole district during the same period. |



Figure 14: Typical housing at a community in Buhuka Flats



Figure 15: Outdoor cooking using biomass fuels



Figure 16: Uncommon use of solar power



Figure 17: Extensive local use of charcoal

7.2.2 EHA #2 – Vector-related Diseases

| Environmental Health Area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|--|--|
| Vector-related Diseases | Malaria | <ul style="list-style-type: none"> • Malaria, a protozoan infection transmitted by female Anopheles mosquitoes causes a significant public health concern [68]. The burden is due to direct health impacts as well as cost of treatment and loss of income, schooling time, and labour [69]. • Malaria remains the leading cause of morbidity and mortality in the country and contributes significantly to the high BOD [21]. While those with low immunity e.g., pregnant women, children under-5 years and people living with HIV/AIDS are particularly vulnerable, the entire population is at risk of malaria infection. • Malaria in Uganda is almost entirely caused by <i>Plasmodium falciparum</i> spp, with the 2009 Uganda Malaria Indicator Survey (UMIS) reporting this species in 99% of cases. <i>P. malariae</i>, accounts for 0.2% of cases as a mono-infection but is more commonly found as a mixed infection with <i>P. falciparum</i>. Both <i>P. vivax</i> and <i>P. ovale</i> are rare and do not exceed 2% of malaria cases in Uganda. • The major anopheles mosquito species are <i>An. gambiae</i> and <i>An. funestus</i>. <i>An. gambiae</i> is the dominant species in most places, while <i>An. funestus</i> is generally found at higher altitudes and during the short dry seasons (September through November), when permanent water bodies are the most common breeding sites. <i>An. gambiae</i> s.l. and <i>An. funestus</i> feed and rest indoors, making LLINs and IRS viable vector control strategies. • Favourable temperature and rainfall patterns allow for intense vector propagation. • About 90% of the Uganda's population is at high risk of malaria infection, 10% at low risk. Malaria is highly endemic in 95% of the country, with 5% consisting of unstable and epidemic prone malaria [70] (Figure 18:) [71]. • Although transmission is largely stable, there is some seasonal variation associated with the rainy seasons in | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> • Malaria emerged as the leading cause of illness in the study area. • Awareness was limited in terms of cause and prevention of the disease. • Common misconceptions were that malaria is caused by drinking dirty water, working in the hot sun, and bathing in dirty water. Less common misconceptions were that malaria is caused by some birds, wild animals, and eating hot food on plastic plates. • In some instances, the link to a mosquito bite was correctly identified. • Some participants had the correct knowledge that malaria can be prevented by sleeping under mosquito nets, drainage of stagnant water and clearing of vegetation around dwellings. • Women in Nsonga village reported that malaria can be prevented by drinking a local herb called “Ekyibirizi” and Aloe Vera. The herbs were also locally used to prevent and treat malaria during pregnancy. • Over 60% of participants had at least one LLIN for their household. Majority of the nets were acquired from a government mass distribution campaign. Some said they got their nets from CNOOC. • Net utilisation was lower than ownership. Reasons for not using a net were varied: “the nets are torn”, “the nights are too hot”, nets do not fit on floors for those without beds, etc. • It emerged that in some of the farming communities, people use nets to cover seedlings, or gardens. Use of nets in fishing was reported, but this did not appear to be common. (See Figure 22). |

| Environmental Health Area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|--|--|
| | | <p>different geographic areas [24]. In some high altitude areas in the Southwest, West and East, malaria transmission is generally low, with more pronounced seasonality and occurrence of epidemics [71].</p> <ul style="list-style-type: none"> • Uganda has the of the highest recorded entomological inoculation rates globally, with over four infected bites per night in high transmission areas. • Other national statistics include: <ul style="list-style-type: none"> ○ Among children under-5 years, mortality due to malaria increased from 28% in 2011/12 to 30.7% in 2012/13 [22]. ○ The 2009 UMIS [24] reported that malaria is responsible for 30%-50% of outpatient visits, 15-20% of admissions, and 9-14% of inpatient deaths. About half (52%) of children under-5 years (in the survey) tested positive for malaria by rapid diagnostic test (RDT). ○ Findings from the 2011 UDHS [21] showed that six in ten households (60%) own at least one long lasting insecticide treated bednets (LLIN), while 28% of households have at least one net for every two people. ○ ITN use was reported at 35% for household population, 43% among children under-5, and 47% among pregnant women. ○ Malaria control and intervention strategy in the country includes [21, 24, 70, 71]: <ul style="list-style-type: none"> § Vector control measures including free distribution of LLINs - adopted in 2006, indoor residual spraying (IRS) - adopted in 2005; and use of larval control measures - adopted in 2012. IRS is limited to 10 districts in the North of the country as these have traditionally had the highest prevalence rates. In 2014, to manage potential insecticide resistance Uganda moved to a long lasting organophosphate product, with a single spray round per year. § Intermittent preventive treatment during pregnancy (IPT_p) using Fansidar. § Uncomplicated malaria case management with | <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • Malaria was noted as the main cause for morbidity and mortality in the study area. • Comprehensive community knowledge regarding malaria ranged from fair (Kaseeta and Buhuka Flats) to poor (Other lake-shore communities, Ngoma and Ikamiro) • Health seeking behaviour (HSB) regarding malaria was reported to be poor, especially in remote communities with poor access to formal health services. The majority of people in these communities would reportedly visit a traditional healer or unregistered private medical provider for treatment. • Traditional healing practices that negatively impacted on HSB were reported by HCWs. • The major impact of these practices was the delay in proper diagnosis and treatment as the belief is that the traditional healing practices has to be performed prior to utilising modern medicine. • On the Buhuka Flats, a certain religious leader forbids his followers to seek medical care in the diagnosis and treatment of malaria. • No surveys have been performed in the area but reported LLIN ownership varied 75% and 90%. • Perceived LLIN utilization, however, was rated much lower at between 45% and 50%. This was attributed to poor knowledge and poor risk behaviour. • Malaria control measures implemented include: <ul style="list-style-type: none"> ○ Mass LLIN distribution campaigns – last performed in 2014; ○ IPT_p; and ○ IEC outreach campaigns by HCW and VHT. • No vector control activities were reported anywhere in the study area. It was reported that vector control |

| Environmental Health Area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <p>artemisinin-based combination therapy (ACT) at the community level and in health units (with emphasis on improved diagnosis and management of severe malaria). Malaria diagnosis and ACT treatment is provided free for patients in the public health sector (since 2006).</p> <ul style="list-style-type: none"> § Early detection and response to malaria epidemics. § Information, education, communication (IEC) and social mobilisation to promote behaviour modification § Monitoring, evaluation and research to assess the extent of implementation of several of these malaria control strategies. <ul style="list-style-type: none"> • Regional findings show that: <ul style="list-style-type: none"> ○ Malaria is endemic in the entire Western Region. In the 2009 UMIS the prevalence rates in the Mid-Western Region was 43% [21]. ○ LLIN ownership in the region was at 53% in 2011 [21]. | <p>interventions would be welcomed by the population, provided that good sensitization was performed prior to implementation.</p> <ul style="list-style-type: none"> • IRS and larvaciding was not part of local control interventions in the study due to limited budgets and access challenges. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> • During the 2013/2014 and 2012/2013 periods, malaria accounted for between 35% and 54% of all OPD visits to the four rural HC in the study area. • In addition, the number of malaria cases seen at these HCs increased significantly between the 2012/2013 and 2013/2014 periods: <ul style="list-style-type: none"> ○ Buhuka – 33% increase ○ Kyangwali- 42% increase ○ Kaseeta - 54% increase ○ Kabaale - 6% increase • While this may be due to increased awareness, it is more likely that an increase in case load resulted in the upwards trend. • As reported in the RHMIS data, only between 52% and 68% of mothers who attended antenatal care at the HC in the study area received both doses of IPT. <p><u>Direct Observation:</u></p> <ul style="list-style-type: none"> • The environment on Buhuka Flats and the escarpment villages is conducive for the breeding of a number of species of <i>Anopheles</i> mosquitoes. • Waste management was poor and pooling of water was evident through environmental change. This can promote breeding of nuisance as well as disease transmitting mosquitoes. • Drainage ditches were cleared around community water holes to promote flow of water, and water was pooled in others due to lack of water in dry seasons (Figure 20 and Figure 21). |

| Environmental Health Area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | Arboviral diseases | <ul style="list-style-type: none"> Arthropod-borne viruses (arboviruses) have become significant global public health problems, with the emergence and re-emergence of certain diseases in recent years. These diseases are transmitted by several species of day-biting mosquitoes from the genus Aedes and Culex, which are generally domestic and breed in dirty/polluted water or in human-made containers [73]. More than 38 arboviruses have been documented in Uganda. Surveillance for these diseases stalled in the 1980s and was only recently reinstated through the Uganda Arbovirus Programme 2007 [72]. The most important arboviral diseases that may occur in the study area are dengue fever, chikungunya fever and yellow fever. Rift Valley fever remains a theoretical threat. <p><u>Dengue fever</u></p> <ul style="list-style-type: none"> Dengue is regarded as the most important arboviral disease in humans due to the large case numbers and the morbidity and mortality associated with the disease. Not much is known of the disease in Uganda, but it is a likely threat. <p><u>Yellow fever</u></p> <ul style="list-style-type: none"> Yellow fever (YF) poses a significant national health risk, although data on the disease remains scanty. The country's most recent outbreak occurred in October-December 2010 in the five districts in northern Uganda, near the border with South Sudan [74, 75]. There is currently no specific treatment for the disease and up to 50% of severely affected persons die. Vaccination is the key preventive measure against YF and disease surveillance remains central to control [76]. The vaccine is safe, affordable and highly effective and a single dose confers life-long protection. To prevent outbreaks, vaccination coverage must reach at least 60% to 80% of the population at risk [77]. <p><u>Chikungunya fever</u></p> <ul style="list-style-type: none"> Chikungunya is a significant risk in the country but the disease | <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> Arboviral disease was poorly recognised in the study area. Although some of the HCW were knowledgeable about the diseases, gaps in diagnostic capacity meant that the extent of the diseases in the region could not be quantified. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> Only two cases of YF was diagnosed in the whole of Hoima District during the 2012/2013 and 2013/2014 periods – both from Kaseeta HC. |

| Environmental Health Area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|-------------------------------|---|---|
| | Filariasis | <p>is less documented [78, 79]. In February 2014, a few cases were confirmed in Western Nile region [80].</p> <p><u>Lymphatic filariasis</u></p> <ul style="list-style-type: none"> Lymphatic filariasis (LF), commonly known as elephantiasis, is a neglected tropical disease (NTD) [81]. In East Africa, the filarial worm responsible for the infection is <i>Wuchereria bancrofti</i>. LF is transmitted from the bites of mosquitoes harbouring infective larvae. These are often from the same group that transmit malaria and most commonly, <i>An. gambiae</i> and <i>An. funestus</i>. The disease can also be transmitted by the Culex mosquito. The main vectors mainly bite indoors at night and breed in open, generally clean water. The disease is endemic in the country and shares similar environmental risk factors with malaria and overlap in geographical distribution [82]. Thus, LF control will benefit from malaria and vector control measures in this setting. The prevalence of the disease generally decreases with increasing altitude and almost non-existent in areas > 1300 m above sea level [83]. <p><u>Onchocerciasis</u></p> <ul style="list-style-type: none"> Onchocerciasis, or river blindness, is caused by vector borne filarial worm (<i>Onchocerca volvulus</i>). Microfilariae that are present in one person are transmitted to other people through the bite of an infected female blackfly, which belong to the genus <i>Simulium damnosum</i>. Nationally, onchocerciasis is distributed in discrete foci as shown in Figure 19 [84]. Hoima District is among the endemic areas that are targeted for mass drug treatment with ivermectin. A few years of annual mass treatment has reduced the community worm load in target areas by 52%-100% [85]. | <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> LF was reported to be rarely seen in the study area. It was known to exist in the Kibale district to the south of Hoima District. Onchocerciasis was well recognised throughout the study area with the highest burden reported to be in the Kabaale area (of Hoima district), towards the north. Bi-annual (April and October) Community Directed Treatment with Ivermectin (CDTI) campaigns have been implemented in the Kabaale HC catchment area, with the Kaseeta HC catchment area recently (reportedly) declared free of onchocerciasis. The CDTI campaigns were not implemented in the Kyangwali area, and although Buhuka Parish was a target area implementation has not occurred due to difficulty in accessing the area. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> Six cases of LF had been reported from the HCs in the study area between 2012 and 2014. During the same period, a total of 96 cases were reported in the whole district. During the 2012-2014 period, one case of onchocerciasis was reported in both Buhuka and Kaseeta HCs, while a total number of 280 cases were reported from the Kabaale HC. A total of 2048 cases were reported in the whole of Hoima District during the same period. |
| | Human African Trypanosomiasis | <ul style="list-style-type: none"> Human African Trypanosomiasis (HAT) commonly referred to as sleeping sickness, is a vector-borne protozoan disease caused by <i>Trypanosoma brucei</i> and transmitted through the | <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> HAT was not widely recognised in the study area. |

| Environmental Health Area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <p>bite of blood feeding tsetse flies (<i>Glossina spp.</i>).</p> <ul style="list-style-type: none"> HAT is endemic in parts of Uganda and both forms of the parasite occur in the country. <i>T.b.gambiense</i> is dominant in north-western Uganda and <i>Trypanosoma brucei rhodesiense</i> in the south-eastern region. Approximately 6.6% of the country (2.1 million people) is at risk of the infection [86]. The Western region, including Hoima District is at very low risk area for the disease. | <p><u>RHMIS:</u></p> <ul style="list-style-type: none"> No cases were reported in the study area between 2012 and 2014 while only 22 cases were reported in the whole of Hoima District between 2012 and 2013. No cases were reported during the 2013/2014 period. |

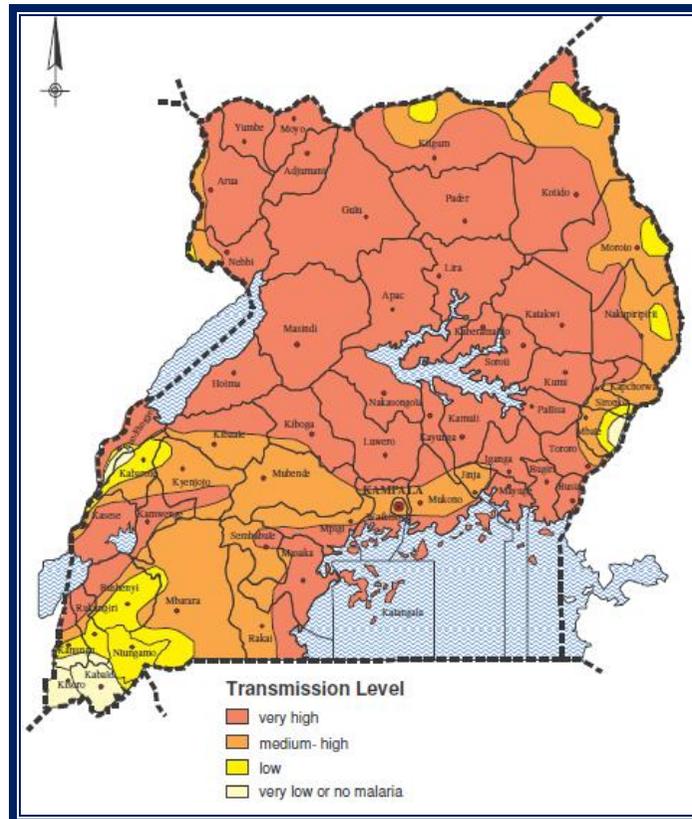


Figure 18: Distribution of malaria in Uganda (current)



Figure 20: Water dam in between houses in Kyarushesha



Figure 21: Clearing drainage ditches

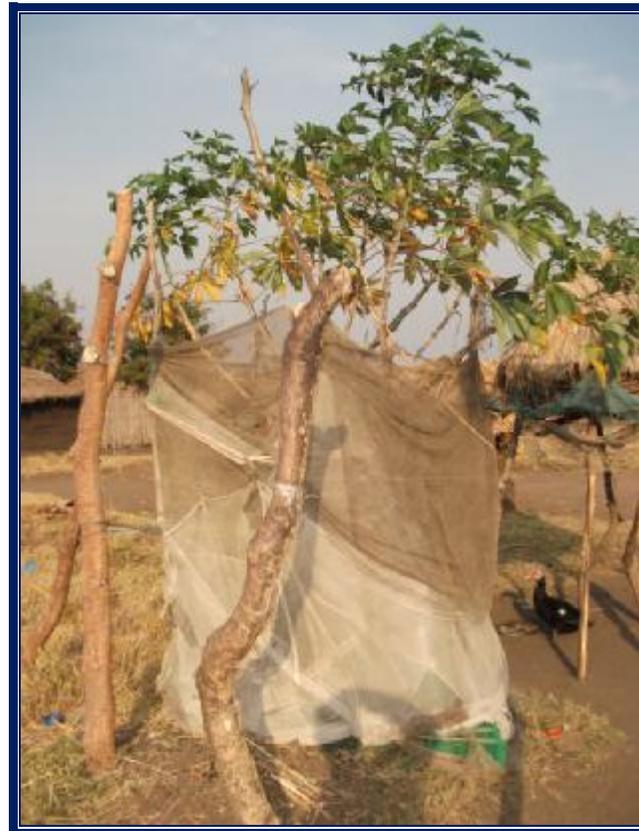


Figure 22: Incorrect use of mosquito net

7.2.3 EHA #3 – Soil-, Water- and Waste-related Diseases

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|--|---|--|--|
| Soil-, Water- and Waste-related Diseases | Access to safe drinking water and adequate sanitation | <ul style="list-style-type: none"> The prevalence of soil-, water- and waste-related diseases highly depend on sanitation coverage and access to safe drinking water, factors which often show high variations at national and regional levels. According to the 2014 WHO/UNICEF progress report [87] on water and sanitation coverage (based on data up to 2012), 75% of households in Uganda have access to safe drinking water, at a higher proportion in urban (95%) than rural areas (71%). The country has met its MDG target on access to safe drinking water [88]. Access to adequate sanitation is generally low at 33% (at an equal proportion for both urban and rural areas), showing minimal improvement when compared to 32% coverage in 2010 and 27% in 1990 [88]. In 2011, only 51% of the population in Hoima District was served by the piped water network [35]. The social baseline reported that there was no formal waste system in the study area or broader district, and that Kyangwali often experienced shortages of drinking water. | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> Access to safe drinking water emerged as the biggest challenge for the communities in the study area with the majority getting their water from unimproved sources. Communities in the Buhuka Flats mainly relied on surface water from the lake or streams (Kyabasambu river) (Figure 24). Communities at the escarpment mainly sourced water from shallow wells or swamps while a few, especially at the village centre had access to a public borehole. A water improvement project in the Buhuka Flats completed years back involved the supply of stream water by gravitational pipes to communal taps. However, at the time of the field visit, only the tap in Nsonga village was functional. The water from the tap was said to be raw “just like river water”, unfiltered and untreated. Some participants said they preferred lake water to the unclean “tap” water. The construction of escarpment roads had damaged the gravitational pump scheme but this is planned to be repaired. A piped distribution network delivers water to the various villages on Buhuka flats, but some of these were damaged and thus even if the central collection area was fixed the distribution of water remains a challenge (Figure 25). No quality assurance of water quality is undertaken from water fed from the gravity scheme. The majority of people do not boil or treat water in any way to make it safer for drinking. They cited lack of access to treatment options such as WaterGuard or Aquatabs, while boiling was considered time consuming, expensive (as they needed charcoal) and difficult to sustain. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|-------------------------------|--|
| | | | <ul style="list-style-type: none"> • Sanitation coverage in the study area was very poor. As many as 70% of households in the Buhuka Flats did not have a toilet/latrine. The majority practiced indiscriminate defecation in the bush, lake shore or inside the lake. Some participants reported that the sandy soil by the lake was unsuitable for construction of pit latrines. Others attributed this to pure negligence and lack of will or determination by people to construct latrines. • Sanitation coverage was slightly higher in the escarpment communities, at approx. 60%. • Disposal of general household waste was also an issue. There were no garbage collection mechanisms or specific dumping sites for waste. Littering and haphazard disposal of waste was common. • Participants in all the communities were aware that indiscriminate disposal of waste was contributing immensely to their ill health particularly diarrhoeal disease, typhoid and bilharzia. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • According to key informants, the majority of communities obtained water from unprotected sources. • These sources comprised mainly of shallow wells and surface water in the forms of swamps and rivers. • The only area that was considered to be water secure by the interviewees, were the lake-shore villages who had access to Lake Albert. • Most community members would not treat the water before consumption. • HC in the area were dependent on rain harvesters for water supply. This source would frequently run dry and with the exception of Kyangwali HC, the others would use (sometimes unprotected) sources similar to what the communities use. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|---|--|--|
| | | | <ul style="list-style-type: none"> • None of the HC were able to test the quality of water used in the HC but all indicated that water would be treated with chlorine before use. • Sanitation coverage and standards were generally considered to be poor in the area, with latrine coverage estimated to be between 15% (Buhuka Flats) and 50% (Kyangwali, Kaseeta and Kabaale). • Those community members who did not have access to latrines would practice open defecation, sometimes in or close to water sources. • Waste handling and disposal in communities are not organised and the majority of waste is disposed of in the open. • With the exception of Kyangwali HC, all medical waste in the study area is disposed of by burning in open pits. This includes Hoima RRH who was constructing an incinerator at the time of the evaluation. • Kyangwali HC used incineration to dispose of medical waste before burial. <p><u>Direct observation:</u></p> <ul style="list-style-type: none"> • Waste management was very poor with litter strewn over a wide area (Figure 27). • Only a few latrines were noted in communities on Buhuka Flats. These were generally unimproved pit latrines. • Ventilated improved pit latrines were noted in the pipeline communities (Figure 29). |
| | <p>Diarrhoeal Diseases, Cholera and Typhoid fever</p> | <p><u>Diarrhoeal Diseases</u></p> <ul style="list-style-type: none"> • Infective diarrhoea is the second most common cause of death in children under-five globally. About 90% of the ~4 billion annual global episodes of diarrhoea can be attributed to three major environmental causes: poor sanitation, poor hygiene, and contaminated water and food [89]. • National and regional statistics include: <ul style="list-style-type: none"> ○ While diarrhoeal disease is still a major public health, the | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> • Diarrhoeal disease was consistently listed among the common ailments in the study area. These diseases were attributed to limited community access to safe drinking water, poor personal hygiene and the low sanitation coverage. • Typhoid was said to be very common and frequently diagnosed in those presenting to health facilities. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|--|---|
| | | <p>disease has recorded significant decline in the country's share of disease burden. In 2010, diarrhoeal disease was attributed to 5.2% of premature deaths, a decline from 11.4% in 1990 [36]. In 2012, diarrhoeal disease was responsible for 9% of deaths in children under-5 years in the country [31].</p> <ul style="list-style-type: none"> ○ Findings from the 2011 UDHS [21] show that: <ul style="list-style-type: none"> § 23% of children under-5 had diarrhoea, including 4% with bloody diarrhoea, in the two weeks preceding the survey. Reported prevalence of diarrhoea was highest among young children aged 6-23 months. § Reported cases of diarrhoea disease among young children was found highest in the Eastern region (32%) and lowest in the Southwest (14%). The Western region recorded a prevalence of 19%. <p><u>Cholera</u></p> <ul style="list-style-type: none"> • Cholera, the main cause of dehydrating diarrhoea in adults is caused by the bacteria <i>Vibrio cholera</i>. Clinical episodes range from asymptomatic infection to acute fulminant watery diarrhoea which, if untreated, may be fatal [90]. • Uganda has reported cholera cases every year since 1997. It's estimated that an average of ~11,000 cholera cases and 61–182 cholera deaths occur each year. The geographic distribution of the disease is very heterogeneous. While there is a clear distinction between low and high-risk districts, sentinel surveillance would help to better quantify the burden in endemic districts [91]. The outbreaks last an average duration of 15 weeks (range of 4–44 weeks) [91]. • A cholera outbreak in 2013 also affected Hoima District, which recorded at least 32 cases with 3 deaths [92]. <p><u>Typhoid fever</u></p> <ul style="list-style-type: none"> • Typhoid fever, also called enteric fever, follows infection with a bacterium (<i>Salmonella spp</i>) and transmission is via ingestion of contaminated food or water. The disease continues to be a | <ul style="list-style-type: none"> • The study area, particularly the Buhuka Flats has experienced frequent outbreaks of cholera. A major outbreak was reported in 2013, which led to some deaths. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • Diarrhoeal disease was routinely listed as one of the 5 most common diseases recorded at the HCs in the study area. • Cholera is widely recognised throughout the study area. Sporadic cases are recorded with the last significant outbreak reported to have taken place in 2013. • In certain HCs (Kyangwali), staff had erected isolation tents in anticipation of cases associated with the start of the rainy season. • Typhoid was considered to be common Kyangwali, Buhuka and Kabaale, but less so in Kaseeta. • All HCW considered communities to have poor knowledge regarding appropriate sanitation practices that could aid in the prevention of diarrheal disease and associated outbreaks. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> • The highest proportion of diarrheal related OPD cases have been recorded in the Buhuka HC where diarrhoeal disease accounts for between 13% and 15% of all OPD consultations. In all other HCs, diarrheal disease accounted for approximately 5%-6% of all OPD visits. • Based on the annual reports for the four health centres, the ranking of diarrheal disease according to period prevalence was reported as follows: <ul style="list-style-type: none"> ○ Acute diarrhoea – 71.8% ○ Dysentery – 17.2% ○ Typhoid – 8.7 % |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|---|---|--|
| | | <p>public health problem in many developing countries, including Uganda [93].</p> <ul style="list-style-type: none"> In 2008-2009, a large laboratory-confirmed outbreak of typhoid fever occurred in Kasese District of Uganda with a high proportion of intestinal perforations and at least 47 deaths [94]. | <ul style="list-style-type: none"> Persistent diarrhoea – 1.3% Cholera – 0.9% <ul style="list-style-type: none"> Of all the HCs evaluated, only Buhuka HC had reported any cholera cases in the 2013/2014 period with 24 cases in total. None of the other HCs reported any cases in the same period. |
| | <p>Soil Transmitted Helminthiasis and Schistosomiasis</p> | <p><u>Soil-transmitted helminthiasis</u></p> <ul style="list-style-type: none"> Soil-transmitted helminthiasis (STH) is the most common parasitic infection worldwide. STH produce a wide range of symptoms including intestinal manifestations (e.g. diarrhoea and abdominal pain), general malaise and anaemia [95]. STH are endemic nationally and their transmission by contact with human faeces in the soil is promoted by the lack of adequate sanitation. The overall prevalence of roundworms (<i>Ascaris lumbricoides</i>), whipworm (<i>Trichuris trichiura</i>) and hookworm has been reported at 6.3%, 5.0% and 44%, respectively [96]. Lake Albert region has recorded a prevalence of 10%-50% (all STH combined), but no accurate studies are available [97]. <p><u>Schistosomiasis</u></p> <ul style="list-style-type: none"> Schistosomiasis, also known as bilharzia, is a NTD caused by parasitic trematode worms of the genus <i>Schistosoma</i>. Two common forms of the disease occurring in Africa are the urogenital form (caused by <i>Schistosoma haematobium</i>) and the intestinal form (caused by <i>Schistosoma mansoni</i>). Infection is prevalent in tropical and sub-tropical areas, especially in poor communities without potable water and adequate sanitation. Therefore, the prevalence of schistosomiasis is a good indicator of the level of sanitation in a potentially endemic area. In Uganda, schistosomiasis is mainly caused by <i>S. mansoni</i> and affects more than 10% of the population [98]. Epidemiological mapping of the population at risk of schistosomiasis has shown typically high prevalence near the lakeshore and along large rivers. No transmission occurs at | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> Abdominal illnesses due worms were reported as a common problem. Young children were most affected and some have been noticed to pass worms in their stool. Bilharzia emerged as a big health issue, especially in the Buhuka Flats. In many instances it was listed only second to malaria. Very few participants knew what causes the disease. Majority had the misconception that bilharzia is transmitted through drinking dirty water, while some did not know the cause. Majority were concerned about the illness and wanted to know how it can be “eradicated” from their community. The study area has not been accessed by any deworming programme and due to the limited awareness and access to health care, majority are “suffering without treatment”. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> All HCW noted that both STH and intestinal schistosomiasis were common in the area. All HCs, with the exception of Buhuka HC, possessed the ability to diagnose STH and intestinal schistosomiasis by microscopic stool analysis. Mass treatment campaigns targeting schools (also called Child Days) were implemented in the area. As part of this programme, Albendazole and Praziquantal distribution was managed through school visits in both April and October. Despite these campaigns, STH remained a significant problem in most of the health centres. The burden of |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------------------------|---|--|
| | | <p>altitudes >1400 m or where total annual rainfall was <900 mm [98, 99]. The geographical distribution and intensity of schistosomiasis in the country is shown in Figure 23. The Lake Albert region shows a very high prevalence of up to 80%-100% [99].</p> | <p>disease is best illustrated in Kaseeta and Kyangwali HCs, where the number of STH cases transposed diarrhoeal disease was the third most common disease reported in the annual reports.</p> <ul style="list-style-type: none"> • Although noted as a common disease, the reporting of intestinal schistosomiasis was noted to be very low in the RHMIS data. This raises serious concerns with regards to the disparity between the perceived burden of disease between community members and HCW. This phenomenon was the most prominent on the Buhuka Flats where the HC did not have the ability to reliably diagnose intestinal schistosomiasis, but had to rely on clinical diagnosis. • Without fail, the general lack of adequate sanitation facilities and poor knowledge regarding sanitation practices were noted as reasons for the perceived high prevalence of the diseases. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> • As noted above, Kaseeta and Kyangwali HCs reported the highest number of STH cases, with percentages ranged between 7% and 9% of all OPD cases. • Child Day coverage were reported to be very low in certain sub-counties where the study area was situated: <ul style="list-style-type: none"> ○ Kyangwali S/C – 43% ○ Kabwoya S/C – 72% ○ Buseruka S/C – 52% |
| | <p>Hepatitis A and Poliomyelitis</p> | <ul style="list-style-type: none"> • Hepatitis A virus (HAV) is the most common viral cause of hepatitis worldwide and is hyper-endemic in many parts of the developing world. Transmission is via the faecal-oral route including ingestion of contaminated food or water. • Due to the prevailing low sanitation coverage, HAV is expected to be endemic nationally even though statistics are limited, partly due to inadequate diagnostic capacity. | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> • There was no mention of polio or hepatitis by participants. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • Neither Hepatitis A, nor Polio were considered to be significant health risks in the area. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|--|--|
| | | <ul style="list-style-type: none"> • Poliomyelitis (polio) is a highly infectious viral disease, which mainly affects young children. The virus is transmitted through contaminated food and water, and multiplies in the intestine from where it can invade the nervous system. There is no cure for polio and it can only be prevented by vaccination. • In 2009, 13 years after Uganda was declared polio-free, a case of polio was confirmed in Amuru District in the northern part of the country, prompting a mass vaccination campaign to avert the outbreak [100]. Polio eradication strategies in the country include routine oral polio vaccination immunisation and acute flaccid paralysis (AFP) surveillance. | <p><u>RHMIS:</u></p> <ul style="list-style-type: none"> • No cases of (AFP) were reported by any of the rural health centres in the study area during the 2012/2013 and 2013/2014 periods. • Eleven cases of AFP were, however, reported in the Hoima District during the 2012/2013 period, with a further 13 cases reported during the 2013/2014 period, confirming the potential that polio may be a risk in the district. |

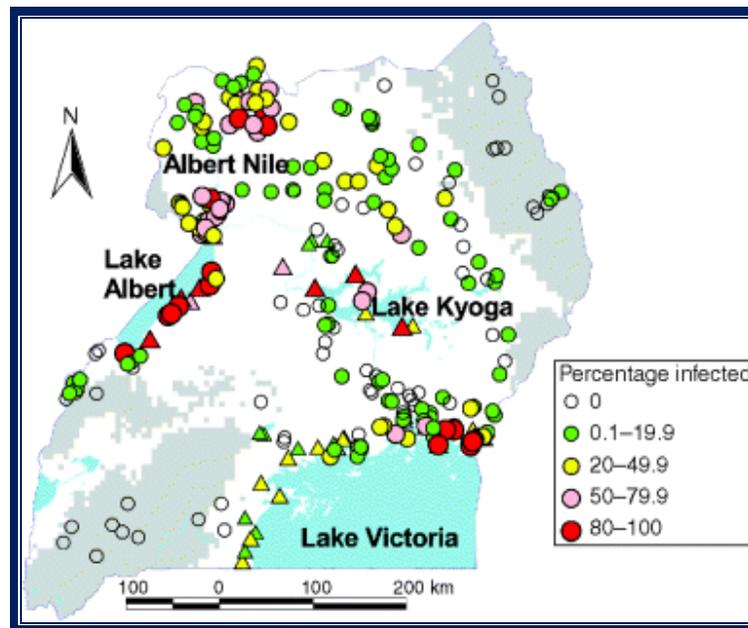


Figure 23: Distribution of Schistosoma mansoni in Uganda

Circles indicate school survey prevalence and triangles represent community survey prevalence. Grey areas indicate areas where either altitude is >1325 m or total annual rainfall is <900 mm.



Figure 24: Use of surface water in Kacunde



Figure 25: Non functional tap from gravity fed water scheme in Kacunde



Figure 26: Functional gravity fed water tap in Nsonga



Figure 27: Dirty environment in Nsonga



Figure 28: Community handpump well in Kyarujumba



Figure 29: Ventilated improved pit latrines in Kyarushesha

7.2.4 EHA #4 – Sexually-transmitted Infections, including HIV/AIDS

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|--|--------------------|--|--|
| EHA #4 – Sexually-transmitted Infections, including HIV/AIDS | HIV/AIDS | <p><u>National and regional statistics</u></p> <ul style="list-style-type: none"> The HIV epidemic in Uganda continues to be generalised, and has not changed pattern in the last three decades [101]. The country achieved impressive success in the control of HIV during the 1990's, bringing HIV prevalence among adults aged 15-49 years down from a national average of 18.5% in 1992, to 6.4% in 2005. Currently, the overall picture is of increased prevalence nationally [101]. Statistics and highlights of the epidemic are presented below: <p>a) <u>HIV prevalence</u></p> <ul style="list-style-type: none"> The 2011 Uganda AIDS Indicator Survey (UAIS) reported HIV prevalence at a national average of 7.3%, with important variations by gender and geographically. The prevalence is consistently higher among women compared to men. The prevalence increases from the age of 15 years, to peak at the age of 35-39 years [23]. The national HIV prevalence (2011) was much higher among women resident in urban areas compared to those in rural areas (10.7% and 7.7%, respectively); but similar for men resident in both settings (6.1%) [23]. Regional variation (shown in Figure 30) shows the highest prevalence in Central region (9.8%) and lowest in Eastern region (4.1%). Western region recorded a HIV prevalence of 8.2% [23]. The HIV prevalence is particularly high among female sex workers (33%) and their male partners (18%), gay men (13%), and <u>fishing communities</u> (37%) [101]. <p>b) <u>HIV burden</u></p> <ul style="list-style-type: none"> The total burden of HIV as represented by the number of people living with HIV (PLHIV) has continued to increase. This is a result of continuing spread of HIV, and increased longevity among PLHIV [101]. | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> HIV/AIDS emerged as a top concern for communities in the study area. However, the local burden of the illness was not well known because of limited access to and uptake of HCT. In the Buhuka Flats, the majority of respondents were not aware of where they can receive HCT. Some mentioned that the test was available at Buhuka and Rwenyawawa HCs, but majority were not sure. For the communities in the escarpments, HIV testing was said to be available at the Kyangwali HC. Uptake of HCT was very low in all the communities, citing distance and limited access to a health facility, fear of knowing ones status and possible stigma. In the Buhuka Flats the common tone was that when it comes to HIV <i>“we are all dead”</i>. It was reported that people who test positive do not disclose their status while continuing to expose others. <i>“Once they are known, they relocate to another ‘landing site’ and continue to behave in the same manner”</i>. The perceived high prevalence of HIV in the communities was attributed to high risk sexual behaviours specifically: <ul style="list-style-type: none"> high rates of polygamy, multiple sexual partnerships, transactional sex work, and low condom utilisation rate. HIV knowledge was relatively good, a majority recognised the sexual route as a principal mode of transmission. Prevention measures such as abstinence, fidelity and condom use were largely identified. The knowledge and awareness appeared to be higher among the youth compared to older participants. However, the main challenge appeared |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <ul style="list-style-type: none"> • Between 2007 and 2013, the estimated number of PLHIV in the country increased from 1.2 million to 1.6 million. Approximately 93% of the PLHIV are adults aged 15 years and above [101]. • The HIV epidemic is worsened by co-morbid high prevalence of TB, cultural practices and negative laws. <p>c) <u>HIV incidence</u></p> <ul style="list-style-type: none"> • Although the country continues to experience a high rate of new HIV infections; the trend over the last three years shows a decline, from an estimated 162,294 in 2011 and 154,589 in 2012, to 140,908 in 2013 [101]. The decline in incidence has been more pronounced among children. This is largely attributed to efforts on prevention of mother-to-child transmission (PMTCT) of HIV [101]. • The main drivers of HIV incidence in the country include [101]: <ul style="list-style-type: none"> ○ Levels of knowledge and understanding of HIV, and especially its relationship to perceived personal risk of HIV infection. ○ Knowledge of one's HIV status, as established through HIV Counselling and Testing (HCT); and associated willingness for mutual disclosure of that status between sexual partners. ○ Risky sexual behaviour - including adolescent sex, multiple and concurrent sexual relationships, transactional and trans-generational sex, and unprotected sex. ○ Level of male circumcision (lowers the risk of HIV infection). ○ Alcohol abuse - closely associated with high risk sexual activity. <p>d) <u>HIV knowledge, attitude and practices</u></p> <ul style="list-style-type: none"> • Findings from the 2011 UAIS showed that [23]: <ul style="list-style-type: none"> • Nearly 75% of women and 80% of men age 15-49 know that HIV can be prevented by using condoms, and by limiting sexual intercourse to one uninfected partner. Men | <p>to be the translation of this knowledge into actual practice. This was important in women where cultural and social standing limited the ability to negotiate safe sex practices or meaningfully influence it.</p> <ul style="list-style-type: none"> • HIV-related stigma was an issue among the fishing communities in the Buhuka Flats. It was less of an issue in the escarpment communities where majority expressed a positive attitude towards PLHIV. • An NGO, Meeting Point was recognised to have conducted sensitisation and free HCT in the communities around the Project area, in 2014. The outreach was well received and the communities hoped that this could be done more regularly. The communities in the pipeline route (Kyarushesha and Kyarujumba) said they did not benefit from this initiative. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • HIV was considered to be a significant public health concern in all of the KIIs conducted as part of this assessment. • Although perceived rates were not considered to be high, an increase in both opportunistic and more formally structured commercial sex work (CSW) was described in the study area, specifically in the Kyangwali and Buhuka Flats areas. • Increased commercial activities and the resultant influx resulted in a more noticeable CSW activity in the above mentioned area. • Despite free condom distribution, uptake on this initiative was generally poor. This was especially evident in the fishing communities where inappropriate risk behaviour was reported by the HCW. • Anecdotally, the risk from dying while fishing was considered to be much higher than dying from HIV |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <p>are slightly more likely than women to know about the different HIV prevention methods.</p> <ul style="list-style-type: none"> • Common misconceptions about HIV still persist, and general acceptance of PLHIV remains low. • Overall, only 43% of men and 36% of women nationally have comprehensive knowledge³ about HIV. <p>e) <i>High-risk sexual behaviour</i></p> <ul style="list-style-type: none"> • HIV transmission is largely through heterosexual contact, information on sexual behaviour is important in designing and monitoring intervention programmes to control the spread of HIV. Main parameters of high-risk sexual behaviour include multiple partnerships, transactional sex and condom use. • Findings from the 2011 UAIS showed that [23]: <ul style="list-style-type: none"> ○ 19% of men and 3% of women had multiple sexual partners. ○ Multiple sexual partnerships were most common in <u>Western</u> (25%) and East Central (31%) regions. ○ Condom use was generally low - only 16% of women and 15% of men who had multiple sexual partners reported using a condom at last sexual intercourse. • A recent newspaper article ‘the impact of oil discovery in Hoima District’ has highlighted an increase in commercial sex work in the area, with clients coming from far and wide, supported by an improved road network [102]. | <p>and therefore, fishermen did not see the need to use condoms. It was also reported that they would still continue to visit certain CSW, even if it was well known that they were HIV positive.</p> <ul style="list-style-type: none"> • In addition to this, the comment was made that people are aware of antiretroviral treatment (ART) and that they could lead a ‘normal life’ despite been HIV+. • HIV rates were perceived to be much higher in CSW and higher risk professions such as bar maids and waitresses. • HIV related stigma was prominent with most of the interviewees noting that HIV patients would not disclose their status for fear of segregation. • Transactional sex was also noted to be a major concern, with a steady increasing trend. An improved economic situation could possibly lead to more transactional sex, with girls/women from poorer communities more vulnerable. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> • Uptake on HCT services varied between HCs. • Prevalence of HIV in the voluntary HCT group during the 2013/2014 period was reported as: <ul style="list-style-type: none"> ○ Buhuka – 3.34% ○ Kyangwali – 5.30% ○ Kaseeta – 6.48% ○ Kabaale – 4.44% ○ Hoima District average – 4.27% • It is important to note that uptake on the HCT services was reported to be low and that these percentages do not necessarily accurately reflects all spheres of the |

³ Comprehensive knowledge of HIV means knowing that consistent use of condom during sexual intercourse and having just one uninfected faithful partner can reduce the chance of getting HIV, knowing that a healthy-looking person can have HIV, and rejecting the two most common local misconceptions about HIV transmission or prevention.

