Mining Health Programs in Papua New Guinea

Lessons Learned to Inform Good Practice

Submitted to AusAID by Mining Health Initiative
(Montrose and Health Partners International)
June 2013

CONTENTS

Contents 2

List of Acronyms 4

List of Tables 6

List of Figures 6

Executive Summary 7

1 Introduction 9
- 1.1 Background and context 9
- 1.2 Risks and opportunities linking mining and health 9

2 Overview of mining in PNG 10

3 Overview of health in PNG 12
- 3.1 Overview 12
- 3.2 Key issues and challenges faced by the health sector 13

4 Governance and regulatory framework 15
- 4.1 Institutional infrastructure 15
- 4.2 The health and mining regulatory frameworks 15
  - 4.2.1 Overall direction 15
  - 4.2.2 Key laws and regulations 16
- 4.3 Governance of mining revenue 18
  - 4.3.1 Royalties 18
  - 4.3.2 Taxes 18
  - 4.3.3 Tax Credit Scheme 18
  - 4.3.4 Sovereign Wealth Fund 19
  - 4.3.5 Extractive Industry Transparency Initiative 19
- 4.4 Stakeholder consultation and coordination 20
  - 4.4.1 Mine approval and the development forum process 20
  - 4.4.2 Agreements 21
- 4.5 Decentralisation to Provincial Level 21
- 4.6 Challenges in implementing the regulatory framework 21
  - 4.6.1 Out-dated regulatory framework 21
  - 4.6.2 Roles, responsibilities and capacity of provincial and local government 22
  - 4.6.3 MRA capacity constraints 23
  - 4.6.4 Buy-in from other government departments 23
  - 4.6.5 Lack of standard procedures and guidelines 23
  - 4.6.6 Lack of NDOH involvement 23
  - 4.6.7 Mismatch between legal commitments and budgetary space 24
  - 4.6.8 Limits on use of Sovereign Wealth Fund resources 24
  - 4.6.9 Regulation of small-scale mining 24

5 Mining health programming in practice 26
- 5.1 Reasons for investing in health 27
- 5.2 Assessment, planning and financing 28
  - 5.2.1 Health needs and impact assessment 28
  - 5.2.2 Planning 29
  - 5.2.3 Financing 30
- 5.3 Stakeholder consultation and coordination 30
  - 5.3.1 Stakeholder consultation 30

5.3.2 Coordination 31
5.4 Partnerships 32
5.5 Provincial and Local Government 33
5.6 Monitoring progress and evaluating impact 35
5.7 Exit strategies and sustainability 36
6 Lessons learned and recommendations 38
6.1 Lessons learned 38
6.1.1 Program design 38
6.1.2 Sustainability 39
6.1.3 Key challenges 39
6.1.4 Opportunities 40
6.2 Recommendations 41
7 Bibliography 43
8 Annexes 48
8.1 Annex 1. List of individuals contacted 48
8.2 Annex 2. Case study summary – Ok Tedi 50
8.3 Annex 3. Case study summary – Lihir Gold Mine 60
8.4 Annex 4. Additional information on governance and regulatory Issues 69
8.5 Annex 5. Other health mining programs and partnerships in PNG 72

LIST OF ACRONYMS

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
BCL	Bougainville Copper Limited
CHW	Community Health Workers
CHS	Christian Health Services
CSR	Corporate Social Responsibility
DHO	District Health Office
DHS	Demographic Health Survey
DNP&M	Department of National Planning and Monitoring
DOM	Department of Mining
DMPGM	Department of Mineral Policy and Geohazard Management
DOPE	Department of Petroleum and Energy
DSP	PNG Development Strategic Plan 2010-2030
DOTS	Directly Observed Treatment (of TB)
DWU	Divine World University
ECPNG	Evangelical Church of PNG
EITI	Extractive Industries Transparency Initiative
GDP	Gross Domestic Product
HANSHEP	Harnessing non-State Actors for Better Health for the Poor
HIV	Human Immunodeficiency Virus
HRMIS	Human Resource Management Information Systems
ICC	Implementation Coordination Committee
KRA	Key Results Area
IMR	Infant Mortality Rate
JDP&BPC	Joint District Planning and Budget Priorities Committee
JPP&BPC	Joint Provincial Planning and Budget Priorities Committee
LGL	Lihir Gold Limited
LICHP	Lihir Integrated Community Health Plan
LMALA	Lihir Mine Area Landowners Association
LMC	Lihir Medical Centre
LNG	Liquefied Natural Gas
LSDHS	Lihir Social and Demographic Health Survey
MHI	Mining Health Initiative
MMR	Maternal Mortality Rate
MMV	Medicines for Malaria Venture
MOA	Memorandum of Agreement
MRA	Mineral Resources Authority
MTDP	Medium Term Development Plan
NDOH	National Department of Health
NFHSDP	North Fly Health Sector Development Program
NHP	National Health Plan 2011-2020
NRLLG	Nimamar Rural Local Government
OTDF	Ok Tedi Development Foundation
OTFRDP	Ok Tedi Fly River Development Program
OTML	Ok Tedi Mining Limited
PHA	Provincial Health Authority
PHT	Public Health Team
PNG	Papua New Guinea
PNG-LNG	Papua New Guinea Liquefied Natural Gas Project
PNGSDP	Papua New Guinea Sustainable Development Program Limited
PPP	Public-Private Partnerships

SSG	Special Support Grants
STI	Sexually Transmitted Infection
TB	Tuberculosis
TCS	Tax Credit Scheme
WHO	World Health Organization
WPHSC	Western Provincial Health Steering Committee

LIST OF TABLES

Table 1: Mining-induced health risks 10
Table 2: Key authorities and their responsibilities 15
Table 3: Key laws, policies and strategies relevant to mining health PPPs 16
Table 4: Agreement types and parties involved 21
Table 5: Overview of mines with health PPPs in PNG 26

LIST OF FIGURES

Figure 1: Map of key mining projects in PNG 11
Figure 2: Overview of health policy and planning in PNG 13

EXECUTIVE SUMMARY

In Papua New Guinea (PNG), mining operations play an important role in social and economic development. Nevertheless, there is a generalised view that the social programs supported by mining companies, including health programs, have yet to realise their full potential in terms of both process and impact. At the same time as mining companies are keen to maximise their return on investment in health programs, both in terms of health impact and community goodwill, the Government is keen to maximise the benefits of investments in the health sector; and landowners as well as wider communities consistently point to areas in which their expectations for better health may be realised.

In this context, and following a similar exercise in Sub-Saharan Africa, the Mining Health Initiative was commissioned to analyse the legal and regulatory framework for mining health partnerships in PNG and document lessons learned in mining health programs on the ground. This document synthesises the findings generated in the process of conducting a literature review; consultations with a wide range of stakeholders; and case studies of the Ok Tedi Mine in Western Province and Lihir Gold Mine in New Ireland Province. The document identifies lessons learned and provides specific recommendations to government, development partners and mining companies.

The document is divided into two main parts: The first part provides an overview of PNG's legal and regulatory framework for mining and discusses issues and challenges in its conception and implementation. A number of institutions, laws and policies exist that quite comprehensively cover mining health partnerships. However, the regulatory framework is out-dated; the Mineral Resources Authority suffers from capacity constraints; the National Department of Health (NDOH) is insufficiently involved; and provincial and local governments largely lack the capacity to perform their important stewardship role over the health sector.

In order to facilitate an understanding of mining health programs and partnerships in PNG, the second part of the document describes and analyses mining health program practice, including assessment, planning and financing of health programs; stakeholder consultation and coordination; identification, engagement and management of partnerships; the actual role of provincial and local government vis-à-vis their theoretical role; progress and impact monitoring; as well as exit strategies and sustainability.

Practice lessons are drawn particularly from the Ok Tedi and Lihir Gold Mine health programs, as well as from the recently-completed Enclaves Project. Key lessons learned include the following:

Program design: Most major mining operations in PNG are associated with significant health programs. These mining health programs are fairly complex, encompassing a myriad of agreements, institutional arrangements and partner organisations. They appear to have organically grown over the life of the mine, responding to a mix of legal obligations, strategic planning, opportunity and necessity. In terms of design, health system strengthening is not sufficiently prioritised. Moreover, program design would benefit from a strengthened focus on evidence and analysis.

Sustainability: With a relatively long time horizon, sustainability and exit strategies do not appear to be strategically and systematically considered from the outset in program design. This may be why, for example, government-run health services are substituted and sometimes weakened through the provision of mine-financed health services, without this being explicitly recognised and addressed in sufficient time before anticipated mine closure. Nevertheless, a number of mechanisms, such as mining health foundations and capacity support, are employed with the aim of ensuring sustainability. While improvements were made recently, efforts to systematically collect, analyse and share health-related data among mining health partners have so far been insufficient, thus increasing the risk of programmatic inefficiency, error and duplication.

Challenges: Coordination of mining health partners and other stakeholders has been a key challenge, relating also to a lack of clarity in regard to partners' roles and responsibilities. Moreover, a key challenge for, and potentially cause of, weak coordination has been the government's inability to fully assume its important leadership and stewardship role of the health sector. A pessimistic view of government capacity, whether justified or not, appears to have exacerbated this situation, causing underinvestment in provincial and district government administration and management capacity.

Opportunities: Despite the many challenges, mining health programs in PNG are having a positive effect, largely avoiding long-term negative health impacts associated with mining and creating improved health outcomes. The strength of landholders and other communities is a key opportunity in terms of civic participation and understanding needs and wants on the ground. There is also an underutilised opportunity to more actively engage communities in health promotion and preventive activities, for example through the village health committee system. Moreover, the NDOH has indicated an interest in becoming more involved in terms of stewardship and policy guidance to health partnerships, and enhanced NDOH engagement in mine approval and tax credit scheme processes is a key opportunity. Last but not least, the fact that a number of new mining projects are coming online soon and likely to increase the international spotlight on PNG is an opportunity for the government and other key players to demonstrate political commitment.

Finally, a number of recommendations are made to specific stakeholders, particularly the National Department of Health, the Department of National Planning and Monitoring, the Department of Mineral Policy and Geohazard Management, the Mineral Resources Authority and development partners. Recommendations concern policy alignment; governance and regulation; capacity building; partnership and program design; and evidence, data sharing and future assessments.

A list of all stakeholders consulted, summaries of the two case studies, additional information on governance and regulatory issues and an overview of other mining health programs and partnerships in PNG are provided in the Annex.

1 INTRODUCTION

1.1 *Background and context*

Given its important share in Papua New Guinea (PNG)'s gross domestic product (GDP), the mining industry is in a position to contribute significantly to improving health service delivery and sustainable development in the country. The mining industry's growing awareness of the importance of investing in health coincides with, and may be linked to, a growing global interest in public-private partnerships (PPP) for health and generally growing business involvement in development.[1] An increasing number of governments and development stakeholders are keen to explore contracting approaches as well as less formal partnerships with non-state actors to complement and support healthcare delivered by the public sector.

Besides being an important provider of health services, the public sector also has an essential stewardship role to play in setting the framework for mining health programs both inside and outside the fence.[2] Mining health partnerships are a key vehicle for maximising health outcomes and, when designed and managed appropriately, strengthen national health systems, while improving company productivity and community relations at the same time.

Aiming to identify and promote good practice, and complementing the findings and outputs of a similar initiative in Sub-Saharan Africa, including a Good Practice Guide on Partnering for Effective Mining Health Programming, AusAID, on behalf of the HANSHEP Group,[3] has commissioned an initiative to document lessons learned in PNG. This document is the principal output of this initiative. The lessons presented were identified in a literature review, during stakeholder consultations as well as in case studies at the Ok Tedi Mine in Western Province and Newcrest's Gold Mine in the Lihir Islands, New Ireland Province.

This document aims to inform government actors, development partners, civil society as well as mining industry of the relevant governance and regulatory framework and provide insights into current practice of health programming and partnership by mining companies in PNG, deriving lessons learned to guide the design of current and future mining health programs and relevant regulatory frameworks.

1.2 *Risks and opportunities linking mining and health*

In developing countries such as PNG, mining companies tend to operate in areas where resources are constrained and poverty is widespread. When a mining company moves into an underserved area, it brings a number of opportunities as well as risks and challenges with it. Opportunities include employment prospects for the local population, improved infrastructure and strengthening of the local economy, all of which are important social determinants of health.[4]Risks and challenges include negative environmental impact and impact on quality of life, accelerated inflation and concerns related to an unequal distribution of the economic benefits arising from mining operations, which, in some cases, has been linked to violent conflict.

In remote rural areas of PNG, where most mining companies operate, access to health services is typically limited, service quality weak and health outcomes are therefore poor. Adding to already existing challenges in regard to health, the presence of mining companies is associated with increased health risks. These are outlined in Table 1 below:

---

[1] See for example Lucci, P. (2012).

[2]Mining companies often distinguish between 'inside the fence' programs focusing on employees and occupational health as well as 'outside the fence' programs, which focus on communities and wider public health. This distinction is not always clear as not all mining health programs neatly fit these categories

[3] HANSHEP (Harnessing Non-State Actors for Better Health for the Poor) is a group of development agencies comprising the Rockefeller and Bill and Melinda Gates Foundations, along with AusAID, DFID, IFC, KfW, USAID and the World Bank. HANSHEP was established in 2010 with the aim of working with non-state actors in delivering better healthcare for the poor.

[4] For more information on social determinants of health see WHO website http://www.who.int/social_determinants/en/

Risks	Examples
Employment-related health risks	Exposure to hazardous working conditions, noise, etc., lifestyle changes e.g. decreased physical activity.
Epidemiological changes related to the influx of people	Increased or accelerated transmission of infectious diseases such as HIV/AIDS, STDs, TB or malaria
Epidemiological changes related to mining operations themselves	Increase in malaria in areas of wetland mining due to increase in breeding sites
Direct impact of population influx	Increased demands on health system, thus lowering quality of service
Indirect impact of population influx	Loss of clean water sources, increased waste management issues, excess demand for water, increased alcohol and drug abuse, sex work and violence

Table 1: Mining-induced health risks

At the same time as there are risks and challenges, there is evidence that improved economic opportunities created through mining activities can lead to improvements in general health in PNG.[5] Systematic, consistent and visible support to both employee and wider public health can:

- Help avoid, mitigate or offset potential negative health impacts of mining activities
- Improve the health of the company's workforce by reducing risks of transmission, thus raising productivity and lowering healthcare costs inside the fence
- Improve the health of potential employees and contractors, thus facilitating recruitment and collaboration
- Improve public and community relations
- Build social capital and ensure the social license to operate
- Fill local gaps in service provision and improve stakeholder capacity to provide services

2 OVERVIEW OF MINING IN PNG

PNG enjoys a significant natural resource base that includes oil, gas, gold, silver, copper, timber as well as other resources, accounting for a significant share of the country's GDP, exports and government tax revenues. Mineral extraction has been named the "backbone" of PNG's economy.

The country's potential mineral wealth is so vast that nearly the entire territory is covered with mining permits. In 2011, 78.6 percent of the country's landmass was permitted for mining activity of some degree, according to the Mineral Resource Authority (MRA). This includes 16.9 percent for current mining permits, 5.2 percent for renewals and a further 56.5 percent for those in the application stage.[6]

In early 2012 there were nine active mines operating in the country, all of which focus primarily on precious metal extraction, with three large mines dominating: the Ok Tedi copper and gold mine located in Western Province; the Porgera gold mine in Enga Province and the Lihir gold mine in New Ireland Province. Mining in PNG has been dominated by gold mining.[7]The map below provides an overview of existing and potential mines in PNG.[8]

---

[5]For example, studies have shown improved nutrition outcomes in communities benefiting most from mine economic opportunities in Papua New Guinea. For more information see Ulijaszek, S. et al (1989). The Ok Tedi Health and Nutrition Project, Papua New Guinea: adult physique of three populations in the North Fly region. Ann Hum Biol. 1989 Jan-Feb; 16(1): 61-74.

[6] Oxford Business Group (2012). The Report – Papua New Guinea 2012. Available online at http://www.oxfordbusinessgroup.com/country/Papua%20New%20Guinea

[7]Additional mines drawn from the literature are listed in Annex 5

[8] Map downloaded from http://www.pngchamberminpet.com.pg/images/minprojects_2010.jpg.JPG on 22 March 2013

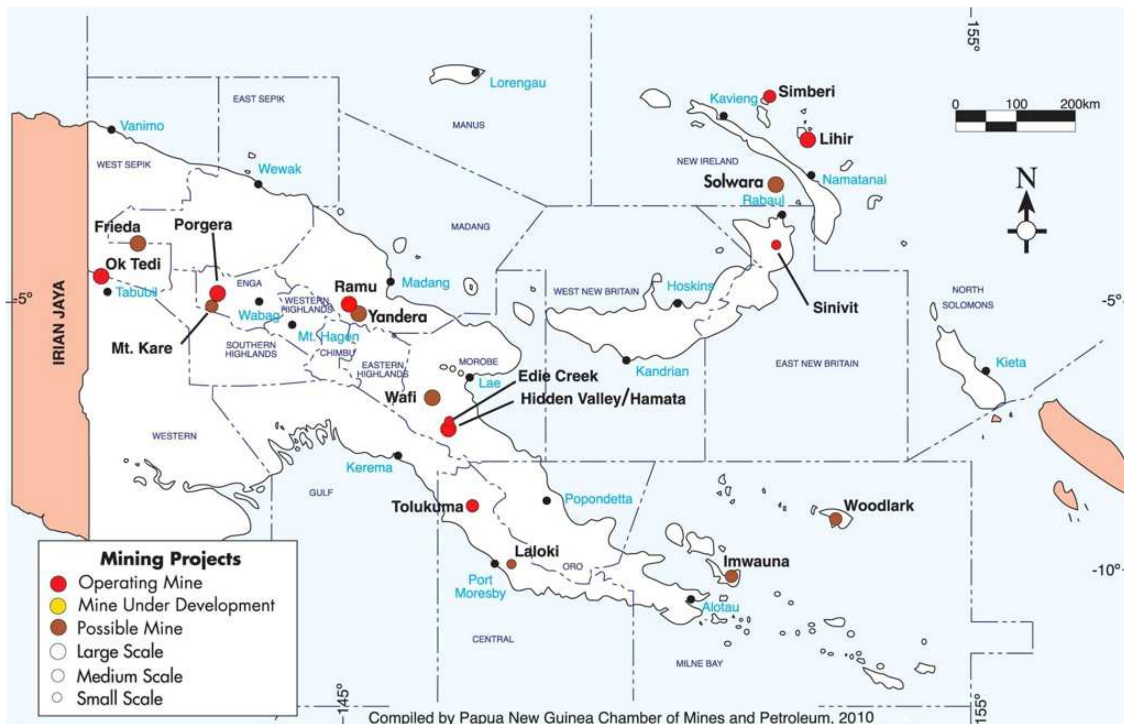


Figure 1: Map of key mining projects in PNG

In addition to existing projects, a large-scale deep-sea offshore mining project is currently being developed. It is the first of its kind globally and has the potential to change global dynamics of the mining industry. Given the potential of deep-sea offshore mining to make some onshore mines uneconomic, as the quality and grade of the commodities in PNG waters are far superior to those in its onshore mines, significant international attention is expected.[9]

PNG's GDP has increased from $5.6 billion in 2006 to $12.7 billion in 2011 – a nominal increase of 127 percent – and is expected to increase to $18.2 billion by 2014, i.e. by another 43 percent. This increase is partly associated with the PNG-LNG operation (led by ExxonMobil) which is expected to catalyse a doubling of the country's GDP within 5 years.[10]

In real terms, growth has also accelerated since 2006, peaking at 9 percent in 2011. Growth is predicted to slow as construction of the PNG-LNG project is completed.[11] GDP growth has been driven by the extractive industries both directly as well as indirectly through spillovers into other sectors of the economy, particularly construction, telecommunications and wholesale and retail trade.