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|-------------------------------|--|
| | | | <p>community. In addition to this, both Kaseeta and Kyangwali have ART clinics, a factor that may provide bias to the percentages reflected above.</p> <ul style="list-style-type: none"> • Pregnant women who attend antenatal care (ANC) at the HCs, also receive HCT (unofficially mandated) as part of their care program. • The prevalence reported from ANC included: <ul style="list-style-type: none"> ○ Buhuka – 5.56% ○ Kyangwali – 2.98% ○ Kaseeta – 1% ○ Kabaale – 2.44% ○ Hoima District average – 3.96% • Again, it must be noted that the percentages above, reflects a certain section of the communities and should not be interpreted as a true community prevalence. Access to services and acceptance will play a role in interpreting actual prevalence. • Out of the four rural HC in the study area, only Kyangwali HC was able to perform safe male circumcision (SMC). During the 2013/2014 period, a total of 2001 SMC procedures were performed at this HC. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--|--|---|
| | Sexually transmitted infections (STIs) and Hepatitis B virus | <ul style="list-style-type: none"> • STIs such as gonorrhoea, syphilis and chlamydia are an important global health priority. Infection with certain STIs can increase the risk of acquiring and transmitting HIV and can alter the course of HIV disease progression. STI control is therefore an important strategy in the control of HIV/AIDS epidemic. • Hepatitis B Virus (HBV) is transmitted in the same way as HIV and is a lot more virulent with an estimated 30% of the world's population infected with the disease. A safe and effective vaccine is available. • National and regional statistics include: <ul style="list-style-type: none"> ○ Syphilis prevalence among pregnant women attending antenatal care has been reported at 2.0% [101]. ○ In the 2011 UAIS [23]: <ul style="list-style-type: none"> § The prevalence of syphilis was found to be 1.8% nationally (at an equal proportion among men and women). § Syphilis prevalence was highest in North East (3.3%) and lowest in Mid-Eastern (1.0%) region. Mid-Western region recorded a prevalence of 1.7% among men and 1.8% among women. ○ The country's RHMIS reported ~73,000 cases of urethral discharge and ~125,000 cases of genital ulcers in 2013 [101]. ○ Alongside other hepatitis viruses, HBV infection is highly endemic nationally, with transmission occurring both in childhood and adulthood. A recent study indicates a seroprevalence of 10.3% in the general population, with 40% of the population infected by the ages of 15-19 years of age. Further, it is estimated that more than 1.4 million adults are chronically infected with the virus [103]. ○ In 2002, Uganda introduced HBV vaccine in its EPI programme [103]. National coverage of the vaccine (among 1 year olds) is currently reported at 78% [34]. | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> • STIs was listed among the top five ailments in adults in the study area. • Syphilis was particularly mentioned as a huge problem with the male youths reporting that nearly all of them had suffered from the illness. Majority felt that the disease is acquired at birth while others felt that the disease is largely sexual transmitted. • High risk sexual behaviour emerged as a major theme in all the communities Polygamy was considered a social and cultural norm. Informal multiple sexual partnerships was a common practice especially in the Buhuka Flats where males referred to this as a "side dish". Women also engaged in multiple partnerships to "revenge" on their cheating spouses. • Transactional sex work was common. This was supported by the presence and increasing number of lodges at the village centres. The commercial sex clients, mostly females come from within and outside the area. The high risk sexual behaviours is fuelled by: <ul style="list-style-type: none"> ○ Availability of disposable income, especially among the fishing communities. ○ Increased accessibility of the area as a result of improvement in road network and the oil developments. ○ Alcohol and drug abuse. • It was reported that project associated workers (males) also engage in the transactional sex and this has led to competition and an increase in asking price for sex. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • STIs were considered to be common in the study area. In Kyangwali, Kaseeta and Kabaale HCs, the perception was expressed that syphilis was the most |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|-------------------------------|--|
| | | | <p>prevalent STI, while HCW at Buhuka HC reported urethral discharge disease to be the most prevalent STI.</p> <ul style="list-style-type: none"> As noted above, all HCs distributed condoms free of charge but uptake of condom use was considered to be low. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> Despite syphilis testing forming part of the routine ANC care at HCs, only Kyangwali HC reported syphilis prevalence out of the four HCs evaluated, with the following results: <ul style="list-style-type: none"> 2012/2013 period – 14.7% 2013/2014 period – 5.5% These figures shows a dramatic increase compared to the national prevalence of 2% for pregnant women attending ANC. <p><u>Direct observation:</u></p> <ul style="list-style-type: none"> A number of small guest-houses and taverns were noted in Buhuka Flats. These had apparently developed recently in response to CNOOCs activities. These were cited as establishments where high-risk sexual encounters were initiated, with reports that staff or contractors from CNOOC as patrons. An example of a new hotel is shown in Figure 31 (the picture does not insinuate that this establishment is a definite site where high risk sexual encounters occur). |

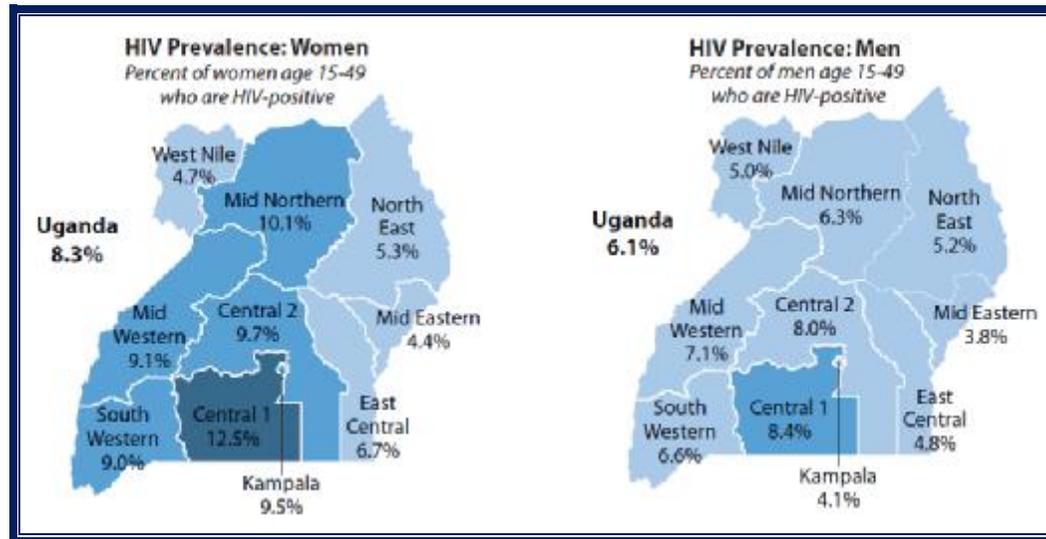


Figure 30: Regional HIV prevalence among adults (15-49 years) in Uganda, 2011



Figure 31: New hotel in Nsonga

7.2.5 EHA #5 – Food- and Nutrition-related Issues

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---|--------------------------------|---|---|
| EHA #5 – Food- and Nutrition-related Issues | Food security and Malnutrition | <ul style="list-style-type: none"> Uganda faces a wide range of development challenges, among them regional and seasonal food insecurity and varying degrees of adult and child malnutrition. However, the country has made significant progress over the past two decades in terms of macro-economic growth and human development. The proportion of people living in poverty declined from 38.8% in 2002/2003 to 24.5% in 2009/2010. Recent discovery of significant oil reserves is expected to boost economic growth in the years to come [104]. The Western region experiences minimal food insecurity [104, 105]. <p><u>Malnutrition</u></p> <ul style="list-style-type: none"> Malnutrition is one of the largest contributing factors to child mortality in less developed countries. It is an important indicator for monitoring a given population's health status and gives a reliable snapshot on community BOD [106]. Even in the absence of a specific food crisis, many communities struggle with chronic malnutrition, especially among children under-5 years. Nevertheless, the overall trend in underweight (low weight for age) and stunting (low height for age) among children has been downward in recent years, as shown in Figure 32. The prevalence of stunting among children under-5 years of age is about 33% nationally [21, 105]. The level of wasting (low weight for height), a measure of acute malnutrition is much lower at 5%-6% [21]. Statistics also show that: <ul style="list-style-type: none"> The immediate causes of malnutrition are high disease burden resulting from malaria, diarrhoeal disease and ARIs, as well as inadequate dietary intake. Child breastfeeding in the country is almost universal. The median duration of exclusive breastfeeding is 3.4 months [21]. | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> The study area is largely food secure. The land in the escarpment areas is fertile and a variety of food crops are grown. These include maize, sorghum, cassava, bananas, potatoes, beans, kales and other types of vegetables. The farming communities also grew cash crops such as coffee and tobacco at a smaller scale. Livestock rearing (cattle, goats, pigs, poultry) was quite evident. The fishing communities in Buhuka Flats reported a reliance on fish meals due to lack of money to purchase a variety of food from the farmers. Access to the escarpment also limited the purchase of vegetables. In general, malnutrition did not emerge as a concern in the study area. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> Malnutrition was noted to be present in the study area, but was not raised as a major concern by any HCW key informants. The area was considered to be food secure with enough food available throughout the year. The only HC that had a functional malnutrition clinic, was Kyangwali HC. The clinic served both the national population as well as the refugees hosted at a nearby refugee camp, and thus was supported by UNHCR. Malnutrition in the Kyangwali area was reported to be more prevalent in the national population, being especially predominant in the migrant agricultural populations. Despite being planned for, none of the HCs |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|---|---|---|
| | | <ul style="list-style-type: none"> ○ The 2011 UDHS found that 44% of children under-5 years in the Western region were stunted (19% severely) and 15% underweight (5% severely). The level of wasting was much lower at 3% [21]. ○ There was no data available at the district level, or stratified between parishes. | <p>performed nutritional outreaches in the communities.</p> <ul style="list-style-type: none"> ● Except for Kyangwali HC, nutritional monitoring was confined to EPI activities with underweight (under 2SD line on growth chart) being the only indicator that was reliably tracked and reported. ● Main contributors to the majority of malnutrition cases were noted to be: <ul style="list-style-type: none"> ○ Poor feeding practices; ○ Poor economic management by migrant agricultural communities, selling the entire crop with associated poor control of expenditure; and ○ Malnutrition associated with immunosuppression. ● A list of prices of commodities at the main Hoima market is attached in Appendix D. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> ● Very scanty data was available.. ● Only two of the HCs (Kyangwali and submitted any data on underweight children in their annual reports. Both reported 1 child each. ● The absolute paucity of information on malnutrition and the deficiency in reporting on reliable indicators raises serious concerns regarding the recognition of malnutrition. This is important as even moderate malnutrition has significant health concerns for children and chronic malnutrition is known to affect the cognitive development of children. |
| | Anaemia and micro-nutrient deficiencies | <ul style="list-style-type: none"> ● Anaemia is an important health consideration as it can retard mental and physical development in children. It can also lead to poor outcome of pregnancies including neonatal deaths. ● The cause of anaemia is multi-factorial and includes malaria, nutritional deficiencies and parasitic infections, and hereditary conditions such as sickle cell disease. Due to its broad range of variables (in causality), anaemia is also a very good indicator of the general status of health in a community. ● Micronutrient malnutrition remains widespread in the country, | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> ● Anaemia was not specifically mentioned among common ailments in the study area. However, with the high occurrence of malaria and worm infections, the condition is likely to be prevalent. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> ● Anaemia was noted as being common in the study area with malaria identified as the primary |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <p>specifically deficiencies in vitamin A and iron-deficiency anaemia. In 2012/2013 anaemia was the 3rd leading cause of death among children under-5 years (after malaria and pneumonia) and was responsible for 11.6% of the deaths in this age-group [22].</p> <ul style="list-style-type: none"> • The 2011 UDHS measured anaemia levels in children aged 6-59 months and women aged 15-49 years and found that [21]: <ul style="list-style-type: none"> ○ Nationally, about half of children 6-59 months (49%) were anaemic. The prevalence was highest (69%) among children age 9-11 months. ○ Regional variation of anaemia in children ranged from 25% in Southwest to 70% in Karamoja region. The prevalence among children in Western region was measured at 39%. ○ About 23% of women age 15-49 nationally were anaemic. Again, women in Karamoja were found to have the highest prevalence of anaemia (43%) while women in Southwest had the lowest (11%). Anaemia prevalence among women in the Western region was found at 17%. | <p>contributor in Buhuka, Kyangwali and Kabaale and intestinal parasites (specifically hookworm) noted as the major contributor in Kaseeta.</p> |

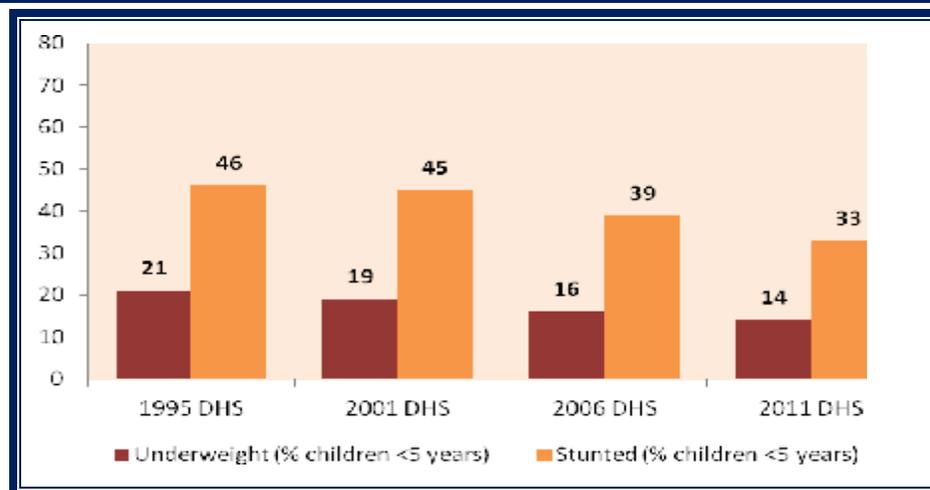


Figure 32: Trend in prevalence of underweight and stunting among children in Uganda



Figure 33: Fish drying in Kyakapere



Figure 34: Road side produce sales

7.2.6 EHA #6 – Non-communicable Diseases

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|------------------------------------|---|---|--|
| EHA #6 – Non-communicable diseases | General profile of non-communicable disease (NCD) | <ul style="list-style-type: none"> • Current global health trends clearly show that the disease burden attributable to NCDs is on the increase. In SSA, it is predicted that NCDs and injuries may cause up to 60% of morbidity and 65% of mortality by 2020 and that the increasing burden may overwhelm already over-stretched health services [107]. • The main NCD considered are cardiovascular diseases (CVD), diabetes, cancer and chronic respiratory conditions. The risk factors underlying the major chronic NCDs include; unhealthy diet, physical inactivity, alcohol consumption and smoking [108]. • NCDs are estimated to account for 27% of all deaths in Uganda [109]. | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> • Due to limited awareness and access to health care, the occurrence or importance of NCDs in the study area could not be easily determined. • However, risk factors such as alcohol consumption and cigarette smoking were common. Sedentary lifestyle and a diet high in refined carbohydrates was however uncommon. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • NCDs were, in general, poorly recognised in the study area with the inability to reliably diagnose Diabetes Mellitus (DM) was noted as a concern. • Only Kyangwali HC had access to a glucometer, enabling the HCW to diagnose and treat DM. All of the other HC reported that they had to refer patients if DM was clinically suspected. • Smoking and alcohol abuse were reported to be very common in the area. • Hypertension was not noted as an issue, which is surprising given its propensity to affect the middle aged African population. |
| | CVD and DM | <ul style="list-style-type: none"> • CVD is the most prevalent NCD nationally, accounting for 9% of deaths in 2012 [109]. • The Uganda Heart Institute records have demonstrated a 500% increase in outpatient attendance due to CVD over the past 7 years [110]. • A recent community based survey found that about a quarter (27%) of the adult population had hypertension, but awareness and control were very low [111]. Hypertension generally has no symptoms, until complications such as heart failure or stroke manifest. • Data indicate that about 5-7% of the country's population is diabetic [112, 113]. Regional referral hospitals have reported | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> • DM and hypertension were mentioned only a few times by FGD participants. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • CVD was not well recognised in the area with only Buhuka HC reporting eight cases in the 2013/2014 period. The exact nature of disease was not recorded in the system. • No other HC reported any cases of CVD (including hypertension) in either the 2012/2013 or 2013/2014 periods. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|------------------------------|---|--|
| | | <p>an increasing number of cases of DM [110].</p> <ul style="list-style-type: none"> Limited awareness and negative perceptions of DM in this setting further hinders its control. A recent study in rural Uganda found that only 34% of the population had adequate knowledge about lifestyle diseases, including DM [113]. | <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> Despite diagnostic challenges, DM was reported in the following facilities: <ul style="list-style-type: none"> Buhuka HC – 1 case (2013/2014) and 3 cases 2012/2013 Kyangwali HC – 100 cases (2013/2014) and 83 cases (2012/2013) Kabaale HC – 2 cases (2012/2013) Kaseeta – no cases |
| | Chronic respiratory diseases | <ul style="list-style-type: none"> The most common non-infectious chronic respiratory diseases are asthma and chronic obstructive pulmonary disease, which includes emphysema, chronic bronchitis, etc. Risk factors for chronic respiratory diseases include tobacco smoking, indoor air pollution, outdoor pollution, allergens and occupational exposure (asbestos, silica, certain gasses). Reports indicate an increasing burden of these nationally, particularly asthma [110]. Current daily smoking of tobacco is estimated at 10% (16% among males and 3% among females), nationally [109]. The population's risk of exposure to indoor residual smoke is significantly high due to a reliance (at 96%) on solid biomass fuels for cooking and heating [21]. | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> Cough illnesses were said to be common. Majority of these were attributed to acute infectious conditions. Asthma was not specifically mentioned. Due to the high prevalence of tobacco smoking in the area and the use of solid fuels for cooking, chronic respiratory conditions are a potential concern. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> As noted before, smoking was deemed to be very common and was seen as a major contributor to both ARI and chronic respiratory conditions. In addition to this, biomass fuels (in the form of charcoal and wood) was common in the study area. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> Asthma cases were reported by every HC in the study area. Cases seem to remain relatively stable over the reported time periods and did not reliably reflect any significant increase in numbers. |
| | Cancers | <ul style="list-style-type: none"> In Africa, it is estimated that infectious agents cause 40% and 29% of cancers affecting men and women, respectively. Effective preventive measures for liver (from Hepatitis B) and cervical cancers (from human papilloma virus and HIV), for example, are available through immunisation and general prevention of STIs, respectively [114]. Statistics on the burden of cancers in Uganda are scarce. The | <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> Cancers were very poorly described during the assessment, with only the HCW at Buhuka HC noting one case of breast cancer in Nsonga community. Cases were generally referred no clear data is available. They were however, rare. Cases generally present late when hopes of effective |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <p>WHO estimates that cancers account for about 5% of all deaths in the country [109].</p> <ul style="list-style-type: none"> • The Uganda Cancer Institute has reported an upward trend in cancer incidence in recent years [110]. The overall lifetime risk of getting cancer is approximately 18% [115]. • In 2012, there were an estimated 29,380 new cases of cancers in the country [115]. • Nationally, cancer of the prostate is the commonest among men, followed by cancer of the oesophagus, Kaposi's sarcoma and liver cancer, respectively. The top four cancers affecting women are cervical, breast, oesophagus and Kaposi's sarcoma, respectively [115]. | <p>treatment or cure is not possible</p> |

7.2.7 EHA #7 – Accidents/ Injuries

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|------------------------------|------------------------|--|--|
| EHA #7 – Accidents/ Injuries | Road traffic accidents | <ul style="list-style-type: none"> • Road traffic accidents (RTAs) are a significant cause of injuries and deaths nationally. • The road sector is the most important mode of transportation in the country, as it carries 97% of freight cargo and 99% of the passenger traffic. • National statistics show that: <ul style="list-style-type: none"> ○ Between 2000 and 2010, the number of vehicles in the country increased from 300,000 to 800,000, along with the number of deaths due to traffic accidents [116]. ○ Uganda has the second highest rate of road accidents in the world after Ethiopia, with the WHO's Global Status Report on Road Safety (2013) listing Uganda among countries with alarmingly high RTA rates [116]. ○ Annual statistics indicate that most of the RTAs are severe, with about 13% fatal [35]. • Due to the ongoing improvements in road network [102] coupled with increased human and vehicle traffic, road accidents are likely to increase in the broader Western Region | <p><u>Findings from the FGDs:</u></p> <ul style="list-style-type: none"> • Road safety emerged as a concern for the communities in the study area. Concern was shown that the improvements in roads would bring about increased numbers of accidents, especially along major routes • Children were identified as a vulnerable group. • Participants called for road safety awareness campaigns, speed controllers such as bumps and low speed limits at the village residential areas. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • RTA were a significant concern to all respondents. • Without exception, an increased incidence in RTA was noted every area where interviews were conducted. Motorcycles were cited as commonly involved in accidents • Poor driving skills, poor adherence to traffic regulations and alcohol intoxication were reported to be amongst the most significant contributors to the increase in rates. • Ironically, the improved tar road in close proximity to Kabaale HCs was noted as promoting speeding and subsequently, an increase in RTA. • All informants uniformly expressed the opinion that a further rise in RTA was expected in the area. • There was no prehospital ambulance service in the district and trauma facilities in all HC in the study area were very limited. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> • With the exception of Kaseeta HC, all rural HCs in the region reported a dramatic increase in RTA between the 2012/2013 and 2013/2014 periods, as |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|-------------------------------------|--|--|
| | Interpersonal and domestic violence | <ul style="list-style-type: none"> Studies have shown that interpersonal and domestic violence is common, especially among the communities in the north. The violence has been linked to armed conflict, poverty, alcohol abuse and negative cultural attitudes and practices. The commonest form of domestic violence in the country is physical abuse and child abuse, including beating and torture, followed by psychological abuse. Some incidents have resulted in loss of life. | <p>follows.</p> <ul style="list-style-type: none"> Buhuka HC – 213% increase. Kyangwali HC – 125% increase. Kabaale HC – 124% increase. <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> Interpersonal violence was reported to occur in the study area. This was more common among the youths and was linked to alcohol, drug abuse and lack of community cohesion. Domestic violence was said to be relatively common, though most were regarded as “normal misunderstandings” that can occur in a family. In the farming communities, it was reported that domestic violence mostly occurred during the harvest season when men sell produce, take away all the money, and abuse alcohol. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> Interviewees reported domestic violence to be very common and routinely associated with alcohol and, more rarely, drug abuse. Indiscriminate spending of money by men was identified as one of the significant triggers, with infidelity and intercultural friction mentioned as other factors. Despite the common occurrence of this phenomenon, it was noted that most cases were never reported to authorities. There is the possibility that domestic violence is tolerated or even accepted in certain communities. |

7.2.8 EHA #8 – Veterinary Medicine and Zoonotic Diseases

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|--|--|---|---|
| EHA #8 – Veterinary Medicine and Zoonotic Diseases | Zoonotic diseases including, pandemic influenza (SARS, H5N1 (Avian Flu) and H1N1 (Swine Flu) | <ul style="list-style-type: none"> • Zoonotic diseases are caused by infectious agents that can be transmitted between animals and humans. • Environmental changes, human and animal demography, pathogen changes and changes in farming practice as well as social and cultural factors such as food habits and religious beliefs all play an important role in emergence of zoonotic diseases. • Influenza is a viral infection that affects mainly the nose, throat, bronchi and, occasionally, lungs. The virus responsible for influenza (Influenza virus A, B and C) has a very high level of mutation and therefore people develop only partial immunity for influenza. • In recent times, there has been a concern related to spread of highly pathogenic viruses that have mutated to pose transmission risk to humans, from animal hosts, with the potential to cause pandemics. These include SARS, H5N1 (avian flu) and H1N1 (swine flu) viruses. • Pandemic influenza remains a general threat in Uganda, due to increased mobility and mixing of populations. Active surveillance is conducted especially in Kampala. Plans are underway to extend surveillance to Western and Eastern Uganda [117]. | <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • No pandemic influenza cases have been recognised in the district. • There is no advanced influenza surveillance or early warning system in the district to detect potential outbreaks. • There is not an advanced veterinary public health system in the district and interaction between the human and veterinary health departments on potential zoonosis was weak. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|---------------------------|---|--|
| | Viral haemorrhagic fevers | <ul style="list-style-type: none"> Viral haemorrhagic fevers (VHF) is a general term for a severe illness, sometimes associated with bleeding and that may be caused by a number of viruses especially Lassa fever, Crimean-Congo, Marburg and Ebola viruses. Since the year 2000, Uganda has experienced repeated outbreaks of VHFs, particularly Ebola, Marburg and more recently Crimean-Congo [118]. Ebola and Marburg viruses belong to the Filovirus family, which are among the most virulent pathogens known to infect humans [119]. <p><u>Marburg virus disease</u></p> <ul style="list-style-type: none"> The Marburg virus is transmitted by direct contact with the blood, body fluids and tissues of infected persons. Transmission of the virus also occurs by handling ill or dead infected wild animals (e.g., monkeys, fruit bats) [119]. Case fatality rates vary from 25% to 80%. The predominant treatment is general supportive therapy [119]. Two outbreaks of Marburg haemorrhagic fever have occurred in Uganda, the first in Ibanda (2007) and more recently in 2012, affecting the western districts of Kabale, Ibanda, Mbarara, and Kampala. The 2012 outbreak had a case fatality rate of 50% (9 deaths out of 18 confirmed cases) [118, 120]. Another isolated case was confirmed in October 2014 [121]. Marburg virus poses a potential threat the study area. <p><u>Ebola virus disease</u></p> <ul style="list-style-type: none"> Ebola virus disease (EVD) is a severe, often fatal illness in humans, caused by Ebola virus. Ebola first appeared in 1976 in two simultaneous outbreaks, in Nzara (Sudan) and in Yambuku (DRC). The outbreaks have a case fatality rate of up to 90%. The natural reservoir for the virus is not well known; fruit bats have been considered among the likely hosts [122]. Initial transmission occurs from wild animals to human, and subsequently sustained through person-to-person spread. This disease is highly contagious and spreads through direct | <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> VHF were not recognized in the study area. Most HCW were aware of the diseases and the associated risks but none remembered any diseases being diagnosed in the area. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> No cases of VHF were reported by any of the rural HC in the region during either the 2012/2013 period or the 2013/2014 period. During the same periods, the Hoima District reported 4 cases (2013/2014) and 5 cases (2012/2013) respectively. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <p>contact with the blood, body fluids and tissues of infected persons. Significant transmission has occurred in the health care setting mainly because of poor infection control practices and unavailability of personal protective equipment [122].</p> <ul style="list-style-type: none"> • The largest outbreak to date is the ongoing 2014 West Africa Ebola outbreak, which is occurring in Guinea, Sierra Leone, and Liberia. Mali, Nigeria and Senegal also recorded cases but has managed to stop the outbreak. A few imported cases have been reported in the United States of America, United Kingdom and Spain [123]. • There are currently no licensed Ebola vaccines but potential candidates are undergoing evaluation and a safe and effective vaccine is hoped for by the end of 2015. No specific treatment is available [124] . • Since the year 2000, Uganda has documented a total of five Ebola outbreaks. The latest outbreak occurred in Kibaale (2012) in western Uganda [118]. • Ebola virus poses a significant potential risk in the study area. <p><u>Crimean-Congo haemorrhagic fever</u></p> <ul style="list-style-type: none"> • Crimean-Congo haemorrhagic fever (CCHF) is a severe viral disease caused by a tick-borne virus of the Bunyaviridae family. The virus causes severe viral haemorrhagic fever outbreaks, with a case fatality rate of 10-40%. The virus is primarily transmitted to people from ticks and livestock animals. Human-to-human transmission can occur resulting from close contact with the blood, secretions, organs or other bodily fluids of infected persons. CCHF is endemic in Africa and is a risk in Uganda [120, 125]. • No vaccine against the virus is currently available, treatment with ribavirin has been found to be beneficial [125]. • The disease is a potential threat in the study area. | |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--|--|---|
| | Brucellosis and other domestic animal borne zoonosis (Q-fever, leptospirosis etc.) | <ul style="list-style-type: none"> Brucellosis in a contagious bacteria zoonotic disease caused by the ingestion of unpasteurized milk, undercooked meat or close contact with secretions of infected animals (through broken skin or mucous membranes). There is a risk that inhalation of the bacteria may pose a risk but this generally limited to slaughterhouse workers or meat packers. Person to person spread is extremely rare. Four species cause disease in humans with the most invasive species affecting goats and sheep, and a less virulent form affecting cattle. <p>Symptoms are generally non-specific and can mimic other febrile diseases (such as malaria). To confirm the diagnosis requires specialised blood tests (not available in the study area). There is very little known about the disease at the level of the study area but in a study completed amongst abattoir workers in Kampala and Mbarara districts in 2007, 10% of workers were tested seropositive for brucella. The plateau areas of western Uganda are regarded as zone of hyper-endemic disease, but with a paucity on actual human prevalence [139].</p> <ul style="list-style-type: none"> Leptospirosis is a bacterial disease that affects humans and animals. The disease is transmitted by both wild and domestic animals (cattle, pigs, dogs), with rodents the most common cause. Transmission is through animal urine or water/soil contaminated by animal urine that comes in contact with broken skin or mucous membranes (eyes, nose, mouth). The bacteria can persist for weeks/months in water and soil media. <p>The disease is more common in farmers who have contact with cattle and in areas of poverty where rodents may be in close contact with household residents (especially in slums or other make-shift settlements. The risk of acquiring the disease is higher in people exposed to water bodies, as prolonged immersion/exposure to water promotes exposure to water. Drinking contaminated water also poses a risk.</p> | <p><u>Direct observation:</u></p> <ul style="list-style-type: none"> Animal husbandry was common in all parts of the study area, with cattle herding clearly the most common. Large herds of cows were noted on Buhuka flats and the escarpment areas along the pipeline route. A few ducks were noted in Buhuka flats, with chickens and some goats on the escarpment. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> There is no formal veterinary health system and diseases such as brucellosis occurred in cattle. There was no vaccination programmes in cattle and milk consumed in the community (from local cattle) was not pasteurised. HC staff and community members mentioned that Brucellosis was relative common in the area and regularly considered as a cause of fever. Other conditions such as leptospirosis and rickettsial diseases were not recognised. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|--|--|
| | | <p>The disease presents with non-specific symptoms and diagnosis is often incorrect (often considered to be malaria). Diagnosis requires specialised laboratory testing, and thus the real BOD is often unknown in setting such as rural Uganda. No statistics or information on the disease was available at a national or local level.</p> <ul style="list-style-type: none"> • Q fever is a bacterial disease spread by cattle, sheep and goats with organisms excreted in milk, urine and faeces of infected animals. The organism is spread in high concentration in the placenta and amniotic (birth) fluid, so birthing and dried placental/product of birth materials poses a risk from a direct contact and inhalation route Tick bites are also a risk. Humans are very susceptible to the disease. • Other tick-borne diseases include rickettsial disease (typhus) but these are poorly described in Uganda. | |
| | Rabies | <ul style="list-style-type: none"> • Rabies is a viral infection, which causes at least 55,000 deaths per year (mainly in Asia and Africa). The disease is very likely to be under-reported due to limited diagnostic capability [126]. • Most human rabies cases are caused by a bite from an infected dog or close contact with the saliva. Once symptoms of the disease develop, rabies is fatal. The most cost-effective mode of rabies prevention is vaccination of domestic dogs. Timely post exposure vaccination of humans is often effective. • Rabies is endemic in Uganda and most cases are secondary to infected dog bites [127]. Majority of the domestic dogs are unvaccinated against rabies. Projections indicate that nearly 600 rabies deaths would occur in the country annually in the absence of post exposure prophylaxis [127]. | <p><u>Direct observation:</u></p> <ul style="list-style-type: none"> • Dogs and cats were not seen commonly in either Buhuka flats or the escarpment areas. These numbers are likely to increase with economic liftment. <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> • Rabies is a risk in the study area and isolated cases of dog bites were reported. Majority of the domestic dogs are not vaccinated against rabies. It was reported that dog bite victims often receive post-exposure medication from Kyangwali health centre. Use of some herbal medicine was also reported. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • Each sub-county is supposed to have a veterinary officer that interacts with the HCs but all of the HCW noted that this interaction did not take place. • Rabies was noted to crop up sporadically, but was never formally diagnosed. • Buhuka HCW noted a suspected case in the week |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|-------------------------------|--|
| | | | <p>preceding the assessment, while the HCW at Kyangwali noted a case in 2014 where several family members died after being attacked by a jackal.</p> <ul style="list-style-type: none"> • Kyangwali HC was the only unit in the area that had rabies post exposure vaccine available. • Vaccination of dogs was not known to ever occur. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> • Due to diagnostic difficulties, confirmed rabies cases were poorly reported on the annual HC reports. The only HC that reported suspected rabies cases, was Kabaale HC that reported 4 cases in the 2013/2014 period. |



Figure 35: Hippo grazing near Kacunde

7.2.9 EHA #9 – Potentially Hazardous Materials, Noise and Malodours

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|--|--------------------|--|--|
| <p>EHA #9 – Potentially Hazardous Materials, Noise and Malodours</p> | | <p>These may also be listed as environmental health determinants and include pollution of air, soil and water, as well as possible exposure to pesticides or other organic or inorganic pollutants, noise and malodours. The pathway of human exposure to pollutants can be complex and may be the result of a variety of sources including air, soil, water, plants and animals.</p> <p>The review completed consisted of a review of determinants related to the Project and associated specialist studies, as discussed below.</p> <p><u>Air quality:</u> Baseline air quality will be assessed as part of the EIA process, but findings have shown a pristine environment devoid of any industrial sources of air pollution [3]. The air quality impact assessment describes the baseline conditions in detail with important facts [150]:</p> <ul style="list-style-type: none"> • Uganda has a bi-modal rainfall with ‘short rains’ from October to December and ‘long rains’ from March to May. Peak rainfall in the study area was from September to November and lowest in January. • Based on regional data, winds generally blow in a north-east to south-west, or vice versa, direction. On the escarpment, winds can be multi-directional. For most of the year the area experiences moderate to strong winds with gusts, increasing in velocity in the afternoon. • Wind roses developed based on modelled site data from Buhuka Flats showed a predominant wind from the south-east to south-west (53%) and north-west (10%). The average wind speed was 2.9m/s with 10% calms. <p><u>Water quality and quantity:</u> A number of rivers/stream, drainage lines and wetlands cut across Buhuka flats. Drainage lines near some villages have</p> | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> • The communities had perceptions in regards to air and water pollution as a result of the Project activities. The fishing communities feared that oil mining in the area may interfere with the normal condition of the lake water and lead to disappearance of fish and loss of livelihood. The farming communities in the escarpment attributed the delay of the rains this year to “environmental effects” of the Project. • The communities closer to the roads reported some noise related to the ongoing road construction as a result of blasting of rocks. • In Buhuka Flats majority were not satisfied with the general cleanliness of their environment citing bad smells from rotten fish and other waste. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • Most of the respondents noted that both air and water pollution was on the increase. • Some forms of pollution, like air pollution due to increased dust and perceived “air pollution from drilling”, was directly attributed to the presence of the project, while water pollution was mainly attributed to the influx of people into the region and the increase pressure this placed on resources that were already under pressure. • Water sources were noted to be polluted by more people using this resource indiscriminately for ablutions and washing of clothing and vehicles. • The fear of an oil spill in Lake Albert itself and the resultant impact of that on both the fish stocks and general health of lake-shore communities were also raised on more than one occasion. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <p>been blocked resulting in ponding and development of localised wetland of putrid water.</p> <p>Surface water quality in this area is affected by animals (particularly cattle), fish cleaning, sedimentation, and human waste. Larger villages near the lake are supplied with untreated water fed by way of a gravitational pipeline from the escarpment. Direct observation from the EIA consideration that surface water sources would be contaminated by i) animal and human faecal due to poor sanitation and unrestricted access to animals to human water supplies, domestic use such as washing clothes/ dishes/ people and poor waste management [3].</p> <p>There are a number of shallow hand pump wells that provide residents with groundwater. These were either provided by government or NGOs and were not widespread (only in 5 villages). Wells were non-functional as pumps were not working, as water is corrosive and the equipment fails. Residents reported that groundwater quality was poor (saline) and that wells don't yield enough water [3].</p> <p>A detailed groundwater specialist study was completed as part of the EIA, at both Buhuka flats and the pipeline route. This found that the groundwater level was very high (less than 1m below surface) in Buhuka flats and relatively unprotected from surface infiltration of contaminants due to the presence of a shallow perched aquifer. Groundwater sources were more common along the pipeline route (with 15 wells recorded in total), which was the main source of water for residents. The deep well provided a better quality and reliable source of water, with shallower ones (less common) providing poorer quality water and variable yields [140]. Ground water quality studies show that:</p> <ul style="list-style-type: none"> • The pH of well along the lake front in Buhuka were alkaline, had high levels of salinity and hardness, and not suitable for domestic use. • Water quality on the escarpment was good and suitable for | <p><u>Findings from direct observation:</u></p> <ul style="list-style-type: none"> • The environment in Buhuka flats was extremely dirty with domestic waste scattered over a wide area. Evidence of indiscriminate human defecation was noted, and animal dung was widespread amongst the human settlements. Potential hazardous materials such as used batteries were noted in the waste. • The communities along the pipeline were less polluted, but it was evident that there was no formal waste system. • Containers that previously stored other products (such as cooking oil) were used to collect and store water. No obvious containers that previously stored hazardous material were noted but the potential use cannot be excluded. • In one small store pesticides were available for general household use as well as for pest control on domestic animals. It was anecdotally reported that cattle were dipped on the lake shore using these products. Only products containing a pyrethroid class of insecticide were noted in the local stores in Nsunzu and Nsonga. These are extremely toxic to fish, birds, amphibians and aquatic invertebrates. Small concentrations (diluted in lake water) are harmless to humans with the product readily broken down by the sun. • Stores with veterinary medications (antibiotics) as well as pesticides were noted along the pipeline route • Air pollution from domestic sources include smoke from charcoal production, and wood/charcoal based fires for heating and cooking. Dust is less common on Buhuka flats as there is less vehicle traffic but it was evident along roads in the pipeline routing and other access roads. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <p>domestic use. Several trace metals exceed established guidelines and probably have a natural occurrence due to leaching of the surrounding bedrock. Some of the metals may pose a long term health risk to users, with lead and mercury of concern.</p> <ul style="list-style-type: none"> • No hydrocarbons were detected in any samples. • Microbial water quality was tested using a presence/absence indicator for total and faecal coliforms with the following results: <ul style="list-style-type: none"> ○ All surface water samples and 71% of ground water samples tested positive for total and faecal coliform contamination on Buhuka flats. ○ 72% of samples along the pipeline were contaminated. <p>Similarly, a specialist surface water study was also completed as part of the EIA. Samples (22 sites) were taken along the pipeline, on the escarpment and on Buhuka flats, with findings [141]:</p> <ul style="list-style-type: none"> • Overall inorganic water quality was good. • The pH fall in the upper limits of water standards, with five having alkaline samples and one acidic sample near pad 5. • Some areas what high levels of total dissolved solids. <p><u>Noise:</u> Buhuka flats is deeply rural with no electricity. Noise is generally restricted to animal or human noise, with boats and some generator powered equipment also contributing to local noise. Noise levels are low at night [3]. A specialist noise impact assessment report was completed as part of the EIA with the following baseline findings [142]:</p> <ul style="list-style-type: none"> • Measured noise levels were similar in all locations. • Noise sources in the study area were typically wildlife, livestock, people and motorcycles. • A typical peak in ambient noise was noted at dusk, followed by a gradual decrease through the night, to a second peak at sunrise. | |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <ul style="list-style-type: none"> In some sampled communities night time levels were above day time values, with ambient day values below the Ugandan and IFC standards and some night values above pure residential standards for Uganda (<30 dB L_{Aeq}) but below IFC standards (<45 dB L_{Aeq}). <p><u>Visual intrusion:</u> A visual aesthetics baseline report was conducted as part of the EIA specialist studies with key findings [143]:</p> <ul style="list-style-type: none"> The topographical character and sense of place of the study area is defined by the contrast of the flat peninsula and vertical escarpment. This was considered to have a high visual resource value. Lake Albert is also considered to have a high visual resource value, but existing vegetation of moderate value. The existing exploration and early works Project infrastructure is intrusive and in visual conflict with the pre-existing sense of place. While the area is rural and remote and relatively sparsely populated, the local residents are expected to attach a high level of value to the landscape and be sensitive towards the Project. | |



Figure 36: Pyrethroid based pesticide

7.2.10 EHA #10 – Social Determinants of Health

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---|----------------------------------|--|---|
| EHA #10 – Social Determinants of Health | Mental health | <ul style="list-style-type: none"> The health status of a population is affected by factors known as health determinants. These are varied and include natural and biological factors (age, gender and ethnicity); behaviour and lifestyles, such as smoking, alcohol consumption, diet and physical exercise; the physical and social environment, including housing quality, the workplace and the wider urban and rural environment; and institutional factors such as the access to medical care. A number of these factors have been described in other EHAs. Mental illnesses are often a neglected major public health problem in many countries. The scarcity of information and research has hindered policymaking and investment in mental health. Uganda recognises mental health as a serious public health and development concern, and has of recent implemented a number of reforms aimed at strengthening the country's mental health system. However, the mental health legislation is still outdated. Services are still significantly underfunded and skewed towards urban areas. In 2010, per 100,000 population, there were only 1.8 beds in mental hospitals (only one national referral hospital), 1.4 beds in community based psychiatric inpatient units, and 0.4 beds in forensic facilities. The total personnel working in mental health facilities were 1.1 per 100,000 population [128]. Reliable data on the prevalence of mental illness in the country is very limited. Estimates from the 2010 GBD show that major depressive disorder is the commonest. Epilepsy is also a major cause of neuropsychiatric illness nationally [36]. | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> A few cases of mental illness were reported in the communities. In Kyakapere, participants were aware of at least 3 children who were mentally retarded as from birth. In Nsonga and Kacunde village, cases of mental confusion and irrational behaviour linked to drug abuse was reported. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> Mental illness was reported to be quite common in the study area with depression and anxiety disorder being noted as the two most common mental diseases. Suicide was very rare but the HCW at Buhuka HC did note three cases that took place within the last two years. <p><u>RHMIS data:</u></p> <ul style="list-style-type: none"> Epilepsy was the most common neuropsychiatric condition reported is part of the RHMIS, ranging from 25% to 98% of all reported psychiatric conditions. |
| | Substance abuse and crime/safety | <ul style="list-style-type: none"> Abuse of substances such as alcohol, tobacco or other drugs is not only an important health determinant but also closely linked to mental health [129]. It is further associated with crime, violence and CSW. Drug and substance abuse has become a public health concern in the country. Tobacco for instance, is widely grown | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> Substance abuse was reported as a huge problem in the study area. Alcohol abuse was said to be an issue in all the communities. At the village centres bars/pubs were quite evident. Consumption ranged from cheap local |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|---|
| | | <p>and easily accessible [35]. The National Drug Authority recognises that drug abuse has reached alarming levels and has recently initiated campaigns to fight the problem, which has also infiltrated into schools and universities.</p> <ul style="list-style-type: none"> A recent study has shown that 20% of students have at some point abused drugs. The commonly abused substances are tobacco (cigarettes, <i>shisha</i>, and <i>kuber</i>), weed (marijuana), khat (<i>mairungi</i>), and alcohol. A few of the teens had access to class A drugs such as cocaine and heroin [130]. | <p>brews to strong spirits in plastic sachets (Figure 38) with high alcohol content. These sachets were widely available, reasonably cheap and were found to litter wide areas around settlements underscoring the range of abuse.</p> <ul style="list-style-type: none"> Abuse was linked to an increase in social vices such as transactional sex, domestic violence and neglect of familial responsibilities. Cigarette smoking was as common as alcohol abuse. Consumption ranged from locally growth tobacco to modern processed cigarettes and <i>kuber</i> (a form of tobacco). Other hard drugs such as marijuana/bhang were also commonly abused. Marijuana was said to be easily accessible (sourced locally) and popular with the youth especially in Buhuka Flats. <p><u>Findings from KIIs and direct observation:</u></p> <ul style="list-style-type: none"> Alcohol abuse was considered to be very common in the area and was considered to be on the increase, specifically during harvest times. Alcohol abuse was also mentioned as one of the main contributors to RTA and domestic violence in the area. Smoking was also considered to be a major public health issue. Drug abuse was reported to be relatively rare and was attributed to younger age groups. The most common recreational drugs noted were marijuana, <i>khat</i> and <i>kuber</i> (Figure 37). |
| | Education | <ul style="list-style-type: none"> Education is a key determinant to support and uplift the health status and wellbeing of an individual in a society and, indeed, communities. The national system of education has a structure of 7 years of primary education, 6 years of secondary education (divided into 4 years of lower secondary and 2 years of upper | <p><u>Findings from the FGDs:</u></p> <ul style="list-style-type: none"> Levels of education in the study area were quite low. Majority did not complete primary education while some had no formal education. Among the youth, there were a few who had a secondary certificate (O or A level). |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|---|--|
| | | <p>secondary school), and 3 to 5 years of post-secondary education.</p> <ul style="list-style-type: none"> Primary education has been offered tuition-free for over a decade (since 1997) and enrolment is nearly universal (stands at 94%). The main challenge however is the quality of education and retention during or after primary school. The total adult literacy rate in the country stands at 73% [34], and 71% in the Western region - with a disparity between males (77%) and females (65%) [35]. | <ul style="list-style-type: none"> Access to education was a main issue for the communities in Buhuka Flats, with a reliance on Nsonga primary school. Majority of children in Kacunde and Kiina were not attending school due to distance (>5 km) and lack of accessibility – no proper paths linking the villages to Nsonga. Communities in the escarpment had relatively good access to education, including private schools. However, educational attainment was still generally low. |
| | Employment | <ul style="list-style-type: none"> Over half of the country's population derive their livelihood from subsistence agriculture and fishery [21]. The youth unemployment rate (at 83%) is the highest in the African continent. The government is working on policies to expand job opportunities for youth. Programmes such as the Youth Venture Capital Fund have set aside ~\$10 million to assist start-ups in the private sector. The Youth Livelihood Programme has also been instituted to teach vocational and entrepreneurial skills to young people around the country [131]. Recent development in the oil sector has high expectations to create jobs. | <ul style="list-style-type: none"> The majority of people on the Buhuka Flats derived their livelihood from fishing while those in the escarpment mainly derived their livelihood from subsistence crop farming and livestock keeping. There was a general sense of high expectations in terms of employment opportunities in the Project. The farming communities reported an increase in earnings due to high demand for farm produce and were optimistic of a better future and improved socio-economic status. |
| | Migration | <ul style="list-style-type: none"> The Western region is experiencing population influx of migrants looking for opportunities in the emerging oil sector. This is also supported by an improvement in road network. A study by the National Land Alliance in 2011 found that 39% of the participants had migrated into the area in the preceding 5 years [45]. Influx can trigger population growth, increase land pressure, and escalate competition for limited social services such as education, health and access to potable water and sanitation. | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> Influx was said to be happening at a fast rate in the study area as a result of the project associated activities Land value in the area has gone up as migrants buy land to settle, farms or set up businesses. Immigration was negatively linked to loss of community cohesion and erosion of some cultural values. <p><u>Findings from KIIs and direct observation:</u></p> <ul style="list-style-type: none"> Significant influx was noted by all respondents during the survey. In all cases, the CNOOC project was identified as the |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|-------------------------------|---|
| | | | <p>main attractor (this may have some bias as the assessment was related to CNOOC).</p> <ul style="list-style-type: none"> Existing resources were noted to be under pressure, and the capacity to manage additional burden is limited. There was evidence of dormitory style accommodation under construction on Buhuka Flats, with the owner acknowledging he wanted to rent out the space to new arrivals (Figure 39). |



Figure 37: Drug that is smoked locally on Buhuka flats



Figure 38: Alcohol sachet



Figure 39: Development of housing for incoming migrants- Kiina

7.2.11 EHA #11 – Health Seeking Behaviour and Cultural Health Practices

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|--|-------------------------------------|---|---|
| EHA #11 – Health Seeking Behaviour and Cultural Health Practices | HSB and use of traditional medicine | <ul style="list-style-type: none"> • HSB, the manner in which people choose which health provider to consult, and when to consult them, depends on a variety of factors. It is essential to understand these factors and identify the community practices to support an understanding of entry into a healthcare system, and how to target interventions. • In circumstances where accessibility and cost is a major determinant to access modern healthcare, it may only serve to further promote the use of traditional medicine (TM) and the informal health sector. • Nationally, 60% of the population use TM for their primary health care (PHC) needs [132]. Although a diversity of materials is used, herbs dominate. Studies have reported the use of TM in treatment of many illnesses including malaria, TB and HIV/AIDS [132, 133]. However, efficacy and safety of most of the TMs have not been documented. | <p><u>Findings from the FGDs:</u></p> <ul style="list-style-type: none"> • HSB the communities was characterised by the use of both modern health care and TM. Use of over-the-counter medicine was also common, purchased from unqualified drug vendors. • Limited access to modern health care in the area was seen as the main driver to the use of TM. • TM was reportedly preferred for treatment of certain conditions during pregnancy, snake bites, syphilis, etc. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • Most of the interviewees considered HSB to be poor in their areas. It was especially considered to be so in the more remote communities for whom access was a major issue. • Travel costs were reported to be very prohibitive - refer to the HC assessments in Appendix E. • It was therefore noted that the choice to make use of TM was mostly made due to economic restriction, rather than personal choice. • Some instances were, however, mentioned were cultural practices (like Awola / personal bewitching) needed to be completed, prior to modern healthcare. One of the associated believes dictates that a patient will die if injected before the bewitchment has been lifted. • As noted previously, the use of TM significantly delayed diagnosis and treatment of specifically children and was associated with a marked increase in both morbidity and mortality. • In addition to this, the majority of women delivered at home with the assistance of traditional birthing attendants (TBA). TBAs are no longer considered to |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|-------------------------------|---|
| | | | be accredited healthcare providers, but the practice still persists, mainly due to the difficulty in accessing HC from more remote communities. |

7.2.12 EHA #12 – Health Programmes, Services and Systems Infrastructure and Capacity

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---|----------------------------------|---|--|
| EHA #12 – Health Services and Systems Infrastructure and Capacity | Health system and infrastructure | <ul style="list-style-type: none"> The country has an extensive network of health facilities including national referral hospitals, general hospitals, and health centres as described in section 7.1.2. The local health infrastructure is described in section 7.1.3 of this report. A summary of the HC assessments are attached in Appendix E. This assessment was based on a modified WHO service availability and readiness assessment tool that SHAPE has adapted for use in HIAs (WHO-SARA). | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> The study area is underserved by health facilities. Communities in Buhuka Flats mainly relied on Nsonga HC. The facility was reported to be understaffed and the level of service was unsatisfactory. Lack of a resident midwife and drug shortages were specifically mentioned as a concern by the community. The communities in escarpment relied on Kyangwali HC as the main facility, but some communities mentioned that access was a challenge as they were over 10 km away from the facility. PHC in these communities was supported by some small private clinics, but these generally lacked equipment, reliable stock of medications and consumables, and personnel. Utilisation of the small private providers seemed to be limited, with some of the respondents reporting to buying drugs from clandestine pharmacies. There is a community health worker volunteer programme (VHT) that act as the first level of care in the communities. In most cases the VHTs lacked medication/supplies and adequate training to discharge their duties. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> All of the HCs that were evaluated as part of the survey, reported an insufficient level of staff for their |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|-------------------------------|---|
| | | | <p>HC. According to regulations, the following number of staff should be appointed to the distinct level of HC:</p> <ul style="list-style-type: none"> ○ Level II – 12 personnel ○ Level III – 23 personnel ○ Level IV – 35 personnel. <ul style="list-style-type: none"> ● HCs in the study area had the following number of staff: <ul style="list-style-type: none"> ○ Buhuka (level III)-3 personnel ○ Kyangwali (level III) – 16 personnel ○ Kaseeta (level III) – 9 personnel ○ Kabaale (level III) – 11 personnel ● In addition to staffing levels, lack of appropriate infrastructure and equipment were noted as significant issues in all HCs. ● An additional issue was the target population (TP) of each HC. HCs in the study area were routinely serving significantly larger TPs than intended. TPs were calculated on officially registered communities, but HCW noted that the populations in unofficially registered communities frequently outnumbered the official ones. This presented a major issue with regards to allocation of resources and calculation of coverage rates. ● On all levels of interaction (both district and rural HC level) access to healthcare was deemed to be another significant challenge to providing adequate healthcare to communities. ● The VHT programme was supported by Malaria Consortium but the funding for the program ended in 2015, leaving a significant gap in communities' access to healthcare. Based on anecdotal evidence, the positive impact of this program was significant. ● The VHT teams also played an important role in outreach activities to communities, as outreach programs, when appropriately implemented, were reported to be very effective. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|---------------------|---|--|
| | | | <ul style="list-style-type: none"> Lack of resources personnel and funding were reported to be major challenges in successfully implementing outreach activities. The proportion of outreaches (executed vs. planned) for each HC is reflected below: <ul style="list-style-type: none"> Buhuka HC – 48% Kyangwali – 62% Kaseeta – 35% Kabaale – 21% The Hoima District only had one ambulance that was used for referral to Kampala and was not available for use in the district. |
| | Reproductive health | <ul style="list-style-type: none"> Achieving universal access to reproductive health by 2015 is one of the two targets of MDG No. 5. Family planning (FP) is an essential component of reproductive health. Nationally, women have an average of 6.2 children in their lifetime. Fertility rate is almost twice as high in rural than in urban areas, and decreases with increasing level of education and household wealth [21]. Childbearing begins early. More than one-third (39%) of women age 20-49 gave birth by age 18, and more than half (63%) by age 20 [21]. Awareness of at least one method of contraception is nearly universal; however, contraceptive use is generally low (only 26% of married women) [21]. | <p><u>Findings from FGDs</u></p> <ul style="list-style-type: none"> Access to reproductive health services in the area was limited. Awareness and uptake of family planning was very low, with a majority of women bearing at least 6 children. Women reported a dislike for the contraceptive medications due to side effects. There was also a perception that contraceptives can lead to infertility. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> Only Kaseeta HC reported good uptake on FP activities while the rest considered it to be poorly supported. In general, women did not share any responsibility in making decisions regarding family size and as a general rule, larger families were considered to be beneficial. |
| | Maternal health | <ul style="list-style-type: none"> Maternal health refers to the health of women during pregnancy, childbirth and the postpartum period. The country launched the Maternal Health Project (MHP) in 2011 which is being implemented in 8 districts including Hoima [22]. The goal is to contribute to reduction of maternal mortality and the implementation model includes community | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> Maternal health care in the study area was characterised by: <ul style="list-style-type: none"> Limited physical access to a health facility. Delay, incomplete or lack of attendance of ANC. Majority of child births occurring at home. |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------------------------|---|---|
| | | <p>dialogues, door to door home visits, media campaigns, drama performances, radio talk shows, etc. VHTs are central to the delivery of the MHP [22].</p> <ul style="list-style-type: none"> • National and regional statistics show that: <ul style="list-style-type: none"> ○ Maternal and perinatal conditions account for approximately 20% of the total disease burden. ○ Conservative estimates put the country's maternal mortality rate/ratio (MMR) at 310 per 100,000 live births. The main direct causes are haemorrhage (34%), hypertension in pregnancy (19%), obstructed labour (13%), unsafe abortion (9%) and sepsis (9%). The lifetime risk of maternal death is 1 in 49 [134]. ○ Approximately 95% of mothers receive ANC from a skilled provider; 48% attend ANC at least four times. More than half (58%) of births in the five years before the 2011 UDHS were assisted by a skilled provider, an increase from 42% in 2006 [21]. ○ 96% of women in the Western region receive ANC from a skilled provider and 56% of child births occur at a health facility [21]. | <ul style="list-style-type: none"> ○ Lack of emergency services. • Those who attended ANC at the health centres reported that they received some tests, medicine to prevent malaria, and blood boosters. <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> • Maternal health care was deemed to be inadequate, primarily due to difficulty in accessing HCs. • The majority of mothers delivered at home with the support of either TBAs or family members. • Based on the modified WHO SARA indices, the majority of HCs scored well on ANC delivery (average of 7.6 out of 9), but scored poorly on basic emergency obstetric care (average of 7.1 out of 13). |
| | <p>Child health and immunisation</p> | <p><u>Child health</u></p> <ul style="list-style-type: none"> • Infant and child mortality rates are basic indicators of a country's socio-economic situation and quality of life. • Uganda has made significant progress in child survival, from an under-5 mortality rate of 178/1000 live births in 1990 to 69/1000 live births in 2012. Current figures indicate that one in every 22 Ugandan children dies before their first birthday, and one in every 14 children dies before the fifth birthday [34]. The country is on track to meet its 2015 MDG for under-5 mortality set at 59/1000 live births [135]. • The leading causes of child mortality in the country are ARIs (15%), malaria (13%), prematurity (12%), birth asphyxia (11%), and diarrhoea (9%) [31, 135]. <p><u>Childhood immunisation</u></p> <ul style="list-style-type: none"> • Child immunisation against common ailments is an important | <p><u>Findings from FGDs:</u></p> <ul style="list-style-type: none"> • Child health and well-being emerged as an issue. • A good proportion of children do not attend child welfare clinics. The main reason was limited physical access to a health facility and inadequate child outreach programmes. • Growth monitoring was hardly done for children over 1 year old. • Child deaths were said to occur, from common ailments such as malaria, measles or unknown causes. • Vaccination coverage was also poor. This was evidenced by the frequent occurrence of conditions such as measles in the area. Vaccination coverage was reportedly much lower for children in Buhuka Flats compared to those in the escarpment |

| Environmental health area | Health determinant | Literature and secondary data | Participatory data, local findings and statistics |
|---------------------------|--------------------|--|---|
| | | <p>factor that ensures proper child growth and development, with implications into adulthood.</p> <ul style="list-style-type: none"> The national childhood EPI schedule is well aligned to the WHO/UNICEF recommendations and available in most areas in the public health service⁴ [21]. Additionally, the EPI schedule includes hepatitis B and <i>Haemophilus influenzae</i> type b (Hib) vaccines and the recently introduced (in 2013) pneumococcal conjugate vaccine [136]. Findings from the 2011 UDHS showed that only 52% of children aged 12-23 months in the country are fully vaccinated. There were significant dropout rates for multi-dose vaccines (e.g., polio) with higher coverage for first compared to last dose [21]. In 2011 and 2012, none of the vaccines met the recommended national coverage target of at least 90% of population at risk [34, 137]. In 2011, only 60% of children in the Western region were reported to be fully vaccinated. EPI vaccine coverage in the region were reported at 95% for BCG, DPT-3rd dose (78%), polio-3rd dose (72%), and measles (82%) [21]. Immunisation coverage for Hoima District is shown in Table 14. | <p>communities.</p> <p><u>Findings from KIIs:</u></p> <ul style="list-style-type: none"> Immunization coverage was considered to be sub optimal due to ineffective outreach programs and significant influx of people into all of the catchment areas. According to RHMIS data, the coverage of the intended targets for immunization coverage reflected as follows in January 2015: <ul style="list-style-type: none"> BCG – 93% DPT1 – 101% DPT3 – 91% Measles – 87% It should be noted, though that actual coverage may be lower due to potential discrepancies in TP calculations as noted above. |

Table 14: Immunisation coverage for Hoima District (%)

| Antigen /Year | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 |
|---------------|---------|---------|---------|---------|---------|
| BCG | 80.0 | 82.0 | 83.0 | 84.2 | 87.2 |
| Polio3 | 80.0 | 85.0 | 85.1 | 87.0 | 92.0 |
| DPT3 | 75.0 | 79.0 | 80.0 | 83.0 | 85.0 |
| Measles | 65.0 | 70.2 | 76.0 | 77.0 | 79.0 |

⁴ World Health Organisation guidelines for childhood immunisation call for all children to receive a BCG vaccination against tuberculosis; three doses of the DPT vaccine to prevent diphtheria; pertussis; and tetanus; three doses of polio vaccine; and a measles vaccination during the first year of life.

8 Impact Definition/Evaluation and Associated Mitigation Measures

This section details the analysis, modelling and ranking of the potential health impacts associated with the Project and considers the analysis of potential negative impacts and their mitigation measures, but also potential positive impacts and measures to enhance these.

As health impacts may vary significantly in the different Project phases, these have been separated, as relevant, into construction and operations, as well as closure. As the final FEED is not available it is challenging to consider detailed mitigation measures especially in early works and no closure. Based on the iterative nature of HIA, these impacts and associated mitigation measures should be considered in a continuous manner as the Project progresses.

As potential impacts are not likely to affect all PACs equally, a short discussion on the distribution of impacts is presented at the end of each impact evaluation section. This will then allow for planning on where the management measures should be focused to effectively mitigate impacts.

The methodology of the impact assessment and modelling has been presented in section 4.2.5, with the categorization matrix described in detail in Appendix A.

As a general principle, the management of potential impacts is more likely to succeed if the following sustainability principles are considered:

- Interventions should be aligned with national strategies and programmes and the Project should engage a management entity (foundation/outsourced) to support community based (i.e. outside the fence line) mitigation and management strategies. However, this should be applied where relevant to achieve the required level of mitigation, and corporate social investment (CSI) opportunities must not be confused with pure impact mitigation. This alignment is to ensure that there is a clear separation between the delivery of public health services, which is a government function, and the role of the private sector.
- Where applicable, CNOOC must avoid becoming entangled in the role of government in planning and developing public health programmes, but rather focus on developing Public-Private Partnerships (PPP) with government departments and engage

partners (key NGO/agencies) with experience in managing these agreements and associated programmes.

- Lack of human capacity and formal regulations to plan and manage health impacts may result in a stakeholder focus that may not be aligned to priorities, or unlikely to have the desired result due to management and human capital constraints. Thus, interventions that have a focus on health system strengthening (HSS) should be considered as opposed to localized, unsustainable, once-off initiatives. While health infrastructure development may be warranted this should ideally not occur in isolation.
- There should be a caution against quick fixes that do not have a business interest or a degree of mutual partnership/ownership.
- Effective and on-going communication with authorities and PACs should be maintained throughout the Project life cycle stages. This should include the development of a commitments register to monitor the stage of delivery, key responsible person, when it is likely to be delivered etc., with the stakeholders continually appraised of progress. A grievance register should be created to record and track any complaints or comments from the community on health related matters. This is important to manage stakeholder expectations and to ensure an effective route of communication.
- Cultural sensitivity should be displayed in interactions with stakeholders.
- Contractor management and compliance should (strongly recommended) be enforced from the outset by making provisions in contracts to adhere to certain requirements. An audit and assessment process should be in place to verify this compliance. This is essential as construction contractor companies have a focus to develop the Project as quickly and cheaply as possible, but if due process is not followed then the legacies from this phase will persist into operations.
- Effective surveillance systems, preferably based on evaluating key indicators, should be developed to monitor for both potential health impacts but also the effectiveness of management measures.

8.1 EHA #1 – Communicable Diseases linked to the Living Environment

Impact Definition:

As discussed in the baseline section, the housing in the PACs on Buhuka Flats and on the immediate escarpment was rudimentary with poor construction techniques. In general, the housing in the communities along the pipeline route was of better quality [2]. It was reported that the communities in Buhuka Flats rarely spent large sums of money on improving their homesteads, and despite migratory communities staying for longer periods than originally intended, improvements to housing structures were not commonly made.

Overcrowding in communities was found to be common, with the number of people per household in Buhuka Flats (estimated at 8), significantly higher than the regional average of 4.9 people per household [2]. On direct observation, ventilation in the majority of households appeared to be poor, with poor indoor air quality likely. The extensive use of biomass fuels (wood and charcoal) for cooking and heating contributes significantly to the poor air quality.

The prevailing low socio-economic status makes the local communities particularly sensitive to changes in their living environment, with limited capacity at either the level of local authority or community, to support housing or the provision of basic services that promote environmental health and hygiene. In-migration and pressure on housing and the environment increases these sensitivities.

ARI in both children under five and all age groups were routinely ranked amongst the top three contributors to local BOD. Measles posed an epidemic outbreak risk with significant outbreaks reported as recently as 2014 in the study area. At the local level there was limited data on the BOD related to TB, but it was reported to be on the increase, with limited disease management capacity and poor knowledge of the disease and HSB. The risk of these and other communicable diseases spread by close contact are important given the weak health system and poor access to health care services in the study area.

The Project has the potential to impact on housing and communicable disease risk in the following direct and indirect pathways, with the bulk of the impacts likely to occur in the construction phase, with a reduction in operations.

Direct:

- **Impacts on communicable disease transmission from the incoming construction workforce**

The incoming construction work has the potential to increase the local transmission of communicable diseases, in the following ways:

- Poor workforce housing/accommodation conditions if associated with overcrowding as diseases are commonly spread by close contact. Contractor temporary work camps are especially important to consider and they have a globally mobile workforce and overcrowding can occur in camps especially in peak staffing periods.
- Introduction of communicable diseases into the study by an incoming migrant workforce, especially if these workers originate from areas where the prevalence of disease is high, or they acquire conditions from their past assignments. While CNOOC has a casual labour policy in place that aims to comply with a 60% local resident employment target for casual job opportunities, and while this is expected to be maintained, the low level of skills in the study area will mean that semi-skilled and skilled workers will need to be sourced from other countries to support the development of both the CPF and the pipeline [2].

Significant risks can include TB, where the external labour force may be sourced where the status of latent and more importantly active TB may be poorly described, or may be significantly higher than in the host communities. This may increase local disease transmission patterns in both the workforce and ultimately the community as people are likely to work and live in close association with one another, especially in temporary work camps. The local health system has poor TB disease management systems and a sudden spike in cases will be challenging to manage. The co-morbid association of TB with HIV is also important to consider as higher caseloads of TB may affect local HIV interventions, especially TB detection and case management, given the weak health services. An additional risk related to the incoming workforce and TB transmission is the potential introduction of multidrug resistant strains as local transmission of these resistant strains may be associated with significant public health implications, as MDR-TB is extremely costly and complicated to manage.

Other than TB, movement of people has the potential to introduce other diseases that may have significant public health implications, especially meningitis, seasonal influenza, potentially pandemic influenza and other novel communicable diseases. Increased movement in and out of the area (including international air travel) has the potential to introduce different circulating virus strains (especially influenza) with the risk for local transmission.

- **Resettlement**

The number of households to be resettled and their potential host sites is yet to be finalized, and it will be important to consider the specific potential health impacts once these are concluded. While the resettlement framework will consider local Ugandan regulations as well as IFC PS5 it will be important that development effective management measures that are sustainably implemented as health impacts can be felt in a positive and negative direction. Important considerations include:

- Migration of extended families into the study area to benefit from the improved social amenities and economic possibilities may result in large families staying in relatively small homesteads with the potential for overcrowding and transmission of communicable diseases. This may also create potential negative impacts associated with in-migration in the host sites, especially the social impacts and impacts associated with increased demands on available basic services including housing.
- The previous point is not limited to families but also to newly arriving migrants who are rented accommodation either in newly developed resettlement houses or make-shift structures developed on the same property. This can result in overcrowding of both the resettled household as they try to maximise their earnings, but also for new arrivals as rental costs may increase (due to supply and demand factors) and whole families or a number of families share small living areas. Dormitory style accommodation may also promote overcrowding (Figure 39).
- Options for compensation should include a requirement that adequate housing should be developed as part of the resettlement agreement. It was reported that financial management was poor, especially in Buhuka Flats and cash compensation may be diverted away from developing appropriate housing for the family unit. This may result in the development of make-shift structure settlements that pose significant risk to communicable disease

spread. The Project can also be blamed for creating this poor housing situation with reputational damage.

- Resettlement planning should be considered so as not to impact on communities that may be selected as host sites (if a site is chosen where communities already live). The existing housing infrastructure in these communities is likely to be limited, and influx into the area to benefit from the improved social infrastructure may create overcrowding with a subsequent risk for transmission of communicable diseases.

As housing space may be at a premium there is the potential that rentals may increase based on supply and demand factors. This may result in the poorer more vulnerable elements of the population not having access to suitable housing as they will not be able to afford it. There is also the risk that homeowners will rent out portions of their existing households to extract rental payments.

There is also the potential to create significant inequalities between the communities who are resettled (and receive new houses) compared to those who are not.

- **Air quality**

Reduced air quality because of Project activities has the potential to increase the risks for acute and chronic respiratory conditions, including secondary infections such as community-acquired pneumonia. Dust from Project activities and emissions from Project vehicles and activities will need to be considered as potential environmental health determinants that can affect human health. These impacts are discussed in section 8.3.9

Indirect:

- **Project induced in-migration**

Due to the limited economic opportunities in the broader area, the Project may be an attractor with subsequent speculative in-migration to look for jobs and secondary benefits. Generally, the demographic situation in EA3A represents a steady population growth, with this extending to the whole district to include Hoima town, attributed to the extended Oil and Gas activities.

Influx is likely to occur in all stages of the Project and signs of early influx were already reported, mainly centred in Hoima City, Kyarushesha and Kyangwali sub-county, and specifically Ngoma and Ikamiro communities as well as those on Buhuka Flats. It is anticipated that Project induced influx will start increasing and peak as the construction phase starts, as this is when the economic and other opportunities linked to the Project are likely to be the greatest. Influx will in all likelihood extend into operations as the Project will remain an attractor, but if not effectively mitigated the impacts of influx will extend into the operational period.

While in-migration can be positive, the movement of people has the potential to introduce disease that local communities may be naïve to, especially if the people originate from areas that have higher prevalence's of these diseases, or introduce resistant strains into the area. Influx may also place strain on the already weak local health system, as there is limited capacity to manage a sudden and significant increase in population numbers. The health services are already overstretched and health prevention/promotion activities to reduce communicable disease transmission as well as case management of diseases will be wholly inadequate. Health impacts related to unplanned development including overcrowding, housing inflation, lack of basic services are all likely to influence environmental health conditions and potentially play a role in increased disease transmission, especially of respiratory or disease transmitted by droplets, including ARI and TB.

Potential "hot-spots" for new settlers will need to be identified or there may be the development of makeshift camps/settlements to accommodate "camp-followers" that migrate into the area looking to benefit from the Project. These settlements will not only promote overcrowding - as often the whole family unit will travel together - but also promote the spread of disease, especially conditions associated with close contact, such as TB, meningitis and measles.

- **Local housing and rentals**

There is inadequate housing in the study area and the development of the Project may place pressure on available accommodation. Supply and demand may increase rental prices, and this pressure may limit access to suitable housing for the poorer and more vulnerable sectors of the community. This may prompt the development of makeshift structures, and lead to increased overcrowding with risk for disease

transmission. Standards of living may decrease and inequalities created, especially in poor and in those who do not benefit from the Project.

- **Local air quality and use of biomass fuels**

Increased pressure on housing and associated increase in use of biomass fuels for heating and cooking may lead to a deterioration of both indoor and outdoor air quality. This can increase the incidence of ARI amongst children and the elderly. In a national study, persons living in households burning biomass fuels were reported to have an odds ratio of 2.58 (1.98-3.37) of developing ARI compared to households using cleaner fuel, with over 50% of cases of ARI attributed to smoke from cooking with biomass fuels in people above 20 years of age [144].

Impact Evaluation and management measures:

| EHA #1 | Communicable disease linked to the living environment | | | | | | | | | | |
|---|---|---|---------------|---|--------------------|------------------------|----------|-------------|----------------------|----------------|------|
| | Early works through to Construction and Operations | | | | | | | | | | |
| | Consequence/Effect | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence | |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Medium term | 2 | Study area | 2 | Major negative | 8 | Probable | 3 | 15 | Major negative | High |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Develop Project induced in-migration initiatives so that adequate mitigation measures are established and implemented as soon as possible. In-migration to the study area is already occurring and this will increase as the Project progresses. Ideally, systems should be in place before the finance investment decision (FID) is made as influx may increase significantly after this. Interventions should include: <ul style="list-style-type: none"> ○ The location for recruiting and especially hiring labour will need to be clearly planned to avoid the attraction of job seeking migrants to the front gates of the various Project work areas and into sensitive communities. Possibilities may include the placement of labour offices away from main gates and only allowing employment of local inhabitants from certain recruitment centres. The restriction on hiring outsiders from certain centres will require support from local community leaders and some form of registration. Careful management will be required to prevent corruption on job applicant lists and recruitment. Migrants and outsiders should be considered for hiring (based on skills) from a central area such as Hoima town? ○ Contractor management in supporting the labour recruitment plan will be essential to enforce to prevent hiring at the front gate during construction, as this will reduce settlement in the area to secure jobs and reduce loitering at the front gates. This should include all casual labour and staff requirements along the pipeline. Compliance to, and consistency with, labour recruitment policies is also important for general community relations as expectations for jobs will be high and deviation from agreed policies may create a community dispute. ○ In partnership with the district authorities undertake a regular census in the study area and develop strategic plans to ensure adequate provision of basic services such as housing, water and sanitation, power, education and health care. The Project should not assume the role of providing these services but should support in the planning and support of infrastructure as the Project will be the key attractor to the area. It is acknowledged that there is an overlap between Project mitigation and social development in this recommendation but the limited capacity at the local level means that the Project needs to take some ownership as part of their regional development plans. ○ Support capacity building for town planning in anticipation for Project induced influx and growth in key settlements. If requested based on discussions with the local authorities, the capacity will need to be provided externally to assist the local authorities with urban planning, including housing, roads, basic services and recreational facilities. Adequate urban planning will eliminate a host of environmental health factors that may impact on spread of communicable disease and promote improved quality of life. These initiatives will need to extend into operations and presents an opportunity for the Project to support the authorities in proactively managing planning rather than fixing new challenges. The challenge will be to reduce the attraction to the study area that may overwhelm best laid plans. • Establish a baseline and surveillance system for: <ul style="list-style-type: none"> ○ Knowledge, attitude, practices (KAP) survey on ways TB is transmitted and prevented, BOD from ARIs, and questionnaires on specific environmental hygiene determinants related to housing and influx. ○ The state of housing in the area using techniques such as mapping and review of satellite images. Review this regularly to show change from baseline and to support future interventions with the local or district authorities. ○ House costs or rental costs and surveillance for how these change over time. • Develop programmes to manage inflation and support vulnerable groups as required (elderly, single women or child headed households). • Design and develop appropriate environmental health programs to reduce the potential risk of airborne pollutants such as dust, which may impact on community health. Ideally these should be planned and managed through engineering designs to eliminate risk or to keep it ALARP. Effective monitoring systems will also need to be established to measure potential exposures such as total suspended particles, particulate matter (PM_{2.5} | | | | | | | | | | | |

and PM₁₀), oxides of sulphur etc. Dust can be a major cause of community aversion from a Project and must thus be effectively managed.

- Support the development of a Community Health Information System (CHIS) to monitor specific key health indicators in a longitudinal fashion. This will require cooperation with the district health authorities and other partners. For example, indicators should include demographic indicators as well as TB incidence, as well as acute and chronic respiratory infections. If possible, this system should be integrated into the ESMP dashboard system.
- Develop and maintain epidemic preparedness policies and programmes to reduce the impact of any suspected or confirmed outbreak of a communicable disease at the local level. This will require a formal hazard identification of potential infectious diseases so likely risks are identified and prioritised. Business resilience and recovery plans should be developed so safeguard business continuity. Plans and actions should include workplace and community activities.
- Outbreak control risk assessments and planning should occur regularly by keeping abreast of pandemic alerts through WHO notifications; especially concerning circulating influenza strains and novel infectious disease.
- Strong relationships with local health authorities should be developed/maintained to receive local disease outbreak reports. Project outbreak management plans should align and be integrated with local government outbreak response systems (where relevant and applicable).

Occupational health, safety and environmental management:

- Develop a site based TB management policy and program for the workforce (including contractors and short term labourers) that incorporates screening as well as education campaigns. These programs should be integrated into the Project's HIV policy (see below in section 8.3.4) and should be developed with clear objectives and measurable indicators so effectiveness can be established. These programs should be (strongly recommended) in place prior to construction.
- Screen local employees/contractors for TB at recruitment (as provided for in the Ugandan Employment Act) and provide adequate care and treatment programs from the Projects workplace medical service while complying with the requirements of the national TB program. Discussions will need to be held with the health authorities to effectively support TB treatment by either providing treatment and care at site (using medication from the national program), with the completion of required notifications and documents, or referring patients to the public health service and supporting with follow up care. This screening should (strongly recommended) form part of the contractor management plan and medical surveillance should include screening based on risk of exposure and exposing others (for example health centre and catering staff).
- Evaluate the origin of any incoming contracted construction workforce (especially from high burden TB countries) and understand TB and MDR risks in this group. Ensure effective TB screening in external contracted workforce prior to final appointment and mobilization as part of the Project's Fitness to Work (FTW) procedures to ensure that diseases are not introduced in the study area. This FTW program should be managed through a central human resource system and no employee or contractor should be allowed to mobilize before potentially infectious conditions such as TB have been excluded.
- Ensure adequate housing is available in the accommodation camps so that overcrowding does not occur. The IFC and European Bank for Reconstruction and Development have guidance on this that can be used as a reference for the development of construction camps, especially in construction [145].
- Ensure that employees/contractors have suitable housing if they reside in the local community to ensure appropriate environmental health conditions (noting impacts on the local rental market).
- Develop a vaccine preventable disease programme for all employees, contractors and visitors based on risk for travellers and at risk occupations. As a minimum a primary or booster measles, diphtheria/tetanus and polio vaccine, as well as seasonal influenza vaccines should be provided to all temporary work camp residents. Even though Uganda is not located in the seasonal meningitis belt it is further recommended that all employees and contractors residing in close contact in camps receive the quadrivalent meningococcal meningitis vaccine. Ensure effective contractor management with these programmes.
- Develop and/or maintain pandemic preparedness policies and programmes to reduce the impact of any suspected or confirmed outbreak of disease at the local level. These need to include effective surveillance mechanisms.

Social development mitigation and management:

- Evaluate opportunities for health systems strengthening (HSS) with government and key partners to specifically focus on:
 - Improved case detection and treatment of TB especially from Buhuka Flats and the immediate escarpment area.
 - Support training and capacity building in health centre staff in the case detection, treatment and follow up of suspected and confirmed TB cases as well as training on the management of integrated management of childhood illness (IMCI) to support care for ARIs.
 - Consider upgrading the diagnostic capability of TB and ability to detect MDR-TB in the district by supporting the use procurement and use of the GeneXpert diagnosis system in the public health system. Hoima RRH and Kyangwali HC would be target areas for a pilot project
- Support the introduction of efficient stoves so that heating and cooking using charcoal requires less fuel. This will reduce the local reliance on biomass fuels for cooking and lighting, which will reduce the potential environmental impact of in-migration placing pressure on local vegetation as a source of fuel, but also reduce the potential for improved air quality and reduction in acute and chronic respiratory conditions.
- Support community based information, education and communication (IEC) campaigns to promote improved knowledge and awareness of TB, other infectious diseases and their associated determinants, through:
 - Extending VHTs programmes as these can effectively provide acceptable and peer based messaging within communities.
 - Evaluating the potential to use mobile edutainment. A 'cinemobile' that moves from community to community may be an effective method to deliver messaging on health, social and general Project related information. This can be supported from either a dedicated unit (or even as part of a mobile health unit) that then travels to communities on different days and delivers health messaging. Pre-recorded messaging (developed specifically for the Project) can then be delivered to the community through an external screen with a powerful sound system.

| | | | | | | | | | | | |
|--------------------------------|------------|---|------------|---|-------------------|---|----------|---|----|-------------------|--------|
| Impact after management | Short term | 2 | Study area | 2 | Moderate negative | 4 | Possible | 2 | 10 | Moderate negative | Medium |
|--------------------------------|------------|---|------------|---|-------------------|---|----------|---|----|-------------------|--------|

Vulnerabilities and Spatial Effects of Impacts:

There is limited capacity to detect and manage an increase in communicable diseases and their introduction may pose a major risk to vulnerable sectors of the local population (young

children, elderly and those with a weak immune system). The poor socio-economic and local living conditions compound the risk. No specific gender risks are anticipated.

The impacts associated with communicable diseases linked to the living environment are more likely to occur where in-migration is likely to occur. The communities on Buhuka Flats, on the immediate escarpment (PAC 2 and PAC5) are likely to experience the bulk of in-migration and associated influences. However, the other PACs are likely to experience the influences of influx, but in varying degrees. Communities in proximity to temporary work camps (PAC 1-2, PAC 5 and PAC6, 7) may be more vulnerable to introduction of communicable disease.

8.2 EHA #2 – Vector Related Diseases

8.2.1 Malaria and Associated Determinants

Impact Definition:

Malaria was cited as the most important public health concern in the broad study area, with the disease accounting for 35-54% of all outpatient visits in the study area HCs. Malaria case rates are also on the increase but this may be due to improve diagnostics and reporting. Misconceptions and poor prevention behaviours were common, with the morbidity exacerbated by poor HSB and access to health facilities. Vector and malaria control initiatives were limited in the study area, with LLINs the most common form of prevention, albeit limited by poor utilisation. There is limited capacity to support other malaria and vector control initiatives.

Malaria is well described to limit economic growth and stifle development in communities that have a high burden of disease. The poverty in the area is almost certainly exacerbated by the effects of malaria. The environment in the study area is conducive for high rates of malaria transmission as the habitat is ideal with poor environmental hygiene supporting numerous breeding sites conducive to promote the transmission of disease.

There is a paucity of accurate data at the level of the study area on vector typology and behaviour, prevalence of malaria and indicators related to knowledge, practices and behaviours. This limits the ability to monitor impacts or interventions from a clear point of departure.

The Project has the potential to influence and sustain malaria transmission in the PACs in the following direct and indirect ways:

Direct:

- **Modification of the environment**

Modification of the environment may increase the available breeding habitats for mosquitoes to breed in. The most efficient vectors in sub-Saharan Africa, *An. gambiae* s.s. and *An. funestus*, are likely to occur widely in the Project area as a conducive habitat is present. *An. gambiae* (likely the most common species) is able to utilize very small bodies of water to breed in, such as hoof or footprints, or well-ruts, around water stand-pipes and prefers sunlit habitats, and while not restricted to such temporary sites, but it is these which often bring this species into close contact with humans. *An. funestus* prefers more shaded and permanent habitats such as swamps,

marshes, edges of streams and ditches. In the dry season the river courses and wetlands in the study area may be ideal breeding grounds.

With this understanding, modification of the environment during early works and construction through general clearing of ground, development of borrow pits, development of roads with drainage furrows, rutting on access roads, construction yards etc. may potentially increase the number of suitable breeding sites and promote vector propagation.

The causal diagram in Figure 40 describes the risk of vector proliferation associated with water resource projects and the development of water bodies. Alteration of the environment associated with the Project will have similar effects and if effective malaria and vector control programmes are developed simultaneously, negative impacts should be limited [146].

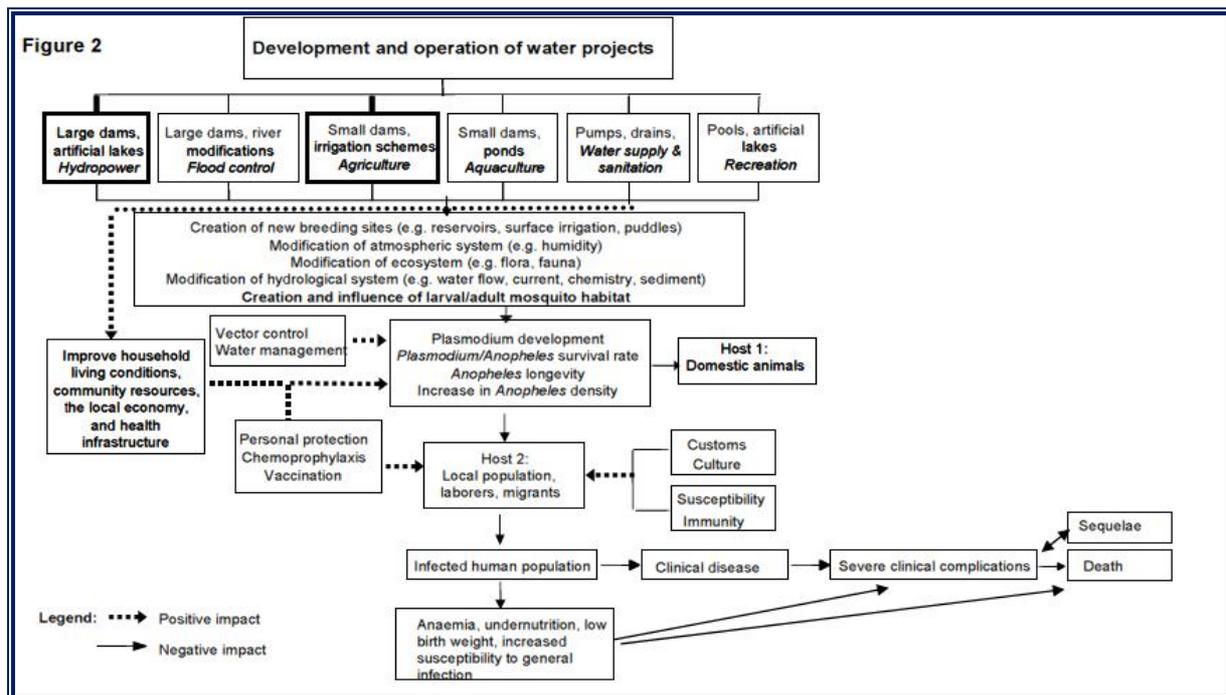


Figure 40: Relationship between malaria and water/extractive industry projects

- **Resettlement**

Resettlement will be very important to manage so as not to negatively impact on communities or host sites, including:

- Location of the resettlement sites

Site selection must include due consideration for environmental factors that may increase the risk of malaria transmission. For example, relocating a community near to a wetland area or close to an area with unmediated environmental modification may increase human vector interaction.

- Appropriate housing and town planning

Construct housing that respects the local norms and culture, but designed in a way to limit the ability for mosquitoes to gain entry into the dwelling. These can include closing eaves where the roof connects with the wall or providing ceilings, screens on windows etc. The town planning of the resettlement sites should include provision for effective drainage and waste management so as to reduce the number of potential breeding sites.

- **Health of the workforce**

The risk of the disease could have significant health and economic impacts to the Project workforce if not mitigated effectively. Design elements and development of integrated malaria and vector control programmes:

- Absenteeism through repeated infections will have a significant impact on productivity and increased costs. It is estimated that an expatriate non-immune employee will take at least 5-7 days to reach optimal productivity after an uncomplicated case of malaria and a semi-immune local employee 2-3 days.
- Health and safety risks: Patients with malaria who still work may pose a risk to fellow employees and themselves. The effects of the disease and the treatment drugs may reduce alertness and some medications may reduce hearing sensitivity.
- Increased cost of overall health care: The cost of malaria management through large caseloads can become significant. An uncomplicated case of malaria may cost about US\$15-\$20 to manage, without considering human resource and initial capital expenses. The impact of a complicated case of malaria, that may require medical evacuation and extended hospitalization in an ICU setting, can be very costly, and may run into tens of thousands of dollars.
- Increased burden on the workplace medical service: High case-loads of malaria will take a significant amount of time in the medical service and limit the effectiveness of other health programs, such as health promotion and prevention activities.
- Employee turnover and attractiveness: Exposure to risk may decrease the ability to attract skilled staff to work in the Project area. Repeat infections and decreased

morale from the risks related to the disease may also increase employee turnover.

- Employer liability: The risk exists for an employer to be held liable for complications that may arise from an infection, especially if mitigation measures have not been put in place.

Indirect:

- **Accessibility and Project induced in-migration**

The development of the Project will alter accessibility and may promote influx into the study area, which may have both positive and negative impacts on the risk of malaria transmission:

- **Positive:**

- § Improved access to HCs in the study area and especially the one on Buhuka Flats should improve the ability of the public health authorities to support the supply chain of medications, consumables and commodities such as LLINs.

- § The improved access road from Buhuka Flats to services on the escarpment (and especially Kyangwali HC) will enable better access to health care services and a wider referral network. It is likely that the public transport system will also improve, which (as long as it is affordable) will also promote access to these improved services.

- § Improved communications and access to information may improve HSB and practices through improved awareness and knowledge.

- **Negative:**

- § Continuous movement and an increased concentration of people may introduce higher circulating malaria parasite loads into the community, which may in turn increase transmission of the disease. This movement may also reduce the efficacy of control programmes as the parasite is continually introduced into the area (by infected humans) from other areas.

- § Unchecked development with no planning for drainage or general domestic garbage/waste management may also alter the environment and create improved vector breeding sites, which may increase vector densities and risk for disease transmission.

- § Make-shift settlements with associated poor housing (if it occurs) will reduce natural protection against mosquitoes entering houses.

- § Increasing the burden on already limited basic services including adequate housing, waste management and health services (including care and effects of programmes such as ITN distribution).

In summary, the way malaria transmission will be influenced by the Project will depend on determinants such as the epidemiological setting, local vector behaviour and management, change in land use related to vector activity, socio-economic conditions and HSB. 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. In fact, the potential for economic development and enhanced access may improve indicators. However, during the dry season, and particularly in construction, the alteration of the environment may give rise to increased vector density and prolong the peak malaria transmission season. The development of the pipeline will also increase risk along this route due to an altered environment.

Therefore, mitigation measures are warranted and are likely to play a significant beneficial role to the community if well planned and executed. Extension of interventions as part of CSI initiatives will be of significant benefit to the community as it will not only support a reduction in burden of disease but also support economic development as malaria plays a co-morbid role in many other conditions, reduces the economic abilities of households and perpetuates poverty. It will also influence the ability to recruit from the local population in the short to medium term as it effects educational attainment and ability to work effectively.

Impact Evaluation and management measures:

| EHA #2 | Malaria and associated determinants | | | | | | | | | | |
|--|-------------------------------------|---|---------------|---|--------------------|---|------------------------|---|-------------|----------------------|------------|
| Early works through to Construction and Operations | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Long term | 3 | Study area | 2 | Moderate negative | 4 | Probable | 3 | 12 | Major negative | Medium |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> In the early works and construction phase, maintain strict environmental controls around earth works and related construction activities, to avoid the development of suitable vector breeding sites. This may involve backfilling, draining and management of any area that may, or has collected water, and that may increase the vector densities in the area. A permitting system should be developed for ground disturbance, with a process to ensure minimal disturbance and effective remediation near any settlements. This process should continue into operations and include any offsite activity, such as road construction. Labour Recruitment and Influx Management Plans as per the social management plans. Plan the resettlement host sites to include specific design criteria, including: <ul style="list-style-type: none"> Location of the host site to avoid a location in proximity to a potential breeding area (wetland). Planning and maintenance of effective water drainage and waste management to limit the development of breeding sites. Resettlement housing should have sealed eaves, ceilings, and screens on windows to limit the potential for mosquitoes to enter dwellings. The designs should consider cultural requirements in terms of housing, and be adequately ventilated. Support programs (clean community campaigns) that promote good environmental hygiene such as removal of garbage and limiting standing | | | | | | | | | | | |

- water.
- Prioritize the host sites in community based malaria interventions.
- Collect data to define a robust baseline to describe the BOD and specific malaria indicators to serve as a point of departure to monitor impact mitigation and programme interventions. This should include conducting a baseline malaria parasite prevalence and anaemia survey as well as determining local knowledge, attitude and practices (including LLIN ownership and utilisation). Surveillance of these indicators should be included in the design but should include considerations for a follow up at a minimum of three yearly intervals or a transition between Project activities (construction to operations).
- Undertake a baseline entomology studies with a dry and wet season sample to determine the main vector species present in the study area, its biting and resting behaviour and susceptibility to different insecticides. Based on this, develop a vector control strategy at both the workplace and community level, including specific entomological surveillance to determine the effectiveness of interventions as well as the seasonal behaviours of different vectors to determine what species is most common at different times of the year and what feeding/resting patterns the vectors exhibit. This will ensure interventions are appropriately targeted and allow a pro-active management of disease risk during construction and operations rather than reacting to an increased number of cases retrospectively.
- Evaluate opportunities to develop an effective CHIS to monitor the BOD from malaria in partnership with the district health authorities. These need to include, longitudinal data sets as well as monitoring of specific indicators collected at baseline and linked to mitigation activities. The surveillance activities should have thresholds for response in the event of a spike in case numbers.

Occupational health, safety and environmental management:

- Pre-design controls are essential to reduce potential human vector contact and control of breeding sites. The FEED design should be reviewed to consider these risks and include:
 - Locate any accommodation or temporary work camps as far away as possible from communities (or where communities may settle) to create a buffer zone (a 'cordon sanitaire' of 1.6km is suggested) and reduce the risk of human vector contact in mosquito populations that are more likely to harbour the parasite.
 - Adequate drainage and management of storm water to limit the amount of standing water on site (for e.g. construct down-pipes on roofing structures to feed into underground channels that then discharge the water into an existing water channel some distance from the site, or into the Lake).
 - Provision of appropriate accommodation units to promote bite prevention including i) screened windows and doors; ii) doors that close with a self-closing mechanism; iii) air conditioners or fans; and iv) provision of LLIN that fits the bed appropriately and promotes actual use (suggest to use oversized LLINs that mount on a square frame to limit close contact to the bed).
- Evaluate the opportunity to develop an integrated workplace malaria and vector control programme in the based on the principles described in Figure 41 and to reflect the Ugandan Public Health Law. This should have a focus on environmental management, vector control, behaviour management and effective case management:
 - Source reduction and environmental management should form the mainstay of the interventions as this has been shown to reduce the risks from malaria transmission by up to 95% if effectively executed. Actions should include; i) maintaining good housekeeping on site to prevent the creation of breeding sites and limit the amount of vegetation around accommodation units as these can serve as resting areas for vectors; ii) avoid, reduce or remove standing water onsite and offsite by ensuring adequate drainage, back-filling and run-off; and iii) if warranted consider larvaciding with biological or chemical larvicides, but this requires skilled staff.
 - Routine inspections should be undertaken to check accommodation units to ensure that screens etc. are in place. An effective camp maintenance programme will need to support this.
 - Vector control measures should include IRS and larval source management, with space spraying (fogging) reserved for outbreaks and emergency controls based on the entomological surveillance and caseloads. Skilled personnel will be required to establish and maintain the programme.
 - Develop appropriate IEC programmes for the workforce/contractors prior to secondment and for use in country. These programmes should be designed based on risk and not simply generic messaging. They should be supported by serial KAP or qualitative studies to measure effectiveness of interventions and to support effective behaviour change communication.
 - Develop policies and programmes related to use of protective clothing (long sleeves and long pants) and use of malaria chemoprophylaxis (for non-immune individuals).
 - Develop effective case surveillance programs between the workplace medical service and vector control team to determine the likely origin of, and root cause of malaria cases. All cases should be recorded on a database so basic demographic profile, their job, their residence (in past three weeks) and behavioural elements can be evaluated. This information will allow a trend analysis to profile high risk groups, the likely areas where malaria is transmitted and the behaviour of employees/contractors that contract the disease.
 - Include malaria risk as criteria for FTW (based on immune status and other underlying medical conditions) in pre-assignment medical examinations in non-immune employees.

Social development mitigation and management:

- Any community based interventions should be performed in partnership with the Ugandan National Malaria Control Programme (NMCP) and related national strategies. The USAID funded Presidents Malaria Initiative (PMI) is currently the biggest programme running in Uganda, but there are a number of other bilateral agencies working on malaria, and there may be the opportunity to extend the scope of these interventions to the study area. Other partners (UNHCR, Chinese development) may also be interested and the Project could support elements of these as part of a clear agreement defining roles and responsibilities including sustainability considerations. The opportunity would be to introduce comprehensive malaria and vector control interventions, with the focus initially at Buhuka Flats and communities located on the edge of the escarpment, with a slow extension to the pipeline area and communities. The real opportunity may be in developing a district wide programme in partnership with the other Project partners to extend malaria control efforts over a broader area. The latter would be the most efficient from a disease control perspective.
- Support IEC programmes in the communities, schools, and even with through the health centres. This can be supported through the VHT and district health authorities. This will reduce the misconceptions related to malaria and prevention efforts. The proposed 'cinemobile' or associated edutainment activities will be a good medium to deliver messaging to surrounding communities.
- Encourage source reduction in communities through environmental control mechanisms based on community work groups. These groups can support source reduction efforts. The company can consider sponsoring "Clean Community Campaigns" as part of this initiative as this will address a host of environmental health issues.

| | | | | | | | | | | | |
|--------------------------------|-------------|---|------------|---|---------------|---|----------|---|---|------------------|--------|
| Impact after management | Medium term | 2 | Study area | 2 | Minor benefit | 2 | Possible | 2 | 8 | Moderate benefit | Medium |
|--------------------------------|-------------|---|------------|---|---------------|---|----------|---|---|------------------|--------|

Vulnerabilities and Spatial Effects of Impacts:

Communities in the immediate study area (PAC1-3), at the top of the escarpment (PAC 5) will be affected in the medium to long term. The communities along the pipeline route will be affected during the environmental manipulation stages of early works and construction, and after environmental remediation should return to the baseline situation.

Children, pregnant women and people with a lowered immune system are particularly vulnerable to malaria. No specific gender risks are anticipated.

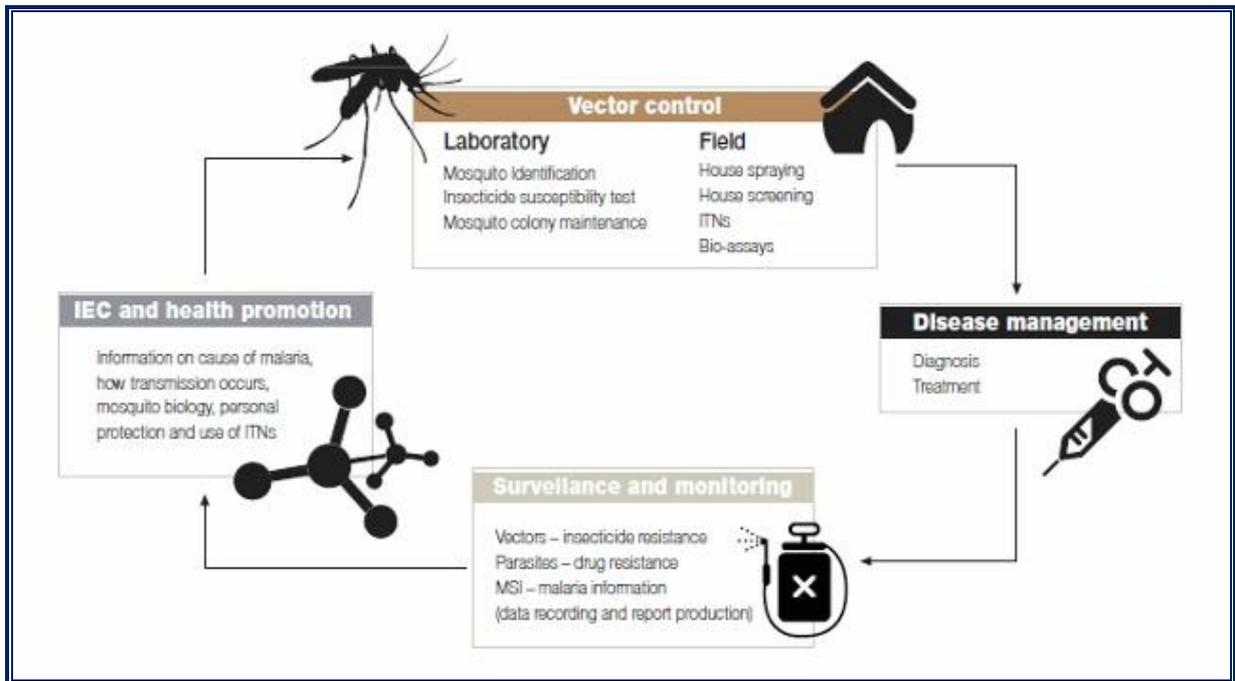


Figure 41: Integrated workplace malaria control programme

8.2.2 Arboviral and other Vector Related Diseases

Impact Definition:

Arboviruses have not recently been described in the study area but this is likely to reflect weak surveillance mechanisms rather than absence of the diseases. Yellow fever is a threat with sporadic outbreaks nationally and in the region (DRC and Southern Sudan). Dengue and chikungunya fever are likely risks but have not been described in the district. It is highly likely that the mosquito vector (*Aedes* group) is widely distributed in the area, with the local environment conducive to its distribution, especially in association with human settlements (where it has a propensity to breed in man-made containers holding water).