The government anticipates two additional LNG projects and four new major mines by 2015, in addition to the existing eight major mines currently operating in the country. Despite mineral deposits accounting for almost two-thirds of PNG's export earnings,[12]contributions by the extractive sector to the Government of PNG's revenue streams are volatile. It is clear that while mining and petroleum are very significantly contributing to the PNG economy, there is some uncertainty as to the exact weight and impact of these sectors and their contribution to government revenue in the future, and indeed whether and how such revenue will be used for the country's development.

[9] Oxford Business Group (2012). The Report – Papua New Guinea 2012.
[10]Department of National Planning and Monitoring (2010).Papua New Guinea Medium Term Development Plan.pp. 14.
[11]The project is about 70 percent completed and is reported to be on schedule for production to come on stream in 2014.
[12]CIA World Factbook (2013).Accessed on 26 March 2013 at https://www.cia.gov/library/publications/the-world-factbook/geos/pp.html.

3 OVERVIEW OF HEALTH IN PNG

3.1 Overview

Papua New Guinea is unlikely to meet any of the Millennium Development Goals by 2015.[13] The 2010 National Health Plan notes that progress has been either minimal or absent. Some health indicators have even deteriorated vis-à-vis several decades ago. In 2006, the maternal mortality rate (MMR) stood at 773 maternal deaths per 100,000 live births, one of the highest MMR ever recorded in a Demographic Health Survey anywhere.[14]Today, the World Health Organization (WHO) reports an under-five mortality rate of 61 (per 1,000 live births) and an MMR of 230 (per 100,000 live births).Obstetric haemorrhage is the main medical case and unsafe abortion a key risk factor in maternal mortality in PNG. Premature birth and pneumonia are the two most common causes for children to die before the age of five. Malaria, a disease against which only poor progress has been made in PNG, accounts for ten percent of child deaths. HIV prevalence is at 0.9 percent but possibly rising.[15]

PNG's health system is relatively weak and public facilities are under-resourced, understaffed and lack reliable provision of essential drugs and medical supplies. Government-owned health facilities account for approximately 50 percent of ambulatory care and are managed by provincial governments; the remaining half is managed by church health authorities. The church health system is directly financed by the National Department of Health (NDOH). The NDOH is also responsible for the oversight of hospitals - one in each province, managed by an independent board - and for the purchase and distribution of pharmaceutical supplies to the provincial capitals for all publically-financed health institutions. Provincial governments have a system of district and sub-district offices through which they manage the government system and they coordinate with church authorities within their districts and sub-districts.

The chart below provides an overview of PNG's health system as it relates to policy and planning at national, provincial and district level[16]:

[13]Asian Development Bank (2011). Papua New Guinea: Facilitating public-private partnerships. Technical Assistance Report. pp. 1
[14]Government of Papua New Guinea (2010). National Health Plan 2011 – 2020. pp. 10
[15]WHO (2012). Papua New Guinea: Country Health Profile. Available for download at http://www.who.int/countries/png/en/
[16]Government of Papua New Guinea (2010). National Health Plan 2011 – 2020. P 17.

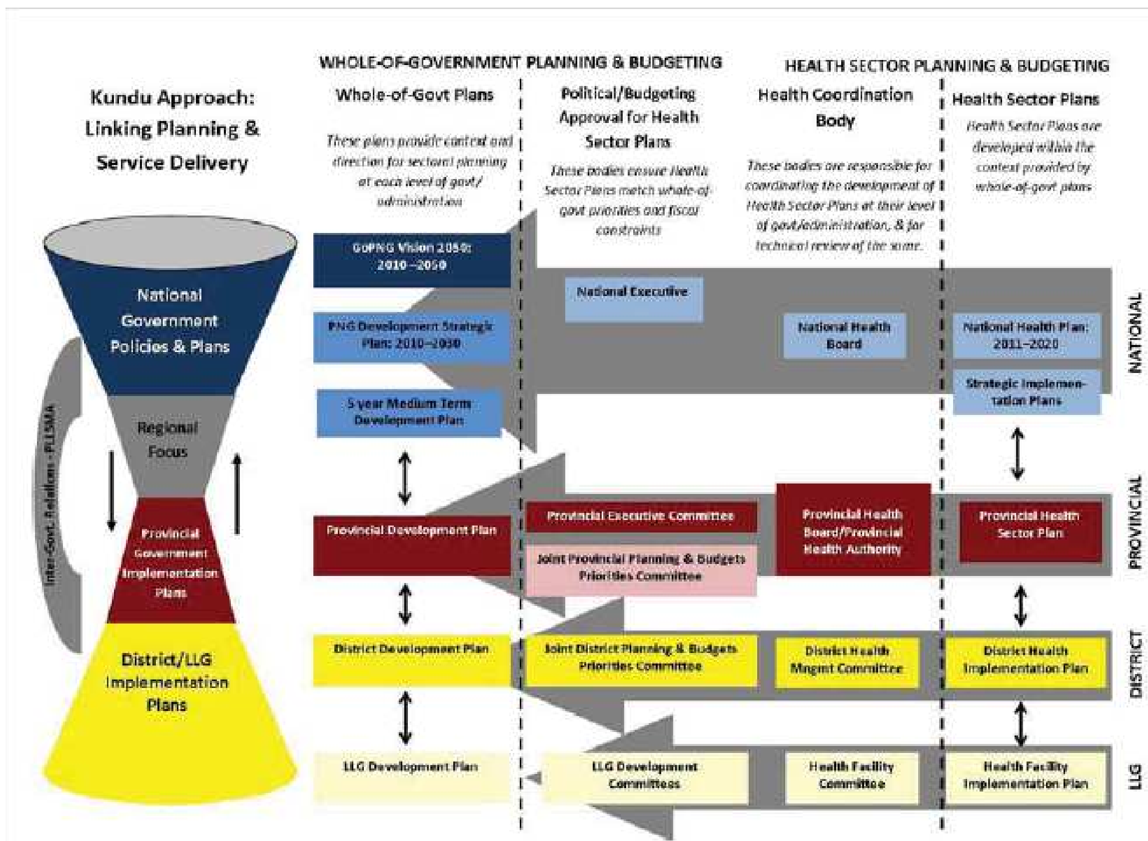


Figure 2: Overview of health policy and planning in PNG

The private health sector is small but growing, currently largely restricted to enclave development sites, such as mine sites and plantations, as well as major urban areas. One estimate is that the private sector accounts for 10-15 percent of total direct service delivery staff in PNG.[17]

3.2 Key issues and challenges faced by the health sector

Underlying issues and challenges that explain the poor health indicators mentioned above include:[18]

1. **Physical barriers to access and delivery of health services:** Difficult terrain and the lack of road infrastructure and transport present logistical challenges, and contribute to the high cost of delivering services. This hinders patient referrals, outreach and supervisory visits. Persistent law and order problems discourage health workers from taking on assignments and lead to the closure of health facilities. These issues create barriers for the rural majority in accessing services.

2. **Health funds not reaching frontline service delivery:** PNG is highly decentralised, with provinces granted considerable autonomy. Central government has little direct control over the proportion of budget allocated to health at lower levels of government, or of alignment with national policies. Planning systems are complex, not well integrated and are exacerbated by parallel donor systems. Despite increases in provincial health budgets there is still not enough to cover the total cost of a minimum level of rural health services. Bottlenecks at each point of the system result in delays and uneven spending patterns. Provinces continue to prioritise funding health administration over service delivery but nevertheless record underspends each year.

[17]World Bank (forthcoming). Papua New Guinea Human Resources for Health Review: Meeting Human Resource Constraints and Improving Health Outcomes.
[18]This analysis was done employing AusAID's PNG Health Sector Analytical Framework

3. **Stock outs of medical supplies:** National procurement processes are hampered by corruption and lack transparency and competition in tendering and awarding of contracts. Expensive but poor quality medical supplies are often supplied to provincial area medical stores and not stored properly, leading to waste. At the provincial level, the 'pull' system, i.e. ordering based on need, has proven too complex to manage and is chronically underfunded. Those health facilities that can afford to independently purchase medical supplies pay a significantly inflated price.

4. **Deteriorating infrastructure:** Decades of low prioritisation of maintenance have contributed to chronic neglect of infrastructure. Health facilities commonly lack a consistent supply of clean running water, adequate sanitation, lighting and basic equipment. Rather than rehabilitation of existing facilities, new facilities are often built in new locations. Insufficient and inadequate housing, and concerns about employment conditions, further erode the motivation of many staff.

5. **Health worker shortage:** PNG's health worker density is estimated to be 0.58 per 1,000 population, which is significantly below the WHO-defined minimum threshold of 2.3 per 1,000. Moreover, more than half of health workers are approaching retiring age in the next decade, and qualified medical staff are attracted from the public to private sector owing to better remuneration and working conditions. Critical cadres such as midwives and community health workers are particularly scarce, and there is insufficient capacity within training facilities to produce the number and quality of health workers needed.

6. **Lack of clarity on roles and responsibilities affects service quality:** Many health staff lack clarity regarding their roles, rights and responsibilities. Inadequate reporting lines exist between facilities, provincial health managers and the provincial administrator. At the district level, poor quality and infrequent supervisions are a major barrier to improving health outcomes, requiring greater emphasis on monitoring, mentoring and links with training.

7. **Communities fail to utilise health services:** Due to funding constraints, most facilities charge user fees, which discourages poorer individuals from utilising services. Cultural beliefs in magic as the cause of disease sometimes lead to ostracising of individuals with tuberculosis and neglect of community responsibilities for maternal health and hygiene practices. Low service utilisation is also linked to underlying social determinants, such as low levels of education and literacy; the low status of women in society; lacking access to water and sanitation; etc.

4 GOVERNANCE AND REGULATORY FRAMEWORK

The theoretical role and actual practice of the mining industry in health service provision in PNG is influenced and impacted by the regulatory and governance framework overseeing the extractive industry, the health sector and PPPs in public service provision. Understanding specific mining health interventions therefore requires an understanding of the regulatory and governance framework in which these interventions function.

This section provides an overview of PNG's governance and regulatory framework as it relates to mining health partnerships. Besides outlining the institutional infrastructure as well as key policies and laws that govern mining, health and PPPs, mechanisms for stakeholder coordination and democratic governance are described and key issues in implementing the governance and regulatory framework outlined.

4.1 Institutional infrastructure

Since 2007, five main government authorities have been involved in regulating the mining and petroleum sector. Their responsibilities are summarised in the table below:

Authority	Responsibilities
Department of Environment and Conservation	• Environmental policy and regulation • Environmental monitoring and enforcement of social and environmental safeguards and compliance criteria for all sectors, including minerals and petroleum • Implementing Code of Practice for Mining
Department of National Planning & Monitoring	• Review and approval of Tax Credit Scheme proposals
Department of Mineral Policy and Geohazard Management	• Minerals policy and legislation • Monitoring of volcanic and earthquake-related risks
Department of Petroleum und Energy	• Licensing, monitoring and enforcement of licence and contract conditions for petroleum-related projects, including health and safety
Internal Revenue Commission	• Income tax collection and enforcement, including specific arrangements for minerals and petroleum
Mineral Resources Authority	• Licensing, monitoring and enforcement of licence and contract conditions for mining, including health and safety

Table 2: Key authorities and their responsibilities

From an operational perspective, the Mineral Resources Authority (MRA) is the primary regulatory and monitoring body for the mining industry. It has both a technical role as well as an administrative role relating to management of the mining sector, including specific project agreements. For example, the MRA is responsible for licensing, monitoring and enforcing license and contract conditions for mining, including health and safety. MRA responsibilities also include negotiating mining development contracts and Memoranda of Agreement, thus involving coordination and development facilitation.[19]

4.2 The health and mining regulatory frameworks

4.2.1 Overall direction

Overall, the Government of PNG strategy for large-scale mining is to encourage private sector-led mining development so that the resources generated through increased exports and taxes can support social and economic development. It is emphasised that mining should be socially and environmentally sustainable, including at the local level where focus is on:

- establishing improved linkages to the local economy;
- improved benefit sharing, e.g. for health;

[19] For more information on the MRA see Annex 4.

- risk mitigation, particularly as regards environmental risks for local communities and land owners.

In other words, an explicit link is drawn between mining and development. This is reflected to an extent in most relevant pieces of legislation as well as policy and strategy documents.

4.2.2 Key laws and regulations

Papua New Guinea has a common law legal system. Laws affecting mining are made by the National Parliament, a single-chamber, democratically elected legislature of 109 members.

There are a number of national laws, policies and strategic plans which influence how mining PPPs in health are structured and governed. Regulation affects the development and scope of mining companies' approaches to addressing their corporate social responsibility as well as their approach to health of both employees and communities more generally.

Mining in PNG is regulated at the national level. The regulatory framework for mining is currently under review (see Section 4.6.1 for more detail).[20]

Table 3 provides an overview of PNG's laws, policies and strategic plans relating to development, health and public-private partnership which are relevant when it comes to mining partnerships for health. Some of these are described in more detail below in as far as they contain stipulations that are particularly relevant for mining health PPPs.

Key laws, policies and strategic plans	
Mining	• Mining Act 1967 (Bougainville Copper Agreement) • Mining Act 1992 • Mining Safety Act 1977 • Mineral Resource Authority Act 2005 • Mining Development Act • Mining (Ok Tedi Agreement) Act 1976 (as amended and supplemented)
Development	• Vision 2050 • Medium Term Development Plan 2011 – 2015 • PNG Development Strategic Plan 2010 – 2030
Health	• PNG National Health Plan 2011 – 2020 • National Health Act
Public Private Partnership	• National Public Private Partnership Policy • Public Private Partnership Act 2010

Table 3: Key laws, policies and strategies relevant to mining health PPPs

Mining Act

PNG's principal Act related to mining is the Mining Act 1992 and regulations made under that Act.[21]Within the framework of 1992 Mining Act, PNG established the Development Forum for stakeholder consultation on project approval, for example.[22]

Overall, the role of mining companies in the financing and provision of health services has expanded significantly over time. While mining companies were originally focused on meeting employee health needs, various cost-sharing agreements have been developed since to ensure employee dependants and the wider community also have access to health services. The Mining Act has been influential in continuing the tradition for mining companies to focus on construction of a new hospital or health centre in their impact areas. For instance, companies and Government may share capital costs for purpose-built company health facilities in return for having those facilities opened to the public. In some cases, such as in the

[20] Oxford Business group (2012). The Report – Papua New Guinea 2012.
[21] Law Business Research (2011).Mining 2011. Available for download at http://www.gettingthedealthrough.com/books/updates/article/28421/
[22] This process applies to companies seeking a 'Special Mining Lease' which is issue for large-scale mining operations.

LihirGold mine and Ok Tedi mine, Government has also contributed to the recurrent costs of these facilities where they were opened to the general public.[23]

Medium Term Development Plan 2011 – 2015

The PNG Medium Term Development Plan (MTDP) 2011 - 2015 provides an overall perspective on development objectives. The MTDP specifically requests private companies to conduct development activities through PPPs rather than through independent private development initiatives. As for health service provision, the MTDP emphasises the history of and potential for PPPs as infrastructure providers, rather than service providers. This may be seen as a natural focus given that infrastructure is a major area of unmet need in the country.[24] The Government considers partnerships with the private sector, churches, as well as other groups as fundamental to achieving progress in health.[25]

National Public Private Partnership Policy

The 2008 National Public Private Partnership Policy is highlighted by the MTDP as a key instrument to promote public-private partnerships. The main goal of the Policy is to provide a formal, transparent and predictable process for evaluating and processing PPP projects, reducing the risks and costs to private companies. The PPP Policy is backed by a 2010 PPP Act (draft), the main purpose of which is "to provide for the procurement and delivery of infrastructure facilities and services through public private partnership (PPP) arrangements".[26,27]

Specific objectives of the PPP Policy are to:

- Support the achievement of development plans and strategies, specifically related to infrastructure and access to public services
- Increase efficiency, quality and innovation in infrastructure service delivery
- Capitalise on the private sector's operational and logistics capacity for infrastructure projects
- Manage risks associated with large projects
- Benefit from capacity development and transfer of knowledge and skills between all partners[28,29]

National Health Plan 2011 – 2020

The health sector's overall guiding document in PNG is the National Health Plan 2011 – 2020 (NHP). Building on the vision of the MTDP in terms of health services provision and health outcomes, the NHP 2011 – 2020 sets out eight Key Result Areas (KRAs) for the health sector. It also defines a 'back to basics' approach, focusing on increased health service coverage in rural areas with emphasis on child and maternal health and key infectious diseases, including malaria and HIV.

Strengthening partnerships and coordination with stakeholders is one of the KRAs. Under this KRA, emphasis is placed on implementing the PPP Policy and introducing "innovative and cost-effective options for delivering services". Special reference is made to establishing PPPs with relevant major mining ventures.[30] Increased use of PPPs and outsourcing and the need for ensuring effective monitoring and coordination mechanisms for these PPPs are also mentioned. The NHP is underpinned by the Health Act, which delineates the role of the National Department of Health in the stewardship of the health system overall.[31]

---

[23] For additional information on the Mining Act see Annex 4 as well as the section regarding the development forum process below.

[24] Asian Development Bank (2011). Papua New Guinea: Facilitating public-private partnerships. Technical Assistance Report. pp. 1

[25] Department of National Planning and Monitoring (2010).Papua New Guinea Medium Term Development Plan. pp. 170

[26] Government of Papua New Guinea (2010). Public Private Partnership Act 2010(Draft).

[27] Papua New Guinea Institute of National Affairs (2011).Draft Public Private Partnership Bill – Explanatory Notes.

[28] It should be noted that the main focus of the PPP Policy are service and infrastructure projects worth K50 million or more and thus not necessarily the types of mining health partnerships discussed in this document.