Other vector related diseases occur in the area but as described in section 7.2.2 are not common or are subject to large-scale eradication programmes. Onchocerciasis and LF may occur sporadically, but the mass treatment programmes have reduced the prevalence of the disease locally, although there were still significant foci in Hoima and surrounding districts. Unfortunately, no specific prevalence data exists on either disease at the level of the study area. As LF is a mosquito borne disease, an increase in poor sanitary conditions and environmental change may create a proliferation of mosquitoes, with a risk for increase in disease transmission. HAT, was not widely recognised in the study area and unlikely to be of major concern as an emerging threat.

The Project has the ability to influence the transmission of arboviruses and other vector related diseases in the following ways:

Direct:

- **Conducive vector environment**

The development of the Project, especially in construction, is likely to increase the number of potential mosquito breeding sites for various mosquito species. Areas such as construction sites or lay-down construction yards will increase the number of receptacles available for collection of water, which may promote the proliferation of *Aedes* group mosquitoes. Environmental manipulation related to construction may promote pooling of water (as with malaria) and increase mosquito densities.

- **Transport of products**

There is a risk that shipping of products and equipment into the area may introduce infected vectors from destinations where diseases like dengue fever are endemic or outbreaks of disease are known to occur, such as Mombasa. The supply chain of

equipment, material and other goods will be predominantly supported via shipping of products via Mombasa. This can include products that are shipped from highly endemic areas such as South America or Asia as mosquitoes that transmit dengue and chikungunya fever do not have to acquire it from a human host before they can transmit it to other humans; eggs or larva can emerge with the virus with resultant transmission. Thus, the movement of vehicles/trucks into the study area to deliver goods and construction material may introduce these conditions into the study area. Tyres and other receptacles that can collect and hold water are often implicated as potential sources.

The peak risk period will be construction as this is when most of the material will be shipped from ports, but it will persist into operations, although the risk will decrease.

Indirect:

- **Project induced in-migration**

As mosquitoes that transmit LF and arboviruses are associated with human development the degradation of the environment in local communities as a result of unplanned development and poor waste management may influence the risk of transmission of these diseases.

- **Weak health system**

The limited local health surveillance systems related to these conditions has the potential to increase their potential impact as detection and thus effective management may be inadequate.

Impact Evaluation and management measures:

| EHA #2 | Arboviral and other vector related diseases | | | | | | | | | | |
|---|---|---|---------------|---|--------------------|---|-------------|---|-------------|----------------------|------------|
| Early works through to Construction and Operations | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Medium term | 2 | Study area | 2 | Moderate negative | 4 | Unlikely | 1 | 9 | Moderate negative | Low |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Labour Recruitment and Influx Management Plans as per the social management plans. Include vector control measures for <i>Aedes spp.</i> and other relevant mosquitoes in the broader integrated vector program with a large emphasis on source reduction at the site. Tyres, general lay-down yards, accommodation areas are important areas to avoid water collections. Develop vector control capacity to reduce vector populations in the event of vector proliferation or suspected/confirmed arbo-viral outbreak. | | | | | | | | | | | |
| Occupational health, safety and environmental management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Project designs to avoid standing water in man-made containers. This must be planned in the FEED for example storing tyres, equipment in sheltered areas so water does not collect in them, direction of shovels in heavy equipment etc. Effective drainage, waste management and general housekeeping to reduce risk of increased numbers of <i>Culex spp.</i> and <i>Aedes spp.</i> mosquitoes. Develop appropriate medical protocols to screen for suspected arboviral diseases. These should include initial medical management and establishment of a laboratory network that can rapidly diagnose any suspected case. | | | | | | | | | | | |
| Social development mitigation and management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Improve case detection and outbreak response capabilities for suspected arboviral diseases in the local health services. Control of <i>Culex spp.</i> mosquitoes to reduce the potential for transmission of LF, including maintenance of a clean environment and reducing foul standing water. If risk dictates then place polystyrene balls in pit latrines to reduce the number of <i>Culex spp.</i> Support the authorities as required with LF and onchocerciasis eradication programmes to ensure adequate coverage of target areas, especially with potential influx. | | | | | | | | | | | |
| Impact after management | Medium term | 2 | Localized | 1 | Moderate negative | 2 | Unlikely | 1 | 6 | Minor negative | Medium |

Vulnerabilities and Spatial Effects of Impacts:

Risks will be higher in construction and may extend to the operations phase. PACs located in proximity to construction camps are at an increased theoretical risk, as are those who may be impacted through influx. Foci of LF may occur and arboviruses may extend into the broader area if they emerge. There are no specific vulnerable groups and no specific gender risks are anticipated.

8.3 EHA #3 – Soil-, Water- and Waste-related Diseases

Impact Definition:

The lack of access to safe water and adequate sanitation was described as one of the major local health challenges, with diarrheal and diseases associated with poor water and sanitation reported to be the third most common cause of OPD visits in the study area. Cholera outbreaks were reported seasonally, with cases of typhoid reported commonly. High rates of STIs and intestinal schistosomiasis is reported although no accurate data is available. Fungal skin disease was also reported as common citing poor local hygiene conditions.

Data at a district and local level shows that access to improved (safe) sources of water is limited. This was confirmed in participatory discussions with key informants and the community, with the majority of people collecting water from unimproved sources, including Lake Albert. Protected water sources were often in a state of disrepair or had poor quality water and it was rare for the community to treat their water in any way before use. Data on surface and ground water quality showed extensive faecal contamination of sources, and while no data was available on water quality at the level of the household (end user), general hygiene and storage capabilities was poor so the expectation that drinking water would be contaminated. This supports reports that open defaecation was common, especially on Buhuka Flats and migratory communities on the escarpment, but less so in the pipeline communities. It was reported that it was challenging to construct latrines on the sandy soil near the lake-shore as they collapsed.

Seasonal availability of water was also an issue with the communities on the escarpment and pipeline route especially reporting challenges in the dry season. This was less of a challenge in Buhuka Flats as the community simply used Lake Albert, but water quality was of concern as a multitude of activities were conducted in the water body including personal ablutions, open defecation and cleaning of cooking utensils and clothing, cleaning of motorcycles, drinking water for cattle. Cattle were also treated (with pesticides) for ticks and fleas on the Lake shore.

The local authorities have limited institutional capacity in addressing existing challenges related to access to both adequate sanitation and safe drinking water, especially to a growing population. While no accurate data was available on the communities knowledge and

practices on hygiene and general sanitation practices it was deemed to be poor by all HCW that were interviewed.

Given this profile the community is likely to be extremely sensitive to changes in water access and quality, which warrants careful consideration of measures to manage any impacts. Considering this, the following direct and indirect impacts related to water quality and waste/sanitation related disease may occur as a result of the Project.

Direct:

- **Improved access**

Improved access to Buhuka Flats with the development of the escarpment road should support the delivery of healthcare services to the local communities. Outreach programmes are a current challenge due to either funding shortages and human resource constraints, but improved logistics may make mass treatment campaigns (for STH and schistosomiasis) and IEC easier to deliver.

- **Pollution of surface and ground water sources**

There is the potential to contaminate surface and superficial ground water sources that occur in the surrounding environment including wetlands, surface water bodies and soil by:

- Poor human and domestic waste management including lack of provision of toilets for construction field crews and poor camp facilities management.
- The discharge of water from the sewerage treatment plant (STP) developed to cater for the various accommodation and temporary construction work camps (including contractors), offices, CPF and other work areas. The STP will need to be of adequate capacity to minimize the potential consequence of nutrient loading and eutrophication and/or oxygen depletion in receiving water bodies if there is a plan to discharge wastewater in a water body or stream. The general water quality, post treatment, will also need to be monitored to meet Ugandan and International standards
- Domestic waste water from the construction camp kitchen, bathrooms, residential block, and administration areas (grey water).
- Contamination of surface and ground water sources as a result of the Project's activities during construction and operations are discussed in section 8.3.9.

- **Resettlement**

Resettlement of communities will need to include effective planning for the provision of adequate water and sanitation services to ensure that the resettled communities have the same or better water supply than before they were relocated; and that there is adequate capacity in the supply of water and sanitation services in any host community (if applicable) to support any increased requirements. The potential for influx of extended families or new arrivals into the resettlement host site will need to be considered when planning for the provision of these basic services so that they are not over-stretched leaving the resettled communities worse off than before they were relocated. It is recommended to over-design the anticipated capacity for the provision of basic services to allow for this expansion and to ensure that the positive impacts are maintained in these resettled communities. Water quality is determined by a number of factors as shown in Table 15 and this will be important to monitor in terms of quality of access.

Resettlement of communities will also need to be considered in terms of adequate provision of sanitation services so that negative impacts do not occur in the communities who are physically relocated, or the existing communities at the resettlement host sites. It will be important to ensure that the resettled communities have improved sanitation services that have capacity to expand as these areas are likely to be an attractor for potential influx.

Table 15: Water and levels of service

| Service level | Distance/time measure | Likely quantities collected | Level of health concern |
|---------------------|--|---|---|
| No access | More than 1000m or 30 minutes total collection time. | Very low (often less than 5 litters per consumer per day (l/c/d)). | Very high as hygiene not assured and consumption needs may be at risk. Quality difficult to assure; emphasis on effective use and water handling hygiene. |
| Basic access | Between 100 and 1000m (5 to 30 minutes total collection time). | Low. Average is unlikely to exceed 20 l/c/d; laundry and/or bathing may occur at water source with additional volumes of water. | Medium. Not all requirements may be met. Quality difficult to assure. |
| Intermediate access | On-plot, (e.g. single tap in house or yard). | Medium, likely to be around 50 l/c/d, higher volumes unlikely as energy/time requirements still significant. | Low. Most basic hygiene and consumption needs met. Bathing and laundry possible on-site, which may increase frequency of laundering. Issues of effective use still important. Quality more readily assured. |
| Optimal access | Water is piped into the home through multiple taps. | Varies significantly but likely above 100 l/c/d and may be up to 300 l/c/d. | Very low. All uses can be met, quality readily assured. |

- **Reduced access to water supply and quality**

The Ecosystems review and assessment found that water abstraction from Lake Albert is unlikely to impact on availability and quality of water for communities who access this source for their personal use [147].

The other important source for communities located on Buhuka Flats is the gravity fed scheme. At the time of the survey it was only working in one community and the system had been damaged during the construction of the escarpment road. While a commitment has been made to repair this system once the road construction is complete it will be essential that direct and indirect Project activities do not disrupt this supply as it is likely to represent a safer supply than the Lake water.

The escarpment communities rely on the use of surface water and shallow hand dug wells for their domestic water needs. As the seasonal availability of water was highlighted as a significant challenge, serious consideration should be given to the supply of water to temporary work camps, disruption to surface water bodies or shallow wells during construction of the pipeline, and waste (water and solid) management, so that pipeline construction crews do not impact negatively on water availability and quality in these communities.

Indirect:

- **Project induced in-migration**

In-migration into the area will place increased pressure on the limited existing water sources (both improved and non-improved sources) and sanitation services in the PACs due to an increased demand. This especially includes the communities in the immediate escarpment area and along the pipeline as water available in more tenuous in these communities. Reduced supply of water may be a source of community dispute as there is limited capacity in the district or local authorities to plan for, or to develop the infrastructure required to support these potential increased needs.

Poor sanitation and environmental health conditions that may accompany any unplanned development may also impact on water quality by further contaminating surface and superficial ground water bodies. As the sanitation system is currently

limited, any improvements to the sanitation situation would be likely to have major beneficial impacts in the communities and improve their overall quality of life.

- **Pollution and disruption of gravity fed water supply**

An increased population in the immediate escarpment communities may reduce the amount of water available to that community and to the communities on Buhuka Flats due to reduced flows. An increased number of people with poor hygiene and sanitation conditions may potentially pollute water sources, and as the water in the gravity fed scheme is not treated, posing a disease risk to communities downstream.

Impact Evaluation and management measures:

| EHA #3 | Soil, water and waste related disease | | | | | | | | | | |
|---|---------------------------------------|---|---------------|---|--------------------|---|------------------------|---|-------------|----------------------|------------|
| Constructions through to Operations, and initial closure | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Medium term | 2 | Study area | 2 | Moderate negative | 4 | Possible | 2 | 10 | Moderate negative | Medium |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Water management plans as part of the ESMP to avoid and manage the potential contamination of surface water and soil which can potentially pollute superficial ground water sources. • Influx management • Monitor community water sources closely in terms of flows, availability of water and quality to ensure that unexpected negative impacts do not occur. Ensure open and transparent communication with the community on water quality and water availability as reduced water supply and pollution of water sources can be a major source of conflict. It may be worthwhile creating water user representative/groups in each community that supports this and becomes the focal point in each community. • Develop an adequate baseline (based on specific indicators) to describe the water and sanitation conditions in the community prior to the Project development, in especially the resettlement areas and areas where influx is likely to occur. These indicators should include: <ul style="list-style-type: none"> o Proportion of households that have access to improved water and sanitation services based on WHO/UNICEF guidelines. o Surveys in school aged children (9-14 years of age) to determine the prevalence of schistosomiasis and STH as an indicator of the BOD from sanitation conditions. o Water quality assessment (using thermo-tolerant coliforms (E.coli) total coliform as the contamination indicator) at community collection points as well as at the end-user level in households. This will determine water quality across the collection- to use- chain. • Effective resettlement planning and execution that include effective water and sanitation programmes in the resettled communities and host sites. These will need to be supported by IEC programmes to support sustained improvements in general hygiene, sanitation and potable water use. • Evaluate opportunities to develop an effective CHIS to monitor the impacts of water and sanitation conditions. These should be conducted in partnership with the district health as well as the district water/sanitation utility authorities and should include monitoring of longitudinal data sets as well as specific indicators collected at baseline and linked to mitigation activities. | | | | | | | | | | | |
| Occupational health, safety and environmental management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Ensure proper disposal of human waste that is generated from all Project sources, including contractor camps and work areas. There must be a proper wastewater and STP with the capacity to manage the expected throughput with required contingencies. The design should be such that if there is a failure that the risk of direct exposure to communities and their water sources is minimized. • Mobile toilets should be provided in different work areas (where formal toilets are not available) to prevent open defecation/urination from occurring in elements of the workforce. These should be properly handled when full and waste disposed of in the STP or other suitable area. • Develop and implement a code of conduct that prohibits open defecation/urination. Support this with a IEC campaigns in the workforce on proper water use and water conservation, as well as on hygiene and sanitation to prevent pollution of community water sources. • Ensure that there is good management of water resources to avoid wastage and leakage of water. • Ensure that there is adequate treatment facilities for the management of sewerage and waste water generated from any accommodation, temporary work camp, office or work area. • Effective domestic waste management. • Water management programs and plans as outlined in the EIA to prevent pollution or deterioration of water quality as a direct consequence of the Projects activities. | | | | | | | | | | | |
| Social development mitigation and management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Develop institutional capacity in the local health and water/sanitation authorities so support the long term planning, development and maintenance of infrastructure in the district. This is essential to prevent the long term reliance on the Project and initiatives like these must be done in partnership with local authorities to ensure that local standards are met and there is an agreement for the government to manage the long term | | | | | | | | | | | |

functionality of services.

- Consider developing a community led total sanitation (CLTS) programme in partnership with potential local partners
- Support integrated water, hygiene and sanitation programmes in the study area. This can be performed either as part of the CLTS initiative or other interventions such as the establishment of water user groups in each community. Sustainability principles will need to be included when planning these interventions, which can include:
 - o IEC programmes on water, sanitation and hygiene to schools and the general community.
 - o Supporting the district health and education authorities with school and early childhood deworming programmes focused on STH as per the WHO guidelines. These should be managed by the local authorities with support of the Project so as to promote sustainability and so as not to assume the role of government. This should include screening for, and treatment of schistosomiasis, based on risk and local exposure patterns.
 - o Support provision of latrines, shoes and hand-washing programmes at schools. Hand washing has been shown to reduce the risk of acquiring disease that is transmitted by the faecal oral route by as much as 50%. Work with the local and district educational authorities to integrate hygiene and sanitation education into the school curriculum or support this locally.
 - o Support waste management in the community through community based work groups (or VHTs) and developing 'clean village campaigns'.
 - o Support with improving end user water quality by supporting the provision of products that make it suitable for drinking (such as WaterGuard®).
- Support with the expansion and planning of food and general markets so that appropriate levels of hygiene and cleanliness are promoted. This will promote food hygiene.

| | | | | | | | | | | | |
|--------------------------------|-------------|---|------------|---|------------------|---|----------|---|----|------------------|--------|
| Impact after management | Medium term | 2 | Study area | 2 | Moderate benefit | 4 | Probable | 3 | 11 | Moderate benefit | Medium |
|--------------------------------|-------------|---|------------|---|------------------|---|----------|---|----|------------------|--------|

Vulnerabilities and Spatial Effects of Impacts:

Communities in the immediate study area (PAC1-3), at the top of the escarpment (PAC 5) and the communities along the pipeline (PAC6, 7) will be impacted. PAC6 and 7 will only be impacted during construction and for a short period into operations while the other communities will be affected in the medium to long term.

Children, the elderly and chronically unwell may be disproportionately affected by water and sanitation related conditions. No specific gender risks are anticipated.

8.4 EHA #4 – Sexually-transmitted Infections and High Risk Sexual Practices, including HIV/AIDS

Impact Definition:

HIV/AIDS is a major public health challenge, with a national prevalence rate of 7.3% in 2011. Some of the gains made in reducing the HIV prevalence rates in the 1990's have been reversed, with high risk groups including female sex workers (33%), their male partners (18%), gay men (13%) and fishing communities (37%). HIV was disproportionately higher in women compared to men, underscoring specific vulnerabilities.

District prevalence rates were lower than national rates at 6.7%. No disaggregated data specific to the study area could be obtained but data suggests that the incidence of both HIV and STIs is on the increase. This was confirmed in data from Buhuka and Kyangwali HC statistics where the incidence of STIs had increased by 68% and 20% from 2012-2013, respectively. Women attending ANC at Buhuka (5.6%) and Kyangwali HC (3%) had HIV rates higher than other HC in the study area, but lower than Hoima district (4%). There was no data available on prevalence of key indicators such as syphilis and no actual KAP studies have been done in the study area to support behaviour change communication and education interventions.

Services to promote awareness and behaviour change were limited but despite this the communities had good knowledge on HIV transmission and prevention. However, misconceptions did occur, especially in older people, but the common theme that emerged was the translation of knowledge into actual practice. It was especially challenging for women to negotiate on safe sex practices and as there were high rates of infidelity in men, women felt that there was very little that they could do to protect themselves. Condoms are available for free from HC, but utilization rates were low.

Behaviours and practices in the lake-shore communities were reported as poor. Polygamy and infidelity is common and complex sexual networks occur in the area, especially in the fishing communities as men are relatively mobile and often have more disposable income. Stigma and discrimination was reported as high in the fishing communities, with men readily moving to other communities if their HIV status was known, but not necessarily changing his practice.

It was reported that formal commercial sex was on the increase in the area given the perceived and potential economic developments. Opportunistic transactional sex was also increasing with young girls, bar maids and other workers in the hospitality trade identified as risk groups. There appeared to be a degree of social acceptance of these practices. Substance abuse was also recognized as a factor that promoted high risk sexual behaviours.

Access to HIV care and treatment services from the public health services was limited. In the study area, only Kyangwali and Kaseeta HC provided ART. Uptake of HCT appeared to be low with access and stigma major hurdles.

The Project has the potential to impact on the transmission patterns of STIs, including HIV, in the study area (including the Buhuka Flats and pipeline route) and along the various transport corridors. Women and young girls are especially vulnerable groups and influences on social ills may increase high risk sexual behaviour. Impacts related to STIs will extend from the current study phase, peak in construction, and extend into operations. Some STIs such as HIV and Hepatitis B are chronic diseases that may cause long term impacts to the health of the individual, family unit and community; but also contribute to social challenges such as orphaned children and loss of traditional values.

The development of the Project has the potential to exacerbate the already high burden of disease from STIs, including HIV, in an indirect manner. These contributing factors are summarised using the four M acronym, with distinct overlaps, including:

- **Mobility**

- There is the potential for increased high-risk sexual encounters along the transport corridors to/from, and in, the study area. The development and subsequent operation of the Project will increase traffic along access roads, pipeline roads and within the study area. Transport workers are a well-described high-risk group, known to have multi sexual partners and to develop sexual networks along transport corridors - so called “core-spreaders”. Different scenarios include:

- § Long distance truck drivers will operate from the port site in Mombasa and important supply centres such as Kampala and Hoima. Long distance transport drivers well known to engage in casual sexual practices with the development of a sexual network along the whole transport corridor, but also in truck stops in the study area.

- § Employee transport (busses) and light duty vehicles operating between various operational areas may offer lifts to members of the community as public transport options are limited and relatively expensive. These lifts may be in exchange for sexual favours.
- § Improved access into the area and economic development will increase the supply of goods and services based on demand. This positive development may also be associated with increased high risk sexual activity amongst businessmen travelling to the area, as well as transport workers.
- The in-migration of people is also an important factor related to mobility and the introduction of new strains of the HI virus and other STIs, and mixing of people with higher STI prevalence rates may promote the increased transmission of disease. Migrant population may include the incoming workforce and also speculative migrants not associated, but looking to benefit from the Project.

There is the potential that influx could be associated with the development of unplanned or “camp followers” settlements. Ikamiro/Ngoma and Nsonga are likely to be ‘hot-spots’ for influx, with these areas often giving rise to social ills due to a mix of cultures and lack of traditional leadership or structure. Substance abuse is generally a clear contributing factor with high risk sexual behaviours commonly place including forms of transactional sex.

- The semi-skilled and skilled incoming workforce who will construct the Project may originate from areas where there are higher prevalence rates of STIs and HIV and they pose a risk for increased local disease transmission. In general, semi-skilled construction workers are mobile and move from project to project, away from their family unit, which increases their potential to engage in high risk and multiple casual sexual relationships. This group often has higher levels of disposable income and thus may engage in transactional sexual relationships with the community and even local employees, as discussed below. This phenomenon is well described in development Projects in Southern and East Africa [148].

This risk will peak in the construction with origins from the temporary contractor work camps as well as from local workers who reside in guesthouses in the local communities. Proximity of work camps and workers residing in local communities is likely to promote fraternization between the various groups, with transactional sexual relations probably. It is thus essential that mitigation measures are developed as soon as possible so that they are in place when construction initiates.

- **Money**

- Transactional sex

The high levels of poverty in the study area render local women and young girls vulnerable to advances from men with money. The development of the Project and associated economic benefits means there is likely to be an increase in the levels of disposable income in the study area. Men are likely to benefit the most economically and weak financial planning or practice may mean that they are likely to spend any disposable income on personal effects or entertainment. This can be to the detriment of the household, especially if the male partner used to contribute to the families livelihood through subsistence farming or fishing. Women may thus be forced into forms of transactional sex to support the needs of the household.

Young girls may also be vulnerable to a “sugar daddy phenomenon”, where they are given payment, or payment in kind in the form of material goods, for sexual favours and companionship (food, clothes, airtime and other gifts). Cultural norms may also make it difficult for a young woman to refuse sexual advances and this vulnerability will make it challenging to negotiate safe sex practices such as the use of condoms. Transactional arrangements may also differ, with less benefit paid for sex with a condom. This is a real potential given the high reported rates of poverty, teenage pregnancy and transactional sex.

- Temporary construction workforce

This is an especially high-risk group as discussed above, as they often have no means to spend the cash they earn, with the potential of using disposable cash for sexual favours. The local community will be extremely vulnerable and even naïve to these approaches. This cohort also tends to have higher rates

of HIV and STIs due to these practices and vulnerable groups in the community may have limited ability to negotiate safe sex practices.

- **Bars/Lodging**

With economic development more bars and guesthouses are likely to open. This has already been observed in Nsonga near the lake-shore, with marketing aimed at oil workers or contractors. While these facilities can provide for accommodation and meals they generally have recreational facilities including bars and pool. These may be areas where high risk sexual encounters development, with girls working in the facilities vulnerable to transactional sexual advances. In addition, the facilities may attract commercial sex workers

- **Men and Gender**

The bulk of the workforce is likely to be men, especially construction and transport workers. The sections on migration and money have described some related high-risk traits but based on literature and from precedence in similar studies, men are more likely to engage in high risk sexual encounters, especially in a society where women are vulnerable. Due to cultural and poverty factors, women and young girls are a vulnerable group in the study area and will be especially at risk for high risk sexual encounters. As risk for transmission of STIs and HIV is higher in women than in men, the risk for transmission to this group is further compounded.

- **Mixing**

This is strongly associated with mobility and influx as discussed earlier. In-migration of outsiders, the construction workforce and the transport workers (as discussed in mobility) are all different groups that may mix with the host population and increased risk of transmitting STIs as a result of mixing of people with higher disease prevalence with those with low prevalence of disease.

- **Increased burden on health care services**

In-migration and an increased incidence of STIs are likely to place an increased burden on the already over-stretched health services. While access to health services may improve for residents in Buhuka Flats, an increased demand may limit ability to deliver services to these and other communities. As HIV is a relatively expensive

disease to manage with ART, an increased demand may limit the ability of health care services to provide care and treatment to all.

- **Workplace Risk**

The workplace health risk related to HIV/AIDS and the impact on business have been well described in literature and will require planning and mitigation both from the community health perspective as described above, but also for workplace health, productivity and business resilience.

- **Reputational Risk**

There is a significant reputational risk for the Project as extractive industry projects have an unfortunate legacy of increasing rates of STIs and HIV as an indirect result of their activities. In addition to the health impacts, there is the potential that the Project can be accused of human rights abuses to vulnerable groups in the study area, either directly or as a result of corporate inaction. These reputational risks extend to criticisms from shareholders, local communities, government and general civil society.

Impact Evaluation and management measures:

| Sexually transmitted infections including HIV/AIDS | | | | | | | | | | | |
|---|--------------------|---------------|------------|--------------------|----------------|---|------------------------|---|-------------|----------------------|------------|
| Constructions, Operations with impacts into closure | | | | | | | | | | | |
| EHA #4 | Consequence/Effect | | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | Spatial Scale | | Severity of Impact | | | | | | | |
| Impact before management | Long term | 3 | Study area | 2 | Major negative | 8 | Probable | 3 | 16 | Critical negative | High |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Develop a clear HIV policy and programme in the workplace and community. It is important that this framework be established at an early stage so these interventions are functional <u>prior to construction</u>. This should be incorporated as part of the occupational health and safety management plan (OHSMP) for workplace activities. • Maintain a <u>closed camp status for all temporary construction accommodation camps</u> to reduce mixing of the incoming workforce with the local population. This provision should be part of all contractor management plans (CMP) included in the FEED. • Ensure that there is adequate capacity in the temporary work camps to eliminate the need for contractors or visitors to seek accommodation in guesthouses in the local community. This should again be part of the FEED and CMPs, which are in turn enforced on sub-contractors. • Develop a code of conduct that actively discourages the external fraternization of the workforce with the local community as well as within the workforce and especially towards female employees that originate from the local community, as this group (especially cleaners and catering staff) may be vulnerable to advances from the male dominated workforce who may have disposal income. The risk for internal fraternization will increase with the closed camp status and while this cannot be prohibited, it should be discouraged. The code should be signed off as policy and be included in CMPs, including sanction at an individual and company level for serious non-compliance (scope and definitions to be determined). • Influx management plans and labour recruitment plans that limits in-migration to the study area and prevents the mushrooming of "camp followers" settlements near the accommodation or work areas of the Project (especially near the permanent operators camp and two temporary construction camps near the CPF, but also on the escarpment near the current roads camp). • Develop HIV and STI prevention programmes for long distance truck drivers and drivers of light duty vehicles (include in CMPs). Procedures must be put in place to restrict the ability for Project related vehicles (including contractors and service providers) from providing lifts to the local community. This will restrict contact with the local community but will also reduce the public liability risk in the event of an accident or accusation of sexual assault. • Consider the placement of Project specific truck stops (near the CPF) in the immediate study area as part of FEED. Ideally, these should be removed from local communities with accommodation, meals and recreation (at subsidised prices) provided in the rest area so that drivers do not need to enter the communities for these services. The local authorities will need to support the management of the truck stops where possible. • Work with the village and traditional leaders, as well as district authorities to report any increase in high-risk sexual behaviour from elements of the | | | | | | | | | | | |

workforce (specific contractors etc.) or the development/expansion of CSW activities in communities.

- Evaluate opportunities to collect baseline indicator data associated with HIV, STIs and related determinants/ behavioural elements. This may include household KAP questionnaires and syphilis prevalence studies. Collecting HIV data in a cross sectional survey has ethical and treatment challenges and should not be considered unless conducted by the district health authorities. These studies should be repeated every three to five years to determine the effectiveness of interventions and if these need to be adjusted.
- Develop a CHIS on key HIV /STI indicators from the local health care facilities as well as qualitative data from community observations and stakeholder communications.

Occupational health, safety and environmental management:

- Develop a HIV and STI management programme in the workforce. This should include awareness and education as well as care and treatment services that link to the public health service. This programme can be extended into operations as part of the companies wellness programme.
- Screen for STIs and hepatitis B/C virus as part of pre-employment fitness to work process. Treatable causes should be managed and chronic carriers excluded from employment until managed. Individuals who test positive for STIs should be referred for HIV counselling and testing (HCT), with an opt-out option.
- Support a HBV vaccination campaign/ or antibody testing on employee who may have not been vaccinated as a child.
- Support widespread availability and social marketing of condoms in the workplace
- Ensure the Project medical service can effectively perform HIV counselling and testing HCT as well as referral for care and treatment of employees as defined by the company's benefits. This must extend into the closure period given the chronic nature of HIV.
- Develop a blood borne pathogen control programme in the workplace, including post exposure prophylaxis for accidental exposure.
- Ensure that contractors are addressed under the workplace management programmes with full access to IEC and care and treatment services.
- Support adequate entertainment and recreational facilities in camps to prevent the need for the workforce to seek entertainment in the community. This should extend to contractor camps.
- Support family friendly accommodation in the operations phase for the local workforce.

Social development mitigation and management:

- Develop specific interventions in partnership with government and other partners (there are numerous active health NGOs in Uganda) to limit the risks related to HIV/AIDS and STI with an approach to educating and empowering the communities, including:
 - Women and young girl support programs. The key will be to support the decision making capacity of local women so that transactional sex is limited as a means of livelihood and ability to negotiate when to have sex or safe sex. This can include interventions such as "One Man Can", Girls Leading Our World' and others that may have local relevance.
 - IEC programs on HIV transmission and high risk sex through consideration of various interventions including strengthening the VHTs programmes as they can act as community based peer health educators. The proposed 'cinemobile' or edutainment will be a good medium to deliver the IEC messaging.
- If groups of CSWs are identified, then encourage and assist the formation of CSW support groups including access to reproductive health services and options for alternative livelihoods. These programs should be managed by local authorities or NGOs.
- Improve antenatal care programs to promote the effective detection and treatment of STIs in pregnancy, including syphilis and HIV. Support with PMTCT programs should also be considered.
- Promote condom distribution through different delivery points that target high risk groups or areas. This should include bars/taverns, guesthouses and other identified key risk areas.
- Support ways to improve uptake of HIV testing services so that more people are enrolled on the national ART programme and promote HSS to increase ability to deliver STI and HIV care and treatment services in the study area.

| | | | | | | | | | | | |
|--------------------------------|-----------|---|------------|---|-------------------|---|----------|---|----|-------------------|--------|
| Impact after management | Long term | 3 | Study area | 2 | Moderate negative | 4 | Possible | 2 | 11 | Moderate negative | Medium |
|--------------------------------|-----------|---|------------|---|-------------------|---|----------|---|----|-------------------|--------|

Vulnerabilities and Spatial Effects of Impacts:

The impacts associated with transmission of STIs and HIV will be experienced in all PACs in some form. These will however vary with the communities in the immediate study area on Buhuka Flats (PAC 1-3) and escarpment the most likely to be affected in the short term (construction) and long term (operations). Communities along the pipeline route and transport corridors will be more impacted during construction (PAC6-8), with some residual impacts extending into operations. The communities along the transport corridor (PAC8) and those located near the proposed oil refinery will experience more cumulative impacts as a result of the broader development of the oil fields in the Lake Albert area. Other PACs may also experience a measure of cumulative impact, but this will be less than the indirect Project associated impacts described above.

Women and young girls are specific vulnerable groups.

8.5 EHA #5 – Food- and Nutrition-related Issues

Impact Definition:

Malnutrition was noted to be present in the study area but not a major concern as the study area was regarded as food secure. Migrant agricultural communities were more vulnerable to food insecurity and this group recorded the highest incidence of severe acute malnutrition. This was confirmed in KII and FGD, but the reasons cited related to poor feeding practices and poor financial management (i.e. selling off entire crops followed by indiscriminate spending by men) rather than an absolute lack of food. The refugees near Kyangwali were reported not to have much malnutrition as UNHCR supported their requirements.

Following a balanced diet was not common with communities on Buhuka flats having limited vegetables or fruit in their mainly fish diet and escarpment communities having limited access to fish and other sources of protein. Food was reported as expensive that could restrict access to certain vulnerable populations.

However, food security was highlighted as a significant social challenge in the study area and future potential impact. Lake-shore communities were dependent on fish as both a food source, but also as a source of income generation, with an estimated 75% of households on Buhuka Flats directly dependent on subsistence fishing activities [147]. There were perceptions of declining fish catches due to the Project's activities, and although unfounded, this highlights the high level of dependency on fishing.

The only HC that had an active malnutrition surveillance centre was Kyangwali, but this was focussed solely on children that attended the HC, and not on any outreach programmes. With the weak health system, no information on key nutritional indicators was available in the study area and as malnutrition is the largest contributing factor to child mortality but also undermines socio-economic growth it may be an important indicator to collect at baseline. In this setting, stunting will be a valuable indicator to consider as it looks at long term nutrition and is associated with diminished educational attainment and long term cognitive ability. Thus chronic malnutrition will have a major role to play in local development in the study area and will be an important component in any local development initiatives.

Micro-nutrient deficiencies are an important indicator of nutrition status and are also implicated in lack of a balanced diet and ill health. Anaemia was highlighted as a major issue in the study area, specifically mentioned by key informants in the escarpment communities of

Kaseeta, Kabaale and Kyangwali. No specific data was available on the prevalence of anaemia and with its multifactorial basis linked to acute disease and nutrition it can be a powerful indicator of socio-economic development and should be considered for collection at baseline.

The Project development has the potential to impact on malnutrition in the following direct and indirect ways:

Direct:

- **Loss of or altered ecosystem**

- The Project land take of natural grassland as cattle grazing areas on Buhuka flats, will increase pressure on an already overextended and over-utilized resource, resulting in a negative impact on cattle rearing. This may have a negative impact on local livelihoods as approximately 80% of households on the Buhuka Flats rear livestock. Project induced population influx will add to this impact, as discussed under indirect impacts below.
- The loss of land along the pipeline route will primarily affect subsistence croplands (estimated at 46 Ha). The impact will be larger in construction of the pipeline but will persist into operations as the pipeline servitude will remain. Some of the farmers who will be impacted form part of the vulnerable migrant population that are heavily dependent on subsistence farming, with no obvious alternate livelihoods, incomes or even food sources [147].
- It is unlikely that the Project will directly affected fishing through altered ecosystem, with the exception of pollution (discussed in section 8.9.3).

- **Improved access and economic development**

Before the development of the escarpment road most of the fish caught and processed in the lake-shore communities was transported to the DRC and to trading posts to the north. Markets and communities on the escarpment and beyond (inland) will become more accessible to fish sellers and buyers, with potential positive and negative consequences:

- Positive:
 - § Increased access to markets with potential to generate more income and stimulate local economic growth from this key sector.

- § Improved provision of fish to escarpment communities and vegetables/fruit to lake-shore communities promoting a more balanced diet.
- Negative:
 - § Increased fishing to maximise the benefits of improved market access, depleting fishing reserves and posing a major threat to the long term viability of fishing in Lake Albert.
 - § Increased generation of cash with poor financial management skills leading to a host of challenges (as discussed in section 8.3.10)
 - § Attraction of more people (migrants) to participate in fishing, with overfishing.

It is anticipated that these positive and negative socio-economic impacts will be addressed in more detail by the livelihood management plan.

- **Resettlement**

Physical and economic resettlement/relocation may reduce access to land. Access to fertile land should also consider access to water for irrigation. Resettlement needs to consider the loss of both food and cash crops as this can impact on the ability for the family units to both feeds themselves and support their general livelihood.

It is anticipated that this will be adequately addressed in the RAP but consideration of access to adequate amounts of fertile land in host sites should be provided for in any compensation/restitution actions due to the dependency on agriculture to sustain livelihoods, especially in the communities along the pipeline.

Indirect:

- **Project induced in-migration**

- Supply and demand

As population numbers in the study area continue to increase, there will be an increased demand for food products. As fish is the most common and accessible source of protein, there may be an increased competition for what is a scarce and overexploited resource. This may give rise to further overfishing and an increase in the cost of fish due to supply and demand economics. The increase price of fish may be a positive (if short-lived) economic benefit for fishermen, but

communities that on fish as subsistence food may be vulnerable to negative impacts.

Supply and demand of other foodstuffs (on the escarpment and lake-shore) may increase food inflation and expose vulnerable groups to escalating food prices that were already described as expensive. There is not an advanced local currency and changing economics in the area may impact on vulnerable sectors of the population who may have less access to cash, thus limiting their ability to procure food products.

- Availability of arable land

There is a dependency on subsistence farming in the area and this is linked to access to land. Migrants settling in different areas may not have access to land that is suitable to cultivate and this may influence food security, this vulnerable group.

Unplanned and rapid development in different areas may limit the land available (both for the indigenous community and migrants) for agricultural purposes. Close spacing of houses will limit the available space to develop small home gardens and available land may not be arable to support subsistence requirements. Poor environmental controls in make-shift settlements may lead to degradation and erosion of soil, with reduced crop yields resulting from poor quality soil.

Theft of crops may become an issue in the area if there is competing interests for land and availability of food. Other than the social challenges this may lead to early harvesting of crops to avoid theft with associated impacts on food security and nutrition.

Access to, and availability of arable land is thus a significant social determinant and relates to food security, livelihoods and even a sense of place. This can be a source of conflict in the community with Project potentially considered as an indirect contributor.

- **Infectious diseases**

Infectious diseases (such as malaria, intestinal parasites and HIV) are major contributory factors towards malnutrition and sustainable improvements in nutritional

indicators will not be realized without supplementary interventions in these areas. Therefore, impacts and mitigation measures relevant to these determinants are important to consider collectively with nutrition.

- **Employment**

Both men and women have a role to play in providing for household food requirements and to support livelihoods. Direct employment of members of the household will support economic liftment as a Project benefit, but the social dynamic within the household will need to be considered so inadvertent negative health impacts are avoided, including:

- A reduced role of one of the parents (e.g. man fishing or women farming) may mean that these tasks are then performed by children, who leave school to support the family's traditional livelihood. This is likely to be the girl child who will then not benefit from an education.
- Fields are not tended properly, effectively reducing yields and the amount of food for household consumption or money as supplemental income. This is important if the wage earned working on the Project is not redirected back to serve the needs of the household, including buying food. It was reported that local financial management was poor, and especially men may waste disposable income to the detriment of the family.

- **Change of livelihoods and practices**

- Employment on the Project or in some secondary activity related to the Project may result in sections of the community abandoning farming/fishing as a source of livelihood. When employment opportunities (especially lower skilled roles) decline after the initial construction phase is completed it may be challenging for portions of the community to return to a subsistence form of lifestyle after having experienced formal employment and receiving a formal wage. This may affect food security in this cohort.
- Changes in practices from growing food to procuring food products may alter dietary preferences to a more western diet of refined food with an increased risk of NCDs as discussed in 8.1.6.

Impact Evaluation and management measures:

| EHA #5 | Food and nutrition related issues | | | | | | | | | | |
|---|-----------------------------------|---------------|------------|--------------------|------------------|------------------------|----------|-------------|----------------------|------------------|--------|
| Early works, construction and operations with impacts into closure | | | | | | | | | | | |
| | Consequence/Effect | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence | |
| | Temporal Scale | Spatial Scale | | Severity of Impact | | | | | | | |
| Impact before management | Medium term | 2 | Study area | 2 | Major negative | 8 | Possible | 2 | 14 | Major negative | High |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Influx management, including: <ul style="list-style-type: none"> If not done for the influx management plan, conduct a market survey on costs of essential foodstuffs (similar to Appendix D) and plan serial food inflation surveys to monitor change. Support sustainable fishing practices through education, assisting with enforcement of fishing laws and economic interventions to manage demand so that significant inflation and overfishing is managed. Pisciculture initiatives may also be considered. Support conservation agricultural techniques following the Food and Agriculture Organisation of the United Nations principles [149]. Promotion and implementation of alternative livelihoods and stimulation of economic opportunities. This is especially important for migrants, women and vulnerable groups in the area so equitable benefits are realised. These should be developed in alignment with a broader economic development plan for the district (developed by Government and partners) to address development related to Oil exploration and production. Integrating efforts across the district will be more powerful than isolated once off interventions. This is discussed in more detail in 8.3.10 Perform a baseline nutritional and micronutrient deficiency (anaemia) survey in the study area to effectively monitor changes in nutritional status. Stunting will be a key indicator to evaluate together with anaemia in children under 5 years. Body mass index should be measured in adults. Support the development of a CHIS to monitor the nutritional status in the PACs and broader study area. Ideally a longitudinal system should be followed, which will require specific HSS and development of systems. A variety of modalities can be used including surveillance from HCs or the use of trained VHTs. These will generally focus on acute malnutrition as an early warning for food insecurity in the area. In addition to the longitudinal nutritional surveillance repeat surveys based in the same methodology used in the baseline survey as a means to evaluate nutritional status in the community in the medium term. This should include surveillance of anaemia either with malaria indicator surveys or part of the nutritional assessments. This will require collaboration with the district health management team and include VHTs as a means to collect valuable data on both wasting (as an early warning system for acute malnutrition) and stunting (as surveillance means for chronic malnutrition). Consider the impacts on nutrition and food security as part of the RAP, final resettlement process and social management plan, including: <ul style="list-style-type: none"> Minimize economic resettlement though limiting agricultural land loss where this is possible. Support with transitional food packages in those communities whose livelihoods will be influenced physical/ economic resettlement with support from the local authorities to ensure equitable distribution and prevention of corruption. Effective compensation processes. Support farmers in re-developing their lands after the pipeline has been developed and improve local yields. Monitor vulnerable groups closely to ensure that food insecurity does not occur as part of direct or indirect Project activities and support as required, in partnership with local authorities and NGOs. | | | | | | | | | | | |
| Occupational health, safety and environmental management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> IEC and nutritional programmes that promote proper feeding practices at workplace to prevent obesity and related NCDs. Education programmes in the workforce on financial management and support of the household units in employees that have traditionally followed a subsistence lifestyle. This may require specific education of men/women who may earn a wage from the Project and the need to support the family unit. This will need to be part of contractor management as workers employed by contractors are likely to only have short term work. | | | | | | | | | | | |
| Social development mitigation and management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> With the local authorities support the development of local co-operations so that agricultural supplies can get to market and be cheaper than supplies that are imported from outside the area. This is will reduce food inflation and support economic development, as long as tangible benefits are passed onto the farmer or fisherman. Consider supporting IEC programs in the local communities as part of an agreement with the district health authorities and VHTs, including: <ul style="list-style-type: none"> Water, sanitation and malaria programmes as well as pre-school/school deworming programmes to support nutritional interventions. Promotion of proper feeding practices at relevant age groups including improved complementary feeding. This can include maternal and child health programs with the promotion of antenatal care, breastfeeding practices, food preparation/hygiene, and family planning. Support educational attainment in women as this will promote better child care and nutrition. Support livelihood practices and economic development in women, and especially in young girls to prevent them dropping out of school. Support nutritional programs in pre-school and school aged children to promote better educational attainment. HSS for recognition and management of nutritional disorders in HC and with VHTs. This should include training on This can include training of CHA on IMCI. | | | | | | | | | | | |
| Impact after management | Medium term | 2 | Study area | 2 | Moderate benefit | 4 | Possible | 2 | 10 | Moderate benefit | Medium |

Vulnerabilities and Spatial Effects of Impacts:

The indirect impacts associated with food and nutrition in the will be experienced in all communities, with the exception of those along the transport corridor (PAC8). However,

direct impacts will be experienced in those who will be physically resettled and economically displaced (PAC1 and PAC6). There are no specific gender risks are anticipated. Vulnerable groups will include those who are exposed to food inflation (poor, elderly, women and child headed households) and those without access to land or an alternative livelihood.

8.6 EHA #6 – Non-communicable Diseases

Impact Definition:

Despite evidence that the incidence of NCDs are on the increase in Uganda, these conditions are poorly described in the study area and as such, remains largely unrecognized. This is most likely due to poor awareness of the conditions and the prioritization of resources to maternal and child health as well as the high BOD from communicable diseases such as malaria, ARIs and infectious gastro-intestinal disorders.

According to key informants, the current lifestyle of community members was not conducive to the development of NCDs. A major concern, however, was the relative scarcity of basic medical equipment in HCs to reliably diagnose NCD and the low index of suspicion by HCWs in actively looking for and diagnosing these conditions. It was further reported that it was challenging to manage these conditions as the community struggle to adhere to the follow up requirements, and thus treatment was poorly managed with patients often presenting with advanced or complicated disease. Cancers were extremely rare and usually detected at a late stage with appropriate treatment dependent on the means of the individual to travel to Hoima for further care.