[29] For additional information on PPP as a national priority see Annex 4.

[30] Government of Papua New Guinea (2010). National Health Plan 2011 – 2020. p. 22

[31] For additional information on the NHP see Annex 4.

4.3 Governance of mining revenue

Mining companies contribute to government revenue through royalties and taxes in particular. At the same time, there is a Tax Credit Scheme that facilitates development of public infrastructure. Several mechanisms, such as the Sovereign Wealth Fund and the Extractive Industry Transparency Initiative, exist to maximise transparency and long-term benefits arising from mining revenues.

4.3.1 Royalties

A royalty of two percent is payable on gross revenue from natural resource sales. All mining operations in PNG make royalty payments to the provincial governments, and in some cases to the landowners, where they operate. These monies are directed to various development initiatives in a manner unique to each mine. Each mine negotiates an agreement with the provincial authorities and relevant stakeholders at the Development Forum[32] seeking to establish the roles and responsibilities of the mining company, the government and local stakeholders, notably landowners and their associations, vis-à-vis mine revenues, royalties and local development needs and objectives.[33]

4.3.2 Taxes

Tax is imposed on a project-by-project basis (i.e. ring-fenced) and tax exemptions and incentives may be negotiated on this basis. The basic tax rate is 30 percent for income from mining for residents and 40 percent for non-resident companies. Resident companies are liable to dividend withholding tax of 17 percent on dividends, reduced to 10percent for dividends out of mining income.[34] Recent mining projects have received tax holidays, exemptions from import duties and other tax concessions. The mining sector enjoys the benefit of special provisions granting allowable deductions for exploration and capital expenditure.[35]Improvements in implementation of tax revenue policy are being made.

4.3.3 Tax Credit Scheme

Established in 1992, the Tax Credit Scheme (TCS) covers the mining and petroleum industries, as well as other enclave development projects. The scheme was established following insights that neither the national nor provincial governments had sufficient planning, engineering and construction capacity to fulfil their obligations to landowners, communities and industry in terms of public infrastructure development and maintenance, particularly in isolated areas. The TCS can be seen as a framework for public-private partnership, facilitating cooperation of private companies with the public sector on infrastructure.

Under the scheme, companies can deduct approved project expenditures from tax obligations up to a limit of 0.75 percent of assessable income.[36]To be eligible, projects must meet national standards and be part of provincial government or district plans while not being covered by government budget or existing mining agreement obligations. Importantly, provincial governments must agree to staff and maintain facilities as part of the overall agreement.

The TCS process follows the usual stages defined in PNG’s national planning system. In part 1 of the process, the project developer submits proposals identified jointly with communities to the Joint District Planning and Budget Priorities Committee (JDP&BPC). Projects assessed by the JDP&BPC are then submitted to the Joint Provincial Planning and Budget Priorities Committee (JPP&BPC). Once endorsement has been obtained from the JPP&BPC, the developer sends three copies of the proposal to the TCS Secretariat at the Department of National Planning and Monitoring (DNP&M).[37]

---

[32] See section 4.4.1 for more information about the Development Forum.

[33]For additional information on royalties see Annex 4.

[34] A resident can be defined as a company incorporated, or managed and controlled, in PNG. See Law Business Research (2011). Mining 2011.

[35]Law Business Research (2011).Mining 2011.

[36] The limit was raised to two percent in 1997 but was reduced to the current level in 2007 for social infrastructure purposes. The mining and petroleum industry is lobbying for a raise back to two percent.

[37]The process is defined in detail in the TCS Guidelines 2001, which are still in use. See Department of National Planning and Monitoring (2001).Tax Credit Scheme Guidelines.

Part 2 of the process involves three stages: In stage 1, a Policy Screening Committee assesses the project for compliance with national development priorities, including the NHP; in stage 2, the TCS Secretariat conducts a financial appraisal, including a cost-benefit analysis for selected projects to ensure high rates of social and economic return; in the 3rd and final stage, the Project Appraisal Committee, composed of the DNP&M Secretary, the Internal Revenue Commissioner as well as Secretaries from the Departments of Works, Treasury, Mining, Petroleum and Agriculture, approves (or rejects) the project after considering coordination of public expenditure programs.[38]

Project approval does not involve a competitive tender process. Nevertheless, project developers regularly put infrastructure and building works out to tender. Lihir Gold Limited, for example, following a tender process, awarded several contracts to commence work on TCS-approved education infrastructure projects and has advertised for expressions of interest on a number of others.[39]

The TCS is administered by the Department of National Planning and Monitoring and the Internal Revenue Commission. It covers infrastructure related to transport; district administration, including police and public service housing; health; education; primary industry; communication and power; as well as associated equipment deemed to be consistent with national development priorities. The TCS allows the government, using mining and petroleum companies as contractors and part financiers, to build infrastructure without the need for appropriation by Treasury. Given the fact that there are serious gaps in infrastructure and increasing expectations by communities, companies are under pressure to use the scheme.

The PNG Chamber of Mines and Petroleum sees the TCS as a "successful, well established private-public sector partnership that enables Government to implement and maintain public infrastructure in an efficient and cost effective manner by utilizing the capacity of the mining and petroleum industry".[40]This view is also shared by many in government who see the TCS as a highly innovative development funding scheme. Nevertheless, Treasury officials remain concerned about the impact on the public purse and question the desirability of tax expenditures vis-à-vis project financing through the budget.[41]

4.3.4 Sovereign Wealth Fund

The Sovereign Wealth Fund was established to ensure that income from mining and petroleum is used to finance the budget in a sustainable and counter-cyclical manner, and for resources to be invested offshore to reduce liquidity in the domestic markets and thus help prevent Dutch Disease, i.e. negative economic impacts due to increased availability of foreign currency. The PNG Development Strategic Plan 2010-2030 envisages that resources from the Sovereign Fund will be used for "productive investments" that will benefit future generations rather than for recurrent budget and expenditures.

4.3.5 Extractive Industry Transparency Initiative

The Extractive Industry Transparency Initiative (EITI) is a global standard for transparency and accountability of mining and petroleum revenues. While the Government of PNG has in principle agreed to take steps to join the initiative, this has not been realised in practice. Policy dialogue between Government and developments partners, particularly the World Bank, AusAID and the Asian Development Bank, is ongoing.

While PNG is already reporting mineral tax and dividend flows in its fiscal accounts and annual budgets, thus providing for a degree of transparency and analysis in regard to revenue and spending power, further measures are necessary and possible to improve the governance of mining revenues.[42] Specifically, while EITI implementation is certainly no panacea, PNG could benefit as follows:

[38]Department of National Planning and Monitoring (2001).Tax Credit Scheme Guidelines.

[39]More informationon LGL's TCS projects, including tender notes and a list of pending and approved projects, is available at http://lgltcs.com/

[40]PNG Chamber of Mines and Petroleum (2012). Pre-Budget Submission (May 2011): Resource Industry Tax Credit Scheme, pp. 1

41Discussions with Treasury Officials by the consultant team.

[42]See Morris, M. (2011). Time to step up in PNG on Extractive Industries Transparency. Development Policy Centre. Available as Development Policy blog for download at http://devpolicy.org/time-to-step-up-on-extractive-industries-transparency/

- Increase trust by the people of PNG in appropriate governance and transparency of resource flows from extraction
- Help the industry manage corporate risk and improve investor confidence
- Help the Government improve its sovereign credit rating and hence reduce the costs of borrowing

4.4 Stakeholder consultation and coordination

Stakeholder consultation and coordination is central to successful mining health partnerships. In this regard, the Development Forum process is a key mechanism to facilitate health and development PPPs and deserves special attention.

4.4.1 Mine approval and the Development Forum process

The Mining and Petroleum Project Development Forum, established through the 1992 Mining Act, is the principal mechanism for stakeholder consultation, and a participatory licensing mechanism in regard to mining. It appears to be a unique and largely effective process for the approval of large-scale mining and petroleum projects.

There are various types of mining tenements issued by the Mining Minister on recommendation from the Mining Advisory Council under the Mining Act 1992. These include exploration licenses, mining leases and special mining leases, for example. While a 'mining lease' is generally issued for small to medium scale alluvial and hard rock mining operations, 'special mining leases' are issued to holders of exploration licenses for large-scale mining operations.[43] Before the grant of a special mining lease, the Minister is required to convene a Development Forum to consider the views of those who are believed to be affected by the grant of the lease.[44] The Mining Act 1992 (Article 3 on consultation) states that:

> *"A development forum shall be convened by the Minister before the grant of any special mining lease to consider the views of those persons whom the Minister believes will be affected by the grant of that special mining lease and shall be conducted by the Minister according to such procedures as will afford a fair hearing to all participants".*

The Development Forum systematically reviews all aspects of a project. The government's decision on whether to approve a specific project or not is only taken after deliberation and resolution within the Development Forum on any issues raised by the various stakeholders. Key issues discussed typically include the following:

- Landowner compensation
- Management and distribution of royalties
- Environmental issues
- Efforts to involve local communities in economic activities associated with the project
- Development of public infrastructure related to health, education, security, etc.

The Forum is designed to involve all stakeholders with an interest in specific projects in reviewing relevant mining, petroleum and gas licence applications. In practical terms, this means that complete project proposals, including compensation, economic and social development documentation, are shared with all interested parties along with selected government departments and agencies, such as provincial and local level governments. The process is thus effective but resource-intensive and time-consuming. Depending on the scale, nature and contention of a proposed project, the process can take up to several years. Development Fora are held both before initial licensing of a mining project as well as around project reviews.

---

[43] A special mining lease may be granted for a term not exceeding 40 years, which may be extended for periods not exceeding 20 years.

[44] For details on the different types of mining tenements see the MRA website http://www.mra.gov.pg/Investors/TypesofMiningTenements.aspx

The DNP&M is responsible for representation of the social sectors and to be the arbiter of national policy and standards with respect to these sectors. The NDOH therefore is not generally involved in Development Fora. Provincial education and health representatives are involved. However, they have no policy responsibility and report to provincial governments rather than line ministries at central level.

4.4.2 Agreements

Following government approval of a project, associated conditions will be outlined in legally binding agreements, which typically specify the role of the mining company vis-à-vis the Government in terms of social infrastructure provision. Government commitments are reflected in the agreements as Special Support Grants. The most common agreements are summarised in the table below.

Agreement	Parties
Memorandum of Agreement (MOA)	Project sponsor (mining company) and the State
Subsidiary Agreements on compensation	Project sponsor and affected landowners
Multiparty Agreement on sharing of royalties, local economic development, environmental and social protection, social infrastructure for health, education and security.	Project sponsor, Government (provincial and local level) and landowners

Table 4: Agreement types and parties involved

4.5 Decentralisation to Provincial Level

The 1995 reforms to the Organic Law on Provincial Governments and Local-level Governments were significant in relation to decentralisation of public administration in the hope of improved service delivery. An ongoing reform process is expected to simplify administrative arrangements, increase accountability and ensure that funds are spent where they are most needed.[45]Decentralisation in PNG means that provincial and local level governments have in fact the greatest responsibility for service delivery, including rural health service delivery.

When it comes to mining health PPPs, district ward administrations as well as local and provincial level authorities have important roles and responsibilities. The national level government has only little engagement in the negotiation or implementation of mining health PPPs. Provincial governments are commonly reported as primary partners.

4.6 Challenges in implementing the regulatory framework

Challenges in implementing the regulatory framework are both intrinsic and extrinsic to the framework itself. They include the fact that the framework is out-dated; there are insufficient capacities and commitment for administration and enforcement; and there is insufficient budgetary space for government to honour legal obligations.

4.6.1 Out-dated regulatory framework

According to Mining Minister Chan, the regulatory framework is “out-dated” and the country’s mining laws need to be modernised.[46] The regulatory policy and legal framework for mining has therefore been under review for a number of years, with new mining legislation awaiting parliamentary approval. This includes a review of the 1992 Mining Act, the 1977 Mining (Safety) Act, the Mineral Policy and the development of an Offshore Mining Policy to govern this growing mining segment. The new framework will be laid out in what may be termed the *Mining and Offshore Mining and Safety Act*.

According to the Department of Mineral Policy and Geohazards Management, the principle issues to be

---

[45] National Research Institute (2010). Papua New Guinea District and Provincial Profiles. Accessed on 3 April 2013 at http://www.nri.org.pg/research_divisions/cross_divisional_projects/Web%20Version%20Profiles%20Report%20140410.pdf
[46]Oxford Business group (2012). The Report – Papua New Guinea 2012, p. 91.

addressed include government participation, royalty recovery, mine closure procedures, offshore drilling regulations, environmental standards, and health and safety.[47] It is thus hoped that the new framework will resolve a number of issues that have affected the sector in the past, including transparency as well as gaps in social, health and environmental regulation. According to the Minister, the adjusted policies "will be captured in various equity and benefit-sharing components between the public and private sectors".[48]

A Mining Amendment Bill has also been promoted by some, proposing the transfer of ownership of the minerals from the State to communities. This has caused controversy among the mining industry, fearing negative impacts with regard to uncertainty of investments and related ability of companies to raise capital in international financial markets.[49]

Initiatives to strengthen the mine sector regulatory and policy framework are being supported by the World Bank, the Asian Development Bank, the European Union and AusAID, including through the development of a Sustainable Mining Development Policy and related legislation as well as a Small-Scale Mining Occupational Health and Safety Act.

4.6.2 Roles, responsibilities and capacity of provincial and local government

Provincial and local level government authorities face a number of financial, legal and governance challenges, and the capacity of provincial, district and local level administrations to deliver services is limited.[50]Despite increases in provincial health budgets there is still not enough to cover the total cost of a minimum level of rural health services. Inadequate reporting lines exist between facilities, provincial health managers and the provincial administrator, and are hampered by the absence of reports on health spending and outputs.

Because of the disjoint between funding flows, service delivery, and human resource management, NDOH policy directives are not always implemented by provincial governments. Advice provided to the provincial government by provincial health advisers is not always acted upon, nor is funding appropriately allocated. Similarly, supervision of health facilities by district and provincial authorities does not appear to be prioritised.

Provincial centres are often far from mining operations, and establishing and managing close partnerships for operations is therefore challenging. In other words, despite the connection through royalty and tax payments, Development Forum agreements and the provincial governments' involvement in implementing the TCS, provincial governments are often not closely involved in mining operations and their health programs.[51,52]

Both donors and mining companies recognise these constraints and challenges and many are working to raise capacity. Moreover, the Government of PNG recognises that improved services will require more effective public administration and that particular attention will need to be paid to systematic record keeping and timely performance reporting to facilitate performance monitoring.[53]Nevertheless, many efforts have focused primarily on building health worker capacity, rather than those of the administration and regulatory bodies of the health system, potentially missing an opportunity to build competent and effective health services management capacity in the host districts and provinces.

---

[47] Oxford Business group (2012). The Report – Papua New Guinea 2012.
[48] Oxford Business group (2012). The Report – Papua New Guinea 2012, p. 91.
[49]Oxford Business group (2012). The Report – Papua New Guinea 2012.
[50] See AusAid website as accessed on 3 April 2013 http://www.ausaid.gov.au/countries/pacific/png/Pages/economic-governance-init1.aspx
[51]Banks, G. (2001) Papua New Guinea Baseline Study Final Report Mining, Minerals and Sustainable Development Project for the International Institute for Environment and Development. pp. 25, 62.
[52]Thomason, J. and Hancock, M. (2011). PNG Mineral Boom: Harnessing the Extractive Sector to Deliver Better Health Outcomes. Australian National University Development Policy Centre Discussion Paper 2.Available for download at http://devpolicy.anu.edu.au/pdf/papers/DP_2_-_PNG_mineral_boom-_Harnessing_the_extractive_sector_to_deliver_better_health_outcomes.pdf.
[53] National Research Institute (2010). Papua New Guinea District and Provincial Profiles.

4.6.3 MRA capacity constraints

Management of the MRA faces a wide range of challenges with regard to implementation and oversight of specific mining agreements - which often are complex sets of agreements. Many of these challenges are related to limited MRA capacity to respond adequately to issues which emerge during the implementation of agreements, specifically subsidiary agreements between the mining company and landowners regarding compensation. They also relate to sectoral insight, such as for health, which is not part of the MRA mandate but required in negotiating mining agreements.

Regarding multi-party agreements between the mining company, government agencies and landowners, issues that are often challenging to solve are those concerning sharing of mineral royalties as well as local economic and social development, including health. MRA capacity to manage and guide the five-year reviews of the local economic and social development agreements embodied in the MOAs and other project related agreements is also constraint.[54]

4.6.4 Buy-in from other government departments

Lack of support from other government departments, including central government agencies and, in particular, the Department of National Planning and Monitoring with respect to the monitoring of government commitments under the agreements, has been mentioned as a key challenge. Government departments have reneged on commitments and agreements embodied in Special Support Grants. This has prompted the MRA to establish an independent capacity in-house to undertake such functions as implementation of infrastructure agreements, for example.

4.6.5 Lack of standard procedures and guidelines

There are currently no standard procedures or guidelines to help prospective investors develop project proposals and access best practice guidance with regard to environmental and social aspects, such as health needs and potential impacts, of mining projects. Nevertheless, such standards and guidelines might go a long way not only in maximising mining companies' contributions to environmental and social development, including health, but also in improving efficient negotiation and agreement processes, thus serving to improve MRA capacity to oversee and assume responsibilities related to mining project agreements.

4.6.6 Lack of NDOH involvement

While provincial authorities are responsible for implementing primary healthcare programs, the NDOH is responsible for ensuring national policies, standards and protocols are followed; demands for additional health workforce are taken into account in human resource plans; and to ensure drugs and medical supplies are efficiently procured, financed and distributed. There is concern that the NDOH has no effective oversight of health programs on the ground to ensure they follow national polices and standards. This is particularly relevant when it comes to mining health programs and partnerships far away from Port Moresby.

For example, the NDOH does not consistently receive information on health-related PPPs[55]in mining or other sectors. Importantly, the Department is not usually involved in Development Fora. As a result, there is little knowledge and understanding of local level processes and agreements related to mining health, both from a technical and operational perspective. By the same token, the NDOH is thus unable to ensure compliance with national health policies and priorities, or to assist with health sector coordination.

[54] While the consultant team was unable to formally review these issues with respect to the petroleum industry with the Department of Petroleum and Energy (DOPE), a number of informants from MRA, DNP&M, Treasury and the Chamber of Mines and Petroleum indicated that most of these issues were equally applicable to the oversight of the petroleum sector, highlighting parallels between MRA and DOPE in regard to capacity constraints.

[55] At present there is no system to collect health workforce data on the private for-profit (non-publically financed) sector. There is a requirement for all health professionals (doctors, nurses, dentists and pharmacists) to be registered to practice, but the associated databases are not functional.

The MRA has indicated that the DNP&M might consult with individual social sector agencies, such as the NDOH, but this does not seem to be current practice. The MRA has expressed support for the involvement of central agencies such as the NDOH in Development Fora, particularly if this would mean taking responsibility for the relevant aspects of agreements and thus facilitating a reduction of the MRA workload with respect to the social sectors, which is not an area of MRA core competence.

Another example is the lack of NDOH involvement in project appraisal under the TCS, which is handled by provincial authorities and the DNP&M. Given that these institutions are not in a position to provide sectoral guidance, for example when it comes to distribution of health facilities, there is a missed opportunity for NDOH involvement.

Moreover, it appears that the NDOH is not involved in questions and issues around mine-related occupational health more broadly. Therefore, the Department has only limited knowledge of what standards are being applied to mine work sites. It has been argued that while the NDOH does not have expertise in many of the areas associated with health and mining in-house, it could work with universities and their national experts to fulfil this role.

Following insights into this lack of involvement, the NDOH indicated in mid-2012 that it was about to review the Health Act to ensure it has a clear role in the stewardship of the overall approach to health PPPs and with the mining sector more specifically. This will be done in collaboration with the MRA, Department of Petroleum and Energy, and Department of Mineral Policy and Geohazard Management. It is unclear whether steps have been taken to address the lack of NDOH involvement in Development Fora or the TCS process but there appears to have been little or no concrete action in this direction.

4.6.7 Mismatch between legal commitments and budgetary space

The above-mentioned lack of NDOH involvement also causes a mismatch of legal commitments and budgetary space for implementing them. The health workforce is the largest component of the provincial workforce[56]. However, while it is not evident that mechanisms exist for provinces to increase the numbers of health staff, provincial authorities enter agreements to staff health facilities built by mining companies or mining health PPPs. For example, as part of agreements by mining companies to use the TCS for the development of health infrastructure, provincial governments must agree to staff and maintain facilities. Therefore, at a time of an overall health workforce supply crisis, it is important that policies and practices in regard to matching commitments to the supply of additional health staff are clarified and aligned. Stronger links between NDOH and provincial governments in this regard may be useful.

4.6.8 Limits on use of Sovereign Wealth Fund resources

The Government envisages that resources from the Sovereign Wealth Fund will be used for "productive investments" to benefit future generations rather than for the recurrent budget and expenditures. Productive investments are defined to include schools, hospitals, roads and ports. These of course involve additional recurrent costs, which the Government is not always in a position to cover. To this end, the distinction identified in the PNG Development Strategic Plan 2010 - 2030 between "productive" and "non-productive" expenditures is not entirely helpful. While concern about wasteful recurrent expenditure is in order, there is a considerable amount of evidence that increased quality-enhancing recurrent expenditures could dramatically enhance health outcomes and the cost-effectiveness of expenditures.

4.6.9 Regulation of small-scale mining

The Government strategy for artisanal and small-scale mining, a significant means of livelihood for many households across PNG, is primarily to reduce the harmful health, safety, and environmental impacts evident within the sector. This is to be done through on-site training and extension of services to support improved mining practices and equipment. Health and safety issues in connection with use of mercury and other chemicals are of particular concern.

[56] Education staff, although managed at a provincial level, are considered national staff.

Small-scale mining projects have particular needs when it comes to policy and legislation. Yet there is currently no specific regulatory framework that covers small-scale mining. This is relevant to occupational health and safety as well as to wider community and public health, all areas that small-scale mining companies may not financially be able to prioritise with potentially devastating consequences for employees, communities and last but not least the businesses themselves.

5 MINING HEALTH PROGRAMMING IN PRACTICE

Mining health programs - and the partnerships these involve - are very diverse. However, the focus areas of this document are internal and external health programs associated with mining operations that are planned, implemented and monitored in partnership with government authorities, donor agencies, landowner associations, NGOs and other stakeholders.

Over time the role of mining companies in PNG in the financing and provision of health services has expanded significantly. Today, community expectations for service delivery by mining companies are high, and often go beyond contractual obligations of companies. In fact there is evidence that in some PNG contexts, mining companies and their health programs effectively take over parts of the Government set of responsibilities, for example in terms of infrastructure development, service provision and sectoral coordination.

A literature review identified seven mines with associated health PPPs in PNG. They are presented in the table below. A more extensive table, outlining details of those health programs and partnerships identified as well as listing mines for which no health PPPs could be identified, is in Annex 5.

Mine	Operator / Owner	Date started production / set up	Mineral
Porgera	Barrick Gold and PNG government	2009	Gold
Hidden Valley	Newcrest Mining and Harmony Gold as 'Morobe Mining Joint Ventures'	2009	Gold-Silver
Wafi-Golpu		Construction expected to start in 2014	Gold
Ok Tedi	PNG owned (by Government and the PNG Sustainable Development Program Ltd previously BHP Billiton and Inmet)	1984	Gold – Copper - Silver
Lihir Gold Mine	Newcrest	1997	Gold
Simberi Oxide Gold Project	St. Barbara Limited	2008	Gold-Silver
Woodlark	Kula Gold	In pre-production. Production expected 2013	Gold

Table 5: Overview of mines with health PPPs in PNG

The health programs and partnerships associated with two of PNG's three most important mines – Ok Tedi Mining Limited (OTML) and Lihir Gold Mine (LGM) – were assessed in case studies. The lessons learned are presented in this section. Further detail on the health programs associated with the Lihir and Ok Tedi mines is provided in case study summaries in Annexes 2 and 3. Moreover, some additional lessons learned are drawn from the ADB-funded Enclaves Project, which was recently completed. The case studies from which lessons are drawn in the following section are introduced in the box below.

CASE STUDIES

Ok Tedi Mining Limited has been operating in PNG for almost 30 years. It is currently the largest open-cut mine in the country, mining copper concentrate containing gold. The mine is located in the Star Mountains in North Fly district of Western Province. After BHP Billiton divested its 52 percent share in the mine in 2002, and Canadian-owned Inmet sold its 18 percent share in 2011, OTML became fully owned for the benefit of PNG, with the PNG Sustainable Development Program Limited (PNGSDP) holding 63.4 percent and the Government holding 36.6 percent of shares.

The **Lihir Gold Mine** (LGM) is owned and operated by Newcrest Mining Limited, an Australian mining company. The open pit mine is located on Niolam Island, also known as Lihir Island, which is part of the Lihir Island group off the northern coast of New Ireland Province. The gold deposit was discovered in 1982 and feasibility studies and developments for the mine were managed by Rio Tinto until October 1995, when the mine was spun off as an independent company – Lihir Gold Limited (LGL) – until its merger with Newcrest in 2010. LGM is one of the largest gold mines globally and, having begun production in 1997, it has an expected mine and processing life past 2040.

The **HIV Prevention and Control in Rural Development Enclaves Project** was centred around a PPP for health modality to support the national response to HIV and AIDS in rural areas peripheral to economic enclaves in the context of a deteriorating health system. Enclaves are characterised by a large workforce and growing industry attracting inward migration, and resulting increases in the vulnerability of populations. The project ran from 2006 to 2012 and was ADB-funded with material contributions from all partners: the NDOH, Provincial Governments and six companies, including three working in extraction and three working in agricultural business. While achieving its goals in many aspects of HIV prevention and systems strengthening through infrastructure improvement, several challenges were encountered in regard to its public-private partnership focus, which are instructive to mining health PPPs.

5.1 Reasons for investing in health

There are three main reasons for mining companies to invest in employee and community health in PNG. All of these are, to an extent, regulated in the policy and legal framework of PNG as well as in individual companies' sustainability or corporate social responsibility (CSR) policies:

1. **Necessity, given the lack of basic health facilities in remote mining areas.** The PNG context of poor health indicators and low access to quality health services, combined with the remoteness of most mining sites, means that addressing health issues is a necessity for any mining company working in the country, most immediately to ensure that employees and their dependents have access to a minimum package of health care.

2. **The business case for supporting a healthier workforce.** Most mines in PNG draw heavily on the local workforce. Heavy malaria and HIV burdens, in particular, are clear motivators for investment in health in order to reduce days lost to illness as well as costs associated with replacement of staff in case of death or disability, and thus improve productivity.

3. **Social licence to operate.** Limiting negative externalities of the mine, including negative health impacts, is an important part of maintaining a company's social licence to operate.[57] Moreover, a wider global social license and reputational aspirations are also relevant as there are a number of organisations on the international stage which promote and monitor the impact of mining companies and their

[57] The social license to operate can be defined as the implicit or explicit approval by local communities and other stakeholders on the ground. Such approval is usually not formalised, and it is dynamic. Community dissatisfaction with actual or perceived mining company practice, for issues ranging from local employment to social service delivery, can mean that approval is withdrawn without warning, sometimes causing social unrest. It is important to note that, given the country's unique system of making community and landowner approval a condition in the formal licensing process, the term 'social license to operate' has an additional dimension of meaning in PNG.

adherence to CSR standards, including the International Council on Mining and Metals, the Global Reporting Initiative and the International Finance Corporation.[58]

Contextual factors in each mine will mean that the rationale for engaging in a health PPP varies, though the main motivations presented above are the same across all mining health programs. In settings where there has been a perceived or actual negative environmental health impact on the area surrounding the mine, mining companies will need to invest heavily in health and other social and environmental programs to be able to do business at all. For example, under BHP Billiton management of the Ok Tedi mine, the disposal of waste and tailings into the riverine system resulted in the degradation of the Ok Tedi and the Fly River, and negative impacts on the communities relying on the river for their livelihoods. Subsequent investments into community health by the mine have constituted an important boost to the company's social licence to operate.[59]

5.2 Assessment, planning and financing

5.2.1 Health needs and impact assessment

Before setting up or revising a health program, it is good practice to conduct a systematic health needs assessment, and, where applicable, to identify and build on an existing one. A health needs assessment identifies and quantifies the health issues faced by the target group of beneficiaries, such as the pool of employees, including contractors; mine-affected communities; and the wider public. It also helps define priorities for prevention and treatment.[60]

The assessment will consider actual as well as potential health impacts of the mine, and the ability of the national and local health system and non-governmental actors to address all key health issues, through both public and private providers. Distance, transport, financial and cultural barriers to accessing health services will be analysed and health equity, i.e. differences in health access and outcomes by different parts of the population, particularly the poor and marginalised, considered. The data and information gathered and distilled in the process will provide the evidence needed for making informed decisions about how to design, manage and resource the mining health program.

The health assessment may be linked to other assessments in the licensing process, such as environmental and social impact assessments. Importantly, water, hygiene and sanitation, all important determinants of health and typically affected by mining operations, must also be considered. This will help avoid a one-sided or narrow focus on direct health needs and impacts and ensure the health program is embedded in a more general vision to ensure a positive social net impact for local stakeholders.

There are indications that large mining companies in PNG are recognising the importance of an evidence-based approach for a number of reasons. For example, Newcrest has proposed an independent and participatory health review for the whole of Lihir, as part of a planned review of existing agreements, to form the basis of an integrated plan for Lihir health system development to be funded through the LSDP. It is felt that establishing a neutral baseline on which to build through participation of a consortium representing all stakeholders is essential in establishing trust. Moreover, it is hoped that this process will motivate partners to continue being involved in data collection and sharing even after completion of the review. The review will address a comprehensive set of issues, including the disease burden, quality of service provision, health system governance and funding, human resources, medical supplies, community involvement, and other issues.

[58] Thomason, J. and Hancock.M. (2011). PNG Mineral Boom: Harnessing the Extractive Sector to Deliver Better Health Outcomes. Australian National University Development Policy Centre Discussion Paper 2. pp. 4

[59] Townsend, P.K. and Townsend, W.H. (n.d.).Assessing an assessment: The Ok TediMine.pp. 10

[60] Some of the information relating to general good practice used in the following sub-sections relating to planning, stakeholder consultation, partnership development and data collection has been adapted from Mining Health Initiative (2013). Good Practice Guidelines – Partnering for Effective Health Programming. Available for download at http://www.mininghealth.org/wp-content/uploads/2013/02/Good_practice_guidelines.pdf

The Enclaves Project design, on the other hand, involved several key assumptions that were not specifically assessed and did not bear out in project implementation. This included underestimating the efforts required to build, manage and maintain partnerships; overestimating management expertise of private sector partners; assuming that companies would extend health services beyond employees; assuming that the Government workforce would respond positively to external supervision provided by private companies; and an assumption about private companies' expertise in health and HIV. In other words, rather than conducting assessments, implicit or explicit assumptions were made that proved wrong, thus impeding project progress to some extent.

5.2.2 Planning

A solid design and planning process is key to maximising impact of the program, minimising obstacles in its setup and management, and ensuring support by stakeholders. The use of evidence generated in the health needs and impact assessment as well as in prior considerations regarding the business case when designing and planning a health program facilitates negotiating resources and permissions both internally and externally. It also lays the groundwork for monitoring and evaluating success of the program.

It is important that public health experts are involved in the planning process. Moreover, involving beneficiaries and other key stakeholders is also useful. When consulting with stakeholders, mining companies must avoid raising false hopes and expectations while being aware that there will always be hopes and expectations on the part of communities, which companies cannot or indeed should not meet.
Community members can also play an active role in improving community health. In PNG, community members have been trained to provide basic health promotion and disease prevention services. Such community health workers perform a wide range of tasks, including first aid and treatment of simple and common ailments; health education; nutrition, maternal and child health and family planning activities; as well as home visits, referrals, and recordkeeping.

It is common practice in PNG and beyond for mining companies to engage third-party health contractors to conduct one-off technical consultancies, advising the mining company on the design of and approach to health programming, and potentially to oversee the subsequent process up to implementation.

For example, the North Fly Health Sector Development Program (NFHSDP) which is fully financed by OTML was developed by JTA International, a global provider of health advisory services (which has since been acquired by Abt Associates and is now called Abt-JTA). This was in 2008 at the request of the OTML Board, which recognised that the company was compelled to address wider public health issues in North Fly District. JTA International was subsequently contracted to also manage the NFHSDP. The program began in January 2009 and will operate through 2013, with a likely extension to 2018.

The partnership with Abt-JTA dates back to 2004 when OTML contracted the firm to manage Tabubil Hospital in order to improve clinical services. Tabubil is the largest settlement in North Fly, located about 12 km from the mine. The Hospital had previously been managed directly by OTML, with a limited understanding of wider public health issues and challenges facing the company and the general population. The public health programs had not been technically reviewed and were primarily focused on mine employees.

The Lihir Medical Centre (LMC) was constructed in the late 1990s at a cost of almost US$ 4 million.[61]It was jointly funded by the Government of PNG which contributed toward the extra cost of the public ward and Lihir Gold Limited (LGL), then operating the mine. This setup was a condition for mine approval, and required that the LMC provide services to the general population as well as to employees. Since its inception, the LMC has been operated by International SOS (I-SOS), a global private healthcare provider working with mining companies around the world.

[61]Hancock, M. (2010). Risk Management Systems for Communicable Diseases in Papua New Guinea Mining Industry: Maturity Model – Paths for Development. University of Queensland, PhD Thesis.

It is good practice to tailor health program planning to each stage in the mining cycle from exploration to production and closure of the mine. Among other things, this involves paying special attention to population movements during different stages in the process. Establishing a program to mitigate health and related impacts of population influx in addition to a community development programming should be considered. However, there is no evidence that this is systematically addressed in PNG.

5.2.3 Financing

There are four key sources used to finance mining health PPPs in PNG. In most cases, a mix of these is applicable for each mine. It is evident that the form, focus and management of these funding and financing mechanisms vary significantly from case to case.

1. **Initial project agreements** typically outline a list of health facilities to be built or refurbished and the level of services to be provided to mine employees and affected communities, assigning responsibilities both to the company and government.

2. **Specific agreements** on the distribution of mining royalties between provincial and local level governments as well as landowners and affected communities stipulate how mining royalties will be utilised, including for health.

3. Companies use **own funds** to directly finance health services and to support improved health outcomes, often as part of sustainability or CSR commitments, and with a view to ensuring a social licence to operate. These funds are sometimes managed through a Foundation set up by the company.

4. The **Tax Credit Scheme** for infrastructure is often used to finance health infrastructure not included in the above-mentioned agreements.

For example, OTML's funding to Tabubil Hospital and related aid posts and activities are based on a cost-sharing agreement with the Fly River Provincial Government. Costs are agreed annually and the appropriate amount deducted from OTML's royalty payments. From 2000 to 2011, about K35.6 m (US$ 14 million) of operational costs were accounted for by royalty payments.[62]The North Fly Health Development Program, on the other hand, is wholly financed by OTML. Moreover, OTML has used the TCS to finance a number of health related infrastructure developments in recent years.

5.3 Stakeholder consultation and coordination

5.3.1 Stakeholder consultation

Knowing and attempting to understand stakeholders, i.e. those individuals, groups and institutions that are affected by, or can affect, mining operations and health programs is key. Most large mining companies have departments responsible for community relations, and these may be engaged in constant, meaningful dialogue and stakeholder engagement more generally. Such engagement is often institutionally formalised through multi-stakeholder coordination fora. They serve as an excellent starting point for further assessing stakeholders and involving communities in conducting health needs assessments, designing and planning health programs as well as in monitoring and evaluation.

The emergence of the Development Forum process for major mine and petroleum project approvals or license renewals is a significant tribute to the importance of stakeholders, particularly landowners and community members. At the same time, it is a practical response to their power, which can make or break business success in PNG. In other words, mining companies operating in PNG have no choice but to consult with, and respond to, the expressed needs and requests of a number of different stakeholders. This is different from other countries, where stakeholder involvement in licensing processes is not formalised and therefore, at least in theory, voluntary.

---

[62] The exchange rate used in this document is PNG K 1 to US$ 0.375.

Importantly, stakeholder involvement does not stop with approval or renewal of a license. Stakeholder demands are built into project agreements and it is therefore essential for companies to engage with stakeholders in a meaningful way from the outset, and to prioritise this engagement during the life of the mine, and possibly beyond.

The three-tiered programming and partner coordination mechanism of the Ok Tedi NFHSDP is essential in providing a forum for all stakeholders to meet regularly and share information, plan interventions and address issues regarding programming and coordination. Tier 1 is the Program Steering Committee, comprised of the OTML and JTA Executives and the North Fly District Administrator. The Committee meets quarterly to review program progress and contractor compliance. Tier 2 is the Implementation Coordination Committee (ICC) which includes all partners and meets monthly. It is responsible for planning and coordination of health services across the District in the absence of a Government-led District Health Management Committee (DHMC) and is chaired by the North Fly District Administrator. Reporting to the Implementation Coordination Committee are Program Activity Groups with representatives from all relevant partners involved in a specific program, such as TB, maternal and child health, immunisation, etc. It is expected that when the Western Province Health Steering Committee establishes the DHMCs, the NFHSDP ICC will transition into the DHMC for North Fly District.