While the NCDs are certainly less of a priority at present, their chronic and complicated nature means that they will in all likelihood play a significant public health role in the future. Models developed by the WHO predict that the incidence of NCD will increase significantly in Africa over the next 2-3 decades, with these chronic conditions placing a significant burden on the health systems. NCD may play a major role in the economics of the country as it is well recognised that poor adult health negatively effects economic well-being at an individual and household level, but also at a macro level. Labour productivity will fall, and the social and medical costs of managing chronic diseases, but also an ageing population, will escalate.

The Project may impact NCDs in the following ways:

- **Workforce health risks**

Diet and lifestyle will need to be monitored in the workforce as they will have access to increased incomes and meals on the Project site, with the following potential outcomes:

- High costs associated with absenteeism due to ill health.
- Loss of trained or skilled people from the workforce, with higher cost due to the need to retrain or recruit replacement staff.

- Impact on the family unit with potential social and behavioural impacts.
- **Increased disposable income with altered lifestyle practices**

The Project will in all likelihood enhance the socio-economic conditions in the area (in both Buhuka Flats and escarpment communities), which may lead to an increase in life expectancy and a transition to an “urbanized” setting and an adoption of a more sedentary western lifestyle and diet. A change in values and behaviour may also occur, which may pre-dispose the community to an increase in lifestyle related diseases such as obesity, hypertension, diabetes, dental caries and some forms of cancer. This will be particularly evident in the operational workforce in the short term, but applies equally to the community.

As noted in the SIA, approximately 97% of all households on the Buhuka flats purchased their main foodstuffs (other than fish) from markets and shops on the escarpment [2]. The closest markets and shops were located in Ngoma, but improved access provided by the construction of the escarpment road is likely to stimulate trade and increase socio-economic opportunity in the broader area but specifically to the lake-shore communities. This will enable easier transport of various products from (fish), and to (fruit, vegetables and others (salt, sugar, alcohol etc.) the lake-shore communities. This may improve access to a balanced diet, which is positive, but may also have a negative impact, as access to refined foodstuffs high in carbohydrates and/or fat and other food products often associated with a westernized diet (processed foods) may increase. There may also be a transition from current dietary behaviours to buying food produced from outside of the area.

These dietary factors may be compounded by other modifiable lifestyle factors including smoking and alcohol use, which may become more common with improved socio-economic conditions. Social and environmental factors may increase stress and support unhealthy behaviours.

- **Increased burden on local health care services**
 - Increased pressure on the overburdened and under-capacitated HC facilities.
 - Increased potential for mental illness due to altered lifestyle and as well as general perceptions of well-being.

Impact Evaluation and management measures:

| EHA #6 | Non-communicable diseases | | | | | | | | | | |
|---|--|---------------|--------------------|---|-------------------|------------------------|----------|-------------|----------------------|-------------------|--------|
| | Construction, operations with impacts into closure | | | | | | | | | | |
| | Consequence/Effect | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence | |
| | Temporal Scale | Spatial Scale | Severity of Impact | | | | | | | | |
| Impact before management | Long term | 3 | Study area | 2 | Major negative | 8 | Possible | 2 | 15 | Major negative | Medium |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Support IEC programmes as part of community based outreach programmes in partnership with the district health authorities. These should focus on lifestyle risk factors such as diet, exercise, smoking, oral health and alcohol consumption, with the VHTs the ideal delivery mechanisms for these preventative programmes. Schools should be a focus of IEC programmes as they are the generation who are most likely to be affected by these diseases in the medium to long term. Work with the local educational authorities to incorporate IEC programmes into the local curriculum and support sporting and other interventions that encourages exercise and a healthy lifestyle. These sporting activities are ideal opportunities to support IEC activities, but should equitably focus on activities for boys and girls and focus on an extension into adult life. Support the surveillance of key NCDs in the proposed CHIS in collaboration with the district health authorities. These should include hypertension, diabetes, non-infectious chronic lung disease and cancers. These interventions may require specific HSS. | | | | | | | | | | | |
| Occupational health, safety and environmental management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> The following management measures can be considered with a focus on operational staff: <ul style="list-style-type: none"> IEC programmes and nutritional programmes in the workplace that promote proper feeding practices to prevent obesity and NCD. Manage the onsite catering facilities in the type of food and the size of portions that are provided. Seek guidance from dieticians to support the design of menus in the canteens. If the catering of camp facilities management is outsourced, make the type of menus a provision of the on-going service level agreement. Healthier eating options (range and quantity), restricted access to soft drinks, availability of desserts and healthier lunch packs etc. As part of the medical surveillance activities in the workforce screen for NCDs (including oral health). This is an important fitness for work requirement and should be incorporated into the OHSMP as an essential health promotion intervention. Surveillance of weight or BMI as a predictor for NCDs can be used and supported by aggressive routine screening for hypertension, cholesterol and diabetes in higher risk groups. Ensure the workplace medical service is able to recognize, manage and effectively follow up chronic diseases. This will require specialized diagnostics including the use of Hb1Ac surveillance in diabetics and screening for early kidney, eye and heart disease. Initiate wellness programmes in the workplace for the prevention of chronic diseases through management of modifiable risk factors. These should include behaviour change strategies aimed at diet, exercise, smoking and alcohol consumption strategies. These programmes are well known to be very cost effective and can reduce absenteeism, promote increased work effectiveness and increase staff retention. | | | | | | | | | | | |
| Social development mitigation and management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Promote well-being and healthy lifestyle programmes in the communities through different planned interventions. These can include programmes (mainly IEC related) designed to support the prevention of and cessation of smoking, balanced diet, reduced use of alcohol etc. Support the local health authorities to implement an integrated NCD intervention programmes based on national or WHO programmes with the intent to reduce risk factors in the community. This may need to be a strategy that develops over time or in phases due to local policy priorities focused on communicable diseases. Prevention aspects would be a good initial strategy. If supported this should occur in a staged approach and will require specific HSS. Ideally, this should be developed as a district wide strategy to consider the broader impacts of the Oil development. | | | | | | | | | | | |
| Impact after management | Long term | 3 | Study area | 2 | Moderate negative | 4 | Possible | 2 | 12 | Moderate negative | Low |

Vulnerabilities and Spatial Effects of Impacts:

The impacts associated with NCDs will be experienced in the broader district with the exception of the communities along the transport corridor (PAC8). People who benefit directly and indirectly from the Project may in theory be more vulnerable to develop NCDs. There are not likely to be specific gender impacts.

8.7 EHA #7 – Accidents, Injuries and Violence

8.7.1 Accidental and Non-Accidental Injuries

Road traffic accidents (RTAs) remain a significant cause of injuries and deaths nationally. The road sector is the most important mode of transportation in the country as it carries 97% of freight cargo and 99% of the passenger traffic.

With the exception of communities located on the Buhuka Flats, RTAs, both motor vehicle accidents and pedestrian vehicle accidents, were identified as the most common form of injury in the study area. Alcohol misuse, poor driving skills, and poor adherence to driving regulations were noted as some of the major contributors to this high prevalence. The incidence of RTA was reported to have dramatically increased as a result of improved roads and the resultant increase in vehicles, specifically motorcycles. There was generally poor awareness of road safety as historically, vehicle traffic was limited, especially in the communities away from the main roads and on Buhuka Flats.

Gender-based violence (GBV) is reported to be common in the study area, and based on information from the FGD and KII, especially common in the Buhuka Flats where it was closely linked to alcohol abuse. An increase in alcohol abuse has been reported as a concern in the study area and, in conjunction with influx, is likely to worsen the incidence of GBV [2]. The health services reported that not all cases of domestic violence were reported to the HCs, either highlighting the stigma of GBV, or that incidents do not routinely result in serious injuries.

In addition to GBV, fights and assault was noted to be the most common criminal activity in the area, resulting in 55% of all arrests [2]. Where incidents did occur, they were often (50% of the cases) associated with alcohol abuse. Policing and related law enforcement is weak in the district through lack of capacity, equipment and proactive policing and as a result, most of the disputes are resolved through the local council system.

There is minimal capacity in the local HCs to manage the current, let alone an increased, trauma caseload effectively. The referral system is hampered by distance, poor referral networks, lack of skilled staff, diagnostic equipment and surgical capacity. There is no ambulance that serves this area of the district and no pre-hospital or emergency (fire and rescue service).

The Project has the potential to influence accidents and injuries in the following direct and indirect manners:

Direct:

- **RTAs from Project related vehicles**

The early works and construction phase will involve the use of mobile machinery and an increased movement of vehicles in and around the study area. This will include newly developed roads around the lake-shore communities, up the escarpment road, development along the pipeline and general access roads along the bigger routes to Hoima, Kampala and even port import sites.

It is likely that the development of the Project and other oil developments will improve access and bypass roads into the broader area. The improved transportation network will offer numerous benefits and support economic development but the improved network and surface will allow for poor driving practices such as over-speeding with the risk for increased RTAs.

The Project specific risks will be from heavy vehicles, mobile earth moving equipment and light duty vehicles. There will be an increased risk for motor vehicle accidents but children are an especially vulnerable group for pedestrian vehicle accidents, as they are likely to be relatively naïve to the risks of road and pedestrian safety.

- **Security and community safety**

The Project's security force need to be considered in this section due to the link to potential injury associated with their actions. The Voluntary Principles of Security and Human Rights (VPSHR) will be important to consider and these are addressed in separate studies and management plans.

Indirect:

These can relate to RTAs as well as non-accidental injuries due to social pathologies and include:

- **Increased ownership of motorized transport**

Improved socio-economic conditions in the area may increase ownership of motorized transport, especially motorcycles as they are relatively cheaper. This will result in an increased numbers of cars and motorcycles on the roads in both lake-shore, pipeline and broad study area, and with the poor adherence to common road

rules and lack of proper enforcement increases the potential for increased accidents and injuries. Use of safety devices such as seatbelts was reported as poor so accidents often result in severe injuries and death, and as overloading is common, this can lead to multiple casualties.

Increased road use on unsealed roads will decrease visibility through dust generated by vehicles, which can in-turn increase the risk of injuries.

- **Non-accidental injuries due to social pathologies**

- Crime and domestic violence

A number of factors may impact on the traditional values and social harmony in the study area. These include:

- Project induced in-migration;
- Stress on already limited resources, including healthcare, food, water, housing and schools;
- Erosion of traditional authority and cultural practices;
- Altered economy with potential inequalities between those who benefit from the Project and those who do not; and
- Altered lifestyle practices and possible development of increased levels of social ills such as alcoholism and substance abuse.

All these and other factors have the potential to increase levels of criminality and crime, which may be associated with violence and injuries

- Substance abuse

Increased levels of alcohol and substance abuse may occur in the area which is likely to increase the risk of general and domestic violence and RTAs.

- **Risk of fire in unplanned settlements**

As mentioned, with Project induced in-migration, there is the potential for unplanned settlements to mushroom. These settlements are generally unplanned, and due to limited land availability structures are often developed close to one another, limiting access especially to vehicles. These structures are generally seen as temporary and as result constructed from make-shift materials, with roofing generally from traditional sources such as grass. These factors pose a significant risk for the development of

uncontrolled fires that can easily spread to large sections of the settlement. There is no formal fire brigade in the area, and reduced access in these settlements will make any fire management activities challenging. This was noted as a significant challenge in the communities who developed make-shift settlements in the Chad-Cameroon pipeline project.

• Cumulative impacts

This assessment has not considered potential impacts that may occur if other operators start working in the district, but the added pressure on roads and altered social dynamic is likely to increase both RTA and incidents of non-accidental injury.

Impact Evaluation and management measures:

| EHA #7 | Accidents, Injuries and Violence | | | | | | | | | | |
|---|----------------------------------|---|---------------|---|--------------------|---|------------------------|---|-------------|----------------------|------------|
| Early works through to Construction and Operations | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Long term | 3 | Regional | 3 | Major negative | 8 | Probable | 3 | 17 | Critical negative | High |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Mitigation measures as described in the relevant traffic/ transport section in the ESIA. Develop community security and safety management plan for the Project related to the different activities. This should include emergency response plans for both community related accidents, and also for the workplace. This must include a fire, rescue and chemical spill response capability, as well as medical emergency response strategies. This will need to include primary response as well as carriage to health facilities and policies on on-going management of cases. Develop a clear policy for the management of emergencies or accidents in the community unrelated to the Project's activities as part of the community security and safety management plans. This will need to include primary response as well as carriage to health facilities and policies on on-going management of cases. Develop specific traffic calming measures on the escarpment road, pipeline roads and Project related roads on Buhuka Flats. These should focus on avoiding and reducing the risk of motor and pedestrian vehicle accidents including speed bumps, use of circles to slow traffic, pedestrian walkways, overpass bridges for pedestrians to use in busy areas and improved lighting along roads (solar powered) in key communities. Plan the alignment of roads on Buhuka Flats (where possible) and along the pipeline development in the FEED, so that these bypass communities where possible Ensure dust suppression generated by vehicles in key areas including communities so that risk of accidents is reduced through poor visibility. This can also be achieved by speed controls. Support road safety campaigns in the study area, targeting both roads users and pedestrians. Support the extension of road safety education into the local school curriculum, but extend IEC messaging to the broader study area so that current users are educated. Develop relationships with and support law enforcement authorities and traditional authorities in the area to support road safety and crime prevention activities in accordance with the VPSHR. This should be proactive to reduce the potential for crime related to the influx into the area as well as enforcement of road traffic laws and to inform public road users of legal speed limits. Labour Recruitment and Influx Management Plans and protection of social structures, traditional authorities and social cohesion where possible. Support the surveillance of RTA and non-accidental injuries (assault) in the proposed CHIS using data from police records as well as records from HCs and VHTs. The use of the VHTs as a source of information will be useful in tracking the incidence of criminality and domestic violence in their communities and comparing to what was actually reported to authorities. This surveillance will need to support further interventions based on trends. | | | | | | | | | | | |
| Occupational health, safety and environmental management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Management of mobile equipment and machinery within the framework of the Project's OHSMP. This must include fitness to work of drivers, supported by specific medical surveillance programmes. These programmes must include contractor personnel and be part of CMPs. Maintain appropriate emergency preparedness and response capabilities at the Project. Develop and strictly enforce a drug and alcohol policy for all work related vehicles- including contractor transport vehicles. Employee and contractor management for Project transport vehicles. These need to include specific requirements for driver training, fatigue management, vehicle roadworthiness, over-speeding (electronic speed governors) etc. This includes driving around the study area but also related to the transport of goods and products from other areas. These should be part of CMPs. Implement a social code of conduct policy for all employees to ensure that violence and other threatening behaviour is not tolerated on the site or within the broader community. Training of the security department on the VPSHR. | | | | | | | | | | | |

Social development mitigation and management:

- Support the local authorities with the planning of new settlements and existing settlements so that unplanned development does not increase the risk of fire that will be challenging to control. As required create capacity to support future town planning.
- In partnership with the local authorities and police, coordinate IEC campaigns about responsible driving including speed management, vehicle safety and pedestrian safety. Educational efforts on road safety should also be supported through the school system.
- Support HSS in the district to support a pre-hospital emergency service as well as increase capacity in HC to manage injuries and trauma.

| | | | | | | | | | | | |
|--------------------------------|-----------|---|------------|---|-------------------|---|----------|---|----|-------------------|--------|
| Impact after management | Long term | 3 | Study area | 2 | Moderate negative | 4 | Unlikely | 1 | 10 | Moderate negative | Medium |
|--------------------------------|-----------|---|------------|---|-------------------|---|----------|---|----|-------------------|--------|

Spatial Effects of Impacts:

The impacts associated with accidents and injuries will be experienced in all the listed PACs, including those in the broader transport corridor, with the exception of PAC4 who currently have vehicle access. Children are a specific vulnerable group.

8.7.2 Work related Illness and Injury

Impact Definition:

The occupational health and safety (OHS) requirements of the employed and contracted workforce will be addressed in a separate OHSMP and the ESMP (as part of IFC PS 2).

While workplace OHS is out of scope for the HIA, the fact that a significant component of the workforce will be sourced from the local communities is important as activities in the workplace at the individual level can impact on community health, with the following important to consider:

- The Project will employ a significant proportion of the workforce from a relatively low skill labour pool. This labour force will not be aware of modern health and safety requirements and will thus be more prone to high risk behaviour and accidents. This will be most evident during the construction phase and as this is inherently the most dangerous aspect of the Project appropriate health and safety standards will need to be introduced to reduce incidents and accidents to a minimum.
- Labour Laws in Uganda and specifically the enforcement of health and safety regulations are not advanced compared to international best practice standards. This includes occupational health and safety legislation/standards and practices as well as compensation for occupational injuries and disease. Disability management and appropriate compensation standards and regulations are limited.
- There is a limited emergency response system in the broader study area and indeed district.
- The Project will have a range of OHS risks which will include physical (injuries, UV radiation, heat, noise and vibration), chemical, biological and psychosocial risk factors. These may lead to occupationally acquired illness/disease which may be

chronic in nature and may render the individual unable to continue with normal activities. The capacity of the individual to be supported by the family unit will be reduced.

Impact Evaluation and management measures:

| Work related illness and injuries | | | | | | | | | | | |
|--|---------------------------|---|----------------------|---|---------------------------|---|-------------------------------|---|--------------------|-----------------------------|-------------------|
| Early works through to Construction and Operations | | | | | | | | | | | |
| EHA #7 | Consequence/Effect | | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Long term | 3 | Study area | 2 | Major negative | 8 | Possible | 3 | 16 | Critical negative | High |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: <ul style="list-style-type: none"> Develop appropriate OHS plans that are integrated into the Project ESIA and Project ESMP. Ensure that OHS plans consider the community exposure from different exposure groups. For example ensuring employees do not return home with soiled work clothes, that workers (e.g. handling chemicals) adhere to appropriate hygiene principles etc. | | | | | | | | | | | |
| Occupational health and safety: <ul style="list-style-type: none"> Follow the OHSMP as defined in the ESIA. Develop an OHSMP based on risk. This should include workplace and geographical location, and thus have a broad occupational health and travel medicine focus. Develop an adequate workplace illness/injuries compensation fund in accordance to the national laws and GIIP. Develop an effective emergency response disaster management plan and system that caters for workplace health. | | | | | | | | | | | |
| Impact after management | Long term | 3 | Localized | 1 | Minor negative | 1 | Unlikely | 1 | 6 | Minor negative | Medium |

Spatial Effects of Impacts:

The impacts associated with workplace accidents and injuries will be limited to the workforce.

8.8 EHA #8– Veterinary Medicine and Zoonotic Diseases

Impact Definition:

Zoonotic diseases are poorly recognized and described in the study area as there are limited local veterinary public health services available. The local health services also have limited capacity to recognize or manage zoonotic diseases.

Uganda has been subject to a number of outbreaks of VHFs, but none have been reported in the study area. At a national level they have good vigilance and effective outbreak response teams to deal with these potentially severe diseases. Brucellosis is likely to occur in the study area given the common practice of animal husbandry. There is the potential that leptospirosis occurs, but this is not confirmed.

While zoonotic conditions have a significant outbreak potential as they can be unpredictable, the development and operation of the Project is unlikely to influence or create health impacts related to these conditions. A recent publication, titled 'Emerging Infectious Diseases and HIAs' was commissioned by USAID in 2012, address the potential threats from wildlife and the fact that nearly 75% of emerging infectious disease have an animal origin. The report summarizes that industrial activity can contribute to disease emergence and activities that are congruent with the Project include:

- Altered environment that may increase human: animal contact.
- Road and corridor development
- Temporary work camps
- Expansion of local communities
- Project induced influx.

Some relevant potential impacts that may be associated with Project include:

Direct:

- **Garbage and camp facilities management from the Project site**

Poor hygienic conditions and ineffective management of especially food waste from construction camps, temporary work camps and along transport corridors may attract rodents and other wild animals to the camp or to the waste management facility/landfill. This attraction may increase the number of rodents in the study area with the potential to transmit disease associated with poor sanitation. The increased number of rodents may also attract snakes into the area with the increased potential for snake bite in both the workforce and community.

- **Disturbed habit or environment**

Clearing of bush and movement of earth in early works may increase contact with different species of snakes and other wild animals in both the workforce and to the community in proximity to these activities. This may increase the risk for bites or injury. However, other than the protected forest (along the transport corridor) the study area is relatively disturbed with subsistence agricultural activities common along the bulk of the pipeline route. The only relatively undisturbed area would be the development of the escarpment road, but given its topography will only support small wildlife.

Other than a few hippopotamus in Lake Albert, there are very few large mammals in the study area. Crocodiles do occur but are reported to avoid populated areas, but remain a threat. Snake bites (a recognised NTD) probably pose the biggest threat to morbidity and mortality.

Indirect:

- **Animal husbandry**

This may increase with improved socio-economic circumstances in the study area. Due to limited public veterinary health programs, there is the potential for diseases such as brucellosis to increase. This is at best an indirect impact from the Project but does not require any specific management measures.

- **Dogs**

There are currently not a lot of dogs in the area, but with improved socio-economic circumstances the ownership of pets may increase, especially in areas of unplanned development. There is no effective local veterinary public health service and therefore the number of dogs is likely to increase dramatically as no reproductive management measures are available (such as sterilizing female dogs), and vaccines to prevent diseases in dogs will similarly not be available. This may pose a risk for the transmission of rabies in the study area.

- **Project-induced influx and unplanned settlements**

In-migration and movement of animals with incoming migrants may pose a risk for the introduction of zoonotic diseases locally (that can affect other animals and potentially humans). Unplanned developments with poor sanitation and domestic waste

management may be associated with a consequential deterioration in health and sanitary conditions, with an increase in the numbers of the rodents and pests and therefore increase the risk of disease.

Impact Evaluation and management measures:

| EHA #8 | Zoonotic diseases | | | | | | | | | | |
|---|--------------------|---------------|------------|--------------------|-------------------|---|------------------------|-------------|----------------------|-------------------|--------|
| Construction and Operations | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability/Likelihood | Total Score | Overall Significance | Confidence | |
| | Temporal Scale | Spatial Scale | | Severity of Impact | | | | | | | |
| Impact before management | Medium term | 2 | Study area | 2 | Moderate negative | 4 | Possible | 2 | 10 | Moderate negative | Medium |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: <ul style="list-style-type: none"> Influx management including effective waste management in communities Ensure that the workforce and community are cognizant of snakes and other animals with the clearing of bush in early works and construction. Management measures need to be developed in this period to reduce risks of animal/snake bite. Develop IEC interventions on snakes and wild animals in the community to avoid incidents. Develop the capacity from the workforce where skilled (trained) personnel from the Project can respond to and remove a snake or wild animal from a community and safely relocate it. This will require interaction with local authorities if a larger wild animal. | | | | | | | | | | | |
| Occupational health, safety and environmental management: <ul style="list-style-type: none"> Develop effective waste management practices in all accommodation and work areas to reduce the risk for pests being attracted or proliferating in these areas. This will require effective camp facilities management with controls on general camp cleanliness and hygiene. Consideration should be given to incineration of all foodstuffs and items that may attract rodents. Rodent control (biologically friendly) should occur in landfill sites. Design, build and manage accommodation and camp facilities to prevent rodents from gaining access to accommodation, kitchens and food/water storage areas. Prohibit employees from keeping pets on the Project site. Develop effective protocols and procedures for managing wild animal and snake bites from the Project's workplace medical service. IEC programs in the workforce on preventing snake bites and immediate first aid care in the field. Develop specific epidemic disease preparedness and response plans that include business resilience and recovery plans | | | | | | | | | | | |
| Social development mitigation and management: <ul style="list-style-type: none"> Work with the local wildlife authorities as required to manage movement of wild animals into the study area. Work with local authorities to prevent the development of a bush-meat trade in the study area. Support the improvement of veterinary public health services in study area. This can include IEC program in the community on animal husbandry and support to the local authorities in providing animal health services, especially preventive programs such as vaccinating and sterilizing dogs and vaccination/managing cattle disease such as brucellosis. Support with the local markets for animals where animals are sold or slaughtered, to prevent transmission of disease. This is especially important for poultry and domestic cattle (cows and goats), and even avian influenza. | | | | | | | | | | | |
| Impact after management | Medium term | 2 | Localized | 1 | Minor negative | 2 | Unlikely | 1 | 6 | Minor negative | Medium |

Vulnerabilities and Spatial Effects of Impacts:

The communities in the immediate study area (PAC1-3) as well as the immediate study area on the escarpment and pipeline route have the potential to be impacted by zoonotic diseases. No specific vulnerable groups or gender sensitivities are anticipated.

8.9 EHA #9 – Environmental Health Determinants

The potential environment health determinants and exposure to hazardous chemical substances have been addressed as part of specific sections in the biophysical specialist studies as part of the environmental section of the ESIA. These include noise and vibration, water and air quality, visual intrusion and waste management. The HIA will not attempt to repeat these findings and thus the following sections will just highlight some key findings and suggest additional mitigation measures as applicable to ensure health determinants are addressed.

8.9.1 Noise

Impact Definition:

A specialist noise impact assessment report was completed as part of the EIA with impacts evaluated for different operating circumstances, as follows [142]:

- Construction of Project infrastructure

The impact significance of construction activities with no mitigation measures was regarded as major due to a medium to high magnitude of change with high receptor sensitivity. Sensitive receptors include those communities near the wellpads and the road construction camp near Ikamiro. The construction of the CPF is predicted to have less of an impact due to the 200m exclusion zone around it. The pipeline development will have transient impacts, depending on the location of worksites in relation to sensitive receptors.

A range of mitigation measures have been proposed including:

- Minimum separation distances (at 130m) with some options requiring the physical relocation of people or proposed positions of well-pads.
 - Limit working time to day-light only for noisy construction activities.
 - Install silencing equipment on mobile machinery.
- Drilling wells
- Depending on the location of communities in relation to the well-pads the impact significance ranges from major to minor. Predicted noise intensity increases (to high) at night in most of the sites (exception Ikamiro). Noise from drilling activities is enhanced due to the lack of any natural or man-made barriers. The drilling activities will occur 24 hours a day. A range of mitigation measures have been proposed including minimum separation distances (at 380m), erection of noise barriers and physical relocation of communities or a change in the position of the well-pads.

- Production
Noise from production activities range in significance from minor to major. Mitigation measures include acoustic enclosures to attenuate noise.

The HIA will not rank impacts or propose specific mitigation measures over and above those proposed by the specialist noise study. However, due to the potential concerns of health impacts of noise (physical and especially psychosocial) it will be important to develop effective communication procedures to proactively and transparently communicate results on noise and vibration to the community. A grievance mechanism supported by a register and a process to follow up and close out complaints should be established.

It will also be important to develop occupational hygiene (environment) programmes to reduce noise and vibration exposures to the workforce. A hearing conservation programme based on reducing noise exposures through engineering and administrative controls should be developed as a proactive priority intervention. If these engineering controls are effective, it will also reduce general noise exposure in the community. Vibration should also be included in the occupational environment surveillance programmes to monitor exposures to the workforce and by proxy the community. These considerations should be part of the FEED.

Impact Evaluation and management measures:

| EHA #9 | Noise and Vibration | | | | | | |
|---|-----------------------------|---------------|--------------------|-------------|-------------|----------------------|------------|
| | Construction and Operations | | | | | | |
| | Consequence/Effect | | | Probability | Total Score | Overall Significance | Confidence |
| | Temporal Scale | Spatial Scale | Severity of Impact | | | | |
| Impact before management | Not ranked for HIA. | | | | | | |
| Management Measures | | | | | | | |
| Project impact mitigation: | | | | | | | |
| <ul style="list-style-type: none"> • Recommendations as per the noise specialist study from the EIA. • Engineering designs that consider noise and vibration and model potential exposures to communities. This can include potential physical relocation of sensitive receptors or Project activities away from receptors. • Develop effective communication procedures to proactively and transparently communicate results on noise and vibration in the community. • Establish a grievance mechanism supported by a register and a process to follow up and close out complaints. | | | | | | | |
| Occupational health, safety and environmental management: | | | | | | | |
| <ul style="list-style-type: none"> • Ensure effective occupational hygiene programs to reduce noise and vibration exposures to the workforce. • Develop a hearing conservation program based on reducing noise exposures through engineering and administrative controls as priority interventions. | | | | | | | |
| Impact after management | Not ranked for HIA. | | | | | | |

Spatial Effects of Impacts:

Impacts associated with noise are discussed in the specialist study depending on each community's proximity to Project activity.

8.9.2 Air Quality and Mal-odours

Impact Definition:

Air quality and associated impacts have been addressed in a separate specialist study that describes the baseline air quality, potential current and future sources of air pollution and potential impacts associated with the Project [150]. The HIA will not rank impacts or propose specific mitigation measures over and above those proposed by the air quality specialist study, other than mentioning the importance of supporting influx management and ecosystems services plans. However, for reference some important findings are discussed below.

While there is no current oil production in the district or study area a number of potential air pollutants that may occur as a result of the oil extraction and refining include:

- Criteria air pollutants including; sulphur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO) and particulate matter (PM₁₀, PM_{2.5} and TSP).
- Hydrogen sulphide (H₂S) and aromatic hydrocarbons such as benzene, toluene, ethyl benzene and xylene (BTEX group).
- Greenhouse gasses including methane and carbon dioxide.

Significant impacts at baseline include domestic fuel burning (charcoal and wood) and biomass burning associated with clearing for farming. Vehicle emissions and dust generated from unpaved roads are also risks, but the low current volume of traffic limits significant exposures.

Impacts on air quality were divided into Project activities as follows:

- Construction activity impacts were mainly associated with the short and long term impacts from particulate matter (PM₁₀, PM_{2.5} and dust fall out).
- Construction activity impacts were mainly associated with the short term impacts associated with SO₂ and NO_x. Impacts from H₂S and volatile organic compounds

The most sensitive receptors were on Buhuka Flats and included the villages of Kyakapere, Kyabasambu, Nsonga and Nsunzu. The proposed mitigation measures will be completed based on the FEED.

In addition to the air quality impacts that are directly associated with the Project, the following are also important to consider:

- The development of the escarpment road and service road along the pipeline route will improve access to communities. Influx into the study area and a locally improved economy is likely to increase motorized forms of transport. It is likely that the local authorities will not seal roads in the short term and thus dust will be generated from existing road surfaces. It is also likely that community vehicles will not be adequately maintained and thus emissions will increase, and especially old diesel engines may increase exposures to diesel particulate matter which potentially have mutagenic and carcinogenic properties.
- Malodours from the sewerage treatment plant(s) will need to be considered as a source of air pollution that may affect both the community and the workforce. Therefore, the location and management of the plant are important to consider.
- Greenhouse gas emissions and energy consumption and impact on global climate change will be evaluated in a separate specialist report.

Impact Evaluation and management measures:

| EHA #9 | Air quality and malodours | | | | | | |
|---|--|---------------|--------------------|-------------|-------------|----------------------|------------|
| | Early works through to Construction and Operations | | | | | | |
| | Consequence/Effect | | | Probability | Total Score | Overall Significance | Confidence |
| | Temporal Scale | Spatial Scale | Severity of Impact | | | | |
| Impact before management | Not ranked for HIA. | | | | | | |
| Management Measures | | | | | | | |
| Project impact mitigation: | | | | | | | |
| <ul style="list-style-type: none"> • Air quality mitigation as per the air quality specialist study. • On-going monitoring of air quality as per the recommendation of the air quality specialist study • Dust suppression measures as required on access and service roads as required. Consider dust suppression in areas of increased dust from non-Project related activities. Dust may be a major concern and reason for complaints against Project activities. • Develop effective communication procedures to proactively and transparently communicate results on air quality to the community. • Establish a grievance mechanism supported by a register and a process to follow up and close out complaints. | | | | | | | |
| Occupational health, safety and environmental management: | | | | | | | |
| <ul style="list-style-type: none"> • Develop effective medical surveillance programs • Perform occupational hygiene baseline assessments and initiate a sampling program based on risk and exposure profiles | | | | | | | |
| Impact after management | Not ranked for HIA. | | | | | | |

8.9.3 Water Quality/Quantity

Impact Definition:

Specialist surface water, soil and groundwater studies were completed as part of the ESIA, and each of these has highlighted specific impacts and proposed mitigation measures [140,141]. The health consequences of altered drinking water quality are addressed in section 8.3.3 and this report will not rank impacts or propose specific mitigation measures over and above those proposed by these specialist studies.

However, in summary impacts on water quality/quantity were generally associated with an altered environment, the potential for pollution from Project activities and crude oil spills. Impact on water quality and quantity that the community use for domestic use and impacts on land capability (as the ecosystem is so important to local livelihoods) are the major impacts

- Surface water:
 - In the construction phase erosion and spills of oils, fuel and chemicals were the main impacts identified. These have the potential to pollute surface water sources that the community utilises for their domestic water supply as well as impacting agricultural land along the pipeline route. After environmental mitigation methods, these impacts were considered moderate.
 - In the operational phase major impacts can be associated with erosion, dust and sediment collection in run-off water that pollutes surface water and deteriorates land capacity. Other impacts included spillage of crude oil (moderate significance) and oil leaks around the pipeline (high significance). After environmental mitigation methods, these impacts were considered low to moderate.

- Ground water:
 - In the construction phase impacts are associated with domestic water discharge, sanitation waste, waste from equipment maintenance and accidental spills of materials stored or handled on site. All potential impacts were regarded as minor after mitigation. Abstraction of ground water on Buhuka Flats was not regarded as an impact as it is not seen as a sustainable or potable source of water.
 - In the operations phase well drilling with pollution from drill wastes and pollution from a well blow-out potential risks. The risks were regarded as

minor after mitigation but drilled cuttings removed from the wellbore are typically the largest waste stream generated in oil activities with groundwater pollution a real potential if there is improper handling and disposal of the drill fluids and cuttings.

Other impacts in the operational phase include an extension of impacts in construction with pipeline failure and leakage of crude oil. The communities along the pipeline route above the escarpment are dependent on groundwater in some areas so this poses a major potential impact, with a moderate residual risk after mitigation.

Impact Evaluation and management measures:

| EHA #9 | Water quality and quantity | | | | | | |
|---|--|---------------|--------------------|-------------|-------------|----------------------|------------|
| | Early works through to Construction and Operations | | | | | | |
| | Consequence/Effect | | | Probability | Total Score | Overall Significance | Confidence |
| | Temporal Scale | Spatial Scale | Severity of Impact | | | | |
| Impact before management | Not Ranked for HIA. | | | | | | |
| Management Measures | | | | | | | |
| Project impact mitigation: <ul style="list-style-type: none"> • Management as per the Project water management and surveillance system. • Develop effective communication program in the PACs on risks related to water quality. • Maintain the grievance mechanism supported by a register and a process to follow up and close out complaints | | | | | | | |
| Impact after management | Not Ranked for HIA. | | | | | | |

Spatial Effects of Impacts:

The potential spatial impacts on water quality and quantity are diverse and depend on the location of the community to potential event.

8.9.4 Visual Intrusion

Impact Definition:

A visual specialist study has been conducted as part of the EIA, which highlighted specific visual intrusion risks and associated mitigation measures [143].

The health effects of visual intrusion are generally mild but have been described to result in psychosocial health impacts and influence circadian rhythms, which affect sleep and general well-being. These are mentioned in the HIA for completeness but the potential impact findings and mitigation measures are discussed in detail in the EIA.

8.9.5 Hazardous Chemical Substances

Impact Definition:

The Project will utilize different types of hazardous chemical substances (HCS) in the construction phase and operational process or to support elements of the Project, including the following potential substances:

- Pest control: insecticides, pesticides and rodenticides to control insect and other vermin such as rats.
- Water treatment: chlorine and associated water treatment chemicals used in the treatment of potable water as well as waste water.
- Petroleum products to support heavy vehicles and light duty vehicles on site, including diesel fuel, mineral oils, grease, degreasers etc.
- The site based environmental laboratory.
- The site based medical services including cleaning agents, laboratory equipment as well as medications (especially expired ones requiring disposal).
- Potentially contaminated surface water including storm water, fire water and wash-down water originating from dirty areas.
- Other solid waste including contaminated rags, florescent light tubes, batteries etc.
- Products required for the operation of the CPF and produced as part of the waste stream of the CPF.
- Products required for well-drilling including drilling fluids and drill cuttings as part of the waste stream.

These HCS will need to be managed in the framework of best practice as defined by local Ugandan legislation, IFC PS 3 (Pollution Prevention and Abatement) and IFC EHS guidelines. This section is mentioned for completeness and it is out of scope to consider a risk assessment for each potential HCS. However, this should form part of the Project HCS management system, especially as the procurement, storage and use is a dynamic process.

Impact Evaluation and management measures:

| EHA #9 | Hazardous chemical substances | | | | | | | | | | |
|--|--|---------------|------------|--------------------|----------------|---|-------------|-------------|----------------------|----------------|------|
| | Early works through to Construction and Operations | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability | Total Score | Overall Significance | Confidence | |
| | Temporal Scale | Spatial Scale | | Severity of Impact | | | | | | | |
| Impact before management | Medium term | 2 | Study area | 2 | Major Negative | 8 | Possible | 2 | 14 | Major negative | High |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> As per recommendations from the EIA and waste management plans. Effective monitoring of emissions, water quality etc. and transparent reporting to stakeholders. Develop appropriate HCS management programs in alignment with IFC PS3 guidance as well as the International Code of Conduct on the Distribution and Use of Pesticides [151]. Effective waste management so the communities do not use discarded containers that may have contained hazardous materials for collecting of water or storage of water or related domestic products. These should be crushed or spiked to prevent use as storage containers. | | | | | | | | | | | |
| Occupational health, safety and environmental management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Undertake a risk assessment on all HCS on site and determine the specific human health risks that may potentially result from exposure to a product or by product of a process or emission. Develop specific workplace health, safety and environmental plans based on the risk assessments, with clear emergency preparedness and response capability (equipment and trained personnel) for hazardous materials management. Ensure adequate personal protective, hygiene and washing facilities for employees that handle any form of pesticide. This should include dedicated personal protective clothing as well as showering and changing room facilities so that personnel are required to change potentially contaminated clothing before they go home, thus preventing exposures to their family unit or other workers. Medical surveillance (including biological monitoring) of employees handling HCS should be incorporated into the Projects OHSMP. | | | | | | | | | | | |
| Impact after management | Medium term | 2 | Study area | 2 | Nil/baseline | 1 | Unlikely | 1 | 6 | Minor negative | High |

Spatial Effects of Impacts

The impacts associated with HCS in Project activities are likely to be felt in the immediate study area and related to receptors that may be in proximity to the potential exposure.

8.10 EHA #10 – Social Determinants of Health

The holistic model of health and well-being acknowledges that the health status of a population is affected by factors known as health determinants. They are many and varied and include, for example; natural and biological factors, such as age, gender and ethnicity; behaviour and lifestyles, such as smoking, alcohol consumption, diet and physical exercise; the physical and social environment, including housing quality, the workplace and the wider urban and rural environment; and institutional factors such as the access to medical care. All of these are closely interlinked and differentials in their distribution lead to health inequalities. The model for the determinants of health is depicted in Figure 42, with many of the socio-economic, cultural and environmental conditions discussed in other sections. This section will focus on the influence of employment, local economic development and well-being/lifestyle factors.

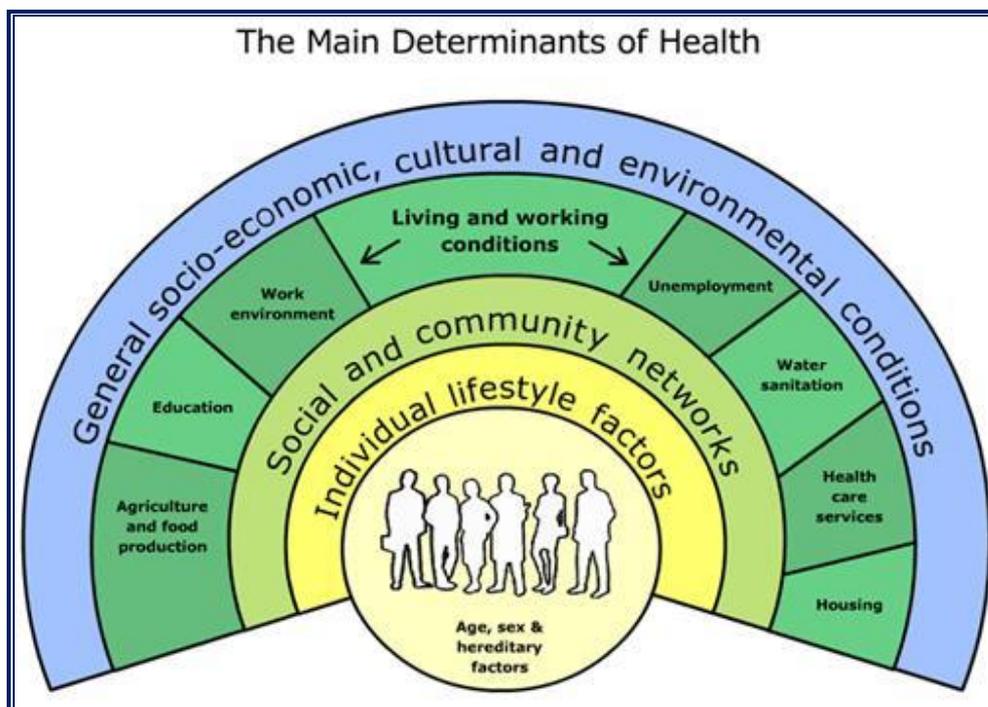


Figure 42: Determinants of health

8.10.1 Local Economic Development and Employment

Impact Definition:

The Project has the ability to improve the local employment and economic development in the study area if properly planned and executed. These are discussed in the SIA, and while the HIA will not seek to repeat these elements, the potential benefits are likely to influence

certain social determinants of health. General socio-economic conditions play an important role in the living and working conditions, which contribute to quality of life and well-being.

Education is a major challenge in the area. The poor educational attainment and indeed quality of education is a major challenge to breaking the cycle of poverty and ability for employment or to develop a local business. In addition, there are few employment opportunities in the study area, which has limited the indigenous population from participating in the formal job market and benefit from skilled or semi-skilled jobs. This lack of experience and exposure will limit the ability for the Project to hire people from the local community to more senior and well paying positions, with the likelihood that they will be placed in lower skilled jobs. These lower skilled positions will be more common in the construction phase but will taper into operations. However, the expectation for the Project to deliver sustainable economic benefits is high, in the local community and with other stakeholders, and thus effective communication and engagement strategies to outline the magnitude and timeframe for these benefits are important to develop to avoid creating unrealistic or unmatched expectations.

The Project has the potential to impact social determinants related to economic development in the following ways:

- **Direct employment at the Project**

In the construction phase, CNOOC has a casual labour policy in place that aims to comply with a 60% local resident employment target for casual job opportunities. However, as the Project transitions to operations, it will require a smaller workforce, with a specific skill set not likely to be available locally. Thus, there is a limited potential that the local community will benefit from local employment in a sustainable and long term manner with the potential for negative impacts, including:

- Unfulfilled expectations that the Project will employ vast numbers of people and to reduce poverty in the area.
- Employment of the community for a short period, with a resultant altered livelihood from subsistence farming to earning a paid wage. This may change traditional practices, especially in men who may not want to return to farming/fishing once the employment opportunities have ceased.
- Development of a local currency that may erode community cohesion and traditional bonds, which are an essential element in mutual help structures and local culture. Project induced influx may also influence these traditional

structures and also create supply and demand of products and services with escalating inflation.

- **Government spend and development.**

The government will be drawing royalties and taxes from the development of the oil fields including from KDA. It will be important that some of this revenue make it back to the development of the study area, district and region so the people that reside in the area actually feel tangible benefits related to the development. The Project has a role to play on supporting development but should do so in the framework of a broader district strategy, and in line with the National Oil and Gas Policy of 2008, with the following potential benefits:

- **Multiplier effects on the local economy** due the presence of the Project and its activities. This can stimulate economic growth and if part of a district development plan with other Oil developments may generate real benefits.
- **Improved infrastructure** in the host sites for communities that will be resettled by the Project and other communities due to CSI initiatives by the Project and government supported projects.
- **Improved access and improved basic services** such as education, water and sanitation and health care as discussed in numerous sections.
- **Local investment and development.** If the Project is supportive of local economic development and works in partnership with government and existing agencies/donors, it may serve as an attractor to increased funding and even improved government commitments to local and rural development. These businesses may also support the needs of the Project if correctly identified and supported, which may promote their sustainability in the longer term, especially if a linkages program is developed to stimulate local businesses as service providers, either directly to the Project or for general indirect services at the local or district level.

Impact Evaluation and management measures:

| EHA #10 | Employment and local economic development | | | | | | | | | | |
|---|---|---|---------------|---|--------------------|---|-------------|---|-------------|----------------------|------------|
| Construction and Operations, through to closure | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Short term | 1 | Study area | 2 | Minor benefit | 2 | Possible | 2 | 7 | Minor benefit | Low |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Recommendations as per the social management plan, as well as the community investment and development plan. This should be aligned to legal requirements for Oil developments in Uganda. The Project should also enter into any agreements with the understanding that benefits of the investment will benefit the study area and broader district. Evaluate opportunities to support local economic development with a focus on improved quality of life and perceived well-being. This will be important in areas that are impacted by influx and the host sites for resettled communities. Influx management. Develop clear labour recruitment strategies including local hire policies that are realistic. Develop training programmes to enable local inhabitants to eventually secure skilled roles. Develop CMPs to supports these policies. Support effective communication strategies to manage community expectations on realistic extended benefits from the Project, including elements such as employment. Develop an effective stakeholder engagement strategy to develop partnerships with the authorities as well as with the communities. This will promote community ownership and thus ultimately sustainability of interventions. | | | | | | | | | | | |
| Social development mitigation and management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Evaluate opportunities to create an effective linkage program to stimulate local businesses to support the Project and other opportunities that may arise in the study area or district. Evaluate opportunities for the empowerment of women and girls in the area. Microfinance and self-reliance/co-operative schemes may be opportunities with the understanding that programs are being developed based on the ability at the local level to support this. | | | | | | | | | | | |
| Impact after management | Long term | 3 | Regional | 3 | Major benefit | 8 | Possible | 2 | 16 | Very high benefit | Low |

Vulnerabilities and Spatial Effects of Impacts:

The impacts associated with local economic development and employment will be felt in the longer term as these gains will take a period to time to develop and mature, if effectively planned, implemented and sustained. In the construction phase the communities in the immediate study area (PAC1-6) are likely to benefit from employment and local development. This is hard to predict in the operational phase but if effectively managed the broader district should benefit.

8.10.2 Social Ills and Gender Inequality

As discussed earlier, women are a vulnerable group in the study area, with cultural factors and a patriarchal society marginalising women to some extent. GBV was reported to occur, and although this could not be quantified, it appeared to be accepted or even tolerated.

Certain social ill, such as substance abuse, was common in the study area and this contributed to other challenges such as neglect of family responsibilities, transactional sex, GBV and common assault. This was more common in the lake-shore communities with migration of people into the area and erosion in some traditional structures contributing factors to a disruption of social order. In the SIA alcohol abuse was cited as the most common cause of dispute in the communities on Buhuka Flats. While communities perceived

their community to be safe, 48% of residents knew of a person who had been arrested for some form of crime, the most common being assault (55%) but theft in 22% of cases [2].

A number of factors may impact on the traditional values and social harmony in the study area as a result of the Project development. These include influx, stress on limited resources, altered lifestyle practices and possible development of increased levels of social ills such as CSW and substance abuse that have been discussed in previous sections. All these and other factors have the potential to increase levels of criminality and crime which may be associated with violence and injuries. This can include GBV as women are a vulnerable sector in the community and at risk to CSW and other forms of marginalization.

Impact Evaluation and management measures:

| EHA #10 | Social Ills and Gender Inequality | | | | | | | | | | |
|---|---|---------------|------------|--------------------|-------------------|---|-------------|---|-------------|----------------------|------------|
| | Construction and Operations, through to closure | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | Spatial Scale | | Severity of Impact | | | | | | | |
| Impact before management | Medium term | 2 | Study area | 2 | Moderate negative | 4 | Possible | 2 | 10 | Moderate negative | Medium |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Mitigation measures as part of the social management plan. These should seek to involve programs to promote gender equality and promotion of women's rights. Labour recruitment and influx management plans. Support the retention of the powers of traditional authorities to limit the development of social ills in communities. | | | | | | | | | | | |
| Social development mitigation and management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Support local policing initiatives and an effective justice system, where possible, and in partnership with the local authorities. Promotion of gender based interventions including opportunities such as micro-finance projects, education and skills development programmes, in addition to educational programs on general women's rights and equality. Continue to support educational development but support the focus on education for girls as part of these initiatives. Support local empowerment for girls in the area through local development projects. Attempt a gender balance in the workforce noting the limitations of females in certain forms of manual labour. | | | | | | | | | | | |
| Impact after management | Long term | 3 | Study area | 2 | Moderate benefit | 4 | Possible | 2 | 11 | Moderate benefit | Low |

Vulnerabilities and Spatial Effects of Impacts:

These impacts may be experienced across the entire the study area, but will be more marked in the immediate study area (PAC1-3 and 5).

8.10.3 Altered Access

The Project has the potential to alter access in the study area with improved transport networks and communication systems having the potential to promote positive impacts:

- Improved access to information**

Improved mobile phone networks, services and eventually the introduction of the internet has the potential to improve the access to information, which will allow better

transfer of information and will possibly support better education and, which may in turn promote and support improved lifestyles, HSB and health knowledge and awareness.

- **Improved transport links**

The escarpment road that connects Buhuka Flats, improved roads to construct the pipeline and a potential general improvement in other roads in the area will promote improved access to services and trading opportunities. This can include better access to health services and public transport that may also promote HSB practices to the formal health sector.

- **Improved services**

Improved access will improve the ability for district authorities to deliver basic services in areas that were previously hard to reach.

Improved access may also cause negative impacts such as spread of STIs and other communicable diseases as described in each individual section.

Impact Evaluation and management measures:

| EHA #10 | | Altered access | | | | | | | | | |
|--|--------------------|----------------|---------------|---|--------------------|---|-------------|---|-------------|----------------------|------------|
| Construction and Operations, through to closure | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Medium term | 2 | Study area | 2 | Moderate benefit | 4 | Possible | 2 | 10 | Moderate benefit | Medium |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Evaluate opportunities to enhance the potential benefits of the improved access to the areas within the study area. This will need to be tempered with the mitigation of the negative impacts linked to access as described in other sections. • Influx management. | | | | | | | | | | | |
| Social development mitigation and management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Evaluate opportunities to enhance the local economic development through access to markets, improved education and gender empowerment as described above. • Support the broader study area with access to improved and affordable information technology services. • Consider supporting the development of a community radio station. This can support health education but also general communication related to the Project and other community developments. | | | | | | | | | | | |
| Impact after management | Long term | 3 | Study area | 2 | Moderate benefit | 4 | Probable | 3 | 12 | Major benefit | Low |

Vulnerabilities and Spatial Effects of Impacts:

These impacts may be experienced across the entire the study area, but will be more marked for the lake-shore communities due to the development of the escarpment road (PAC1-4).

8.10.4 Social Harmony and Project Expectations

Impact Definition:

Project related expectations have the potential to influence social harmony in the study area in a number of ways, including:

- **Employment and Local Development**

The lack of general employment opportunities in the study area and the high expectation (as reported from the community comments and concerns study) that the Project will support employment for a large number of the community for extended periods has the potential to create social disharmony especially towards the Project, or those who many benefit from the Project. This may result if negative perceptions of well-being within communities or sections in the communities that do not directly benefit.

There will also be the expectation that the Project will support a full range of social development and community investment programs, irrespective of the role that district and national government should play in this role. The local community does not have insight into the actual scale and planned activities of the Project, which will support false expectations.

- **Inequalities and Social Harmony**

Potential or perceived inequalities may be caused by:

- those who are physically resettled may have improved housing structures compared to those who are not moved.
- those who benefit from employment;
- those communities that may benefit from outreach support from the Project; and
- gender inequalities as the Project is more likely to employ men than women.

- **Project induced in-migration**

Influx may create impacts on well-being/lifestyle and erode quality of life through:

- eroded cultural and traditional values;
- increase in crime, alcoholism and potentially drug abuse;
- increase in GBV;
- increase in CSW; and

- various psychosocial effects related to lifestyle change and perceptions of well-being.
- **Third country nationals and migrant workforce**
During construction and operations, a portion of the workforce will originate from outside of the study area, and potentially even the country. This group may have a different cultural and value system and be wealthier than the local community. This has the potential to create frustrations in the study area due to the limited alternative employment opportunities in the local communities with the perception that these outsiders are taking jobs that could be provided to local inhabitants. There is also the potential for this incoming workforce to be disrespectful of the local cultures and norms and flaunt wealth.

Impact Evaluation and management measures:

| EHA #10 | Social Harmony and Project Expectations | | | | | | | | | | |
|---|---|---------------|------------|--------------------|-------------------|---|-------------|-------------|----------------------|-------------------|--------|
| Construction and Operations | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability | Total Score | Overall Significance | Confidence | |
| | Temporal Scale | Spatial Scale | | Severity of Impact | | | | | | | |
| Impact before management | Medium term | 2 | Study area | 2 | Moderate negative | 4 | Probable | 3 | 11 | Moderate negative | Medium |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Mitigation measures as part of the social management plan. • Labour recruitment and influx management plans • Effective communication regarding the employment and local development capability of the Project- especially to the youth. • Evaluate opportunities for local development that support vulnerable groups, including gender balance. • Effective communication programs on the activities of the Project and management of expectations of what the Project will, and will not do. | | | | | | | | | | | |
| Occupational health, safety and environmental management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Limit the contact of the in-coming construction workforce with the local population as far as practical (closed camp). | | | | | | | | | | | |
| Social development mitigation and management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Any social development and community investment programs should be planned to be conducted with district authorities. Where relevant these should be harmonized with national policy and strategy and while the Project should (strongly recommended) take a leading role in the planning, implementation and review of programmes, it should not be seen as the sole actor. Sustainability elements should be incorporated into each plan and a MOU developed that defines roles and responsibilities of each party. • Development programs that maintain traditional values and promote social cohesion/ sense of community. These can include co-operative programs that promote sustainability and self-reliance in communities as well as maintenance of effective traditional leadership structures. | | | | | | | | | | | |
| Impact after management | Medium term | 2 | Localized | 1 | Minor negative | 2 | Possible | 2 | 7 | Minor negative | Low |

Vulnerabilities and Spatial Effects of Impacts:

These impacts may be experienced across the entire the study area.

8.11 EHA #11– Cultural Health Practices and Health Seeking Behaviour

Impact Definition:

HSB in the communities is affected by cultural preferences, access to, and acceptability of the local health services.

TM plays an important role in local HSB, with traditional healers (TH) were reported play a major role in health care and treatment of certain problems such as “Awola” (bewitching). Local beliefs dictate that certain medical conditions, such as fever, necessitates a consultation with a TH prior to visiting a HC for further treatment. Though most local TH practices were not noted to cause any adverse effects, such as herbal intoxication, the process often results a substantial delay in diagnosis and treatment, increasing the morbidity of serious medical conditions.

However, lack of access to, and the prohibitive transport costs, to local HC supports the utilization of TM, underscoring the fact that HSB in the study area is as much a financial consideration as it is a matter of personal preference. Included in this phenomenon, is the use of TBAs for home deliveries. Despite the fact that TBAs are not considered to be an officially recognized option for delivery assistance by the Hoima DHMT, HCWs in the area reported that between 50 to 80% of all deliveries in the area were home deliveries performed with the assistance of TBAs and/or family members.

Many of the poorer members of the population in the study area also used herbs and medicinal plants to self-medicate where cultural believes dictated this, or when financial restrictions did not allow for the use of THs or health centres.

The Project development is unlikely to play a major role in influencing cultural health practices, but may influence HSB in the following manners:

- **Improved access to formal public healthcare services:**

Improved access roads, such as the escarpment road, will lead to easier access and shorter referral times for residents of the Buhuka Flats to their level 4 referral health centre at Kyangwali. This is likely to be replicated on most of the main transportation routes to the Project, as well as access roads to the pipeline route where road improvement and maintenance is likely to form an important part of construction.

- **Project induced In-migration:**

The negative indirect effects of in-migration may impact on the ability of public HC facilities to meet the demands of the community and the fact that access to health services may be limited in certain areas. This may lead to an increase in the demand for services provided by the informal medicine sector.

Impact Evaluation and management measures:

| EHA #11 | Cultural health issues and HSB | | | | | | | | | | |
|---|-------------------------------------|---|---------------|---|--------------------|---|------------------------|---|-------------|----------------------|------------|
| | Constructions through to Operations | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Medium term | 2 | Study Area | 2 | Minor negative | 2 | Possible | 2 | 8 | Moderate negative | Low |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Develop mitigation measures for the reduced access of the community to health care services. • Influx management. | | | | | | | | | | | |
| Occupational health, safety and environmental management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Support IEC programmes to educate the local workforce in a culturally sensitive manner on the use and application of TM. | | | | | | | | | | | |
| Social development mitigation and management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Support IEC programmes related to HSB and use of TM. This will support proposed health interventions described in other sections so that notification of specific health conditions occurs in the public health services. • Partner with the local health care authorities to improve the functionality of health care services and to improve HSB towards the formal health sector for serious conditions. It is important to recognize that culturally TM still has a role to play in local health care delivery but if the community can be educated on when to seek priority care from the formal health sector, it will likely result in a health benefit. To this end, it may be beneficial to work with the local health authorities to create a TH forum that integrates into the formal health sector so that each practice is recognized and functions effectively to improve the health care needs of the population. This can include training TH on the need for early referral for acute conditions. | | | | | | | | | | | |
| Impact after management | Medium term | 2 | Localised | 1 | Nil/baseline | 1 | Unlikely | 1 | 5 | Negligible | Low |

Vulnerabilities and Spatial Effects of Impacts:

Negative impacts associated with cultural health issues may be experienced in all communities that will experience influx (PAC1-3, 5-7). Communities that currently have reduced access to HC services (PAC1-4) will benefit from better access after the development of the escarpment road. Access to the area and improved socio-economic conditions may improve the HC services and reduce the need to seek TM in the absence of an alternative.

8.12 EHA #12 – Health Systems and Services

Impact Definition:

The capacity and quality of health care services is limited in the study area. The highest level of health care is a RRH in Hoima city, which serves 6 other districts, including Hoima district. In addition to the Hoima RRH, 4 other HC that serve the communities in the study area as discussed in 7.2.12 and Appendix E that describes a modified SARA metric that assessed the service availability and readiness of the health sector.

All HC, including the Hoima RRH, were found to be under-resourced, both in terms of infrastructure and human resources and had challenges relating to diagnostic and clinical monitoring capacity, skilled staff capacity, referrals, general infrastructure and reliable water and electricity services. The smaller HCs were noted to be under-scoped for the populations they were intended to serve, with a level three HC was supposed to serve a target population of approximately 1500 people. RHMIS data indicated that actual populations in Buhuka HC was 9493 and Kyangwali HC 24 274. None of the HC evaluated had the full complement of personnel required to fully staff a level 3 HC, with Buhuka HC only having three enrolled nurses in attendance.

Medical waste management was a universal challenge, with only Kyangwali HC using an incinerator to dispose of their medical waste. All of the other facilities, including Hoima RRH, depended on open pit burning and burial for disposal of medical waste (although Hoima RRH was in the process of commissioning an incinerator).

Access to HCs and the referral of patients from HCs to hospitals was highlighted as a major issue as the entire district had access to only one ambulance, which was reserved for patient transfers between Hoima and Kampala. In the absence of public transport, the population was entirely dependent on private means for routine and emergency transportation, with costs reported as prohibitive for the majority of the population,

The supply chain of consumables and medications from the central district stores was reported to be fairly consistent, following a push system based on an essential drug list. Stock-outs were reported to be infrequent, with the exception of Kyangwali HC who reported regular stock-outs due to high patient numbers, reportedly associated with a rapid population growth.

The Project has the potential to impact on the health systems services and infrastructure as follows:

- **Workforce health requirements**

The Project will require primary, occupational and emergency care facilities to serve the needs of the workforce. While the estimated workforce is not predicted to be excessively large, there is the risk that the public healthcare system will be overburdened if the workforce and contractors were referred into the local systems. This added demand may impact on the capacity of the local health centres to deliver care to the local community, causing a negative health impact and potentially pushing the community to seek alternative forms of care (such as TM). The HC staff in Kyangwali and Buhuka reported that contractor staff from the escarpment road construction were commonly seen and treated in their facilities and that this had added to an already busy patient load.

- **Employment of skilled public health service staff**

CNOOC and selected contractors will need to develop workplace medical services and while these are not likely to be extensive, the Project must take care not to employ local public health care staff as this will significantly impact on the ability to deliver local services, especially with the anticipated increased demand for services associated with influx. The facilities are already under-capacitated and engagement of staff will further limit human resource capacity. While these impacts are most likely in the construction phase, it may be challenging to recruit medical staff to return to work in the public sector.

- **Project induced in-migration**

Migration into the area has the potential to significantly exceed the capacity of what are already limited health care facilities. There is minimal institutional capacity to support this potential growth from a planning, budget or a delivery perspective; and without due anticipation, awareness to meet the increased demand will impact on local health service delivery. This can include acceptable infrastructure, effective supply chain of medications and consumables and diagnostic equipment.

- **Improved access**

The development of the escarpment road to Buhuka Flats will dramatically improve access and enable both a broader economic development and access to health

services. Public health services will be enhanced as officials will be able to reach the local HC, and the community will have improved access to referral facilities.

However, the capacity at the Kyangwali HC may be over extended as improved access will increase demand for services at this centre, as it is the best staffed and equipped facility in the area.

- **Altered burden of disease**

The development of the Project may alter the local social and environmental determinants and change the current BOD patterns as discussed in other sections. Health planning and the ability to proactively respond to an epidemiological transition may be challenging with a potential inability to effectively respond to emerging or new disease profiles (such as increased HIV and certain NCDs). However, economic development may enhance the general state of health and support improvements in certain health indicators.

Various HSS activities have been mentioned in various EHAs under their respective mitigation sections, but for these activities to be effective it will require interaction, agreement and collaboration of all parties, and especially the district health department. However, if these measures are effectively and sustainably implemented there is a real opportunity to manage an altered BOD and enhance the well-being of the population and improve local health care services.

Impact Evaluation and management measures:

| EHA #12 | Health Systems and Service Issues | | | | | | | | | | | |
|--|-----------------------------------|---|---------------|---|--------------------|---|------------------------|---|-------------|----------------------|------------|--|
| Early works, constructions into operations and post closure | | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence | |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | | |
| Impact before management | Medium term | 2 | Study Area | 2 | Moderate negative | 4 | Possible | 2 | 10 | Moderate negative | Medium | |
| Management Measures | | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Influx management should include health sector planning, as there is minimal capacity to plan for, or expand, services in the study area to meet what is likely to be a growing demand, recognising the shortfall at baseline. The planning should be supported by monitoring of demographic changes to determine the target number of people per HC, and evaluate if the available health facilities are adequate for the needs of the community based on Ugandan standards. Support as required within framework of HSS and broader district health strategy. • Consider supporting the extension of the current VHT programme into the study area. This programme was managed by Malaria Consortium in other parts of the district and by all accounts was extremely successful. The use of the community as a resource will be extremely powerful as there is an available pool of human resource, they will understand cultural and ethnic factors in supporting health promotion and prevention messaging, it will provide a sense of worth and meaning for sectors of the community and some form of employment (even if on an incentivised volunteer basis). The scope of the VHT can include health education and behaviour change communication, support with managing environmental health issues ('clean community campaigns'), first line medical aid and treatment (after training), and collection of health data. | | | | | | | | | | | | |

- Consider supporting key HSS activities in partnership with the district health authorities. This HSS links into other sections and while some interventions may be designed to specifically mitigate impacts, there is the likelihood that some extended benefits may be achieved through enhancement of interventions. Therefore, sustainability criteria must be applied to any HSS activities including a clear memorandum of understanding (MOU) and an exit strategy. Ideally CNOOC should create an entity that supports any HSS activities to remove the direct involvement of the company, while still serving the needs of the Project (see 8.13). Interventions can include:
 - Support health infrastructure refurbishment and upgrades in Buhuka Flats HC. This will require refurbishment of buildings and medical equipment. Upgrades to other HCs and even the RRH can be considered as the Project extends.
 - Support the district in attracting medical staff to work in the various HC in the study area but providing incentive packages. This can include proper accommodation and living amenities, top up on salaries, beneficial training etc.
 - Support outreach services in maternal and child health, school health, mass drug administration and health education.
 - Support health infrastructure to cater for the health care needs of the resettled communities if access is affected.

Occupational health, safety and environmental management:

- Plan and design an appropriate site based medical service that is managed by a reputable medical service provider as part of the Project's OHSMP. This service will need to cater for most health related conditions so that referral into the local public health sector (HC level) is not required from CNOOC or contractors. It is strongly recommended that workplace health service capacity is developed proactively so the services are in place before demand exceeds supply. This is essential in construction and given delays in construction and procurement of medical equipment this should be planned with adequate foresight. A CMP will need to be developed to cater for workplace medical service planning and implementation that defines what scope of services is required, staffing levels and referral restrictions and plans.
- This planning and CMP should include human resource planning so that health staff are not recruited from the local public health sector.

Social development mitigation and management:

- HSS as discussed under other sections.
- In partnership with the other Oil companies, support the District and National Health departments to develop a district health strategy that considers the health sector planning in the district to address the Oil field developments. These initiatives should have the focus to consider the broader district/region and not just individual operating entities and their small direct area of influence. This is essential to maximise the potential economic and development benefits of the Oil sector.
- Support medical waste management in the local health facilities.

| | | | | | | | | | | | |
|--------------------------------|-------------|---|------------|---|------------------|---|----------|---|----|------------------|--------|
| Impact after management | Medium term | 2 | Study area | 2 | Moderate benefit | 4 | Possible | 2 | 10 | Moderate benefit | Medium |
|--------------------------------|-------------|---|------------|---|------------------|---|----------|---|----|------------------|--------|

Vulnerabilities and Spatial Effects of Impacts:

As discussed in section 8.11, negative impacts may be experienced in all communities that will experience influx (PAC1-3, 5-7). Communities that currently have reduced access to HC services (PAC1-4) will benefit from better access after the development of the escarpment road. The broader study area may benefit from improved health care facilities if extended benefits are realised. No gender specific impacts are anticipated.

8.13 EHA #13 – Health Programmes and Systems

Impact Definition:

There is currently a limited ability to support effective health programmes in the study areas due to local capacity in the communities and amongst the health authorities. In general, health systems such as national disease control programs (TB, malaria) are weak and are inadequately implemented at the level of the study area due to funding, logistics and human resource constraints.

Access to primary healthcare at a community level is dependent on VHT and outreach services from HCs. VHT consist of community volunteers who are trained to perform a specific set of basic educational, diagnostic and curative activities in communities. As part of the program, a novel HMIS, utilizing mobile phones, was introduced to provide IEC, decision making support and diagnostic support while simultaneously tracking community level health indicators. Until recently, the VHT program was supported and funded by Malaria Consortium but despite positive impacts, the five year funding cycle has come to a close.

Structured outreach programs by HC staff are planned on a monthly basis and addresses key health concerns, including:

- EPI outreach;
- HCT;
- Environmental health outreach;
- Health education/promotion outreach; and
- Nutritional outreach.

However, based on available DHMT statistics, only 24 to 62% of all planned outreach activities were performed due to insufficient funding, lack of transport and staff.

NGO presence throughout the study area is varied, depending on ease of access and logistical restrictions. The lake-shore communities reported no NGO activities. There was extensive support in and around Kyangwali HC, specifically coordinated by UNHCR to support the refugee camp located in the Kyangwali sub-county. It was noted that many NGOs were active in Hoima district with many organisations having offices in Hoima town. Alignment between individual NGO's and the DHMT was reported to be sub-optimal. As a result, an alignment forum to help align different stakeholders has been established and is expected to be operational by mid-2015.

The paper-based Hoima district RHMIS is functional but weak. Its effectiveness and accuracy is limited by lack of skilled staff, limited diagnostics, limited reporting and recording capabilities, which ultimately limits the accuracy of reporting and ability to use the RHMIS as an effective decision making and tracking tool. The entire district HMIS was managed off a range of MS Excel spreadsheets with manual capturing from paper based reports sent from various HCs. Access to and acceptance of the public health services was also poor so many conditions in the district are not recorded in any system. Clandestine pharmacies and small private HC were noted in the study area and the community does seek treatment from these facilities. There was no formal reporting from these facilities so these statistics are effectively not notified. The weak health system will not be resilient to the added demands from Project induced influx, which will increase demand for preventive and curative health services, as well as other basic services.

The Project has the potential to influence health systems and programs in a number of ways:

- **Health care funding**

The development of the Project may reduce the future interest of agencies to work in the area as there may be an assumption that the Project should fund any local development so that the NGOs/donors can work elsewhere. However, there are several initiatives by agencies and NGOs that are working in the Hoima district or at provincial level (Table 16) that can be leveraged for mitigation and social investment purposes, or that can overlap or be extended into health programs. This can extend to national programs that have limited functionality in the study area.

Table 16: Selection of partner organizations within Hoima district

| |
|--|
| Action Africa Help: Health, education, water, sanitation and hygiene, agriculture and environmental management. |
| Infectious Diseases Institute: HIV/STI information, education and communication, HCT, safe male circumcision. |
| Malaria Consortium: VHT support. |
| Mary Stopes: Family planning services. |
| Meeting Point: HIV/STI information, education and communication. |
| UNHCR: Support of Kyangwali HC |
| USAID: Sustain Initiative [HIV treatment capacity survey], MDR and XDR-TB support) |

- **Health service delivery capacity, inequality and expectations on the Project**

There is limited institutional capacity to support the current health service delivery requirements, and additional demands on this system would be challenging to

support. As the Project will be so visible in the area, the community, district and even national health authorities may look to the company to plan, finance and even deliver health services to support this lack of capacity.

There is the potential for inequality and inequity between different communities as a result of Project supported health initiatives. The Project will logically have a priority to mitigate impacts and support social developments in the study area as a priority but this may generate perceptions of inequality in those who do not benefit. This may further support the attractor state of the Project and lead to influx with the development of make-shift settlements. The decision to support these unplanned settlements can be challenging, as on the one hand it may attract more settlers, but if not supported the numerous health impacts discussed in previous sections will be realized.

- **Health information**

The RHMIS that is managed at the Hoima DHMT is limited, and while it presents a valuable (and only) source of health data in the study area, it has constraints that limit its use in effectively monitoring health trends and effects of health interventions. The system relies to a large extent on manual entry and the limited human resource skills and diagnostics in the district, limits the accuracy of captured health information.

While the Project will not cause any direct impact on the HMIS, the fact that the system has these limitations poses a risk to the Project to utilize local health statistics as a surveillance mechanism to track health impacts, or to effectively monitor the success of interventions. This also to a degree limits the ability of the local health authorities to inform policy decisions for interventions in specific areas.

Impact Evaluation and management measures:

| EHA #13 | Health Programmes and Systems | | | | | | | | | | |
|--|-------------------------------|---|---------------|---|--------------------|---|-------------|---|-------------|----------------------|------------|
| Construction and Operations, through to closure | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Medium term | 2 | Study area | 2 | Minor negative | 2 | Possible | 2 | 8 | Moderate negative | Low |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: | | | | | | | | | | | |
| <ul style="list-style-type: none"> Evaluate opportunities for HSS that will primarily mitigate impacts as discussed in the previous sections, but also explore opportunities for a broader district/ regional approach so as to reduce potential inequalities and reduce the attractor state of the study area. Develop effective communication strategies on the role and responsibility of the Project in supporting health care service delivery in the area, and manage expectations. Support the improvement in the RHMIS at the local and district level, with the intent to develop a key set of indicators from the district statistics to effectively monitor health impacts and interventions longitudinally. A specific community health information system (CHIS) or database could be developed as part of the health monitoring plan which links information from the district RHMIS, measurement of specific Project sponsored interventions, and track data that may have been collected at baseline by the Project and subsequently monitored. A basic Project specific software system that captures key indicator data can be developed with trends evaluated in dashboard matrix | | | | | | | | | | | |
| Social development mitigation and management: | | | | | | | | | | | |
| <ul style="list-style-type: none"> HSS as part of the broader district development plans. Seek opportunities to partner with donor agencies/NGOs for HSS interventions in the study area and as part of a broader district development plans and in alignment with district strategies. The Project must attempt to outsource the management of as many of these health programmes as possible; and only retain a supporting (and as required logistics or funding arm) role. These programmes must be based on sustainability principles. | | | | | | | | | | | |
| Impact after management | Long term | 3 | Study area | 2 | Moderate benefit | 4 | Possible | 2 | 11 | Moderate benefit | Low |

Vulnerabilities and Spatial Effects of Impacts:

Impacts on health programs and systems will be experienced from the construction phase and extend into operations and even closure. These impacts will not be localized but experienced across the broad study area and even district. No specific gender impacts are anticipated and no vulnerable groups are recognised as long as equity is maintained.

9 Data-gaps and Opportunities for Data Gap Closure

The HIA process to date has collected and analysed secondary and primary participatory data, and while this is adequate to describe the major potential health impact areas of concern on a qualitative basis, it does not always allow for the effective monitoring of specific health impacts or interventions, especially at the level of the study area or PACs.

The impact analysis section (chapter 8) has identified a number of data-gaps to support the detailed description of these key health indicators at the level of the study area. These are described as relevant under the respective EHA, but a summary has been developed to highlight data-gaps and provide recommendations for data-gap closure. This is based on modularised approach to collecting baseline health data in the structure of HIA as shown in Figure 43 (this is an example and not all elements will be required for the Project).

| | | Individual level | | | | |
|---|--|--|--|---|---|--|
| | | Indicators on personal status | Indicators on KAP | Biomedical indicators | | |
| Module 1 Questionnaire survey | Self reported status of health (e.g. diarrhoea, acute respiratory infection, genital discharge, etc.) | KAP related to transmission of disease (e.g. malaria, HIV/AIDS, helminthiases, etc.) | Prevalence of disease conditions in children under 5 years of age and the adult population (e.g. malaria, anaemia, hypertension, etc.) | Module 3 Clinical field unit | | |
| | Reproductive health (e.g. pregnancy, and fertility status) | KAP related to prevention of disease (e.g. vector control measures, contraceptive use, general health education, personal hygiene, etc.) | Nutritional status based on height and weight measurements and/or mid-upper arm circumference (MUAC) | | | |
| | Vaccination status | KAP related to maternal and child health (e.g. health seeking behaviour, feeding practices, place of delivery) | Prevalence of disease conditions in school-aged children (aged 9-14 years) (e.g. schistosomiasis, soil-transmitted helminthiasis) | | Module 4 Parasitological survey in school children | |
| | Indicators on social determinants of health (e.g. employment status, educational level, domestic violence, life style, etc.) | Role of traditional medicine/healers | Concentration of heavy metals in urine/blood (e.g. mercury, arsenic, cadmium, lead) | Module 5 Heavy metal exposure | | |
| | Self reported exposure to air and noise pollution | Animal husbandry and consumption of animal products | Household level | | | |
| | | | Structural indicators | Asset indicators | Environmental indicators | |
| | | Number of people per household | Construction material of houses (e.g. floor, walls and roof) | Drinking water quality at household level (e.g. presence of coliform and/or faecal coliform bacteria) | Module 6 End-user water quality testing | |
| | | Distance to drinking water collection points | Number and type of general household assets (e.g. beds, bicycles, radio, etc.) | Number of open water bodies around the household (e.g. open containers) | Module 7 Larval breeding site survey | |
| | | Available improved/non improved toilet/latrines facilities | Method of cooking (type of fuel) | | | |
| | | Type and location of kitchen compartment within household | Availability and use of vector control measures (e.g. insecticide-treated nets, repellents) | | | |
| | Method and place of waste disposal | | | | | |
| | | Community level | | | | |
| | | Health system indicators | Infrastructure indicators | Environmental indicators | | |
| Module 2 Service and infrastructure assessment | Number and type of available health facilities | Number of households in a community | Water quality at community drinking water points (e.g. presence of coliform bacteria, heavy metals, organic pollutants, turbidity, etc.) | Module 8 Water source quality testing | | |
| | Type and quality of health care services | Number and type of drinking water collection points | Level of air pollution (e.g. dust along road) | Module 9 Environmental monitoring | | |
| | Type and capacity of health initiatives (e.g. national and international health initiatives, NGO activities) | Number and type of waste disposal points | Exposure to noise pollution (e.g. traffic or project related noise) | Module 10 Vector study | | |
| | Number of traditional healers and provided services | Traffic burden in community | Presence of disease transmitting vectors | | | |

Figure 43: Framework of modularised baseline health surveys for HIA

The range and significance of potential health impacts, related social sensitives and scale/footprint and precedence of the Project requires that a robust baseline be developed to support the health status at point of departure and to support an effective health monitoring programme. The Project also meets the criteria of a Category A project and given this stature it is strongly recommended to develop a robust baseline at point of departure. Table 17 provides the rationale for collecting detailed primary data. The timing of proposed data collection is important as it intends to describe conditions prior to Project initiation, and while the HIA process is iterative, it is recommended to collect any primary data before any more significant early works or construction work proceeds. It would be beneficial to wait for the FEED before finalising the scope, but as cross sectional surveys can take months to plan and execute advanced planning is recommended.

Table 17: Opportunities and risks for primary data collection

| Variable | Opportunity | Risk |
|---|--|---|
| Criticisms related to negative health impacts caused by the Project | By having a robust health baseline the project will have the ability to describe the baseline health situation and the present state. This will allow easy, effective and evidence based communications with internal and external stakeholders. | Inability to respond to criticisms and effectively communicate with stakeholders. This may lead to reputational loss at a local, national and even international basis. |
| Benchmarking the operation as good international industry practice, especially in country with new oil discovery and development. | Ability to effectively describe a baseline health situation and report on changes from the baseline | Inability to report on measured changes |
| Establishing a good track record of the sustainable management of health impacts in the study area. This will support the elevation of CNOOC as the oil company of choice in Uganda and enhance the reputation in stakeholders. | Ability to report on achievements from baseline and linked to specific interventions. | Inability to proactively report actual impacts of health programmes in annual or specific company reporting. |

Table 18 summarises potential data-gaps and suggested opportunities to close gaps. These should be elaborated further with the development of detailed sampling strategies and designs. Surveillance of these indicators will be required and therefore it is important that the study is designed in such a way that allows reproducibility and comparison from baseline. This will require that surveys are repeated serially and while this will provide invaluable data on change from baseline a longitudinal surveillance system should also be considered that tracks disease incidence and other KPIs. CNOOC should consider developing a database that links into their social and environmental management system to track key indicators.

Table 18: Data gap and data-gap closure opportunities

| Data gap | Data closure opportunity | Proposed approach |
|---|--|--|
| Lack of information on knowledge, attitudes, practices and behaviour related to certain health conditions | Perform focussed KAP surveys on various demographic and health indicators. These can include such as water and sanitation, reproductive health, HIV/AIDS, TB, malaria, as well as HSB and socio –economic indicators linked to health. | Cross sectional surveys at household level by developing a structured sampling strategy to include lake-shore, escarpment and pipeline alignment communities. Questionnaires can be developed based on local needs and validated against indicator, core welfare and other demographic and health studies completed in Uganda or the region. |
| Robust baseline of key clinical disease indicators such as: <ul style="list-style-type: none"> • Malaria • Potential filariasis or dengue • Anaemia • Sanitation related conditions, with STH and schistosomiasis effective indicators. • Nutritional status- especially wasting, stunting and body mass index • Indicators for STIs- specifically syphilis. • Blood pressure and potential chronic diabetes as indicators for NCDs. | Biomedical surveys in communities. | As part of the household questionnaire surveys develop a strategy to collect biomedical samples in a clinical field unit. Ideally most samples should be analysed in the field. Full ethical clearance and practices will need to be followed. Ideally, these surveys should be conducted in association with the district health authorities and extensive pre-survey consultation and sensitisation is required. |
| Knowledge of behaviours and insecticide sensitivities of local disease vectors, to enable evidence decision making for control programmes. | Entomology studies | Commission a baseline entomology study to determine the presence, behaviour and preferred control methods for disease vectors in the study area. Research agencies in Uganda should be able to support these. |
| Environmental hygiene indicators on quality of water from community collection points to end user to evaluate quality at source-collection-storage-use. | Collection of environmental data in communities | Use a field test kits (Del Aqua) to determine the presence of thermo-tolerant coliforms (<i>E.coli</i>) in community water sources and at end-user level (cups). |

10 Assessment of Alternatives

Alternatives related to the Project design and associated FEED is still under development and is considering the elements of the ESIA.

The proposed alternatives are recommended to avoid, reduce, mitigate or enhance potential health impacts include:

- Resettlement:
 - Plan physical resettlement in such a way to reduce exposure to sensitive receptors.
 - Plan location of host sites for physically resettled communities so as not to create new environmental health or social challenges.
 - Minimize economic resettlement from land as far as reasonable possible and support effective compensation and support to those whose livelihoods depend on subsistence agriculture.
- Temporary and permanent work camps:
 - Plan these in such a way to limit contact with the camp residents and local population. A cordon sanitaire of 1.6 km is ideal, but this may not be practical.
 - Limit the number of employees and especially contractors/villages that use local accommodation (guesthouses) when overnighing in the study area.
 - Maintain a closed camp status.
 - Maintain good environmental sanitation and hygiene controls in the camps including
 - § Domestic garbage and waste water management.
 - § Storm water run-off and drainage both on site and immediately surrounding the site.
- Engineering controls and selection of equipment to keep noise and air emissions ALARP, selection and management of HCS to reduce risks to workforce and community, and good environmental management to prevent water and soil pollution and increased risks from vector related disease.
- The in-coming contractor workforce should be selected in such a way so as not to introduce a novel or higher rates of communicable diseases into the communities residing in the study area.
- Plan development to manage Project induced influx and also the creation of “camp follower” settlements.
- Effective OHSMP.

11 References

1. CNOOC Limited. *Company Profile*. [cited 2015/ 03/20]; Available from: <http://www.cnooltd.com/col/col7261/index.html>.
2. Golder Associates, *Socio-economic Impact Assessment for the proposed Kingfisher Development*. 2014, CNOOC Uganda Limited.
3. Golder Associates and Eco & Partner Consult Ltd, *Final Scoping Report for the Environmental & Social Impact Assessment for Kingfisher Discovery Area in Hoima District, Uganda* 2014, CNOOC Uganda Limited.
4. Lexadin. *Legislation Uganda*. 2010 [cited 2015/ 03/23]; Available from: <http://www.lexadin.nl/wlg/legis/nofr/oeur/lxweuga.htm>.
5. Uganda Law Library. *Statutory Instruments* [cited 2015/ 03/23]; Available from: http://www.ugandalawlibrary.com/ull/lawlib/consolidated_edition.asp.
6. Government of the Republic of Uganda, *The Occupational Safety and Health Act, 2006*. 2006.
7. IFC. *IFC Sustainability Framework - 2012 Edition*. 2012 [cited 2015/ March]; Available from: http://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/IFC+Sustainability/Our+Approach/Risk+Management/IFCSustainabilityFramework_2012.
8. International Council on Mining and Metals (ICMM). *Health Impact Assessment: summary of the good practice guidance*. 2010 [cited 2015/ March]; Available from: <http://www.icmm.com/publications/health-impact-assessment-summary-of-the-good-practice-guidance>.
9. International Labour Organization (ILO). *Country Profiles: Uganda*. [cited 2015/ 03/17]; Available from: http://www.ilo.org/dyn/normlex/en/f?p=1000:11110:0::NO:11110:P11110_COUNTRY_ID:103324.
10. Wikipedia. *Treaties of Uganda*. [cited 2015/ 03/20]; Available from: http://en.wikipedia.org/wiki/Category:Treaties_of_Uganda.
11. WHO Regional Office for Africa. *Uganda: Progress on the Ouagadougou and Algiers Declarations*. [cited 2015/ 03/20]; Available from: http://www.aho.afro.who.int/profiles_information/index.php/Uganda:Progress_on_the_Ouagadougou_and_Alqiers_Declarations.
12. WHO Regional Office for Africa. *The Ouagadougou Declaration on Primary Health Care and Health Systems in Africa: Achieving Better Health for Africa in the New Millennium*. [cited 2015/ 03/20]; Available from: <https://www.aho.afro.who.int/en/ahm/issue/12/reports/ouagadougou-declaration-primary-health-care-and-health-systems-africa-achieving>.
13. Quigley, R., et al., *Health impact assessment international best practice principles: Special publication series no 5*. 2006, International Association for Impact Assessment: Fargo, USA.
14. WHO/ECHP. *Gothenburg consensus paper. Health impact assessment: Main concepts and suggested approach*. 1999; Available from: <http://www.euro.who.int/document/PAE/Gothenburgpaper.pdf>.
15. WHO. *Health Impact Assessment*. [cited 2015/ 03/118]; Available from: <http://www.who.int/hia/en/>.
16. WHO, *Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June 1946, and entered into force on 7 April 1948*. 2004.
17. Listorti, J.A., *Bridging environmental health gaps. Lessons for sub-Saharan Africa infrastructure projects.*, in *AFTES Working paper No. 20*, Environmental sustainable development division. Africa technical department, Editor. 1996, The World Bank.

18. Listorti, J.A. and F.M. Doumani, *Environmental health: bridging the gaps. World Bank discussion paper No. 422*. 2001, The World Bank Group: Washington, D.C., U.S.
19. WHO. *HIA and policy making*. [cited 2015/ 03/20]; Available from: <http://www.who.int/hia/policy/en/>.
20. WHO, *WHO Country Cooperation Strategy: Uganda*. 2014.
21. Uganda Bureau of Statistics (UBOS) and ICF International Inc., *Uganda Demographic and Health Survey 2011*. 2012.
22. Uganda Ministry of Health, *Annual Health Sector Performance Report 2012/2013*. 2014.
23. Uganda Ministry of Health and ICF International, *2011 Uganda AIDS Indicator Survey: Key Findings*. 2012.
24. Uganda Bureau of Statistics (UBOS) and ICF Macro, *Uganda Malaria Indicator Survey 2009*. 2010.
25. Uganda Bureau of Statistics, *Uganda National Household Survey 2009/10*. 2010.
26. Uganda Bureau of Statistics, *2002 Uganda Population and Housing Census: Main Report*. 2004.
27. Uganda Bureau of Statistics, *2002 Uganda Population and Housing Census, Analytical Report: Population Size and Distribution*. 2006: Kampala, Uganda.
28. Uganda Bureau of Statistics, *National Population and Housing Census 2014: Provisional Results*. 2014: Kampala, Uganda.
29. Hoima District Local Government, *District Development Plan (2011/12-2015/16)*. 2011.
30. Strategic Criteria for Rural Investments in Productivity (SCRIP) - International Food Policy Research Institute (IFPRI) - Kampala, *Background Information on Masindi, Kabarole and Hoima districts*.
31. WHO. *Uganda Health Profile*. 2014 [cited 2014/ 07/12]; Available from: <http://www.who.int/gho/countries/uga.pdf?ua=1>.
32. World Bank. *Uganda Overview*. 2014 [cited 2014 November]; Available from: <http://www.worldbank.org/en/country/uganda/overview>.
33. United Nations Development Programme (UNDP). *Human Development Report 2014*. 2014 [cited 2014/ 08/10]; Available from: <http://hdr.undp.org/en>.
34. UNICEF. *Uganda Statistics*. 2014 [cited 2014/ 07/11]; Available from: http://www.unicef.org/infobycountry/uganda_statistics.html.
35. Uganda Bureau of Statistics (UBOS), *Uganda 2013 Statistical Abstract*. 2013.
36. Institute for Health Metrics and Evaluation (IHME). *Global Burden of Disease Profile: Uganda*. 2013 [cited 2014/ 07/23]; Available from: http://www.healthdata.org/sites/default/files/files/country_profiles/GBD/ihme_gbd_country_report_uganda.pdf.
37. WHO. *The World Health Report 2006 - working together for health*. 2006 September 19, 2011]; Available from: <http://www.who.int/whr/2006/en/index.html>.
38. Ministry of Health of Uganda, *Health Sector Strategic and Investment Plan 2010/11-2014/15*. 2010.
39. Ministry of Health of Uganda, Health Systems 20/20, and M.U.S.o.P. Health., *Uganda Health System Assessment 2011*. 2012.
40. Africa Health Workforce Observatory (AHWO). *Human Resource for Health Fact Sheet - Uganda*. 2010 [cited 2014/ 07/30].
41. Van Alstine, J., et al., *Resource governance dynamics: The challenge of 'new oil' in Uganda*. Resources Policy, 2014. **40**: p. 48-58.
42. Gabriella Wass and Chris Musiime, *Business, Human Rights, and Uganda's Oil. Part One: Uganda's oil sector and potential threats to human rights*. 2013, ActionAid International Uganda and International Peace Information Service (IPIS).

43. African Development Bank, *Managing Oil Revenue in Uganda: A Policy Note*. 2009, Extracted from the proceedings of a National Seminar on Managing Oil Revenue in Uganda held 8-9 July 2008.
44. Annette Kuteesa. *Local Communities and Oil Discoveries: A Study in Uganda's Albertine Graben Region* 2014 [cited 2015/ 03/28]; Available from: <http://www.brookings.edu/blogs/africa-in-focus/posts/2014/02/25-oil-discoveries-uganda-kuteesa>.
45. The Uganda Land Alliance, *Land grabbing and its effects on the communities in the oil rich Albertine region of Uganda*. 2011.
46. Oil in Uganda. *Oil fuels land grabs in the Albertine Region*. 2014 [cited 2015/ 03/27]; Available from: <http://www.oilinuganda.org/features/land/oil-fuels-land-grabs-in-the-albertine-region.html>.
47. Oil in Uganda. *Oil money lures sex workers to Hoima*. 2013 [cited 2015/ 03/27]; Available from: <http://www.oilinuganda.org/features/social-impacts/oil-money-lures-sex-workers-to-hoima.html>.
48. International Alert, *What's in it for us? Gender issues in Uganda's oil and gas sector*. 2014.
49. Oil in Uganda. *Oil spurs new business in Hoima*. 2014 [cited 2015/ 03/27]; Available from: <http://www.oilinuganda.org/features/social-impacts/oil-spurs-new-business-in-hoima.html>.
50. Smith, K.R., et al., *Indoor air pollution in developing countries and acute lower respiratory infections in children*. Thorax, 2000. **55**(6): p. 518-532.
51. WHO. *Indoor air pollution and health: Fact sheet N°292*. 2014 [cited 2014/ 07/21]; Available from: <http://www.who.int/mediacentre/factsheets/fs292/en/>.
52. WHO, *Global Tuberculosis Report 2014*. 2014.
53. WHO, *Global Tuberculosis Report 2013*. 2013.
54. Ministry of Health (Republic of Uganda). *National Tuberculosis Leprosy Program*. 2013 [cited 2014/ 07/23]; Available from: http://health.go.ug/mohweb/?page_id=155.
55. Wynne, A., et al., *Challenges in tuberculosis care in Western Uganda: Health care worker and patient perspectives*. International Journal of Africa Nursing Sciences, 2014. **1**: p. 6-10.
56. WHO. *Uganda: Tuberculosis Profile*. 2013 [cited 2014/ 23/07].
57. Obuku, E.A., et al., *Socio-demographic determinants and prevalence of Tuberculosis knowledge in three slum populations of Uganda*. BMC Public Health, 2012. **12**(1).
58. Amandu, K.L., *Factors affecting implementation of community based directly observed treatment of tuberculosis, short course, in Hoima district - Uganda*. 2009.
59. WHO. *Fact sheet N°101 : Leprosy*. 2012 [cited 2013/05/28; Available from: <http://www.who.int/mediacentre/factsheets/fs101/en/index.html>.
60. Ayebazibwe, A., *Leprosy still prevalent in north, west*, in *Daily Monitor*. 2013.
61. WHO. *Fact sheet N°331: Pneumonia*. 2014 [cited 2014/ 11/21]; Available from: <http://www.who.int/mediacentre/factsheets/fs331/en/>.
62. WHO Regional Office for Africa. *Uganda statistics summary (2002 - present)* 2014 [cited 2014/ 07/23]; Available from: <http://apps.who.int/gho/data/node.country.country-UGA>.
63. Mugerwa, F., *Measles cases in Hoima rise to 39*, in *Daily Monitor*. 2014.
64. WHO. *Global burden of disease statistics*. 2004; Available from: <http://www.who.int/healthinfo/bod/en/index.html>.
65. Trotter, C.L. and B.M. Greenwood, *Meningococcal carriage in the African meningitis belt*. The Lancet Infectious Diseases, 2007. **7**(12): p. 797-803.
66. WHO. *Meningococcal Meningitis in Uganda*. 2014 [cited 2014/ 07/24]; Available from: <http://www.afro.who.int/en/clusters-a-programmes/dpc/epidemic-a-pandemic-alert-and-response/outbreak-news/4039-meningococcal-meningitis-in-uganda.html>.