5.3.2 Coordination

Stakeholder coordination is challenging by the very nature of the concept of engaging with organisations and individuals from a wide range of social, sectoral and cultural backgrounds, and stakeholder coordination in PNG is no exception. On the contrary, it is arguable that partly due to the formal requirements of involving stakeholders and their strong voice, coordination has been particularly challenging. Moreover, it appears that while coordination has been recognised as important, there is still considerable room for improvement with regard to coordination practice, for example in terms of clearly defining roles and responsibilities.

Stakeholders around the Lihir Gold Mine agree that there is significant overlap and considerable confusion related to the roles and responsibilities of the different health service providers on Lihir. One aspect of this is that the Lihir Medical Centre, the company clinic managed by I-SOS, provides a high level of service quality which is currently not available within the public sector. This results in displacement of patients from the public system. Efforts have been made to reduce the displacement of patients through decentralisation of services to lower level facilities and provision of qualified physicians to these facilities on a weekly basis. Moreover, following efforts to dissolve tensions around this issue, a formal agreement was reached among stakeholders in 2010 to establish a new coordination body: The Integrated Health Operations Group (INHOG). The aim of INHOG is to better coordinate the provision of health services between the different providers. The group is comprised of representatives from all key service providers, including local government, I-SOS, and the Christian Health Service (CHS) and there is an agreement to meet on a quarterly basis. Nevertheless, INHOG has suffered from a lack of buy-in from its members, demonstrated for example by the fact that meetings rarely take place.

The upcoming review of the health programs and partnerships associated with the Lihir mine will help clarify roles and responsibilities, such as a definition of the role of Newcrest's Sustainable Development department and the management of INHOG initiated by Newcrest to enhance coordination, cooperation and data sharing among health service providers.

The Enclaves Project found that many partnerships were not functional. Coordination committees in enclaves, set up to facilitate and coordinate project progress, had inconsistent membership and did not meet regularly enough to build momentum or maintain partnerships. For example, most companies had their clinical employees or community relations departments take charge of civil works under the project agreement. This led to poor interpretation of contract documents, inadequate construction activity planning, lack of quality control and ultimately considerable defects that needed to be rectified.

Appropriate coordination between the Project and local partners may have been able to prevent or mitigate some of these issues early on.[63]

It should be noted that PNG is not alone when it comes to room for improvement in regard to collaboration and coordination. A 2008 study showed that main barriers to public-private collaboration in the Western Pacific included the lack of a clear framework to support collaboration, the lack of economic incentives for collaboration and the absence of political commitment for collaboration.[64] The implementation of the PPP Policy and its associated PPP framework, the PPP Act, the MTDP, and, to an extent, the TCS all work to break down these barriers to collaboration.

5.4 Partnerships

It is desirable for partnership considerations to be a key driver of mining health program design from the outset, and for mining health programs to be developed in partnership with key stakeholders who can add strategic or operational value. Working in partnership requires a basic openness to working across sectoral boundaries from companies, governments as well as landowner and community organisations.

The term partnership comprises a number of more or less formal agreements within and between stakeholder groups. Partnerships may involve two or more actors; they may involve actors and institutions from within the same sector or from different sectors, countries and contexts; they may be loosely arranged or governed by formal contracts and financial commitments.

It appears that mining companies in PNG favour partnership approaches over direct provision of community health programming by the mining company. Most mining sector players recognise that the extractive industry does not have sufficient expertise to design or administer a sizable public health program, and is certainly not best placed to do so, for a number of reasons that include not only health expertise and experience but importantly also local knowledge and relationships. Barrick Gold's Chief Medical Officer summarised this view as follows:

"[Partnerships] are absolutely critical, and for several reasons. First, we're in the business of mining gold. And we don't pretend to be the experts in delivering health interventions into communities... Often NGOs have been on the ground a lot longer than us and already have well established, trusting relationships with those communities, and also with donors and government."

Barrick Gold's Chief Medical Officer, Dr. Rob Barbour[65]

Importantly, partnerships with and active participation of local and national stakeholders, can be crucial to consolidating any achievements and long-term sustainability of health programming catalysed by a mine. The partnership process generally involves three key steps:

1. **Identifying partners** – identifying and assessing potential partners, such as mining companies, government health authorities, landowner associations, affected communities, private for-profit providers and NGOs and considering potential partnership approaches
2. **Engaging partners** – clearly defining each partners' roles and responsibilities and setting them out in written agreements
3. **Managing partnerships** – ensuring transparency in regards to goals, expectations and decision-making, and prioritising communication to manage potential differences

In practice, those three steps are not always followed in PNG and insufficient attention is paid to nurturing partnerships. In many cases, mining health partners' roles and responsibilities remain unclear. These issues

[63] ADB (n.d.). Papua New Guinea: HIV Prevention & Control in Rural Development Enclaves Project. Draft completion report (unpublished).
[64] Hozumi, D. et al. (2008). The role of the private sector in health: a landscape analysis of global players' attitudes toward the private sector in health systems and policy levers that influence these attitudes -Technical Paper 2, Results for Development Institute. pp. 32
[65] Excerpt taken from 'Beyond Borders talks to Barrick Gold's Chief Medical Officer'. Accessed at: http://barrickbeyondborders.com/2008/03/beyond-borders-talks-to-barricks-chief-medical-officer/

may be due to insufficient prioritisation of the importance of partnerships in practice, despite rhetoric, by all key stakeholders, and a related lack of insight that establishing and managing partnerships requires considerable investments in terms of time and other resources.

For example, agreements and related roles and responsibilities are not always put in writing. On the national level in PNG, perhaps the most important health partnership is between the NDOH and the Christian Health Service, responsible for coordination of the mission health system and its financing. Despite the longstanding and significant involvement of church agencies in health service delivery in the country and the fact that it is largely financed by Government, there are no formal contracts or memoranda of agreement. In other words, what is arguably the most important public-private partnership in health service delivery in PNG is not formalised and thus appears to be entirely based on trust.

In the Enclaves Project, six Memoranda of Agreement (MOAs), albeit incomplete, were signed between the NDOH, Provincial Governments and participating companies. The latter included Barrick Kainantu Ltd in Eastern Highlands; Higaturu Oil Palms in Oro Province; Oil Search Ltd in Gulf, Southern Highlands and Hela provinces; Porgera Joint Venture in Enga province; Ramu Agri Industries operating predominantly in Madang; and WR Carpenters & Co Estates in Western Highlands and Jiwaka provinces. The MOAs did not fully meet the needs of the PPP in terms of wider project goals. Instead, they focused on the civil works components only, making it difficult to achieve the other expected outputs. For example, the MOAs did not include cost allocations for service provision or specifications about companies opening up their health facilities to communities outside the fence. Besides the MOA template used not being adequate, there was an apparent lack of willingness by most private partners to actually commit to all project components, being particularly interested in the tangible asset of civil works, and, for example, not always being in a position to open up their health facilities to the wider public due to capacity and cost. Moreover, agreement on the MOAs took longer than anticipated due to the fact that neither Provincial governments nor companies were experienced in this type of PPP. [66]

An MOA with the Government and the Lihir Sustainable Development Plan (LSDP)are the two documents currently linking the various tiers of government (national, provincial, local), the Lihir community and Newcrest in partnership around the Lihir Gold Mine. These agreements outline funding, benefits, rights and obligations arising from the mine and thus appear to be sufficiently comprehensive. The LSDP builds on previous agreements, which were more limited to describing the rights and benefits associated with the mine. It also outlines a roadmap for the development of Lihir more broadly, enabled by mine revenues, but sustainable past the life of the mine.[67]Newcrest's adherence to and implementation of these agreements forms the basis of the company's social license to operate in Lihir.[68]The LSDP Committee overseeing these agreements comprises all partners, i.e. Newcrest, the Lihir Mine Area Landowners Association, the Nimamar Rural Local Government, Petztorme Women's Association, Mineral Resources Lihir and the Catholic Church.

5.5 Provincial and Local Government

Considerations regarding health system strengthening and alignment, a goal supported today by most global and international development partners and understood as a key priority by national governments, warrant specific attention in program design from early on.[69] In this context, the capacity of provincial and local government to perform the important stewardship function over the health sector is crucial.

[66]ADB (n.d.). Papua New Guinea: HIV Prevention & Control in Rural Development Enclaves Project. Draft completion report (unpublished).

[67] Centre for Social Responsibility in Mining (2011). Good Practice Note: Community Development Agreements. pp. 7

[68]Newcrest (2009). Lihir Luksave Long Komuniti (Social Awareness Training), pp12 .

[69]A health system can be defined as the organisation of people, institutions and resources to deliver health services designed to meet the health needs of a target population. National health systems aim to provide high-quality prevention, diagnostic and treatment services in an equitable and efficient manner. Important features are health workers, i.e. doctors, nurses and other staff; drugs and equipment; physical infrastructure, such as clinics and laboratories; and the way health services are financed, i.e. through insurance, user fees or other ways. In some countries, national health systems include a large segment of private for-profit providers of healthcare, in others there is more emphasis on publicly-provided services. In PNG, as in many other countries, services provided by NGOs and particularly churches play an important role.

Therefore, it is essential that mining health programs are designed and planned to strengthen the national health system in line with government priorities, rather than setting up parallel systems without consideration of the wider systemic context.

Nevertheless, administrative and management capacity at provincial and local level, just like capacity of health staff, tends to be poor. For example, the District Health Office (DHO) in Kiunga is formally responsible for co-ordinating government-financed health services in the North Fly District where OTML operates. It participates in the management and coordination of the NFHSDP. However, the discretionary funds available to the DHO are limited and there appears to be a risk for them to be displaced by the funding available through the NFHSDP. This, combined with weak administrative capacity, further compromises the stewardship role of the DHO in health service provision and demonstrates the importance of resourcing the DHO adequately to enable it to perform its important role, commensurate with absorptive capacity in terms of financial management and system oversight.

What is more, the differences in working conditions and, to some extent, salaries, between the public and private health sector, including mining clinics, sometimes contribute to undermining the already weak national health system as health staff move from the public sector to less operationally challenging and potentially more financially rewarding positions in the private sector.

For instance, the Lihir Medical Centre, managed by I-SOS, is a well-resourced facility compared to most other health facilities in PNG, even including major hospitals.[70]The LMC has the highest salary scale among health service providers on Lihir, followed by government-employed health workers from public facilities, and employees of Church-run facilities. This has caused a drain of human resources from the public sector to the LMC, which has therefore likely negatively affected the quality and level of staffing in government- and Church-run facilities.

In some cases, the partnerships between mining companies and provincial government on health programming appear strong with provincial teams being closely involved. In other cases, there have been reports of provincial health teams perceiving health operations as the mandate of the mining company and thus engaging only sporadically.[71] This has important implications for sustainability and the long-term impact.

For example, weak governance, absorption and implementation capacity of the Fly River Provincial Government to implement health programs as per agreements between the company and the Government has drawn OTML into public health provision outside the fence, as the only institution with the capacity to support much-needed programs in the province. The original agreements between the PNG Government and the company provided for the latter to build infrastructure and for the Government to provide social services. The expansion of services would be financed by revenues from taxes and royalties. In this context, Tabubil Hospital was conceived of as a facility to primarily service mine and contractor staff. Nevertheless, the Western Province Provincial Government, wanting to extend services to wider communities in mine-affected areas, eventually recognised that its capacity to design and implement social programs was limited. Therefore, it was agreed that OTML would deduct the pro-rata costs of operating the hospital for the wider public from royalty payments, an arrangement that remains in place today. Tabubil Hospital has become the de facto referral hospital for the area, serving employees, contractors and the general public to a nationally-recognised high standard.

The Enclaves Project struggled to gain traction with provincial and district health officers who frequently had competing priorities, or had difficulty successfully advising their Provincial Government on project needs. The project was unable to generate ownership among Provincial authorities to the extent aspired.

[70]Lihir Community Health Plan 2009-2013; pp 21.

[71]Banks, G. (2001). Papua New Guinea Baseline Study Final Report Mining, Minerals and Sustainable Development Project for the International Institute for Environment and Development. pp. 25

Moreover, commitment by provincial and district health teams to regular field supervision was lacking, with an observed lack of motivation and urgency to take up this responsibility.[72]

The current structural issues regarding the relationship between provinces and the NDOH mean that the latter has little insight - let alone oversight - of important developments taking place around mines. Nevertheless, health facilities, built by mining companies to serve outside the fence communities in PNG tend to use standard designs and be compliant with national policy directives and protocols. In other words, national guidelines are followed despite the intellectual and physical distance between the NDOH and mining operations.

5.6 Monitoring progress and evaluating impact

Systematic collection and analysis of data includes baseline studies to understand disease patterns and trends; trends in the number of consultations; trends in sick days; etc. Besides facilitating internal control and providing guidance to program management, such data also facilitates communication with partners and other stakeholders. Importantly, this data is needed to justify mining company investments in employee and community health, and to make the case for an expansion of health programs. Mining health programs, including the partnerships that facilitate them, need to be continuously monitored, and evaluated at intervals. In order to ensure thorough monitoring and evaluation (M&E), adequate tools and procedures need to be built into the program from the design stage.

In health programs, M&E tools usually involve an analytic framework that sets out the planned methodology and processes. Besides a theory of change, i.e. the goals and objectives the health program has set, development of good quality indicators is vital. These can relate to outputs, such as number of patients consulted, number of prescriptions administered, number of staff trained, etc. as well as to health outcomes, i.e. improvements in the health of the target population (such as reduced malaria incidence, for example).

Systematic collection and analysis of health data in PNG has only recently become evident. Moreover, there have been cases of refusal to share data and information even among mining health partners. For example, sharing of health program data appears compromised in Lihir, despite the coordination mechanisms established. As a result, it is not possible to evaluate the achievements of the program in detail. To an extent, this is due to lack of capacity by the Sub-District to collect and monitor health data across Lihir. It has been argued that enhanced coordination would be beneficial in this regard and not only yield the direct benefits of a better overview of the health situation by all key stakeholders, but also provide a useful concrete exercise in collaboration among health stakeholders.

In addition, financial transparency has been compromised in a number of cases. For example, there is no full transparency on the use of funds by the Lihir Mine Area Landowners Association, the Lihir Sustainable Development Plan or local government. While the same public oversight and auditing should apply as for all public expenditures, this is not current practice. The Lihir Sustainable Development Plan renegotiation phase provides an opportunity to enshrine and make explicit fund management and oversight practices for the use of mine royalties. Thus, besides addressing the standard issues concerning public funding flows this process could serve to communicate to the Lihirian community that development funds are appropriately monitoring and tracked, ideally by an independent financial monitoring mechanism that could lend credibility through neutrality.

Nevertheless, there is evidence that health programs in PNG have recently begun to prioritise data collection, analysis and sharing as they recognised the value of an evidence-based approach. The Ok Tedi Development Foundation (OTDF), for example, financed feasibility studies for the design of a five-year

[72] ADB (n.d.). Papua New Guinea: HIV Prevention & Control in Rural Development Enclaves Project. Draft completion report (unpublished).

health development program for the Middle and South Fly districts. These studies built on the successes and lessons learned from the North Fly Health Services Development Program[73].

Another positive example for the use of evidence is OTML's response to changed health needs in regard to non-communicable disease. Tabubil Hospital monitors OTML employees for a voluntary Employee Health and Wellness Program targeting lifestyle and preventive health. This initiative was relaunched in 2010 due to data showing that 70 percent of OTML employees were overweight or obese. The health assessments remain voluntary but employees are strongly encouraged to participate. In 2011, 61 percent of the workforce participated in the assessments, in 2012, 36 percent of the OTML workforce participated.

Despite the challenges in relation to data availability, there is clear evidence that the health programs and partnerships associated with mining operations have had a positive health impact as demonstrated by dramatically reduced infant and maternal mortality rates, for example. On other accounts, for example when it comes to malaria prevention, a sustained positive impact is less obvious.

Reducing maternal and infant mortality is recognised as a major achievement of the mining health programs and partnerships in Lihir.[74]Historically, Lihir had also seen a drastic reduction in malaria prevalence. However, this was not maintained when gaps appeared in the program following misunderstandings regarding strategy and responsibility. Nevertheless, surveys from 2008 and 2010 indicated there was an important positive difference between malaria prevalence in mine-affected villages relative to other Lihirian villages. This may be due to effective vector control activities conducted by the mine; a better socio-economic profile; better screening of houses; higher use of repellents; and last but not least, easier access to the Lihir Medical Centre. In North Fly, home to the Ok Tedi mine, a number of health indicators were found to be better vis-à-vis other parts of the province, and the national average. These include ambulatory care visits per capita, measles vaccination, antenatal care, skilled birth attendance, and family planning. Nevertheless, diarrhoeal disease in children, malaria incidence and injury rates are significantly higher in North Fly.

5.7 Exit strategies and sustainability

Health system strengthening is a key tool for ensuring sustainability. In the context of mining health programs, sustainability can be defined as continuing positive development impacts associated with mining beyond the life of the project. Ensuring sustainability involves working with and building the capacity of local partners; maximising cost effectiveness; generating data and documenting lessons learned, etc. Moreover, questions about ethics arise, for example, where HIV patients have been receiving drugs to manage their infection and must fear losing such support as a mining health program ends.

Sustainability considerations are necessary as mining health programs come with an expiry date while health needs of the population persist and potentially increase. In other words, sustainability and exit strategies, such as handover to public bodies or NGOs, are essential and need to be considered from early on in the planning stage. At the same time, the fact that mining operations tend to have very long time horizons, such as 40 years in the case of LGM, much longer than those of many development partners, is an excellent opportunity for ensuring programmatic sustainability.

Defining an exit strategy involves considerations in regard to mine development and the life of the mine; the business case for continued investments in health; financial contributions to community-owned development, such as through a mining foundation for example; linkages with related sectors, such as water and sanitation; and last but not least, data collection and analysis to clearly understand the costs and impacts of the above and be able to use and share lessons learned for application in other settings.

[73]The initial phases of the proposed Middle and South Fly health programs will be funded from the Western Province People Development Trust which holds accumulated dividends from the mine.

[74]Macintyre, M. (2004). Thoroughly modern mothers: Maternal aspirations and declining mortality on Lihir Island, Papua New Guinea.

Defining an exit strategy ensures not only an appropriate amount of time for implementation, but also allows for this strategy to be clearly communicated to beneficiaries and other stakeholders, thus managing expectations. The available evidence from PNG indicates that attention to exit strategies and sustainability is increasing as a mine approaches closure. In other words, these two highly important issues are not considered from the outset, thus potentially negatively impacting on sustainability.