67. IRIN humanitarian news and analysis. *UGANDA: Scores dead as meningitis epidemic strikes*. 2009 [cited 2014 November]; Available from: <http://www.irinnews.org/report/82513/uganda-scores-dead-as-meningitis-epidemic-strikes>.
68. MAP, M.A.P. *Malaria Risk* 2010 [cited January 2012; Available from: <http://www.map.ox.ac.uk>.
69. Guinovart, C., et al., *Malaria: Burden of Disease*. Current Molecular Medicine, 2006. **6**(2): p. 137-140.
70. WHO, *World Malaria Report 2013*. 2013.
71. Ministry of Health of the Republic of Uganda. *Malaria Control Programme of Uganda*. 2014 [cited 2014/ 24/07/14]; Available from: <http://health.go.ug/mcp/index2.html>.
72. Lutwama, J.J., *Uganda Arboviruses Surveillance Activities*. African Journal of Pharmacology and Therapeutics, 2012. **1**(4).
73. WHO. *Dengue and haemorrhagic fever*. 2009 September 19, 2011]; Available from: <http://www.who.int/mediacentre/factsheets/fs117/en/>.
74. WHO. *Yellow fever in Uganda* 2011 [cited 2014/ 24/07]; Available from: http://www.who.int/csr/don/2011_01_19/en/.
75. Bagonza, J., et al., *Yellow fever vaccination coverage following massive emergency immunization campaigns in rural Uganda, May 2011: a community cluster survey*. BMC Public Health, 2013. **13**(1).
76. Roukens, A.H. and L.G. Visser, *Yellow fever vaccine: past, present and future*. Expert Opinion on Biological Therapy, 2008. **8**(11): p. 1787-1795.
77. WHO. *Fact sheet N°100: Yellow fever*. 2013 [cited 2013/05/28; Available from: <http://www.who.int/mediacentre/factsheets/fs100/en/>.
78. Weinbren, M.P., A.J. Haddow, and M.C. Williams, *The occurrence of chikungunya virus in Uganda I. Isolation from mosquitoes*. Transactions of The Royal Society of Tropical Medicine and Hygiene, 1958. **52**(3): p. 253-262.
79. McCrae, A.W., et al., *Chikungunya virus in the Entebbe area of Uganda: isolations and epidemiology*. Transactions of the Royal Society of Tropical Medicine and Hygiene, 1971. **65**(2): p. 152-168.
80. Agaba, J., *Strange malaria-like disease hits Uganda*, in *New Vision*. 2014.
81. WHO. *Fact sheet N°102: Lymphatic filariasis*. 2014 [cited 2014/0 09/03]; Available from: <http://www.who.int/mediacentre/factsheets/fs102/en>.
82. Stensgaard, A.-S., et al., *Bayesian geostatistical modelling of malaria and lymphatic filariasis infections in Uganda: predictors of risk and geographical patterns of co-endemicity*. Malaria Journal, 2011. **10**(1).
83. Onapa, A.W., et al., *Rapid assessment of the geographical distribution of lymphatic filariasis in Uganda, by screening of schoolchildren for circulating filarial antigens*. Annals of Tropical Medicine and Parasitology, 2005. **99**(2): p. 141-153.
84. WHO. *Uganda: Onchoeciasis status*. 2014 [cited 2014/ 07/24]; Available from: <http://www.who.int/apoc/countries/uga/en/>.
85. Ndyomugenyi, R., *The burden of onchocerciasis in Uganda*. Annals of Tropical Medicine and Parasitology, 1998. **92 Suppl 1**: p. S133-137.
86. Simarro, P.P., et al., *Estimating and Mapping the Population at Risk of Sleeping Sickness*. PLoS Negl Trop Dis, 2012. **6**(10).
87. WHO and UNICEF, *Progress on Drinking Water and Sanitation: 2014 Update*. 2014.
88. WHO/UNICEF, *Progress on Sanitation and Drinking Water: 2013 Update*. 2013.
89. WHO/UNICEF. *Joint Monitoring Programme for water Supply and Sanitation: Global Water Supply and Sanitation Assessment 2000 Report*. 2000 September 2009]; Available from: http://www.wssinfo.org/pdf/GWSSA_2000_report.pdf.
90. Sack, D.A., et al., *Cholera*. Lancet, 2004. **363**(9404): p. 223-233.
91. Bwire, G., et al., *The Burden of Cholera in Uganda*. PLoS Neglected Tropical Diseases, 2013. **7**(12).

92. WHO, *Outbreak Bulletin Vol. 3 Issue 3, 26 April 2013: Cholera in Uganda*. 2013.
93. Neil, K.P., et al., *A Large Outbreak of Typhoid Fever Associated With a High Rate of Intestinal Perforation in Kasese District, Uganda, 2008–2009*. *Clinical Infectious Diseases*, 2012. **54**(8): p. 1091-1099.
94. Neil, K.P., et al., *A large outbreak of typhoid fever associated with a high rate of intestinal perforation in Kasese District, Uganda, 2008-2009*. *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*, 2012. **54**(8): p. 1091-1099.
95. Ziegelbauer, K., et al., *Effect of Sanitation on Soil-Transmitted Helminth Infection: Systematic Review and Meta Analysis*. *PLoS Med*, 2012. **9**(1).
96. Kabatereine, N.B., et al., *Soil-transmitted helminthiasis in Uganda: epidemiology and cost of control*. *Tropical medicine & international health: TM & IH*, 2005. **10**(11): p. 1187-1189.
97. Global Atlas of Helminth Infections. *Distribution of soil transmitted helminth survey data in Uganda*. 2014 [cited 2014 November]; Available from: <http://www.thiswormyworld.org/maps/2013/distribution-of-soil-transmitted-helminth-survey-data-in-uganda>.
98. Tukahebwa, E.M., et al., *A Very High Infection Intensity of Schistosoma mansoni in a Ugandan Lake Victoria Fishing Community Is Required for Association with Highly Prevalent Organ Related Morbidity*. *PLoS Negl Trop Dis*, 2013. **7**(7).
99. Kabatereine, N.B., et al., *Epidemiology and geography of Schistosoma mansoni in Uganda: implications for planning control*. *Tropical medicine & international health: TM & IH*, 2004. **9**(3): p. 372-380.
100. WHO Regional Office for Africa. *Uganda in mass polio immunization following outbreak*. 2009 [cited 2014/ 07/28]; Available from: <http://www.afro.who.int/en/uganda/press-materials/item/1436-uganda-in-mass-polio-immunization-following-outbreak.html>.
101. UNAIDS, *HIV and AIDS Uganda Country Progress Report; 2013*. 2014.
102. Abdulaziizi K. Tumusiime, *The impact of oil discovery on Hoima District*, in *Daily Monitor*. 2014.
103. Bwogi, J., et al., *Hepatitis B infection is highly endemic in Uganda: findings from a national serosurvey*. *African Health Sciences*, 2009. **9**(2): p. 98-108.
104. World Food Programme. *Uganda: Overview*. 2014 [cited 2014/ 07/28]; Available from: <https://www.wfp.org/countries/uganda/overview>.
105. Shively, G. and J. Hao, *A Review of Agriculture, Food Security and Human Nutrition Issues in Uganda*. Purdue University, West Lafayette, IN, 2012.
106. Chhabra, R. and C. Rokx. *The Nutrition MDG Indicator: Interpreting Progress*. The World Bank HNP Discussion Paper 2004 February 2010]; Available from: <http://go.worldbank.org/WTY1HQD7R0>.
107. WHO, *Global Status Report on NCDs 2010*. 2010.
108. WHO/CDC. *The atlas of heart disease and stroke*. 2004 February 2010]; Available from: http://www.who.int/cardiovascular_diseases/resources/atlas/en/.
109. WHO. *Non Communicable Diseases Country Profiles: Uganda*. 2014 [cited 2014/ 07/29]; Available from: http://www.who.int/nmh/countries/uga_en.pdf?ua=1.
110. Ministry of Health of the Republic of Uganda. *Non Communicable Diseases*. 2014 [cited 2014/ 07/29]; Available from: http://health.go.ug/mohweb/?page_id=761.
111. Musinguzi, G. and F. Nuwaha, *Prevalence, Awareness and Control of Hypertension in Uganda*. *PLoS ONE*, 2013. **8**(4).
112. Nyanzi, R., R. Wamala, and L.K. Atuhaire, *Diabetes and Quality of Life: A Ugandan Perspective*. *Journal of Diabetes Research*, 2014. **2014**.
113. Mayega, R.W., *Type 2 diabetes in rural Uganda : prevalence, risk factors, perceptions and implications for the health system*. 2014: Inst för folkhälsovetenskap / Dept of Public Health Sciences.

114. Danaei, G., et al., *Causes of cancer in the world: comparative risk assessment of nine behavioural and environmental risk factors*. *Lancet*, 2005. **366**(9499): p. 1784-1793.
115. International Agency for Research on Cancer. *GLOBOCAN 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide: Fact Sheets: Uganda*. 2014; Available from: http://globocan.iarc.fr/Pages/fact_sheets_population.aspx.
116. Uganda Road Sector Support Initiative (URSSI). *Road Safety*. 2012 [cited 2014/07/29]; Available from: <http://www.ugandaroadsector.org/RoadSafety.php>.
117. Uganda Virus Research Institute. *Influenza in Uganda*. 2014 [cited 2015/03/18]; Available from: <http://www.uvri.go.ug/index.php/divisions/arbovirology/influenza>.
118. Mbonye, A., et al., *Repeated outbreaks of viral hemorrhagic fevers in Uganda*. *African Health Sciences*, 2012. **12**(4): p. 579-583.
119. WHO. *Marburg virus disease*. 2014 [cited 2014/07/30]; Available from: <http://www.who.int/csr/disease/marburg/en/>.
120. CDC Viral Special Pathogens Branch (VSPB). *Outbreaks*. 2014 [cited 2014/07/30]; Available from: <http://www.cdc.gov/ncezid/dhcpp/vspb/outbreaks.html>.
121. Uganda Virus Research Institute. *Uganda declared Marburg free!* 2014 [cited 2014 November]; Available from: <http://www.uvri.go.ug/index.php/media-and-news/uvri-in-the-press?showall=1&limitstart=>.
122. WHO. *Ebola virus disease*. Fact sheet N°103 2014 Updated April 2014 [cited 2014/07/30]; Available from: <http://www.who.int/mediacentre/factsheets/fs103/en/>.
123. Center for Disease Control (CDC). *2014 Ebola Outbreak in West Africa - Case Counts*. 2015 [cited 2015/03/23]; Available from: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>.
124. WHO. *Ebola vaccines, therapies, and diagnostics*. 2015 [cited 2015/03/21]; Available from: <http://www.who.int/medicines/emp Ebola q as/en/>.
125. WHO. *Fact sheet N°208: Crimean-Congo haemorrhagic fever*. 2014 [cited 2014/07/30]; Available from: <http://www.who.int/mediacentre/factsheets/fs208/en/>.
126. WHO. *Fact Sheet N°99 - Rabies*. 2013; Available from: <http://www.who.int/mediacentre/factsheets/fs099/en/>.
127. Fèvre, E.M., et al., *The epidemiology of animal bite injuries in Uganda and projections of the burden of rabies*. *Tropical medicine & international health: TM & IH*, 2005. **10**(8): p. 790-798.
128. Kigozi, F., et al., *An overview of Uganda's mental health care system: results from an assessment using the world health organization's assessment instrument for mental health systems (WHO-AIMS)*. *International Journal of Mental Health Systems*, 2010. **4**(1).
129. Prince, M., et al., *Global mental health 1 - No health without mental health*. *Lancet*, 2007. **370**(9590): p. 859-877.
130. Gilbert Kidimu, *Campaign to free Uganda of drug and substance abuse*, in *New Vision*. 2013.
131. Lizabeth Paulat, *Ugandan Youth Demand Government Action on Unemployment in Voice of America*. 2014.
132. Tabuti, J.R.S., et al., *Herbal medicine use in the districts of Nakapiripirit, Pallisa, Kanungu, and Mukono in Uganda*. *Journal of Ethnobiology and Ethnomedicine*, 2012. **8**(1).
133. Lamorde, M., et al., *Medicinal plants used by traditional medicine practitioners for the treatment of HIV/AIDS and related conditions in Uganda*. *Journal of Ethnopharmacology*, 2010. **130**(1): p. 43-53.
134. WHO/UNICEF, *Countdown to 2015: Building a Future for Women and Children: The 2012 Report* 2012.
135. WHO and UNICEF, *Countdown to 2015 - Fulfilling the Health Agenda for Women and Children :The 2014 Report*. 2014.

136. UNICEF, *Uganda launches vaccine against pneumococcal disease*. 2013.
137. WHO/UNICEF, *Immunization Summary: A statistical reference containing data through 2011, (The 2013 edition)*. 2013.
138. Waste Management Specialist Report. Golder Associates. Draft report. July 2014.
139. Kabagambe EK, Elzer PH, Geaghan JP, Opuda-Asibo J, Scholl DT, Miller JE: Risk factors for Brucella seropositivity in goat herds in eastern and western Uganda. *Prev Vet Med* 2001, 52:91-108.
140. Environmental and Social Impact Assessment for Kingfisher Development Area, Hoima District, Uganda. Groundwater report. July 2014. Golder Associates.
141. Environmental and Social Impact Assessment for Kingfisher Development Area, Hoima District, Uganda. Surface water report. July 2014. Golder Associates.
142. Environmental and Social Impact Assessment for Kingfisher Development Area, Hoima District, Uganda. Noise impact assessment report. June 2014. Golder Associates.
143. Environmental and Social Impact Assessment for Kingfisher Development Area, Hoima District, Uganda. Visual aesthetics baseline. March 2015. Golder Associates.
144. Sansa Ambrose. Relationship between indoor air pollution and acute respiratory infections among children in Uganda [Internet]. 2005. Available from: <http://www.ictp.trieste.it/~eee/workshops/smr1686/Toc88219340>.
145. Workers' Accommodation: Processes and Standards [Internet]. 2009. Available from: http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_workersaccommodation
146. Keiser J, De Castro MC, Maltese MF, Bos R, Tanner M, Singer BH, et al. Effect of irrigation and large dams on the burden of malaria on a global and regional scale. *Am J Trop Med Hyg*. 2005 Apr;72(4):392–406.
147. Ecosystem Services Review and Assessment, section 6.2.3
148. A Mining Health Initiative case study: Kenmare Resources PLC and its health initiative in Northern Mozambique: Lessons in Partnership and Process.[Internet]. 2013 Jan. Available from: <http://www.hanshep.org/files/mining-health-initiative/kenmare-mozambique-case-study>.
149. Food and Agriculture Organisation of the United Nations. Conservation agriculture. Retrieved from url: <http://www.fao.org/ag/ca/>
150. Environmental and Social Impact Assessment for Kingfisher Development Area, Hoima District, Uganda. Air quality impact assessment report. August 2014. Golder Associates.
151. International Code of Conduct on the Distribution and Use of Pesticides [Internet]. 2003. Available from: <http://www.fao.org/docrep/005/y4544e/y4544e00.htm>

12 Appendices

12.1 Appendix A: Methodology for Assessing and Categorizing the Significance of Impacts

12.1.1 Introduction

The impact significance methodology discussed below presents the process whereby health outcomes and determinants that may be influenced by the project, or its activities, are ranked to support the prediction, evaluation and ultimate mitigation of potential health impacts.

The categorization of impacts is based on a ranking system that evaluates the direction (positive versus negative) of the impact, the consequence of the impact itself, as well as the likelihood that the impact will occur. These predictions are made based on the evidence collected in the HIA process and the sensitivity/susceptibility of receptors to the proposed project activities- whether direct, indirect or cumulative. The process will consider the different life stages of the project, as the direction, and area of influence of impacts may differ related to these phases.

The ultimate objective of the impact assessment rating process is to provide a subjective assessment of the comparative health impacts so that their significance can be determined based on the criteria above. This significance ranking allows for prioritization of impacts, as well as mitigation and management measures, and can support the project proponent in critical project design and process considerations before the project starts so that these impacts can be avoided where possible.

12.1.2 General Reporting

In general, each potential impact will be reported on in the following manner:

- **Identification of issues:** which include those health issues where project activities impact on a variety of receptors. The issues will be presented in the EHA framework but will only describe relevant issues; neutral impacts will not be discussed. Some of the issues will be addressed in a separate manner; while others may be addressed broadly as many of the health determinants/outcomes are interdependent.
- **Impact definition.** Positive and negative impacts associated with these issues (and any others not included) then need to be defined – the definition statement will include a cause and comment on the project activity (source of impact), how this may

create an impact and who the receptor group is. Impacts are identified and defined where there is a plausible pathway between the activities and receptors. The “base case” scenario will describe the present health status of communities, or the existing health needs.

The impact definition will address direct, indirect and cumulative impacts. In general, the direct impacts will be addressed in the quantitative impact evaluation while the indirect and cumulative impacts will be discussed in a qualitative fashion.

It is essential that an impact definition is set in context, and to achieve this, the impact assessment will seek to describe the sensitivity of the receptors and any stakeholder concern (where relevant).

- **Impact evaluation:** This is the final step in the process where the significance of the impact is ranked. This is described in detail in the section below.

12.1.3 Impact Evaluation

The impact assessment process adopted by SHAPE uses a structured process through the following steps:

12.1.3.1 Part A: Defining the Consequence or Effects of a Health Impact

The impact consequence is defined using three primary impact characteristics including:

- **Magnitude:** this considers the intensity/severity of the health effect on receptors as well as the ability of the community to adapt to the pre-impact level of health. In addition, the degree of stakeholder concern to the level or severity of the health effect is considered. As health effects can be detrimental or beneficial to the receptor this element evaluates how severe negative impacts might be, or how beneficial positive impacts maybe on a particular receptor or a potentially affected community.
- **Temporal scale/duration:** this defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- **Spatial scale/ extent of influence on the population:** This defines the physical extent of the impact. This is relevant to support the description of the magnitude as the specific impact may influence different levels; from an individual; to a small community; and even extend to influencing national and cross boundary effects.

The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it. The word 'mitigation' means not just 'compensation', but also the ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.

12.1.3.2 Part B: Defining the Probability of a Health Impact

The **likelihood/probability** of the impact occurring because of project actions differs between potential impacts. There is no doubt that some impacts will occur (alteration in environment), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.

The likelihood rankings are linked to the temporal rankings as described in the consequence and effects section in Part A.

12.1.3.3 Part C: Determination of the Significance Ranking

Each criterion in Part A and Part B is assigned a ranking score to evaluate the overall **significance** of an activity as shown in Table A-1. This is an additive score based on the specific effect and likelihood rankings, which are then analysed in the matrix presented in Table A-2 and Table A-3. These total scores are then evaluated to determine the significance of the impact and based on the overall cumulative score the significance ranking is divided into four categories as discussed in Table A-4. The importance of the ranking is discussed based on the overall significance to the receptor and the proposed development. The overall significance can be either positive or negative depending on the effect of the magnitude and these are divided into different colour codes in Table A-2 (for negative impacts) and Table A-3 (for positive impacts).

This evaluation is used to prioritize which impacts require mitigation, with critical and high impacts generally requiring some form of mitigation or proposal for an alternative approach. The approach also allows the determination of the benefit of mitigation measures that may actually manage a negative impact to bring about benefits. It can also highlight beneficial impacts because of interventions, generally on the residual rankings though.

These high impacts may also affect decision makers in whether to proceed with the proposed activity. Moderate impacts require an investigation on mitigations or alternatives.

Low impacts will require minimal intervention but it is essential that these elements remain of low significance.

12.1.3.4 Part D: Confidence Level

A confidence level is assigned to the assessment based on the amount and quality of the evidence and the confidence of the impact assessor on predicting the significance of the ranking. These are limited to low, medium and high ratings.

Table A-1: Consequence/effect and likelihood/probability matrix

| Part A: Define the consequence/effect in terms of intensity of health effect, duration and spatial scale | | | | |
|--|---------------------------|---|---|--------|
| Impact characteristics | Definition | Criteria | | Rating |
| | | Negative impact | Beneficial impact | |
| A. Magnitude/Intensity of Health Effect | Nil | Prevailing baseline | Prevailing baseline | 1 |
| | Minor (impact/benefit) | 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. | 2 |
| | Moderate (impact/benefit) | 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 | 4 |
| | Major (impact/benefit) | 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 is 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 | 8 |
| C. Temporal scale/duration | Short term | Short term, < 1-4 years, low frequency | | 1 |
| | Medium term | Between 5 and 20 years | | 2 |
| | Long term | Between 20 and 40 years (generational) and from an individual human perspective permanent | | 3 |
| | Permanent | Over 40 years and resulting in a long term and lasting change | | 4 |
| D. Spatial scale/extent/population | Site/localized scale | Site specific or confined to a sensitive receptor at the local scale. This is generally limited to an individual/ small number of households/small settlement | | 1 |
| | Study area | This is localized to the study area as well as the broader project affected area. These can generally extend to influence an administration post or sub-district level. | | 2 |
| | Regional | District and Provincial level | | 3 |
| | National/Cross boundary | National or influence across international borders | | 4 |
| Part B: Define the likelihood or probability of exposure to impacts | | | | Rating |
| Probability of exposure | Unlikely/Improbable | The likelihood of these impacts occurring is slight | | 1 |
| | May occur/Possible | The likelihood of these impacts occurring is possible | | 2 |
| | Probable | The likelihood of these impacts occurring is probable | | 3 |
| | Definite | The likelihood is that these impacts will definitely occur | | 4 |

Table A-2: Determination of the Negative Significance Ranking

| Part C: Determination of the significance ranking: based on a comparison between likelihood and consequence | | | | | | | | | | | | | | | |
|---|-------------------------------------|---|---|----|----|----|----|----|----|----|----|----|----|----|----|
| Likelihood/Probability | Consequence/effect of health impact | | | | | | | | | | | | | | |
| | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| | 1 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| | 2 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| | 3 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 4 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |

Keys: Light blue: negligible; Green: minor negative; Yellow: moderate negative; Orange- high negative; Red: critical/very high negative

Table A-3: Determination of the Beneficial Significance Ranking

| Part C: Determination of the significance ranking: based on a comparison between likelihood and consequence: Beneficial | | | | | | | | | | | | | | | |
|---|-------------------------------------|---|---|----|----|----|----|----|----|----|----|----|----|----|----|
| Likelihood/Probability | Consequence/effect of health impact | | | | | | | | | | | | | | |
| | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| | 1 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| | 2 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| | 3 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 4 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |

Keys: Aqua: negligible benefit; Lilac: minor benefit; Blue: moderate benefit; Navy blue- high benefit; Purple: very high benefit

Table A-4: Description of Significance Rating

| Significance Ranking | Description of significance | Cumulative score |
|----------------------|--|------------------|
| Negligible | The impact magnitude is small and is within all limits and mitigation is not necessary. These impacts will result in either positive or negative short-term effects on health and well-being. | 4-5 |
| Minor | The impact magnitude is sufficiently small and is within acceptable limits and mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in either positive or negative medium to short-term effects on health and well-being. | 6-7 |
| Moderate | An important impact, which requires mitigation to levels as low as reasonably possible. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in either a positive or a negative medium to long-term impact on health and well-being. As residual impacts, these are of lower importance but warrant careful attention to conditions regarding mitigation and monitoring. | 8-11 |
| Major | A serious impact, if not mitigated, may prevent the implementation of the project (if it is a negative impact). These impacts would be considered by society as constituting a major and usually a long-term change to health and well-being and may result in severe effects. As residual impacts, these should play a role in project development and they require strict controls and monitoring. Beneficial impacts should be fully delivered. | 12-15 |
| Critical/Very High | A very serious impact, which, if negative, may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. At times, these impacts are unable to be mitigated. As residual impacts, these need to be avoided. Beneficial impacts should be fully delivered. | 16-20 |

12.1.3.5 Reporting on Impacts

An example of the reporting format is provided below. For most impacts, summary tables for each project phase (the phases can be integrated or separated as required) are produced to present the rating results.

The first row of the rating table presents the impact definition. This is presented in the form of the environmental health areas framework based on the relevant health outcome or determinant. The second row presents the rating categories as presented in Table 1.

The third row presents the actual ranking or impact definition. The impact before management is presented first in row three to outline the **inherent risk** from the potential impact.

Management measures are listed in row four of the table. These management measures are divided into three management components based on the focus of the intervention; namely:

- **Project impact mitigation:** Interventions required to manage the potential health impacts on the receptors. These are required by the project and are not voluntary contributions. The precautionary principle will apply whilst analysing these.
- **Occupational health, safety and environmental management:** Interventions aimed at ensuring a healthy, safe and productive workforce. In addition, it considers aspects that can be controlled in the workforce to prevent community health impacts.
- **Social Development Initiatives:** Interventions suggested that will improve the existing health status of the communities. These are voluntary contributions and should bring about health benefits and improve social license to operate in the receptive communities. It should also promote project sustainability if developed based on sustainability principles.

The fifth row of the table will present the impacts after management or the so-called **residual risks**. This follows the steps from Part A to D with the ranking that assumes that the recommended mitigation measures are successfully implemented. When voluntary contributions are recommended that may enhance the baseline, these will be mentioned, as they are likely to result in beneficial impacts.

The confidence ranking is included in the summary table, which provides the reader with an indication of the assurance level placed on the rating process and addresses the concept of uncertainty.

Example of the Rating Scale:

| EHA #1 | Communicable disease linked to overcrowding and poor environmental health | | | | | | | | | | |
|--|---|---|---------------|---|--------------------|---|------------------------|---|-------------|----------------------|------------|
| Early works and Construction | | | | | | | | | | | |
| | Consequence/Effect | | | | | | Probability/Likelihood | | Total Score | Overall Significance | Confidence |
| | Temporal Scale | | Spatial Scale | | Severity of Impact | | | | | | |
| Impact before management | Short term | 1 | Study Area | 2 | Moderate | 2 | Definite | 2 | 10 | Major | High |
| Management Measures | | | | | | | | | | | |
| Project impact mitigation: <ul style="list-style-type: none"> G G | | | | | | | | | | | |
| Occupational health, safety and environmental management: <ul style="list-style-type: none"> G G | | | | | | | | | | | |
| Social Development: <ul style="list-style-type: none"> G G | | | | | | | | | | | |
| Impact after management | Short term | 1 | Localized | 1 | Slight | 1 | Unlikely | 1 | 4 | Minor beneficial | Medium |

The final element is to consider which communities are affected by the potential impact. Where it is possible to classify the potentially affected communities (PACs) for the specific project these will be presented as a summary based on the potential for impact. For example, in a project with a linear road feature only the PACs located on the road will be impacted. This will be presented as follows.

| | PAC 1 | PAC 2 | PAC 3 | PAC 4 | PAC 5 |
|--------------------------------|-------|-------|-------|-------|-------|
| Accidents and injuries: | Yes | Yes | No | No | No |

12.2 Appendix B: Progress Report of Preliminary Trip

| | |
|----------------------------|---|
| Project | Chinese National Offshore Oil Company Uganda, Kingfisher Project |
| Progress Report No. | 01 |
| Date | 20th March 2015 |
| Reporting Period | 1 st March 2015-20 th March 2015 |

Summary of Activities in Reporting Period

Activities completed in the reporting period

The activities completed in the reporting period are outlined in Table 19. The brief minutes of meetings and a daily activity log are attached under a separate cover.

Table 19: Activities undertaken in reporting period

| Item | Project Activity | Date/Notes |
|--------------------|--|--|
| Desktop work | | |
| 1 | Initial meeting with Golder | |
| 2 | Completion of initial literature review based on EHA methodology. This will form the basis for the baseline health description. | The literature review and framework of the report updated up the 20 th of March and will form the base for on-going iterations. |
| 3 | Planning for initial field work | |
| Initial field work | | |
| 1. | Met with key CNOOC environmental, health and social staff and presented HIA objectives, approach and expected outputs. | |
| 2. | Field work including: <ul style="list-style-type: none"> Meeting key CNOOC community liaison staff. Initial meeting with Hoima District Health Management Team (DHMT) to present HIA and request support. Meeting with Western Region head of Malaria Consortium (an NGO doing health related work in the region, district and study area). Travelled to study area and evaluated some health facilities and communities. Initial introductions to health facility staff and local community leadership. Interviewing and appointing Ugandan field support staff. Plan for next field visit. Request additional project documents | |

Activities not completed in the reporting period

| Item | Project Activity | Date/Notes |
|---------|---|------------|
| Desktop | | |
| 1 | Review of all project documentation. Project description and biophysical baseline studies, scoping assessments etc. | |

Areas of Concern

No specific areas of project management or contractual concern were noted at this stage. An initial impression of health challenges is summarised below in section 4 (initial impressions). Golder support and items associated to per-diems and sitting fees for government officials needs to be defined in terms of payment and responsibility.

Main activities for the next reporting period (20th March until 18th April 2015)

Activities to be completed in next reporting period

The main activities to be completed in the next reporting period are detailed in the table below.

Table 20: Planned activity

| Item | Project Activity | Responsibility | Due Date | Notes |
|---------------------|---|----------------------------|-----------------------------|--|
| Desktop work | | | | |
| 1 | Finalise field plan | SHAPE | 22 nd March 2015 | Complete on 20 th of March and sent. |
| 2 | Request data, reports and statistics from DHMT. | SHAPE with CNOOC follow up | 22 nd March 2015 | Submitted on 19 th of March to DHMT. |
| 3 | Approval of field plan | Golder/CNOOC | 27 th March 2015 | SHAPE to adjust as required |
| 4 | Develop tools for use in field | SHAPE | 27 th March 2015 | |
| 5 | Contract Ugandan staff | SHAPE | 27 th March 2015 | Annette Kobusingye will be supporting SHAPE. CV sent to Golder and CNOOC for approval |
| 6 | Plan logistics for second field trip | SHAPE | 2 nd April 2015 | As per work plan. Michelle Watts from SHAPE to follow up as required. |
| 7 | Present formal request for HIA to Hoima DHMT and obtain formal stamped permission to conduct the second stage of the field work. | CNOOC | 2 nd April 2015 | As per format provided by SHAPE. CNOOC to arrange from Hoima and to have in place prior to second field trip. |
| 8 | Book and arrange round table meeting with Hoima DHMT, invited NGOs/CBOs/agencies for the 27 th of April 2015 (morning for three hours- 9-12am). Ideally meeting will be held at DHMT offices or at | CNOOC/ Golder | 2 April 2015 | As per work plan and discussed with Hoima DHMT on the 17 th of March 2015. Golder to arrange venue with DHMT. Sitting fees or per diems to be |

| | | | | |
|-------------------|---|---------------------|---|---|
| | other approved venue. | | | arranged by Golder and SHAPE advised. |
| 9 | Book meeting/ interviews with staff in health centres and community leaders as per work plan. | CNOOC/Golder | 9 th April 2015 | Based on receipt of formal approvals from DHMT. |
| 10 | Finalise and confirm arrangements for field trip. | Golder/CNOOC | 9 th April 2015 | As per approved work plan. |
| 11 | Follow up with DHMT on requested data, reports and statistics | CNOOC | 15 th April 2015 | From Hoima DHMT and to receive from health centres in study area but after permissions process. |
| Field work | | | | |
| 1 | Initiate field work on 25 th April 2015 | SHAPE/CNOOC /Golder | Depart Kampala for Hoima and Kingfisher on 26 th of April. | 2 x vehicles as team will split into two. Require CLO support at Hoima and Kingfisher. |
| 2. | Arrange boat trip from Kingfisher to southern communities as per plan | CNOOC | As per work plan | For 2 people |

Client Meetings

Issues addressed at client meetings and field work

Summarised in activities completed to date and in daily field logs.

Issues to be addressed at next client meeting/call

- Workplan and timing
- Logistics
 - Flights
 - Split teams with two vehicles as parallel activities in Hoima/Kingfisher.
 - CLO support at Hoima and at Kingfisher
 - Boat transfers for team of 2 people to remote community for one day.
- Hoima round table meeting. Planning, chairing, venue, recording, refreshments and per diems/sitting fees.

Initial Impressions

The initial field work allowed the opportunity to identify some specific health challenges that have relevance to the HIA. These will be followed up and more data obtained as available in the next phases:

Health systems and health information

The health systems in the study area appeared to be very weak. Numerous challenges were noted including available human resources, inadequate facilities and equipment, poor access for communities and supply chain of essential supplies. A detailed service availability and readiness assessment will be performed in the next phase.

Referral to higher levels of health care was also a major challenge as the district has no ambulance and patients need to rely on their own transport. Distances were large and transport relatively expensive.

The village health team’s programme was reported to be relatively effective but was severely hampered by the inability to provide medications to support community based management of disease. These are supported by donor programmes in areas but these are slowing or funding is coming to an end.

Health information in general appeared to be available but given the limited diagnostics, challenges related to access for the community and potential other health seeking behaviour determinants it may not be reliable at the local level and thus may not reflect a specific point of departure baseline for the potentially affected communities. This will be examined in more detail in the next field trip and advice on the robustness of the baseline health conditions in the study population will be provided. Data closure opportunities including primary collection of data will also be addressed in the next stage as an output of the HIA report or the next progress report.

Major Burden of Disease

A brief discussion was held with staff in the four health centres in the immediate study area on the major burden of disease and associated contributing factors, as summarised in the table below.

| Burden of Disease | Contributing factor |
|--|---|
| Malaria was regarded as the biggest public health concern despite control efforts. | Poor use of bednets. Environment conducive to proliferation of mosquitoes. Poor behaviours increase risk. |
| Diarrhoeal disease and other infective gastro-intestinal ailments was a major concern with dysentery, typhoid and even cholera reported in addition to large case load of viral causes of diarrhoea. Intestinal schistosomiasis was reported in the Lake Albert area with intestinal parasites common. | Access to clean water was a challenge. Unsafe and un-improved sources were used commonly. Sanitation services were poor with open defaecation common. General environmental hygiene and household waste management was very poor. |
| Respiratory disease such as pneumonia was common, with a seasonal preference. | Poor housing. General poor living circumstances. Indoor and outdoor air quality is poor with use of biomass fuel for cooking/heating which increases risk of respiratory disease. |
| Measles outbreaks have occurred. | Weak immunisation campaigns as outreach is limited. |
| HIV and sexually transmitted are on the increase in certain communities. The fishing communities and trading centres are especially experiencing an upsurge in cases. | Knowledge is reported to be good but behaviours poor. Available cash in Buhuka flats was a major issue as transactional and even commercial sex was common. Substance abuse |

| | |
|--|--|
| | increases high risk behaviour and condoms are rarely used. Young girls are especially vulnerable to transient businessmen, fisherman and transport workers. It was reported that construction activity (Turkish contractor building the road and contractor workforce from escarpment road also engage in high risk multi sexual relations often with a transactional nature. Sharing of women and general promiscuity was reported as common place on Buhuka flats. |
| Malnutrition does occur in pockets | Refugee communities that attend Kyangwali are reported with severe acute malnutrition. However, fishing communities and agricultural communities did not report food shortages although food was regarded as very expensive. It was reported that fishing resources have been dramatically depleted. |
| TB | There is an increase in TB with a reported co-morbid association with HIV. Overcrowding and poor living conditions may also contribute. |
| Accidents and injuries | Road traffic accidents do occur but not commonly. However, assault is common as is gender based domestic violence. Substance abuse is the common root cause. |
| Other vector related disease | River-blindness occurs in the district |
| Animal related disease was reported to occur including Brucellosis | Cattle rearing are common in area with weak veterinary health services. There may be a risk of leptospirosis as well. |

Influx and Social Dynamics Influencing Health

Influx and movement of people is reported to be occurring and influencing a number of health determinants. Some respondents considered this to be positive as it injects cash into the area, but pressure on scarce resources, alteration in social dynamics and culture are potential negative effects. Influx is likely to be a major cause for future health impacts.

Information Requirements

As mentioned in the dependencies in the planned activities.

General Issues

- See attached work plan and letter to DHMT.

12.3 Appendix C: Stakeholder Engagement with Hoima DHMT



中海石油乌干达有限公司
CNOOC UGANDA LIMITED

Simba Towers, Plot 22 Acacia Avenue
Kololo, Kampala, Uganda
P.O.Box 7862 Kampala
Fax: +256 (0) 204792012

Date: April 20th, 2015

File Ref: CUL-PT -20150420-01

Hoima District Local Government,
P.O. Box 2,
Hoima-Uganda.

Attention: Director District Health Services.

Dear Sir,

RE: PROPOSED HEALTH IMPACT ASSESSMENT: KINGFISHER PROJECT.

As you are aware, CNOOC Uganda Limited the operator of the Kingfisher Discovery Area is in the process of undertaking the Environment and Social Impact Assessment (ESIA).

CNOOC Uganda Limited intends to conduct a health impact assessment (HIA) as part of the feasibility and risk management studies for the proposed Kingfisher Project (Project) located within the Hoima district and specifically the sub-counties of Kyangwali, Buseruka as well as the Hoima municipality.

A HIA seeks to identify and estimate the lasting or significant changes of different actions on the health status of a defined population. HIA may be defined as “a combination of procedures, methods, and tools by which a project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population”. Therefore, the HIA will identify appropriate actions to manage those effects, and thus plays an important role as a key decision-making tool in development planning, and will assist the Project by understanding the existing health needs of the community, as well as considering the future consequences of different Project options on human health.

CNOOC has appointed Golder Associates and SHAPE Consulting to undertake this survey with Dr Mark Divall leading the assessment. CNOOC and SHAPE wishes to engage with the DHMT to better understand the prevailing public health challenges, related determinants of health and opportunities to mitigate any potential negative impacts from the Project and to enhance the potential positive benefits.

The consultancy team will engage with the DHMT to introduce the study and to obtain key information and data on the communities that may be impacted by the development of the Project. The team also wishes to meet with the other organs of the district health team including:

- Clinical and programme managers
- Planning, Monitoring and Evaluation manager or the person in charge of the district health information system
- Primary health care manager
- Environmental health officer (manager)



中海石油乌干达有限公司
CNOOC UGANDA LIMITED

Simba Towers, Plot 22 Acacia Avenue
Kololo, Kampala, Uganda
P.O.Box 7862 Kampala
Fax: +256 (0) 204792012

The HIA team is looking to obtain secondary and participatory information which we have divided into the following four sections:

1. Firstly, data from the district health information system and where possible disaggregated to the communities that may be impacted by the Project. The data being sought is for the top ten conditions reported in the district stratified by hospitals, community health centres, clinics and mobile units that serve these communities. The team will be interested in the last five years data so as to compare trends.
2. The team will be conducting key informant interviews with key programme managers in the district to understand health challenges, needs and current interventions in the communities that may be affected by the Project. The interest will be understanding specific vulnerabilities and determinants of health in the communities to find out why health challenges are what they are.

The intent of the study is to establish what sectors of the population may be vulnerable to health and social changes related to the Project and potentially working with the district health authority in improving these determinants. For example, if non-accidental injuries are a challenge the team would be interested to know that substance abuse was an issue, specifically in this group and these are the vulnerable parts of the community who are affected. The team would also be interested in understanding practices and behaviours in the communities and if any studies of this nature have been performed and semi structured interview tools will be used to conduct these sessions.

In terms of the health programmes, the team will be interested in:

- What health programmes are ongoing in the areas of interest?
 - Who is the funder and implementing partner?
 - What are gaps and opportunities in programmes? &
 - How are the programmes measured in terms of performance and outcome?
3. Thirdly, the team would like to visit the public health centres in the study area to conduct key informant interviews with the operations/clinic manager in each area to obtain data in a participatory manner on health challenges and needs in their specific community and issues such as health behaviours, health education and health seeking behaviour.
 4. The proposed schedule for the specialist visit to the Hoima district health facilities, looks as follows:



中海石油乌干达有限公司
CNOOC UGANDALIMITED

Simba Towers, Plot 22 Acacia Avenue
Kololo, Kampala, Uganda
P.O.Box 7862 Kampala
Fax: +256 (0) 204792012

| Date | Time | Activity |
|---------------|------|--|
| 27 April 2015 | AM | Hoima DHMT workshop, including programme managers and NGOs |
| 27 April 2015 | PM | Kabaale Health Centre assessment and KII |
| 28 April 2015 | AM | Hoima Hospital assessment and KII |
| 28 April 2015 | PM | Kyangwale HC Assessment and KII |
| 30 April 2015 | AM | Kaseeta HC assessment and KII |

We would appreciate your assistance in setting up these interactions with the specific stakeholders as detailed above.

For further enquiries on the matter, contact Zakalia Lubega on 0772-798 051 or Zakalia.LUBEGA@cnoocuganda.com.

We thank you for your continued support.

Yours Sincerely,

Xiao Zongwei
President
CNOOC Uganda Limited
CA/ZL

Cc: Commissioner Petroleum Exploration and Production Department
Cc: Chief Administrative Officer-Hoima District
Cc: Area Manager, Kingfisher Development Area, Petroleum Exploration and Production Department
Cc: District Health Officer-Hoima District
Cc: The Director Medical Services-Hoima Regional Referral Hospital
Cc: The Mayor-Hoima Municipal Council
Cc: The Town Clerk-Hoima Municipal Council
Cc: LC 111 Chairperson-Kyangwale Sub-county Local Government
Cc: Sub-county Chief-Kyangwale Sub-county Local Government
Cc: LC 111 Chairperson-Buseruka Sub-county Local Government
Cc: Sub-county Chief-Buseruka Sub-county Local Government

12.4 Appendix D: Price list of selected commodities as of 14 October 2014 (Hoima Town)

AVERAGE PRICES OF SELECTED COMMODITIES AS AT OCTOBER 2014

| NO | COMMODITY | PRICE/KG | |
|----|-----------------------|--------------|-----------|
| | | WHOLESALE/KG | RETAIL/KG |
| 1 | Agwedde Beans | 1,450 | 1,800 |
| 2 | Apple Bananas | 2,000 | 2,550 |
| 3 | Beef | 6,950 | 8,200 |
| 4 | Cassava Flour | 950 | 1,200 |
| 5 | Cavendish (Bogoya) | 2,850 | 3,650 |
| 6 | Coffee (Arabica) | 5,000 | 5,250 |
| 7 | Coffee (Robusta) | 1,500 | 1,700 |
| 8 | Cow Peas | 2,700 | 3,200 |
| 9 | Dry Fermented Cassava | 700 | 850 |
| 10 | Exotic Chicken | 10,200 | 12,450 |
| 11 | Exotic Eggs | 8,250 | 9,600 |
| 12 | Fresh Cassava | 750 | 950 |
| 13 | Goat Meat | 8,300 | 9,300 |
| 14 | Groundnuts | 3,250 | 3,850 |
| 15 | Irish Potatoes | 1,050 | 1,300 |
| 16 | Kayiso Rice | 2,150 | 2,500 |
| 17 | Local Chicken | 17,400 | 20,900 |
| 18 | Local Eggs | 12,900 | 14,900 |
| 19 | Maize Flour | 1,400 | 1,700 |
| 20 | Maize Grain | 550 | 700 |
| 21 | Matooke | 19,600 | 23,050 |
| 22 | Matooke(kg) | 850 | 1,150 |
| 23 | Milk | 1,050 | 1,300 |
| 24 | Millet Flour | 2,250 | 2,650 |

| | | | |
|----|---------------------|--------|--------|
| 25 | Millet Grain | 1,450 | 1,700 |
| 26 | Nambale Beans | 1,650 | 2,000 |
| 27 | Nile Perch | 9,950 | 12,150 |
| 28 | Orange S.Potatoes | 600 | 800 |
| 29 | Pineapple | 1,700 | 2,250 |
| 30 | Pork | 7,050 | 8,650 |
| 31 | Processed Honey | 11,600 | 13,800 |
| 32 | Simsim | 4,750 | 5,450 |
| 33 | Sorghum Flour | 1,550 | 1,800 |
| 34 | Sorghum Grain | 950 | 1,150 |
| 35 | Soya Beans | 1,850 | 2,200 |
| 36 | Sun Dried Cassava | 700 | 900 |
| 37 | Sunflower | 1,000 | 1,100 |
| 38 | Super Rice | 2,750 | 3,150 |
| 39 | Tilapia | 8,600 | 10,500 |
| 40 | Turkey | 44,550 | 51,050 |
| 41 | Unprocessed Honey | 6,600 | 7,650 |
| 42 | Unprocessed Vanilla | 2,800 | 3,500 |
| 43 | Upland Rice | 2,350 | 2,600 |
| 44 | White S. Potatoes | 700 | 950 |
| 45 | Yellow Beans | 2,000 | 2,300 |

12.5 Appendix E: Health Facility Assessments

12.5.1 Introduction

In order to evaluate the capacity of the health system that supports the populations of the study area, a health care quality assessment was conducted as part of the HIA field work.

The following health centres (HC) were identified as serving the identified PACs in the Project area:

- Hoima Regional Referral Hospital;
- Kabaale Health Centre (level 3);
- Kaseeta Health Centre (level 3);
- Kyangwali Health Centre (level 3 – to be upgraded to level 4 as from July 2015); and
- Buhuka Health Centre (level 3).

The nearest referral hospital is the Hoima Regional Referral Hospital (HRRH), located approximately 84km north-east from the furthest health centre (Buhuka HC) and 48 km east of the closest, evaluated health Centre (Kabaale HC). In addition to serving the population in the study area, HRRH also served the whole of the Hoima district and six other districts, namely:

- Masindi district;
- Kagadi district;
- Bulisa district;
- Kilyandongo district;
- Kiboga district; and
- Kyangwanzi district.

As outlined in the methodology, the facilities were assessed in terms of human resources (capacity and training), quality and range of services (including availability of equipment, medication and supplies), general infrastructure and profile of catchment population as well as quality of the referral system. Where applicable, the WHO SARA readiness indices were adapted for the Ugandan context and the scores are reported below.

12.5.2 Findings

12.5.2.1 Human Resources: Capacity and Skills

Figure 44 illustrates the number of staff per category as well as the reported target population area at the time of the facility assessment. In general:

- All of the HCs were under-staffed, with Buhuka HC being the worst affected. According to the Hoima DHMT, a level III health centre is supposed to have 23 staff members.
- Even the best resourced and staffed HC (Kyangwali), had an insufficient complement of staff present during the evaluation.
- The lack of staff was identified as the main driver for poor execution outreach programs in the communities.
- All health centres (with the exception of Buhuka HC) had clinical officers (three years of study) as the highest educated health practitioners. Buhuka HC only had three enrolled nurses.
- It must be noted that Kyangwali HC had the services of a medical doctor for three days per week. The doctor, however, is an employee of UNHCR and not the DHMT and the arrangement was subject to availability.