Uncertainty about the future of the OTML mine, i.e. whether and at what level production will continue beyond 2015, amplifies questions about sustainability. It also reinforces the insight that OTML-funded or -managed health programs would benefit from in-built exit strategies setting out the development of capacity, institutional frameworks as well as partnerships to facilitate handover of these programs when the mine is closed. Steps facilitating the implementation of an exit strategy, including the handover of Tabubil Hospital, have been taken when extending the life of the NFHSDP to 2018. This allows for a maturation of program institutions and outcomes in North Fly, alongside the nascent Middle and South Fly health programs, leading to the establishment of a health program covering the whole of Western Province.

The Community Relations Department of OTML, focusing on mine affected communities, plans development activities for implementation by Ok Tedi Development Foundation (OTDF). In 2007, the Foundation was restructured – following a revision of Community Mine Continuation Agreements - to operate independently of OTML and manage community trusts financed largely from mine royalties. In early 2009, the OTML Board approved the transfer of one share of the foundation to PNG Sustainable Development Program, the not-for profit organisation owning close to two thirds of the mine. OTML is legally obliged to transfer the remaining three shares in OTDF to other reputable development organisations prior to or at mine closure. To this end, OTDF and OTML are working with the embryonic Ok Tedi Mine Impacted Area Association which represents mine-affected communities. This is to ensure the Association is fully incorporated and has appropriate status when eventually being granted one of the OTDF shares.

The Lihir Gold Mine, on the other hand, has a time horizon that goes beyond 2040, therefore sustainability considerations in regard to health are not yet at the forefront. Moreover, there is insufficient data to determine the exact cost of the mine's efforts to improve health inside and outside the fence, as well as insufficient data to relate financial inputs to health outcomes. In other words, it is currently not possible to assess cost effectiveness of the health programs associated with the mine, or indeed to estimate what level of investment the company can afford beyond the life of the mine. Nevertheless, available data does demonstrate that the Lihir Medical Centre, which provides high-quality services to patients at virtually no cost at the point of access, has a price tag seven times that of the Government-financed health system. When the cost of other health programs is considered, this ratio rises even higher. At the same time, there are indications that the cost of the highly successful mother and child health program are minimal. This raises important questions in regard to sustainability and reinforces the need to systematically collect and analyse data.

Malaria is the leading cause of illness among those presenting at Lihir Medical Centre. Under a new partnership with the Medicines for Malaria Venture (MMV), Newcrest is receiving guidance on best practice in malaria management in PNG and beyond. Moreover, as part of this partnership the feasibility of eradicating malaria in Lihir will be investigated. Malaria eradication would bring key benefits to the company, particularly in reduced healthcare cost and increased productivity, while benefiting communities and thus sustainability of mining investments in the long-term. It goes without saying that a plan to eradicate malaria would require full agreement and stakeholder buy-in if it is to be successful.

6 LESSONS LEARNED AND RECOMMENDATIONS

Mining is a main contributor to PNG's economy and, with a number of major mines going to come online soon, will likely remain so for the coming decades. In these future mining projects, many lessons learned in existing mines can be useful and fairly easily applicable, others, such as deep-sea offshore mining, will bring additional challenges. Building on lessons learned will be a key determinant in ensuring that the benefits of mining and other extractive industry operations are maximised and used effectively and efficiently to promote health and development.

6.1 Lessons learned

6.1.1 Program design

Complexity of mining health programs and partnerships: Most major mining operations in PNG are associated with significant health programs, both inside and outside of the fence. Both mining health 'programs' assessed in case studies by the project are fairly complex sets of programs, encompassing a myriad of agreements, institutional arrangements and partner organisations. All such programs involve a variety of partnerships and contracts, ranging from medical service provision being outsourced to international private for-profit providers of healthcare to partnerships with beneficiary organisations and of course government authorities at several administrative levels.

Organic growth combined with strategic design: Those 'programs' appear to have organically grown over the life of the mine, originally following legal obligations and agreements between stakeholders, and later expanding or being modified at various junctures, such as pre-determined review points, community demands, new evidence and analytical insights generated, or the appearance of new funding opportunities. In other words, mining health programs in PNG are a mix of legal obligation, strategic planning as well as opportunistic reaction to new developments.

Health system strengthening is not sufficiently prioritised: When conducting health interventions and establishing health services in the context of a weak national health system, as is the case in PNG, mining companies must consider and prioritise health system strengthening from the outset, striving towards harmonisation and alignment with the national system. This involves direct and consistent engagement between mining companies and local health authorities in particular, a solid understanding of local as well as national health priorities and plans, and joint identification of useful ways to address local needs. Health system strengthening also requires sharing of relevant data between mining companies, district health management teams and other interested authorities and organisations, including the PNG National Malaria Control Program, the National Aids Council, the NDOH, local NGOs working in health, local administration, etc. However, by most accounts, such health system strengthening does not appear to be systematically and comprehensively incorporated in mining health programs from the outset, leading, among other things, to a resource drain from the public health sector.

Insufficient analysis in program design: Health programs should be based on evidence and tailored to each stage in the mining cycle from exploration to production and closure of the mine. For example, this involves paying special attention to population movements during different stages in the process. Establishing a program to mitigate health and related impacts of population influx in addition to community development programming should be considered, particularly during mine construction. Moreover, such programs should systematically take into account water, sanitation, hygiene, nutrition and other determinants of health, including social determinants such as education. However, there is no evidence that mining health programs in PNG are designed explicitly and systematically based on such considerations.

6.1.2 Sustainability

Substitution of public services: The widespread perceived and actual lack of capacity of government health authorities can dangerously lead to the public sector being undermined and the need for health systems strengthening being forgotten or ignored, rather than being incorporated into mining health programs and partnerships from the outset. Assumptions about weak government capacity – whether justified or not – appear to contribute to public health service provision to be all but replaced by mining health programs in some areas. While this may not be objectionable per se given the size and importance of some mining operations, it should nevertheless be acknowledged. Only where this is openly done, appropriate provisions can be made to ensure health sector stewardship and local partner takeover once mining operations end.

Sustainability is not considered from the outset: While the term 'sustainability' may be over-employed rhetorically, actual strategic and systematic considerations of sustainability early in the health program design stage are lacking. As a result, once the end of mine's life is in sight, programs tend to have to be revised or re-focused in order to allow for the company's exit without creating excess harm. Mining health foundations are one way of increasing the chances of sustainability, even though questions around management and ownership persist, as does the need to ensure appropriate accountability and transparency.

Insufficient collection, analysis and sharing of data: Data collection, analysis and sharing is absolutely essential for understanding programmatic effectiveness and efficiency, and for deriving lessons learned to facilitate health program development associated with new mining and indeed other extractive industry projects in PNG. Ultimately, establishing a 'lessons learned culture' is beneficial to managing both private and public health programs, and for ensuring cost effectiveness and related sustainability. Nevertheless, while there appears to have been some progress recently, insufficient attention has been paid to appropriate systematic data collection and sharing in PNG so far. This may be due not only to the practical difficulties but also relating to the lack of clarity with regard to roles and responsibilities across mining health program partners.

6.1.3 Key challenges

Stakeholder coordination is a key challenge: When it comes to mining health partnerships in PNG, the most obvious challenges relate to stakeholder coordination and to questions around partners' roles and responsibilities, both in terms of delivery of health services as well as in regard to management and coordination of health efforts within a given context. At least in one case, for example when a lack of clarity about responsibilities for the vector control program caused a programmatic gap of several years in Lihir, negative health impacts of poor coordination and ill-defined roles and responsibilities became apparent.

Lack of government capacity for sectoral stewardship: A key challenge for, and potentially cause of, weak coordination is the government's virtual inability to assume its important leadership and stewardship role of the health sector. Provincial and district health authorities do not have the requisite capacity to oversee, direct and coordinate health programs and activities. Capacity building is needed at these levels to more effectively manage what is likely to become an increasingly subcontracted health services model. Government capacity needs strengthening in a number of aspects, including administrative capacity, supervisory capacity and coordination capacity as well as the capacity to efficiently and transparently manage and distribute funds. In this regard it is worth noting that updating and improving the legal framework for mining and related aspects of health and public-private partnership is important in its own right. Nevertheless, the legal and regulatory framework is only relevant in practice where appropriate institutions have sufficient capacity for implementation and enforcement.

Pessimistic view of government capacity: While some efforts to strengthen government capacity and enable it to perform its stewardship function have been made by mining health programs, there appears to

be a feeling that such efforts may be in vain, not least because of the gaps and issues relating to financial accountability and transparency, including impeded funding flows from the centre to the administrative periphery.

6.1.4 Opportunities

Positive impact of mining health programs: Despite the many issues and challenges, mining health programs in PNG are having a positive impact, largely avoiding long-term negative health impacts associated with mining and creating improved health outcomes, as demonstrated by drastically reduced maternal mortality rates in Lihir, for example. This also shows that real health improvements are possible where funding is concentrated and efforts are made jointly by key stakeholders to use such funding effectively and based on evidence.

Room to improve community capacity and engagement: The strength of communities and landowners in PNG may be both a blessing and a curse. In terms of democratic ownership and civic participation, as well as in regard to understanding health needs on the ground, it is a clear advantage. However, there appears to be significant room for improvement, for example through capacity building, in terms of these groups' ability to manage and provide health services, and in regard to collaboration and coordination with government and industry. Moreover, there appears to be an under-utilised opportunity to engage communities directly in health awareness and preventive activities, through the village health committee system. Mining companies' health teams are an ideal vehicle for resourcing and activating these committees in a way that reinforces the "back to basics" focus of the NHP, as well as providing an opportunity for villages to engage and take responsibility for health at the individual and village level.

Enhancing NDOH engagement: While the NDOH has historically not been involved in mining approval or TCS processes, there is nothing in the regulatory framework that would prevent it from doing so. Moreover, key actors, such as the NDOH itself and the MRA, have expressed an interest in stronger NDOH involvement. Importantly, the draft PPP Act and the NHP both open doors for stronger engagement by the NDOH. In other words, rather than being a political issue, the current lack of NDOH involvement seems to be a capacity issue primarily. It also appears to be a simple necessity for DNP&M and MRA to begin to be able to rely on the NDOH for support on health-related mining issues as more projects come on stream and their workload intensifies. Systematically involving the NDOH in mine approval processes, for example through participation in Development Fora, would have several benefits: besides helping to ensure policy alignment it would facilitate stewardship, mutual understanding and information sharing between NDOH, mining partners and local authorities and thus also build NDOH capacity. Similarly, NDOH involvement in TCS appraisal would facilitate alignment and coordination in terms of health infrastructure.

Clarifying roles and responsibilities: Looking forward, the government should take the opportunity to harness mining and other extractive industry for health infrastructure development and service delivery, as well as for sectoral coordination where this is not otherwise possible. At the very least coordination and sectoral stewardship are issues that would need to be addressed from the outset in negotiations between government and mining companies, to ensure that these important responsibilities do not fall between cracks of assumptions, for example about government performing stewardship in theory or about companies taking on this role in practice.

Ensure political commitment: Last but not least, political support is key in overcoming 'technical' barriers to maximising health outcomes through mining health programs and partnerships, such as low government capacity at provincial and local level or gaps in partners' understanding of their roles and responsibilities. Political commitment and support at all levels can go a long way in ensuring an adequate regulatory framework is developed and enforced; mining companies own up to their expressed commitments to supporting development in a sustainable manner; government prioritises transparency in regard to budgets and funding flows; mining health partners, such as local landowner associations and NGOs deliver on their share of the deal; and most other aspects of good practice facilitating effective and efficient health service delivery and, by extension, development of PNG more generally.

6.2 Recommendations

Recommendations regarding policy

- **Government, led by the MRA**, to clarify the **roles and responsibilities of the MRA, DNP&M and NDOH** in ensuring health sector policies are taken into account in the mining approval process and resulting agreements, and to identify appropriate mechanisms for **NDOH involvement** to ensure national policies and standards are satisfied; this may include systematic involvement of the NDOH in development fora alongside district and provincial health authorities, for example.
- **Government, led by the DNP&M**, to identify ways for ensuring **policy alignment and efficient use of resources through NDOH involvement** in areas concerning health service supply, for instance, when negotiating with mining companies about health infrastructure development under the TCS and related staffing commitments; this may be done by including NDOH representatives in the TCS Policy Screening and Project Appraisal Committees when health infrastructure is being discussed.
- **Government, led by the MRA**, to make **health needs and impact assessments,** in-depth commitments on sustainability and exit strategies a mandatory part of the licensing and subsequent review processes for investors in mining, developing templates and guidance documents to facilitate the process;
- **NDOH, assisted by development partners**, to ensure the anticipated **review of the Health Act** goes ahead as planned, to facilitate clarification of roles and responsibilities for health in mine approval, the TCS process and mining health partnerships more generally.

Recommendations regarding governance and regulation

- **DNP&M and MRA** to explicitly rely on the NDOH for support on health-related mining issues by **transferring both theoretical and actual responsibility to the NDOH**;
- **Regional health and administrative authorities, supported by development partners**, to discuss and define the role local-level government authorities can and should play with regard to **coordination** of mining health programs in districts and provinces with major mining operations, also considering whether and how such coordination could formally be shared with industry and other partners;
- **NDOH** to invite representatives of large mining health programs, including mining company representatives, to **central-level coordination meetings**, such as joint annual health sector review and health-related theme group meetings, to facilitate information sharing and mutual understanding; development partners may facilitate **relationship building** between mining companies and the health sector by acting as a partnership brokers in this regard;
- **Development partners** to continue supporting the **review of the legal and regulatory framework,** particularly concerning roles and responsibilities of health vis-à-vis other government authorities, making health assessments and effective exit strategies part of the licensing process; this includes supporting the development of a **regulatory framework for small-scale mining**, ensuring that relevant lessons learned on health programs and partnerships of large-scale mining are taken into account;
- **DNM&P, in coordination with the Department of Treasury and Sovereign Wealth Fund Board**, **to review and accordingly adapt the definition of "productive investments**" in the PNG Development Strategic Plan as relates to the Sovereign Wealth Fund, in order to ensure that quality-enhancing recurrent expenditures can be used to enhance health outcomes and the cost-effectiveness of expenditures.

Recommendations regarding capacity building

- **NDOH, supported by development partners**, to **establish a unit or capacity pool** of staff to enable the NDOH to understand mine-related health PPPs and policy options for health and mining, including the operations of the PNGSDP; and to facilitate participation of the NDOH in a "whole of government" approach to stewardship of mining agreements, enabling the NDOH to take responsibility for the

government's agreed health obligations, including coordination of TCS-funded infrastructure development;

- **Development partners** to support **capacity building for selected NDOH staff** responsible for mining health programming, including mine health and safety;
- **Development partners** to provide technical assistance and support to strengthen **government capacity for health sector stewardship**, i.e. besides focusing on health worker capacity, invest in administrative and managerial capacity of health authorities, particularly at the regional and district levels.
- **Mining companies** to provide **training on partnership development** and management to key individuals in the company, both at the highest levels and for health program managers, and consider extending such training to existing and prospective partners, including local health authorities;
- **Development partners** to consider providing partnership training to central level agencies involved in mining health programming, such as NDOH and MRA, and to consider extending such capacity building to mining health partners at provincial and district level.

Recommendations regarding partnership and program development

- **All mining health partners**, including mining companies, to prioritise **health system strengthening**, i.e. supporting government stewardship, alignment, harmonisation and capacity building in program design from the outset, when establishing or reviewing a health program;
- **All mining health partners** to ensure that agreements are set out in writing in **comprehensive memoranda of agreement**, outlining goals as well as roles and responsibilities of each partner;
- **All mining health partners** to make appropriate resources available to **develop and nurture partnerships**, particularly in terms of staff time and financial resources;
- **Mining companies** to consider providing **small grants for community-led projects** to provide incentives for communities to organise and develop solutions to health issues in their localities, thus contributing to sustainability and potentially increasing cost-effectiveness in the longer term.

Recommendations regarding evidence, data sharing and future assessments

- **Development partners** to facilitate **linkages and information sharing between mining health programs and donor-funded health programs** within a given geographical area;
- **NDOH, MRA and development partners** to consider organising a **national conference** or several regional conferences on extractive industry health partnerships, bringing together key stakeholders to share information, discuss lessons learned, analyse existing partnership structures and identifying ways of developing new partnerships and effective coordination mechanisms;
- **AusAID** to **make lessons learned in this and future assessments systematically available** to DNP&M, NDOH, MRA, relevant local authorities as well as mining health partners from community and industry;
- **Development partners** to consider supporting a **comprehensive mapping exercise** of extractive industry health programs and partnerships in PNG, analysing commonalities and differences across on- and offshore mining, oil and gas, and drawing lessons for existing and future mining, oil and gas projects;
- **Mining companies**, when developing new health programs or reviewing existing ones, both inside and outside of the fence, to pro-actively identify and **consider available lessons learned and best practice** guidance to avoid repeating the mistakes of others; in particular, draw lessons about stakeholder professional public health analysis; coordination; information sharing; and exit strategy development;
- **Mining companies and other key stakeholders** to develop a lessons-learned culture, making **data collection and analysis a central part** of all aspects of health programming and partnership, and pro-actively share data with government partners.

7 BIBLIOGRAPHY

Allied Gold (2011).Simberi Gold Mine: Four Years of "Making a Difference". Available from: http://www.alliedgold.com.au/IRM/Company/ShowPage.aspx?CPID=2141&EID=36919797. (Accessed: 15th June, 2012).

Asian Development Bank (2000).Resettlement and Mining in PNG. Manila: Asian Development Bank. Cited in Thomason & Hancock (2011).

Asian Development Bank (2008).Public-Private Partnership Handbook. Manila: Asian Development Bank. Available from: http://www.adb.org/documents/public-private-partnership-ppp-handbook. (Accessed: 15th June, 2012).

Asian Development Bank (2011). Papua New Guinea: Facilitating public-private partnerships. Technical Assistance Report. Manila: Asian Development Bank Available from: http://www2.adb.org/Documents/TARs/PNG/43199-01-png-tar.pdf. (Accessed: 15th June, 2012).

Asian Development Bank (forthcoming). Papua New Guinea: HIV Prevention and Control in Rural Development Enclaves Project. Draft Project Completion Report. Manila: Asian Development Bank.

Asia-Pacific Business Coalition on AIDS (2008).Ok Tedi Mine Limited Case Study: Know Your HIV Status. Available from: http://apbca.ptest.tv/wp-content/uploads/2010/10/OTML-Case-Study-Final.pdf. (Accessed: 15th June, 2012).

AusAID (2009).Working Paper 1: Papua New Guinea Country Report.Evaluation of Australian Aid to Health Service Delivery in Papua New Guinea, Solomon Islands and Vanuatu. Canberra: AusAID. Available from: http://www.ode.ausaid.gov.au/publications/documents/working-paper-health-service-delivery-png.pdf. (Accessed: 15th June, 2012).

Australia Papua New Guinea Business Council (2012). PNG Report: A Focus on the Papua New Guinea Resource Sector.

Banks, G. (2001).Papua New Guinea Baseline Study Final Report Mining, Minerals and Sustainable Development Project for the International Institute for Environment and Development. Canberra: International Institute for Environment and Development. Available from: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.137.7335&rep=rep1&type=pdf. (Accessed: 15th June, 2012).

Barr, D.A. (2007). A Research Protocol to Evaluate the Effectiveness of Public - Private Partnerships as a Means to Improve Health and Welfare Systems Worldwide, American Journal of Public Health 97, 1, pp. 19-25.

Barrick Gold (2010). Beyond Borders: A Barrick Gold Report on Responsible Mining [Online] Available from: http://www.barrick.com/Theme/Barrick/files/docs_csr/Beyond-Borders-Sept-2010.pdf. (Accessed: 15th June, 2012).

Bloom, D.E. et al. (2001). HIV/AIDS and the Private Sector: A Literature Review. Available from: http://info.worldbank.org/etools/docs/library/49148/HIVAIDSPrivateSector%20(literature%20review).pdf. (Accessed: 25th June, 2012).

Bloom, D.E. et al. (2006). Business & HIV/AIDS: A Healthier Partnership? - A Global Review of the Business Response to HIV/AIDS 2005-2006. Available from: http://www.weforum.org/pdf/Initiatives/gbs2006_report.pdf. (Accessed: 15th June, 2012).

Boldrini, F. and Trimble, C. (2006). The State of Business Coalitions in Sub-Saharan Africa, Geneva: World Economic Forum Global Health Initiative. Available from: http://www.weforum.org/pdf/GHI/The_State_of_Business_Coalitions_in_Sub_Saharan_Africa.pdf. (Accessed: 15th June, 2012).

Callan, M. (2012). What Do We Know About the Private Sector's Contribution to Development? Australian National University Development Policy Centre Discussion Paper 11.

Center for Business and Government, The World Economic Forum and UNAIDS (2004). HIV/AIDS and Business in Africa and Asia: A Guide to Partnerships. Available from: http://www.weforum.org/pdf/Initiatives/GHI_Harvard_Partnership_Guidelines_Full.pdf. (Accessed: 15th June, 2012).

Centre for Social Responsibility in Mining (2011). Good Practice Note: Community Development Agreements. EISourcebook. Accessed at

http://www.eisourcebook.org/cms/files/csrm_good_practice_notes_on_cdas_document_final_260911.pdf

CIA World Factbook (2012). The World FactBook: Papua New Guinea. Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/pp.html. (Accessed: 15th June, 2012).

CIA World Factbook (2013).Accessed on 26 March 2013 at https://www.cia.gov/library/publications/the-world-factbook/geos/pp.html.

Cibulskis, R. (2002). The PNG Health System and Income Distribution. Draft Mimeo.

Connell, J. (1997). PNG: The struggle for development. New York: Routledge.

Department of National Planning and Monitoring (2001).Tax Credit Scheme Guidelines.

Department of National Planning and Monitoring (2010).Papua New Guinea Medium Term Development Plan. Available from: http://www.treasury.gov.pg/html/publications/files/pub_files/2011/2011-2015.png.mtdp.pdf. (Accessed: 15th June, 2012).

Environmental Resources Management for The World Bank (2010). Mining Community Development Agreements – Practical Experiences and Field Studies.Accessed at http://www.sdsg.org/wp-content/uploads/2011/06/CDA-Report-FINAL.pdf.

Fourth High-Level Forum on Aid Effectiveness (2011).Expanding and Enhancing Public and Private Co-operation for Broad-based, Inclusive and Sustainable Growth. Available from: http://www.oecd.org/dataoecd/25/36/49211825.pdf. (Accessed: 16th June, 2012)

Government of Papua New Guinea (2001).Infrastructure Tax Credit Scheme Guidelines, Department of National Planning and monitoring.

Government of Papua New Guinea (2010). National Health Plan 2011 – 2020. Available from: http://www.wpro.who.int/countries/png/PNGNHP_Part1.pdf (Accessed: 15 June 2012)

Government of Papua New Guinea (2010b). Public Private Partnership Act 2010. Available from: http://www.treasury.gov.pg/html/media_releases/files/2011/2010.oct.draft.ppp.bill.pdf. (Accessed: 15th June 2012).

Hair, J. (2002).Sustainable Development: Going Forward, International Council on Mining and Metals Newsletter, 1, 2, pp. 1-6.

Hancock, M. (2010). Risk Management Systems for Communicable Diseases in Papua New Guinea Mining Industry: Maturity Model – Paths for Development. University of Queensland, PhD Thesis.Accessed at http://espace.library.uq.edu.au/view/UQ:229759.

Hozumi, D. et al. (2008). The role of the private sector in health: a landscape analysis of global players' attitudes toward the private sector in health systems and policy levers that influence these attitudes - Technical Paper 2, Results for Development Institute, Rockefeller Foundation - sponsored initiative on the role of the private sector in health systems in developing countries. Available from: http://www.resultsfordevelopment.org/sites/resultsfordevelopment.org/files/resources/A%20Landscape%20Analysis%20of%20Global%20Attitudes%20toward%20the%20Private%20Sector.pdf. (Accessed: 15th June, 2012).

Independent State of PNG (1967). Mining Act 1967

Independent State of Papua New Guinea (1992). Mining ACT 1992

International Finance Corporation (2011). Understanding IFC's Environmental and Social Due Diligence Process.

International Monetary Fund (2011).2011 World Economic Outlook. Accessed at: http://www.imf.org/external/pubs/ft/weo/2011/02/pdf/text.pdf on 3 December 2012

Jackson, R. T. (2002). Capacity building in Papua New Guinea for Community Maintenance During and after Mine Closure, Commissioned by the Minings Minerals and Sustainable Development Project of the International Institute for Environment and Development. Available from: http://pubs.iied.org/pdfs/G00805.pdf. (Accessed: 15th June, 2012).

Joint United Nations Program on HIV/AIDS (2009).HIV-related Public-Private Partnerships and Health Systems Strengthening, Geneva.

JTA International (2010).North Fly Health Services Development Program.2010 Annual Report.Available from:

http://www.oktedi.com/images/stories/corporate_repoorts/nfhsdp%202010%20annual%20report.pdf. (Accessed: 15th June, 2012).
JTA International (2011). North Fly Health Services Development Program 2009-2013. 2011 Annual Report.
Law Business Research (2011).Mining 2011. Available for download at http://www.gettingthedealthrough.com/books/updates/article/28421/
Lihir Gold Limited (2008). Occupational and Community Health and Safety, Sustainability Report 2008. Available from: http://lihir.ice4.interactiveinvestor.com.au/lihir0902/index.php?option=com_content&view=article&id=29 (Accessed: 15th June, 2012).
Lihir Islands Community Health Plan 2009-2013.
Lihir Sustainable Development Plan 2008.
Lucci, P. (2012). Post-2015 MDGs – What role for business? ODI, London. http://tinyurl.com/bt34jp8
Macintyre, M. (2004). Thoroughly modern mothers: Maternal aspirations and declining mortality on Lihir Island, Papua New Guinea. Health Sociology Review: Vol. 13, No. 1, pp. 43-53.
Manning, M. (2005).PNG thirty years on. Pacific Economic Bulletin, 20, 1, pp. 145 – 158. Available from: http://peb.anu.edu.au/pdf/PEB20-1manning.pdf (Accessed: 15th June, 2012).
McBryde, E. (2012).Evaluation of Risks of Tuberculosis in Western Province Papua New Guinea. Burnett Institute. Accessed at: http://www.ausaid.gov.au/Publications/Pages/png-tb-evaluation-of-risk.aspx on 5 December 2012
Mining Health Initiative (2013). Good Practice Guidelines – Partnering for Effective Health Programming. Available for download at http://www.mininghealth.org/wp-content/uploads/2013/02/Good_practice_guidelines.pdf
The Mining Minerals and Sustainable Development Project (2002).Breaking new ground: Mining minerals and sustainable development. London: International Institute for Environment and Development. Available from: http://pubs.iied.org/9084IIED.html (Accessed: 15th June, 2012).
Mineral Resources Authority (2008). Minerals for Life: Corporate Plan 2008-2013.
Mineral Resources Authority (2008b).Corporate Profile. Available for download at http://www.mra-shop.com/Portals/2/Publications/MRA%20CORPORATE%20PROFILE%20-%20for%20Clients%20_revised%20June%207,%2008_.pdf
Mineral Resources Authority (2013).Webpages for investors; Types of mining tenements http://www.mra.gov.pg/Investors/TypesofMiningTenements.aspx (Accessed: 26 June 2013).
Montrose (2011). Findings and Recommendations of MALCON Review in Papua New Guinea: Lihir Island.
Morris, M. (2011).Time to step up in PNG on Extractive Industries Transparency.Development Policy Centre. Available as Development Policy blog for download at http://devpolicy.org/time-to-step-up-on-extractive-industries-transparency/
National AIDS Council of Papua New Guinea (2010). Papua New Guinea National HIV/AIDS Strategy 2011 – 2015. Accessed at: http://www.undp.org.pg/docs/publications/PNG%20National%20HIV%20Strategy_%202011-2015.pdf on 15 September 2012
National AIDS Council Secretariat (2012).HIV Epidemic in Papua New Guinea—Fact Sheet.
National Research Institute (2010).Papua New Guinea District and Provincial Profiles.
Newcrest Mining Limited (2009). LihirLuksave Long Komuniti (Social Awareness Training).
Newcrest Mining Limited (2012). Draft Review of Health on Lihir by Newcrest Lihir Sustainability Department, mimeo.
Newcrest Mining Limited (2012). 2012 Annual Report. Accessed at http://www.newcrest.com.au/investors/reports/annual/
Newcrest Mining Community Relations Group (2012). Lihir Demographics, Draft mimeo.
North Fly Health Services Development Program (2009). North Fly District Health Services Base Line Study: A situational analysis of existing health services in the North Fly District of Papua New Guinea's Western Province.
North Fly Health Services Development Program (2011).Annual Report 2011. Accessed at: http://www.jtai.com.au/wp-content/uploads/2012/08/NFHSDP-2011-Annual-Report.pdf on 5 November 2012

Oil Search Limited (2012). Building our Future: 2011 Annual Report
Oil Search Limited (2012b).KomunityNius, Volume 10 Issue3.
Ok Tedi Development Foundation (2012). 2011 Annual Report: Delivering with Innovation.
Ok Tedi Mining Limited (2011). OTML Annual Social Responsibility Review.
Ok Tedi Mining Limited (2011b).Tabubil Hospital Annual Report 2010.
Ok Tedi Mining Limited (2012). "Presentation on OTML: The Facts" to mission on behalf of Nigel Parker, Managing Director and CEO.
Ok Tedi Mining Limited – Community Relations Department (2012). CMCA Annual Population Update Report 2012
Oxford Business Group (2012). The Report – Papua New Guinea 2012. Available online at http://www.oxfordbusinessgroup.com/country/Papua%20New%20Guinea
Papua New Guinea Institute of National Affairs (2011).Draft Public Private Partnership Bill – Explanatory Notes.
Peachey, B. (2011).Transparency in Mining Sector is on the Rise, Reveals New Figures. Corporate Social Responsibility Newswire Press Release. Available from: http://www.csrwire.com/press_releases/31851-Transparency-in-Mining-Sector-is-on-the-Rise-Reveals-New-Figures. (Accessed: 15thJune, 2012).
Pilipinas Shell Foundation Inc. (2012). Biting back against Malaria - Shell Global Features and highlights. Available from: http://www.shell.com/home/content/aboutshell/features_highlights/malaria/ (Accessed 15th June 2011).
PNG Chamber of Mines and Petroleum (2009).Extractive Industries Transparency Initiative. Available from: http://www.pngchamberminpet.com.pg/images/pdf_files/ch_eiti_09.pdf. (Accessed: 15thJune, 2012).
PNG Chamber of Mines and Petroleum (2012). Pre-Budget Submission (May 2011): Resource Industry Tax Credit Scheme.
PNG Department of Treasury (2011).Fiscal outturn report, April-May 2011. Available from: http://www.treasury.gov.pg/html/publications/files/for_files/2011/2011.for.apr-may.pdf (Accessed: 15th June, 2012).
PNG LNG (2012). Quarterly Environmental and Social Report: First quarterly report, 2012. Available from: http://www.pnglng.com/media/pdfs/quarterly_reports/Q1-2012-ESR-ExecSummaryEng.pdf. (Accessed: 15thJune, 2012).
PNG National Department of Health (2000).National Inventory of Health Facilities.
PNG Sustainable Development Program (2005).Information Booklet for the Community Sustainable Development Program.
PNG Sustainable Development Program Limited (2006). Pre Program Assessment for Health in Western Province. Accessed at http://www.adi.org.au/upload/WP%20Health%20PreProgram%20Assessment%20PNGSDP.pdf on 5 November 2012
PNG Sustainable Development Program LTD (2012).Annual Report 2011.
PNG Sustainable Development Program LTD (2012b).PNGSDP insight. Issue No 1.
Ratzan, S. (2007). Public-Private Partnerships for Health, Journal of Health Communication, 12(4): 315-316.
Sekhri, N. et al.(2010). Public-Private Integrated Partnerships Demonstrate The Potential To Improve Health Care Access, Quality, And Efficiency, Health Affairs, 30(8): 1498-1507.
Sidhu, I.K. (2008). Business Coalitions Tackling AIDS, A Worldwide Review - January 2008 Available from: http://www.weforum.org/pdf/AM_2008/WBC_Report.pdf. (Accessed: 15thJune, 2012).
Simpson G et al .(2011). Resistance patterns of multidrug-resistant tuberculosis in Western Province, Papua New Guinea, Int J Tuberculosis Lung Dis, 2011 Apr 15(4):555-2
Sulzbach, S. et al. (2005). Advancing Commercial Sector Involvement In Reproductive Health In West Africa. Bethesda, MD: The Action for West Africa Region Project, Abt Associates Inc.
Thomason, J. et al. (2008). Reverse Alchemy-Turning Gold into Health Care in Papua New Guinea, Papua New Guinea Medical Symposium, 2008.
Thomason, J. and Rodney, A. (2009).Public-Private Partnerships for Health – What does the Evidence Say?, PNG Medical Journal, 52 (3-4) pp. 166 – 178.

Thomason, J. and Hancock.M. (2011). PNG Mineral Boom: Harnessing the Extractive Sector to Deliver Better Health Outcomes. Australian National University Development Policy Centre Discussion Paper 2. Available from: http://devpolicy.anu.edu.au/pdf/papers/DP_2_-_PNG_mineral_boom-_Harnessing_the_extractive_sector_to_deliver_better_health_outcomes.pdf. (Accessed: 15thJune, 2012).

Townsend, P.K. and Townsend, W.H. (n.d.) Assessing an assessment: The Ok Tedi Mine. Available from: http://www.maweb.org/documents/bridging/papers/townsend.patricia.pdf. (Accessed: 25th June, 2012).

Ulijaszek, S. et al (1989). The Ok Tedi Health and Nutrition Project, Papua New Guinea: adult physique of three populations in the North Fly region. Ann Hum Biol. 1989 Jan-Feb; 16(1): 61-74. http://tinyurl.com/cnlj2tp

UNDP (2009). Second National MDG Progress Summary Report: Executive Summary. Available from: http://www.undp.org.pg/docs/publications/EXECUTIVE_SUMMARY_MDG_report.pdf. (Accessed: 15thJune, 2012).

UNDP (2012).HIV/AIDS and Development. Papua New Guinea. Available from: http://www.undp.org.pg/. (Accessed: 15thJune, 2012).

UNDP (2012b).Human Development Index – PNG 2011. Accessed at: http://hdrstats.undp.org/en/countries/profiles/PNG.html on 8 November 2012

UNICEF (2012). At a glance: Papua New Guinea. http://www.unicef.org/infobycountry/papuang_statistics.html on 5 November 2012

Widdus, R. (2005). Public-Private Partnerships: An Overview. Transactions of the Royal Society of Tropical Medicine and Hygiene 99, 1, pp. 1-8.

World Bank (2008).Project Appraisal Document for a Second Mining Sector Institutional Strengthening Technical Assistance Project.

World Bank (2011). Papua New Guinea Economic Briefing: Enjoying the opportunities—and facing the challenges—of resurgent commodity prices.

World Bank (2012).Papua New Guinea Country Overview. Available from: http://www.worldbank.org/en/country/png/overview. (Accessed: 15thJune, 2012).

World Bank (2012b). Papua New Guinea Economic Briefing: The challenge of transforming today's boom into better living standards for tomorrow.

World Bank (Forthcoming). Papua New Guinea Health Work Crisis: A Call to Action.

World Bank (Forthcoming). Papua New Guinea Human Resources for Health Review: Meeting Human Resource Constraints and Improving Health Outcomes.

World Economic Forum (2008). Public-Private Partnerships in Health: The Private Sector's Role in Public-Private Partnerships. Geneva: World Economic Forum. Available from: http://www.weforum.org/pdf/GHI/Partnerships_health.pdf. (Accessed: 15thJune, 2012).