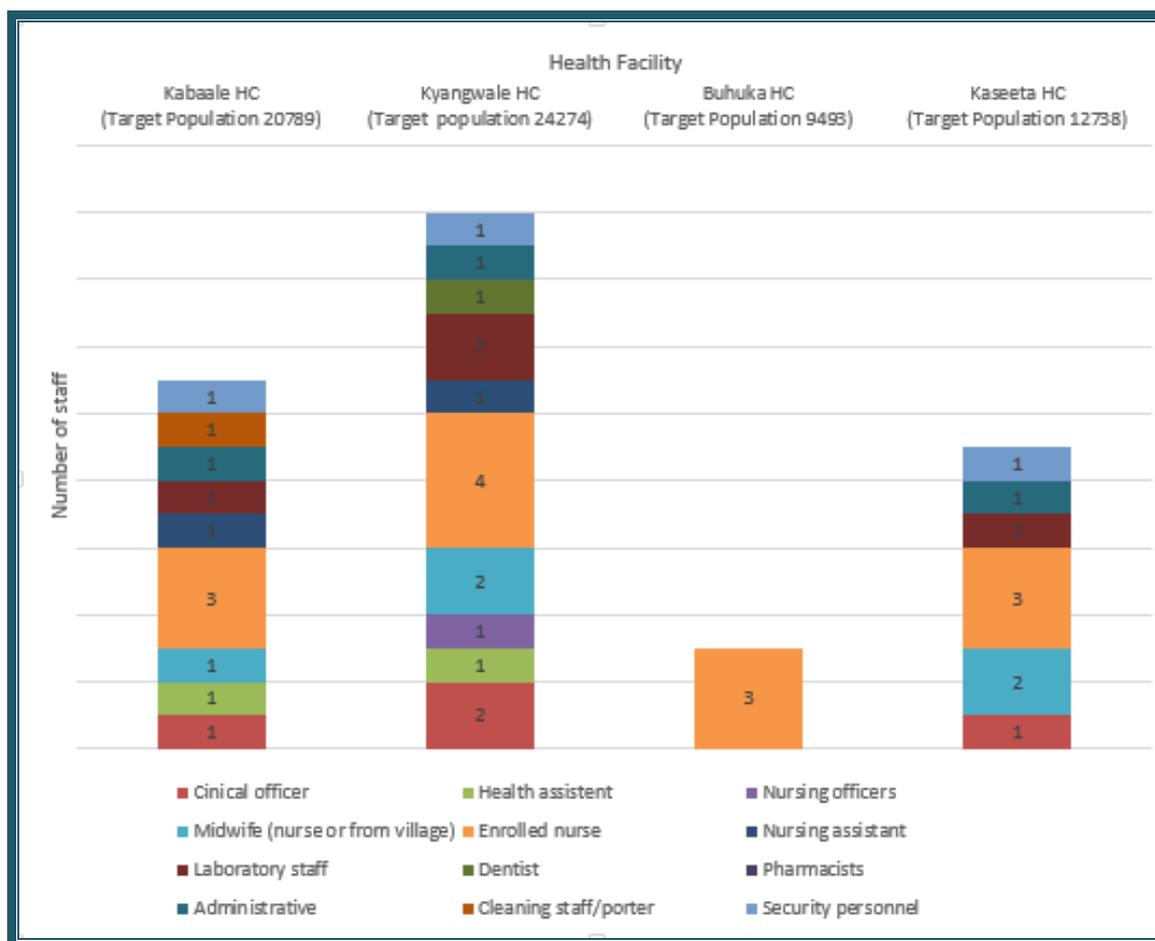


Figure 44: Number and type of dedicated staff per health facility

12.5.2.2 Service Availability and Range of Services

- Hours of service:

All evaluated HCs had 24 hour emergency services availability, although facility hours were officially from 7:00 to 17:00 on a daily basis. All of the centres had clinical staff accommodation on site, although these accommodation facilities were appointed to the midwives who needed to be available for deliveries. For any after-hours emergencies, the clinical staff would be alerted and called to the health facility to attend to the emergency.

- Staff proximity to facility and accommodation:

As noted, all HCs had staff accommodation available on site. Staff who could not be accommodated in these housing units, lived in rental properties in the nearby communities, approximately 5-15 min away from the premises.

- Costs:

All services, treatment and medication were reported to be free of charge in all of the evaluated HCs. The only costs associated with medical treatment in the study area,

was transport cost from their residence to the health centre. It was also reported that patients who needed to be referred from HRRH to the national referral hospital in Kampala, would frequently be asked to contribute money towards the procurement of fuel.

- Transport costs throughout the area were generally considered to be prohibitive with the highest costs for emergency private transport reported on the Buhuka Flats (100 000 UGX for the unscheduled hire of a boat from a lake-shore community to the Buhuka HC).
- Figure 45 illustrates the services offered at the 5 facilities. There is tremendous variation between the packages of services as well as the capacity and supplies available at the different facilities.

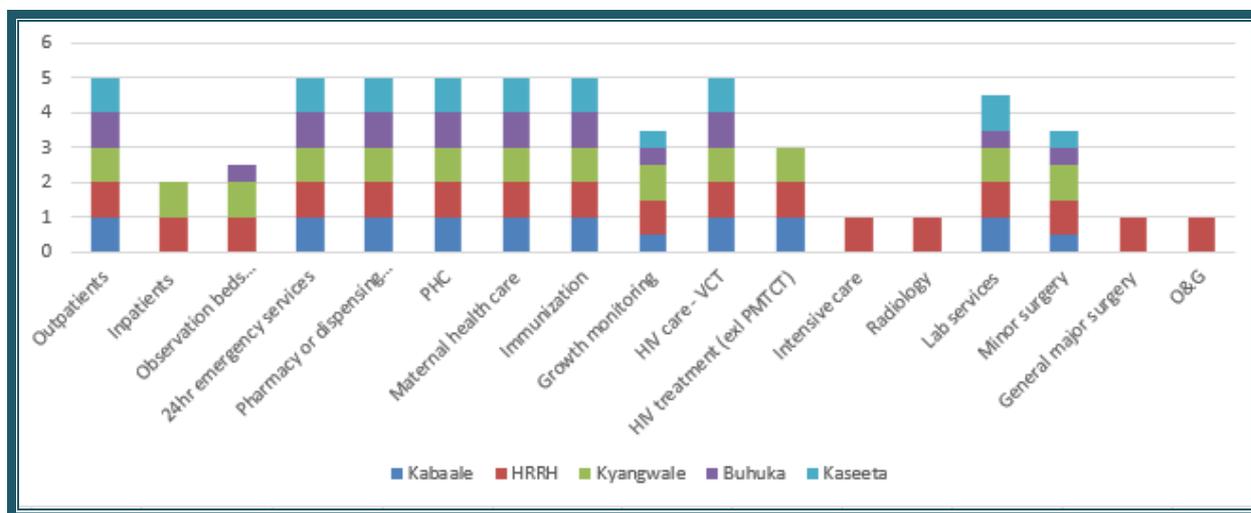


Figure 45: Range of services provided at health facilities

12.5.2.3 Access to Referral Hospital

All HCs had designated referral routes for patients to obtain additional evaluation and treatment. Without fail, though, all of the rural HC indicated that the majority, if not all of the referred patients went to HRRH. Difficulty in access and the perception that most rural HCs had limited diagnostic and treatment capabilities were the reasons stated for not following the existing chain of referral.

Costs associated with transport averaged 68 750 UGX (ranging from 15 000 UGX to 100 000 UGX). Kyangwale HC was the only HC that had access to an ambulance, although it is no longer functional.



Figure 46: Broken down ambulance at Kyangwali HC

12.5.2.4 Readiness Indices

The items used for the different readiness indices of basic amenities, basic equipment, laboratory capacity and essential medicines are described below in Figure 47. Buhuka HC is generally under-resourced. The diagnostic laboratory capacity of all the sampled facilities was limited and a concern. A reliable supply of clean water and power was lacking in all the facilities.

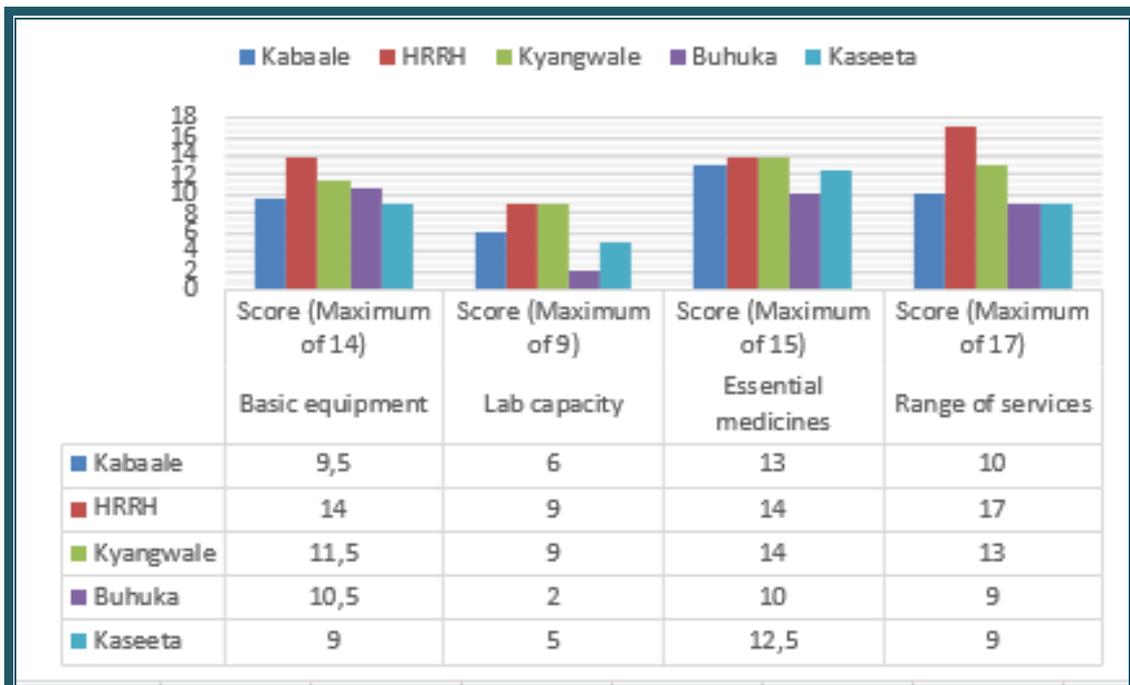


Figure 47: Readiness scores of the health facilities

Comments on Figure 46:

- Basic amenities consist of the following 6 items: reliable power, reliable water source, adequate sanitation facilities, private room, a communication device (not personal mobile) and emergency transportation that is on the premises.



Figure 48: Basic amenities at evaluated health centers

- Basic equipment consist of the following 14 items: any weighing scale, thermometer, stethoscope, sphygmomanometer and BP cuff, sharps box, functional fridge, resuscitation mask and bag, latex gloves, sterilization equipment, eye protection, hand-washing soap and water (or alcohol-based hand rub), blood giving set, oral rehydration solution and Intra venous (IV) sets.



Figure 49: Basic equipment at evaluated health centers

- Laboratory capacity consists of the following 9 items: haemoglobin, blood glucose, HIV RDT or ELISA, syphilis RDT, malaria RDT or smear, TB microscopy, general microscopy and biochemistry.
- Essential medicines consist of the following 15 items: EPI vaccinations, penicillin, erythromycin, doxycycline, any anti-hypertension drugs, IV fluids, any 1st line TB drug regimen, ACTs, ART, diazepam, paracetamol, any anti-inflammatory, anti-helminthic drugs, adrenaline injection and anti-histamine.



Figure 50: Laboratory equipment and drugs at evaluated health centers

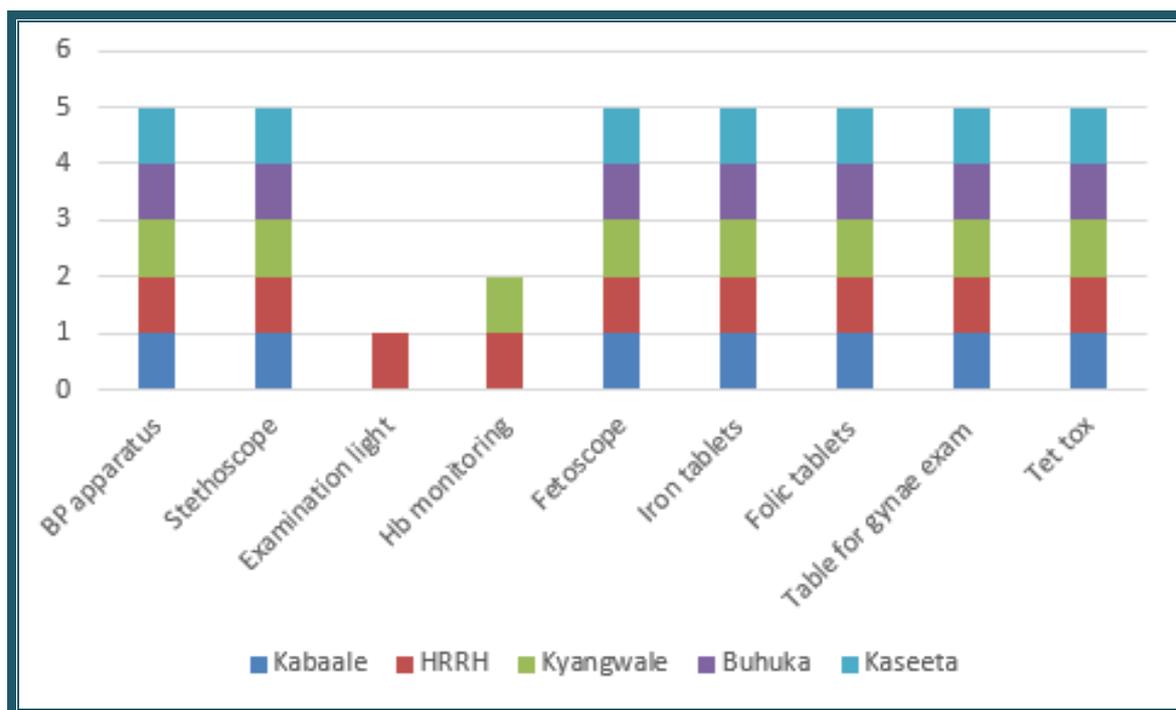


Figure 51: Antenatal readiness index of health facilities

For the antenatal care readiness index in Figure 51, a maximum score of 9 was assigned. Although all the facilities reported providing antenatal care services, only HRRH was considered to be completely equipped. Although most HCs indicated the presence of certain pieces of equipment, it has to be noted that some of these (e.g. stethoscopes and BP apparatuses) were the only ones of their kind in the facility and had to be shared amongst different departments.

For emergency obstetric care (Figure 52), a maximum score of 13 was devised. Three facilities had a score of 7 or less; indicating inadequate supplies on-site to manage an obstetric emergency appropriately.

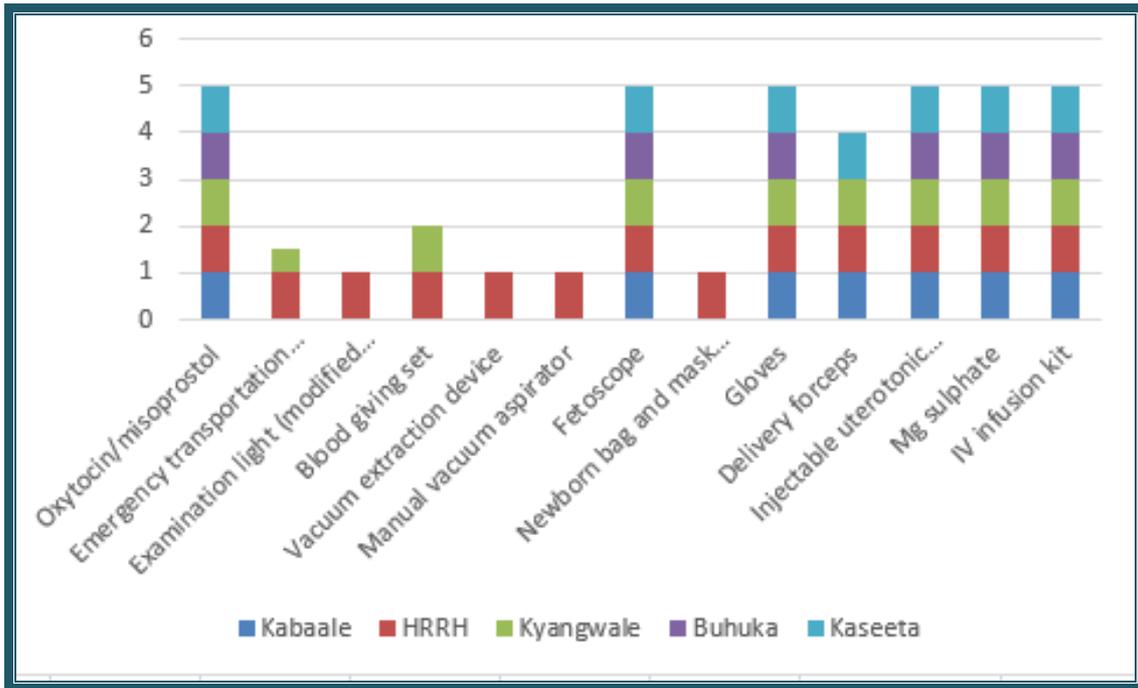


Figure 52: Emergency obstetric care readiness index of health facilities

Figure 53 depicts the items required for malaria care and treatment. IPT_p was offered at all of the evaluated facilities. Where ITNs were available, they were either prioritized for pregnant women or only at the health facility's beds. Although all the facilities were able to diagnose malaria using either the RDT kit or blood smear, only HRRH and Kyangwali HC could monitor Hb for malaria-related anaemia.

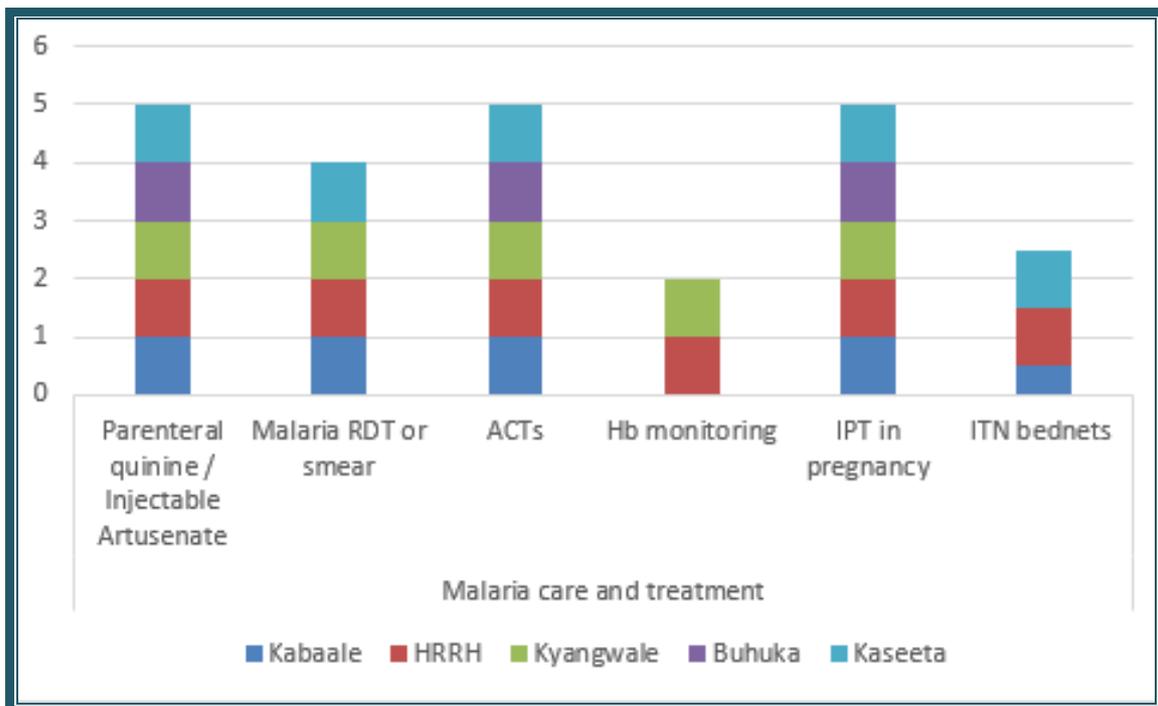


Figure 53: Malaria care and treatment service package of health facilities

For the HIV/TB services, all the facilities were able to provide HIV diagnostic services (based on diagnosis with RDT), ART clinics were available at Kabaale, Kyangwali and HRRH while only HRRH and Kyangwali had the ability to perform CD4 counts.

Similarly, all of the facilities with the exception of Buhuka HC, could reliably diagnose TB (based on sputum-ZN exams) in patients; medication would be started at the facility but of significance is that DOTS was not available and that the treatment default rate was reported to be between 30 and 40%.

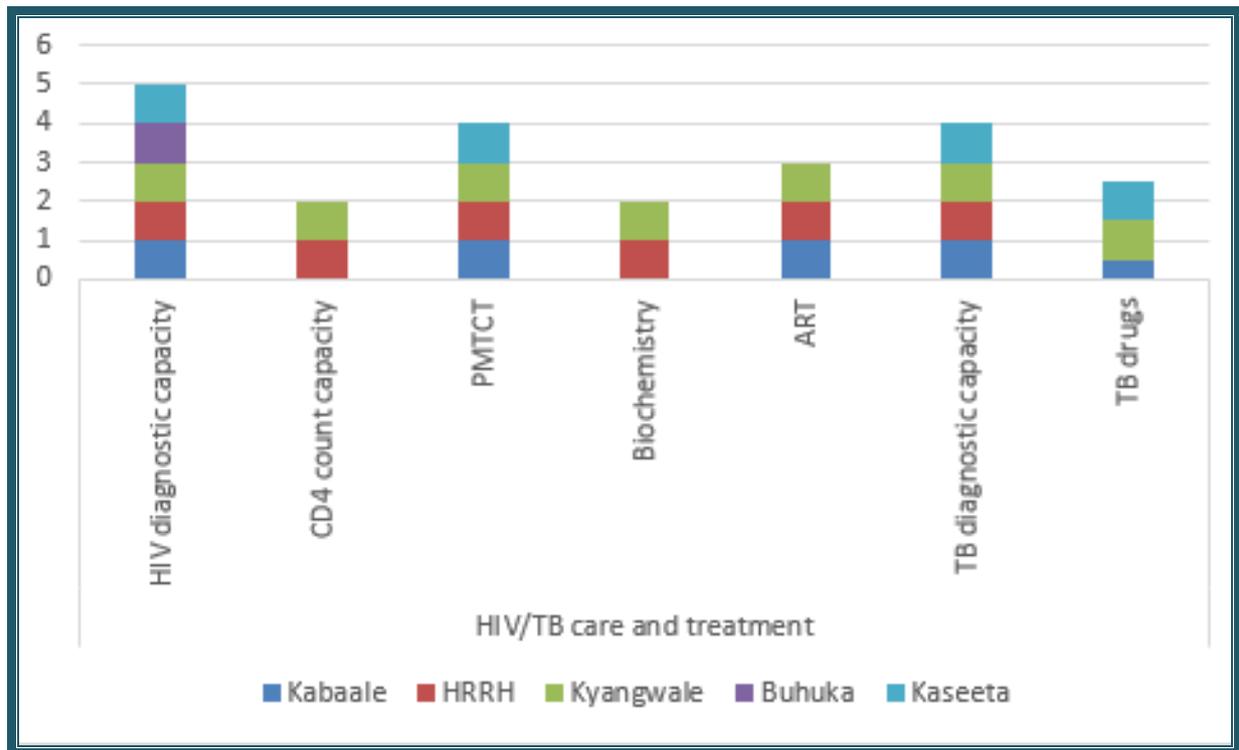


Figure 54: HIV/TB care and treatment service package of health facilities

12.5.3 Disease Profile from Key Informant Interviews at Health Facilities

The most common diseases amongst children under 5 years as well as all age groups were ranked by the person in-charge of the facilities. The findings are reported below in Table 21. The ranking of all age groups is in brackets and for children under 5 years is represented to the left.

Table 21: Ranking profile of common diseases

| | Most common diseases | | | | | | | | | | | | | | | | |
|-----------|----------------------|-----|-----|---------------------|----------------------|-------------|-------|----------------|------------------------------|-----|---------------------|----------------------|------|-----|-----|-----|-------|
| | Children under 5 | | | | | | | All age groups | | | | | | | | | |
| | Malaria | ARI | HIV | Diarrhoeal diseases | Intestinal parasites | Dermatology | Other | Malaria | Resp-related (ARI/LRTI/URTI) | HIV | Diarrhoeal diseases | Intestinal parasites | Derm | STI | RTI | NCD | Other |
| Kabaale | 1 | 3 | NR | 2 | 4 | NR | NR | 1 | 2 | NR | NR | NR | NR | 3 | NR | NR | NR |
| HRRH | 1 | 2 | NR | 3 | 4 | NR | NR | 1 | 2 | 3 | NR | NR | NR | NR | NR | NR | NR |
| Kyangwali | 1 | 3 | NR | 2 | NR | 4 | NR | 1 | 2 | NR | 4 | NR | NR | NR | 3 | NR | NR |
| Buhuka | 2 | 1 | NR | 3 | NR | 4 | NR | 2 | 1 | NR | 3 | NR | NR | 4 | NR | NR | NR |
| Kaseeta | 1 | 2 | 6 | 3 | 4 | 5 | NR | 1 | 3 | NR | NR | 2 | NR | 4 | NR | NR | NR |

NR = Not Ranked

12.6 Appendix F: Hoima District Health Data from Routine Health Management Information System

| HEALTH CONDITIONS | HOIMA DISTRICT | | HOIMA RRH | | BUHUKA HCIII | | KABAALÉ HCIII | | KASEETA HCIII | | KYANGWALI HCIII | |
|--|----------------|---------|-----------|---------|--------------|---------|---------------|---------|---------------|---------|-----------------|---------|
| | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 |
| OUTPATIENT DEPARTMENT (OPD) & REFERRALS | | | | | | | | | | | | |
| Outpatient Attendance | 677,964 | 790625 | 155654 | 172388 | 11123 | 8012 | 12217 | 13588 | 12331 | 16932 | 26331 | 28994 |
| New attendance | 610,202 | 718,043 | 106128 | 114173 | 11033 | 7950 | 12109 | 13381 | 12140 | 16720 | 25550 | 27920 |
| Re-attendance | 67,762 | 72,582 | 49526 | 58215 | 90 | 62 | 108 | 207 | 191 | 212 | 781 | 1074 |
| Deaths in OPD | 6861 | 3976 | 6472 | 3808 | - | - | 18 | 1 | 1 | - | - | 1 |
| Referrals | | | | | | | | | | | | |
| In-referrals | 2,626 | 1,682 | 698 | 454 | 7 | 22 | 58 | 28 | - | 16 | 319 | 320 |
| Out-referrals | 2,627 | 2986 | 19 | 27 | 48 | 29 | 25 | 24 | 63 | 88 | 138 | 102 |
| INFECTIOUS / COMMUNICABLE DISEASES | | | | | | | | | | | | |
| Notifiable Diseases | | | | | | | | | | | | |
| Acute flaccid paralysis | 11 | 13 | 2 | 2 | - | - | - | - | - | - | - | - |
| Cholera | 107 | 19 | - | - | - | 24 | - | - | 35 | 0 | 21 | - |
| Dysentery | 3,290 | 3920 | 166 | 163 | 283 | 213 | 102 | 198 | 116 | 133 | 233 | 255 |
| Guinea worm | 8 | 18 | - | - | - | - | - | - | - | - | - | - |
| Bacterial meningitis | 23 | 7 | - | - | - | - | 9 | - | - | - | - | 1 |
| Measles | 347 | 228 | 16 | 12 | 1 | - | 25 | 6 | 172 | 25 | 5 | 62 |
| Plague | | | | - | - | - | - | - | - | - | - | - |
| Rabies | 2 | 25 | 2 | 3 | - | - | - | 4 | - | - | - | - |
| Yellow fever | 1 | 2 | - | - | - | - | - | - | - | 2 | - | - |
| Viral haemorrhagic fevers | 5 | 4 | - | - | - | - | - | - | - | - | - | - |
| Other emerging infectious diseases | 260 | 138 | - | - | - | - | 1 | 2 | - | 15 | - | - |
| Other Infectious / Communicable Diseases | | | | | | | | | | | | |
| Gastrointestinal Illnesses | | | | | | | | | | | | |
| Diarrhoea - acute | 20889 | 26401 | 1523 | 1108 | 622 | 1146 | 460 | 529 | 609 | 679 | 1202 | 1116 |
| Diarrhoea - persistent | 544 | 610 | - | - | 14 | 30 | 13 | 60 | 2 | - | - | - |
| Intestinal worms | 35815 | 40486 | 866 | 750 | 160 | 185 | 633 | 796 | 914 | 1283 | 2491 | 1782 |
| Respiratory Illnesses | | | | | | | | | | | | |
| Cough or cold (no pneumonia) | 152621 | 175139 | 12632 | 10315 | 572 | 1646 | 2615 | 2248 | 3707 | 5054 | 9232 | 8547 |
| Pneumonia | 22207 | 22515 | 942 | 850 | 3143 | 4559 | 314 | 1164 | 72 | 133 | 317 | 277 |
| Severe acute respiratory infection | 12,418 | 22201 | - | 1408 | - | - | 1592 | 572 | 3 | 18 | - | - |

| HEALTH CONDITIONS | HOIMA DISTRICT | | HOIMA RRH | | BUHUKA HCIII | | KABAALÉ HCIII | | KASEETA HCIII | | KYANGWALI HCIII | |
|--|----------------|---------|-----------|---------|--------------|---------|---------------|---------|---------------|---------|-----------------|---------|
| | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 |
| Tuberculosis (new smear +ve) | 605 | 646 | 218 | 255 | - | - | 3 | 9 | - | - | 26 | 25 |
| Other tuberculosis | 178 | 185 | 13 | 13 | - | - | 4 | | 8 | 15 | 1 | - |
| Vector-Borne Diseases | | | | | | | | | | | | |
| Malaria | 179395 | 242081 | 18882 | 14523 | 3910 | 5214 | 5408 | 5800 | 5934 | 9151 | 9160 | 12997 |
| Sleeping sickness (African trypanosomiasis) | 22 | - | - | - | - | - | - | - | - | - | - | - |
| Leishmaniasis | 7 | 7 | 6 | 0 | - | - | - | - | - | - | - | - |
| Lymphatic filariasis | 100 | 96 | 41 | 14 | 0 | 4 | 1 | 0 | 0 | 0 | 1 | 0 |
| Onchocerciasis (river blindness) | 1321 | 727 | 7 | 1 | - | 1 | 257 | 23 | - | - | - | - |
| Bilharzias/Schistosomiasis | | | | | | | | | | | | |
| Urinary schistosomiasis | 21 | 29 | - | - | 11 | 14 | - | - | - | - | - | - |
| Intestinal schistosomiasis | 628 | 992 | 8 | 3 | 15 | 50 | - | - | 4 | - | - | - |
| Sexually Transmitted Infections (STIs) & other Genitor-Urinary Conditions | | | | | | | | | | | | |
| STIs (excluding HIV) | 9241 | 8227 | 1055 | 969 | 312 | 103 | 556 | 293 | 156 | 145 | 336 | 414 |
| Urethral discharges | 1977 | 1972 | 258 | 210 | 29 | 64 | 7 | - | 4 | 7 | 1 | - |
| Genital ulcers | 1926 | 1686 | 370 | 244 | 15 | 44 | 149 | 277 | 45 | 5 | 9 | - |
| Urinary tract infections | 14649 | 16631 | 3146 | 2460 | 111 | 266 | 283 | 163 | 267 | 230 | 714 | 812 |
| HIV/AIDS | | | | | | | | | | | | |
| Number of individuals tested | 62737 | 113303 | 13469 | 39359 | | 958 | 1330 | | 540 | | 2117 | 5533 |
| Number of individuals who received HIV test results | 62731 | 114787 | 13469 | 39359 | | 958 | 1328 | | 540 | | 2117 | 5533 |
| Number of individuals who received HIV results for the first time in this financial year | 41214 | 57782 | 7821 | 13155 | | 767 | 1278 | | 334 | | 1830 | 5234 |
| Number of individuals who tested HIV positive | 3622 | 4840 | 1186 | 1991 | | 32 | 59 | | 35 | | 178 | 293 |
| HIV positive individuals with suspected TB | 109 | 94 | - | 21 | | - | 3 | | 2 | | 3 | 8 |
| Number provided with safe male circumcision | 9253 | 14387 | 137 | 4845 | | - | - | | - | | 717 | - |
| Other Infectious Diseases | | | | | | | | | | | | |
| Leprosy | 5984 | 1888 | - | 38 | - | - | 1208 | - | - | - | | 320 |
| Other types of meningitis | 4263 | 1376 | 25 | 48 | - | - | 48 | 1 | - | - | 1 | - |
| Skin diseases | 24070 | 28516 | 4618 | 3848 | 270 | 520 | 140 | 86 | 404 | 715 | 529 | 755 |
| Typhoid fever | 2795 | 3539 | 552 | 465 | 159 | 202 | 173 | 214 | 1 | 3 | 8 | 12 |

| HEALTH CONDITIONS | HOIMA DISTRICT | | HOIMA RRH | | BUHUKA HCIII | | KABAALÉ HCIII | | KASEETA HCIII | | KYANGWALI HCIII | |
|--|----------------|---------|-----------|---------|--------------|---------|---------------|---------|---------------|---------|-----------------|---------|
| | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 |
| Tetanus (post-neonatal) | 7 | 55 | 5 | 9 | - | - | - | - | - | - | - | - |
| Ear, Nose and Throat (ENT) conditions | 13722 | 14561 | 3205 | 3201 | 203 | 254 | 198 | 333 | 157 | 165 | 165 | 190 |
| Infectious eye conditions | 25164 | 28213 | 8746 | 9697 | 288 | 320 | 365 | 376 | 422 | 388 | 412 | 389 |
| NON-COMMUNICABLE DISEASES (NCDs) | | | | | | | | | | | | |
| Major NCDs | | | | | | | | | | | | |
| Diabetes mellitus | 1990 | 3599 | 1384 | 2821 | 3 | 1 | 2 | - | - | - | 83 | 100 |
| Hypertension | - | - | - | - | 16 | - | - | 47 | - | 8 | - | - |
| Cardiovascular diseases | 550 | 726 | 168 | 147 | 19 | 8 | - | - | - | 3 | - | - |
| Cancers | No data | | | | | | | | | | | |
| Chronic Respiratory Conditions | | | | | | | | | | | | |
| Asthma | 1982 | 1925 | 230 | 235 | 49 | 40 | 7 | 16 | 23 | 24 | 104 | 73 |
| Nutritional Conditions | | | | | | | | | | | | |
| Severe acute malnutrition | 354 | 1373 | 77 | 122 | 1 | 2 | 7 | 90 | 6 | 13 | 44 | 527 |
| Anaemia | 3450 | 3131 | 1145 | 1172 | 56 | 38 | 7 | 17 | 300 | 497 | 376 | 292 |
| Mental and Substance Use Disorders | | | | | | | | | | | | |
| Depression | 631 | 867 | 528 | 633 | 1 | - | - | - | - | 3 | 18 | 4 |
| Schizophrenia | 622 | 746 | 611 | 726 | - | 1 | - | - | - | - | - | 1 |
| HIV-related psychosis | 396 | 444 | 97 | 101 | - | - | 17 | 2 | - | 3 | 28 | 23 |
| Anxiety disorders | 203 | 387 | 44 | 26 | 12 | 30 | - | - | 1 | 1 | 15 | 3 |
| Epilepsy | 8304 | 9466 | 3662 | 3893 | 25 | 23 | 78 | 98 | 42 | 81 | 169 | 205 |
| Alcohol abuse | 138 | 172 | 76 | 116 | 13 | 1 | - | - | - | - | 3 | 6 |
| Drug abuse | 37 | 24 | 17 | 16 | 3 | - | 1 | - | - | - | 1 | - |
| Childhood mental disorders | 127 | 131 | 94 | 73 | - | - | 1 | - | - | - | - | 1 |
| Other forms of mental illness | 1065 | 1076 | 800 | 918 | 46 | - | 6 | - | - | - | 27 | 19 |
| Oral/Dental Health | | | | | | | | | | | | |
| Periodontal diseases | 1074 | 1340 | - | 171 | 27 | 48 | - | - | 23 | - | 17 | 13 |
| Tooth extraction | 14,282 | 12895 | 11,879 | 9513 | - | - | - | - | 1 | - | 492 | 1232 |
| Dental filling | 379 | 528 | 121 | 22 | - | - | - | - | - | - | - | - |
| Road Traffic Accidents and Other Injuries | | | | | | | | | | | | |
| Road traffic injuries | 1798 | 2031 | 328 | 418 | 8 | 25 | 17 | 38 | 16 | 2 | 12 | 27 |
| Injuries due to Gender Based Violence (GBV) | 806 | 672 | 12 | 317 | 3 | 3 | 14 | 1 | 7 | - | 21 | - |
| Injuries (trauma due to other causes) | 13457 | 16179 | 3551 | 4999 | 139 | 15 | 89 | 10 | 198 | 379 | 155 | 228 |

| HEALTH CONDITIONS | HOIMA DISTRICT | | HOIMA RRH | | BUHUKA HCIII | | KABAALÉ HCIII | | KASEETA HCIII | | KYANGWALI HCIII | |
|---|----------------|---------|-----------|---------|--------------|---------|---------------|---------|---------------|---------|-----------------|---------|
| | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 |
| Animal bites | 520 | 702 | 144 | 206 | 1 | 1 | 6 | 1 | 1 | 3 | 38 | 42 |
| Snake bites | 283 | 254 | 37 | 56 | 3 | 1 | 2 | 1 | 6 | 1 | 16 | 5 |
| MATERNAL HEALTH | | | | | | | | | | | | |
| Family Planning (FP) | | | | | | | | | | | | |
| Oral contraceptives users | 3371 | 4373 | 217 | 318 | No data | 19 | 160 | No data | 47 | No data | 37 | 32 |
| Male condom users | 3585 | 2607 | 4 | 24 | | 29 | 599 | | 20 | | 207 | 558 |
| Female condom uses | 651 | 514 | - | - | | - | 49 | | - | | - | 2 |
| Injectable contraceptive users | 19949 | 24805 | 958 | 1154 | | 115 | 270 | | 259 | | 431 | 601 |
| Intra-uterine-devices (IUD) users | 1289 | 1187 | 492 | 100 | | - | 2 | | 2 | | 14 | 14 |
| Other FP methods users | 2124 | 2052 | 461 | 582 | | - | - | | 0 | | 123 | 101 |
| Pregnancy-related Conditions | | | | | | | | | | | | |
| Abortions due to GBV | 11 | 32 | - | 27 | - | 2 | - | - | - | - | - | - |
| Abortion due to other causes | 875 | 867 | 225 | 224 | 20 | 13 | 12 | 3 | 13 | 9 | 65 | 56 |
| Malaria in pregnancy | 4,220 | 4610 | 596 | 308 | 44 | 53 | 114 | 195 | 202 | 242 | 197 | 243 |
| Hypertension in pregnancy | 124 | 108 | 1 | - | 10 | - | 19 | - | - | - | - | - |
| Obstructed labour | 121 | 142 | - | 5 | 1 | 1 | - | - | 6 | 11 | 12 | 14 |
| Puerperal sepsis | 183 | 158 | 23 | 14 | 16 | 7 | 2 | - | 6 | - | 11 | 14 |
| Haemorrhage in pregnancy | 120 | 153 | 30 | 33 | 1 | 2 | - | - | 13 | 2 | 8 | 15 |
| Antenatal Care (ANC) | | | | | | | | | | | | |
| ANC 1 st visit | 29914 | 30024 | 4522 | 4380 | No data | 366 | 850 | No data | 1204 | No data | 2153 | 1943 |
| ANC 4 th visit | 7831 | 11230 | 1087 | 2013 | | 51 | 181 | | 197 | | 210 | 365 |
| Total ANC visits (new clients + re-attendances) | 67338 | 75913 | 11423 | 11865 | | 763 | 1456 | | 2338 | | 4068 | 4498 |
| First dose IPT (IPT1) for malaria prophylaxis | 25041 | 24403 | 3740 | 2807 | | 340 | 730 | | 991 | | 1837 | 1728 |
| Second dose IPT (IPT2) for malaria prophylaxis | 22660 | 17379 | 2813 | 2031 | | 231 | 387 | | 515 | | 1035 | 1083 |
| Pregnant women receiving iron/folic acid on ANC visit | 26291 | 22987 | 4142 | 867 | | 406 | 701 | | 916 | | 2370 | 1943 |
| Pregnant women receiving free ITNs | 21280 | 8942 | 2237 | 725 | | - | 615 | | 749 | | 1542 | 812 |
| Pregnant women tested for syphilis | 4147 | 4004 | 271 | - | | - | - | | - | | 1746 | 1931 |
| Pregnant women tested positive for syphilis | 470 | 363 | 6 | - | | - | - | | - | | 256 | 107 |

| HEALTH CONDITIONS | HOIMA DISTRICT | | HOIMA RRH | | BUHUKA HCIII | | KABAALÉ HCIII | | KASEETA HCIII | | KYANGWALI HCIII | |
|---|----------------|---------|-----------|---------|--------------|---------|---------------|---------|---------------|---------|-----------------|---------|
| | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 | 2012/13 | 2013/14 |
| Pregnant women counselled, tested and received HIV test results | 26925 | 28878 | 4715 | 3720 | | 126 | 778 | | 904 | | 2174 | 2179 |
| Pregnant women tested positive for HIV | 1157 | 1144 | 294 | 175 | | 7 | 19 | | 9 | | 69 | 65 |
| Pregnant women given ARVs for PMTCT | 1431 | 176 | 238 | 0 | | 0 | 25 | | 23 | | 199 | 17 |
| Pregnant women on ART For their own health | 312 | 934 | 72 | 208 | | - | 2 | | - | | 25 | 104 |
| Male antenatal partners tested and received HIV results | 3882 | 4272 | 171 | 133 | | - | 17 | | 53 | | 157 | 505 |
| Maternity/Delivery | | | | | | | | | | | | |
| Admissions | 16220 | 18345 | 5603 | 6502 | No data | 113 | 130 | No data | 244 | No data | 1414 | 1747 |
| Deliveries in health facilities | 13443 | 15250 | 4776 | 5606 | | 105 | 118 | | 152 | | 933 | 954 |
| Live births | 12944 | 14417 | 4521 | 5304 | | 102 | 94 | | 149 | | 897 | 937 |
| Live births to HIV positive mothers | 735 | 628 | 308 | 222 | | - | 1 | | 1 | | 43 | 52 |
| Babies born to HIV positive mothers given PMTCT | 669 | 579 | 279 | 174 | | - | 1 | | 1 | | 45 | 53 |
| Birth asphyxia | 561 | 444 | 468 | 358 | | 2 | - | | 2 | | 10 | 2 |
| Babies born with low birth weight | 733 | 646 | 307 | 274 | | - | 2 | | - | | 51 | 60 |
| Still births in health facilities | 375 | 429 | 212 | 283 | | 5 | 12 | | 3 | | 27 | 15 |
| Newborn deaths (0-7days) | 44 | 38 | 10 | - | | - | - | | - | | 13 | 5 |
| Maternal deaths | 25 | 37 | 23 | 34 | | - | - | | - | | - | 1 |
| Deliveries assisted by TBA | 28 | 49 | 11 | 12 | | - | 1 | | - | | - | - |
| CHILD HEALTH | | | | | | | | | | | | |
| Total Children weighed at measles Immunisation | 16936 | 18353 | 2646 | 2198 | No data | 297 | - | No data | 187 | No data | 697 | 2088 |
| Dewormed 1 st dose in the yr | 38442 | 74609 | 1152 | 755 | | 101 | 780 | | 105 | | 2852 | 2548 |
| Dewormed 2 nd dose in the yr | 23862 | 20333 | 191 | 363 | | 50 | 46 | | 17 | | 777 | 232 |
| Overweight (above +3SD line) | 139 | 153 | - | - | | 7 | - | | - | | - | - |
| Underweight (Below -2SD line) | 146 | 226 | 4 | - | | 1 | - | | - | | 1 | - |
| Vit A supp. 1 st dose in the yr | 28176 | 49917 | 1515 | 1502 | | 286 | 875 | | 341 | | 962 | 1458 |
| Vit A supp. 2 nd dose in the yr | 11708 | 16820 | 189 | 592 | | 147 | 96 | | 18 | | 140 | 306 |
| Children fully immunized | 14440 | 17850 | 360 | 68 | | 148 | 179 | | 347 | | 246 | 843 |

12.7 Appendix G: Baseline Socio-demographic and Health Indicators

| Indicators | Year | National (Uganda) | Hoima District |
|---|-----------|-------------------|----------------|
| General Demographics | | | |
| Population (No.) | 2014 | 34,856,813 | 573,903 |
| Population growth rate per annum (%) | 2002-2014 | 3.0 | 4.3 |
| Number of households | 2014 | 7,353,427 | 125,907 |
| Average household size (No.) | 2014 | 4.7 | 4.5 |
| Life expectancy at birth (years) | 2012/13 | 57 | 51.7 |
| Population living in urban areas (%) | 2014 | 18.4 | 18.5 |
| Crude birth rate (%) | 2011 | 42.1 | - |
| Total fertility rate (child per woman) | 2011 | 6.2 | 6.9 |
| Mortality rates | | | |
| Infant mortality rate (per 1000 live births) | 2011 | 54 | 88 |
| Under-5 mortality rate (per 1000 live births) | 2011 | 90 | 85 |
| Maternal mortality ratio (per 100,000 live births) | 2011 | 438 | 437 |
| Gender rates | | | |
| Sex ratio (males per 100 females) | 2014 | 94.5 | 99.8 |
| Proportion of females aged 14-49 years (%) | 2011 | 43.6 | 21.6 |
| Disability rates | | | |
| People living with disability of any form (%) | 2011 | 19 | - |
| Respiratory conditions rates | | | |
| TB prevalence (per 100,000) population | 2013 | 154 | - |
| TB incidence | 2013 | 166 | - |
| Multi-drug resistant TB (% new cases, % retreatment) | 2013 | 1.4, 12 | - |
| HIV and STIs | | | |
| HIV prevalence (% adults 15-49 years) | 2013 | 7.4 | 6.7 |
| Syphilis prevalence (% adults 15-49 years) | 2011 | 2.0 | - |
| Vector-borne conditions | | | |
| Malaria prevalence (% children under-5 years, by RDTs) | 2014 | 30.0 | - |
| Food Security & Nutrition | | | |
| Food security index score (%) | 2015 | 42.8 | N/A |
| Stunting prevalence (moderate & severe) | 2011 | 33.4 | 26.8 |
| Wasting prevalence | 2011 | 4.7 | 8.5 |
| Underweight prevalence (moderate & severe) | 2011 | 13.8 | 19.5 |
| Anaemia prevalence (% children under-5 with haemoglobin <11g/dl) | 2011 | 49.3 | - |
| Water & Sanitation | | | |
| Population with access to safe drinking water (%) | 2011 | 70.0 | 74.2 |
| Population with access to any form of sanitation facility (%) | 2011 | 86.8 | 71.0 |
| Population with access to improved sanitation facility (%) | 2011 | 18.7 | - |
| Maternal Health | | | |
| Contraceptive prevalence (% current married women) | 2011 | 26.0 | - |
| Proportion of pregnant women receiving antenatal care from a skilled provider (%) | 2011 | 95.0 | - |
| Proportion of deliveries (child births) occurring at a health facility (%) | 2011 | 57.4 | - |

| Indicators | Year | National (Uganda) | Hoima District |
|--|-------------|--------------------------|-----------------------|
| Proportion of deliveries (child births) assisted by a skilled provider (%) | 2011 | 58.0 | - |
| Vaccination Coverage (% of target children) | | | |
| Full vaccination (by 12 months of age) | 2011 | 40.3 | - |
| BCG | 2013/14 | 82.0 | 87.2 |
| DPT3 | 2013/14 | 78.0 | 85.0 |
| Polio3 | 2013/14 | 82.0 | 92.0 |
| Measles | 2013/14 | 82.0 | 79.0 |