World Health Organization (2009). PNG health partnerships: Interim Report

World Health Organization (2011).World Malaria Report 2011. Accessed at: http://www.who.int/malaria/world_malaria_report_2011/en/ on 3 December 2012

World Health Organization (2012).Global Tuberculosis Report 2012. Accessed at: http://www.who.int/tb/publications/global_report/gtbr12_main.pdf on 3 December 2012

World Health Organization (2012b). Papua New Guinea: Country Health Profile. Available for download at http://www.who.int/countries/png/en/

8 ANNEXES

8.1 *Annex 1. List of individuals contacted*

CASE STUDY LIHIR GOLD MINE	
Name	**Function**
Jimmy Peter	Coordinator Community Relations/Communications, Newcrest
Dr. James Deboi	Occupational Health Superintendent, Newcrest
James Fowler	Health Services Director, I-SOS
LwandoNogela	Senior Medical Officer, I-SOS
Dr.OriolMitja	Senior Medical Officer, I-SOS
Nick Bainton	Superintendent Social Impact Monitoring, Newcrest
Greg Hosea	Program Implementation Manager , LICHP
Sheila Gagari	Program Coordinator, LICHP
Dennis Gati	Manager, LMALA
KatuYapi	Program Director, LICHP
Joe Hobo	Monitoring and Evaluation Coordinator, LICHP
DorothyKaven	Health Manager, Lihir Sub-District Health Office
OberthFiwaye	Environmental Health Officer, Lihir Sub-District Health Office
Peter Mapat	Manager, Putput Clinic
Sr Sophie Alip	Acting Sister in Charge, Palie Health Centre
CASE STUDY OK TEDI	
Name	**Function**
MusjeWerror	General Manager – Government & External Relations, OTML
Brad McMahon	Executive Manager – Human Resources, OTML
Harold Duigu	Manager – Human Resources, OTML
Emmanuel Tajonera	Manager – Finance, OTML
JamilaAbassi	Executive Manager Corporate Social Responsibility, OTML
Leonard Lagisa	Executive Manager Community Support, OTML
Kelly Kewa	Program Manager – North Fly Health Services Development Program
Peter Bulungol	Director – Public Health
Ian Middleton	Chief executive Officer, Ok Tedi Development Foundation
Margaret Samei	Hospital Administrator, Tabubil
Dr John Oakley	Medical Doctor, OTML
Dr Toki Inina	Chief Medical Officer, OTML
Garry Lee	Occupational Health and Safety, OTML
Cedric Davies	Occupational Health and Safety, OTML
John Fueng	Councillor, Kawentikin
Silo Kondomo	Councillor, Ankit
CecilenOmbong	Village Health Worker, Ankit
NongwinKemanem	Law & Order village court committee, Ankit
Joe Wenim	Law & Order village court committee, Kumit
KukdaunEyeng	Elder, Korkit
AtimbonKulipman	Elder, Korkit
BulengEnebon	Councillor, Derongo
KatbonVilanweng	Village Health Committee, Kumit
HandipengTunori	Village Health Committee, Korkit

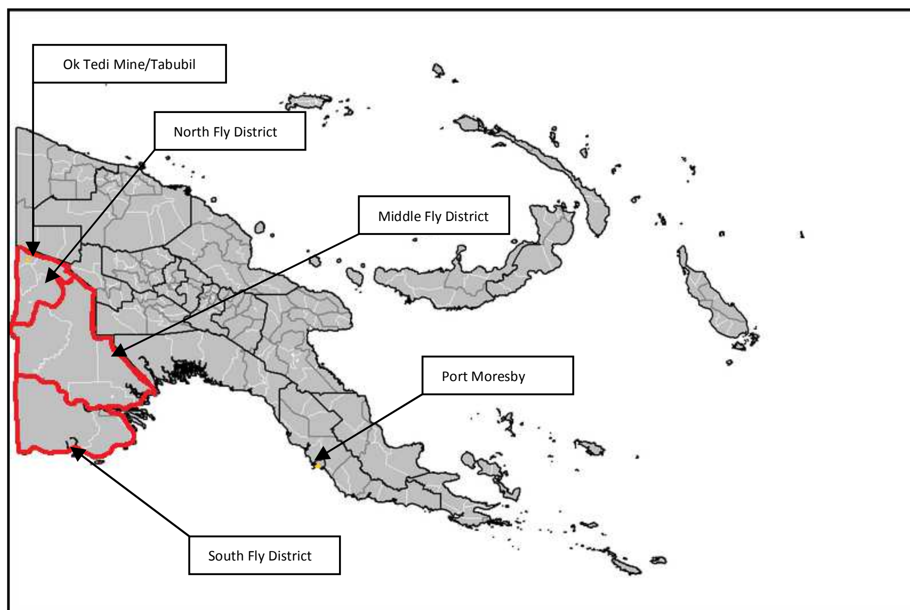
John Lari	District Health Manager, North Fly District
Graeme Hill	Administrator, Kiunga Hospital
Dr Charles Turharus	Kiunga Clinic, OTML
Max Ako	Finance Manager, Rumginae Hospital
Amos Kupaloma	CHW training school Rumginae, Principal
Sr Anna Sanginawa	Catholic Health Secretary, Kiunga
LEGAL AND REGULATORY FRAMEWORK RESEARCH	
Name	**Function**
Adriana Eftimie	Social Development Specialist, International Finance Corporation
AedanWhyatt	First Secretary, Health;AusAID, Port Moresby
Allan Kapi	Assistant Secretary, Treasury Department
Anne Malcolm	Consultant, Asian Development Bank
Ben Imbun	Senior Lecturer, University of Western Sydney
Bryan Land	Lead Mining Specialist, World Bank
Caroline Blackloch	Resident Representative, International Finance Corporation, PNG
Christopher Pilyo	Treasury Department
DianneAikung-Hombhanje	Deputy Registrar/Lawyer, Minerals Tenements Branch, Minerals Resource Authority
David Moses	Treasury Department
David Weeden	GFATM PNG Principle Recipient Manager, Oil Search Health Foundation
Ellen Kulumbu	Health and Education Project Officer, World Bank, Port Moresby
Geoff Clark	Program Director, Health and HIV, AusAID, Papau New Guinea
Gregory Anderson	Head, PNG Chamber of Mines and Petroleum
Jennifer Scott	Community Development Specialist, World Bank, Fiji
Ken KandapWai	Executive Manager, Strategic Policy, National Department of Health
Lady Roslyn Maurata	Chair, National AIDS Council
Lawrence Stephens	Program Manager-Community & Social Investment; PNG Sustainable Development Program Ltd
Mathew Hancock	Former Researcher
Monica Lopyui	Assistant Secretary Economic Branch, Department of National Planning and Monitoring
Nathan Kili	Program Officer, Churches Medical Council
Pasco Kasei	Secretary, National Department of Health
Philip Samar	Managing Director, Minerals Resource Authority
Phillip Tapo	Acting Director, National AIDS Council Secretariat
Ron Brew	Manager, Social Responsibility, Newcrest Mining Limited
Ross Hutton	Public Health Manager, Oil Search Health Foundation
Sakiko Tanaka	PNG Health Project Officer for Asian Development Bank
Dr SibaukVivaldoBieb	Manager, Disease Control and Surveillance Branch, National Department of Health

8.2 Annex 2. Case study summary – Ok Tedi

SITUATION ANALYSIS

Company Profile

OTML has been operating in PNG for almost 30 years, and is currently the largest open-cut mine in PNG, mining both copper and gold. The Ok Tedi Mine is located in the Star Mountains in North Fly District of Western Province - 15 km from the border with Indonesia, and 1,700m above sea level. Western province has two other districts, Middle Fly and South Fly (see map below).[75] Tabubil, the largest settlement in North Fly and originally a planned and company-managed mining town, is located approximately 12 km from the mine.



Political Map of PNG

Gold ore was produced at the mine from 1984 to 1987, and since then the mine has been producing copper concentrate containing gold. In 2010, the mine's export earnings accounted for 18 percent of PNG's GDP. After BHP Billiton divested its 52 percent share in the mine in 2002 to PNG Sustainable Development Program Limited (PNGSDP), and Canadian-owned Inmet sold its 18 percent share in the mine in 2011, OTML became 100percent owned for the benefit of PNG, with PNGSDP owning 63.4 percent and the Government of PNG with 36.6 percent of shares.

The Ok Tedi mine is perhaps best known for the extensive environmental damage caused by waste processing practices employed by the mine project in the 1990s, under the majority ownership of BHP Billiton. Unable to reach an agreement on early closure of the mine's operations, BHP was forced to divest.
OTML's workforce, including contractors and sub-contractors, comprises about 4,009 employees. Of those directly employed by OTML, 95 percent are PNG nationals and 5 percent are expatriates. Some 35 percent of employees are from the "preferred area" of Western Province, defined as being mine-affected. Two percent are from other parts of the province and 58 percent are from elsewhere in PNG.[76]

OTML reported US$ 620 million in profits after tax in 2011, and royalty payments of US$ 35 million, down from US$731 million in after-tax profits in 2010. The current plan and agreements for the mine with the Government of PNG state closure of the mine in 2015. However, the feasibility of a mine life extension is

[75] Map taken from Wikimedia Commons (2012).

[76] Ok Tedi Mining Limited (2012). "Presentation on OTML: The Facts" to mission on behalf of Nigel Parker, Managing Director and CEO.

currently being assessed and discussed with stakeholders, and envisioned for a period up to 2025, including open pit and possibly an underground mine.

Post-2015, if the decision is taken to continue mining, the operation is expected to be much smaller than at present. Nevertheless, OTML has estimated that the benefits to the Government would amount to about K 4 billion (US$ 1.5 billion) in revenues over this period in the form of dividends, taxes and royalty payments, and that the additional resources flowing to the PNGSDP would be significant. The capital costs of the expansion are estimated at about US$ 850 million. A final decision on expansion is expected for 2013.

Demographic Profile

Western Province is the largest province in PNG with an area of 99,300 km^2, but sparsely populated with only 11,544 km^2 (12 percent) of the province occupied. Western Province is not well suited for agricultural production, owing to topography, heavy rainfall and poor soil quality. The population is engaged in subsistence agriculture, fishing, rubber and coconut harvesting for their livelihood, and residents typically live in small villages scattered across the province in pockets which can sustain traditional agriculture.

Consequently, access to services is very difficult. Transport networks between Tabubil and the district capital, Kiunga, have been developed by OTML as part of key mine infrastructure. Villages east of the OTML mining area are particularly remote, affecting their ability to access markets and public services which are more readily available in the urban areas.

Prior to the 1960s, the population in the mine lease area, then estimated between 600 and 700 persons, lived a nomadic subsistence lifestyle and had limited external contact - the first government patrol into the area was in 1963. By 2004, the population on the mining lease had risen to approximately 2,700 and the population of Tabubil area was estimated at about 20,000, half of whom were estimated to be squatters who had migrated from the rest of PNG.[77]Consistent with elsewhere in PNG, the population is young, with 44 percent of the province's total population of 153,304 being under 15 years of age. The population of North Fly district was estimated at 50,635 by the 2000 census and was projected to be 68,193 by the North Fly administration in August 2009.[78]

The Ok Tedi mine has also affected significant populations in both Middle and South Fly – largely due to the effects of mine tailings and waste on the river system south of the mine through to the coast. Various Community Mine Continuation Agreements (CMCA) between OTML, local communities and the Government define which are mine-affected communities and set out compensation and other arrangements.

The mine-affected area covers a total population of approximately 100,000,living in 156 villages. About 36 percent of the affected population live in North Fly; 14 percent in Middle Fly; and 50 percent in South Fly. The CMCA villages of the North Fly comprise 4 tribes, 69 villages and a population of about 24,000 with an average household size of 7.7 people. Ninety-two percent of the population were born in Western Province, suggesting low levels of immigration.

Approximately 60 percent of females and 70 percent of males are considered literate – on par with the national average of 60 percent literacy.[79] The mine is the single main employer in the area, and the total number of direct OTML employees and their dependents in Tabubil is 4,784 - 2,009 employees and 2,775 dependents. Data for the population of the area immediately surrounding the mine are not available, but could roughly be estimated as twice the population of OTML employees and dependents. This population is comprised predominantly of residents living in squatter settlements.

---

[77] Thomason, J. et al. (2008). Reverse Alchemy-Turning Gold into Health Care in Papua New Guinea, Mimeo.

[78]North Fly Health Services Development Program (2009). North Fly District Health Services Base Line Study: A situational analysis of existing health services in the North Fly District of Papua New Guinea's Western Province.

[79]UNDP (2012).Human Development Index – PNG. 2011.

Health Status

Prior to the commencement of mining, health conditions in North Fly district were poor, with an estimated IMR of 230/1,000 live births and a very low life expectancy between 30 and 35 years, principally due to infectious diseases, but with the absence of sexually transmitted infections.[80]

Life expectancy in Western Province is currently estimated at 54 years for both males and females – nearly nine years below the PNG national life expectancy for both sexes.[81]At 92 (per 1,000 live births) the under-5 mortality rate is significantly higher than the national average.[82]At Tabubil Hospital, there is evidence to suggest that 10 percent of TB patients are co-infected with HIV, based on limited data from the first half of 2012.[83]

The quality and reliability of population- and health-related statistics for North Fly has historically been questionable.[84] Nevertheless, while North Fly generally has a lower health status across all basic indicators, particularly those related to child health, North Fly outperforms the national rate in skilled birth attendance, rates of family planning uptake, and has significantly improved maternal health indicators from a 2007 baseline. In 2000, North Fly was home to over half of the Province's medical officers and nearly half of the nursing officers.[85]

While TB is the third leading cause of death in Western Province and still in the top ten of all admissions, cases of pulmonary/sputum smear positive TB are on the decline in North Fly district as standards of living rise and the diagnosis and treatment of TB improves. A growing concern in Western Province is the emergence of multi-drug resistant TB. This is also a concern for the Australian government because of the movement of patients to Australia for treatment through the Torres Strait.

The OTML Public Health Team estimated an HIV prevalence rate of 1.05 percent in Tabubil in 2006.[86]Tabubil Hospital maintains records of all HIV cases. The total absolute number of confirmed cases has been rising, increasing from 33 confirmed cases in 2011 to 47 confirmed cases in 2012. Current estimates by the Team suggest that HIV prevalence may have increased to 3 percent in Tabubil – indicating HIV prevalence more than double the estimated national prevalence rate. Tabubil Hospital reports all data to the National AIDS Council in Port Moresby, as well as the National Department of Health.

North Fly Health System

A number of health service providers are active in health service delivery in North Fly– below is an overview of the major facilities and actors operating in the district health sector.

- **Government:** The Fly River Provincial Government is responsible for the management of all government-financed primary health services and programs in Western Province, except for the independently-managed provincial hospital in the provincial capital, Daru. Ningerum health centre was established as part of the original development agreement for the mine. It is located on the main road between Tabubil and Kiunga.

- **Evangelical Church of PNG:** Close to Ningerum Health Centre is Rumginae Hospital, a 60-bed facility situated at the Rumginae mission station approximately 60 km south of Tabubil. It is managed by the Evangelical Church of PNG (ECPNG). The facility is one of the oldest health facilities in Western Province and pre-dates the mine. The ECPNG operates a number of other health centres and aid posts in North

[80] Thomason, J. et al. (2008). Reverse Alchemy-Turning Gold into Health Care in Papua New Guinea, Mimeo, pp 8.
[81]National Research Institute (2010). Papua New Guinea District and Provincial Profiles. pp. 51
[82]UNICEF (2012).At a glance: Papua New Guinea. http://www.unicef.org/infobycountry/papuang_statistics.html
[83]McBryde, E. (2012). Evaluation of Risks of Tuberculosis in Western Province Papua New Guinea.pp 35.
[84] Improved data collection means that comparisons with historic baselines can be significantly distorted.
[85]NDOH (2000). National Inventory of Health Facilities, 2000
[86]PNG Sustainable Development Program Limited (2006). Pre Program Assessment for Health in Western Province.

Fly District. The Hospital is funded through the CHS for both salaries and operational costs. The Government pays for operational costs of a community health worker training school, which is annexed to the Hospital.

- **Catholic Church:** The Catholic Church operates a total of seven health centres in North Fly, including an urban clinic in Kiunga, along with five sub-health centres. The Church also oversees approximately ten fully-staffed and functional aid posts, and receives funding for these services via grants from the NDOH through the CHS.

- **Callan Services for Disabled People:** The Callan Services for the disabled is an NGO based in East Sepik Province, which also operates in Western Province. OTML provides logistics support to enable Callan Services to undertake eye screening and cataract operations in Kiunga and Daru hospitals. Referrals for specialist treatment are also supported by OTML. In addition to OTML's in-kind logistics support, Callan Services receive financing from the CHS, the Government of PNG, and ad-hoc support from the Western Provincial Government and others.

- **Divine World University (DWU):** DWU is a local university established by the Catholic Church in 1996 which offers several health sciences programs, including on rural health.

- **Tabubil Hospital** is the most important health facility in North Fly district. The Hospital is managed by DWU, following a period of management under JTA International, with 150 staff. Tabubil Hospital will develop into a teaching hospital, where health sciences students will be engaged to do rural placements, in an effort to boost human resources in rural and remote settings. Current Hospital services are summarised in the table below.

Hospital Unit	Details
Outpatient (OPD)	OPD for OTML employees, OPD for the general public Maternal and child (under 5) health clinic Urban clinic out of Tabubil town
Inpatient	General: 36 beds Maternity: Under renovation to expand capacity
Emergency	Fully-equipped with ambulance bay, emergency beds, minor operating theatre, external oxygen.
Other units	Blood bank, lab, X-ray/scanning, dental, pharmacy, Voluntary Counselling and Testing (VCT), offices and consultation rooms

Facilities at Tabubil Hospital

The Hospital functions as a the de facto referral hospital for North Fly District, catering for OTML employees, contractors and their dependants, government employees and the wider community. Tabubil has a 5-star hospital rating under the PNG National Accreditation Standards hospital rating system – the highest possible in the country.

Tabubil Hospital is accessible to the villages surrounding the mine and those who live in Tabubil town, owing to the road system constructed by the mine company. At the Hospital, there is a clinic accessible to OTML employees and dependents, and a regular outpatient facility serving the public. Service quality is equivalent between the two outpatient facilities, though the OTML employee clinic serves a smaller population than the general OPD. User fees for the general OPD are set commensurate with provincial and church agency facilities, as approved by the Provincial Health Board. The aid posts and clinics managed by the Hospital also charge the same fees for the general public.

PROGRAM CHARACTERISTICS

Conception Process

The original agreements with the Government provided for the company to build infrastructure (housing and facilities) as well as social services. National and provincial government revenues from taxes and royalties would finance the expansion of services to the general public according to nationally-determined priorities and standards.

However, weak governance capacity in Western Province and a lack of transparency led to concerns that the considerable financial resources available for local development through the mine agreements were not being used optimally, placing pressure on OTML to respond. OTML's interest in retaining a social licence to operate and in sustainable development post-mine closure provided a strong incentive for the company to become more directly involved in community development issues.

Health Program – Inside and Outside the Fence

The health package offered to OTML employees and their dependants includes comprehensive health and medical cover; employee and family counselling and support; sick and compassionate leave allowances, and chronic illness support. Clinical support services for employees and dependants include haematology, biochemistry, microbiology, parasitology and clinical microscopy. Other tests are outsourced to partner hospitals in Port Moresby and Australia. Supplies for the Hospital typically come from Port Moresby-based suppliers although some more technical requirements are sourced from Australia.

Tabubil Hospital serves OTML employees, their dependents and is open to the general public, thus making it difficult to distinguish between inside and outside the fence programming. This overlap also reflects the integrated nature of the health of mine workers and the health of the communities around the mine, not least when it comes to communicable diseases. The general OPD sees an average of 12,000 cases per month, admitting a monthly average of 150 cases.

Public Health Team

The Tabubil Hospital Public Health Team (PHT) carries out a number of programs targeting the OTML workforce, contractors, and communities and villages within the mine lease area. Activities focus on vector control to reduce malaria and lymphatic filariasis; community nursing; improving access to sanitation; public health laboratory services; environmental health; and specific disease control activities, including for TB and HIV. The catchment population is approximately 25,000. The current Team comprises ten staff, including vector control officers as well as officers for health promotion, community nursing, disease control and HIV-related functions.

North Fly Health Services Development Plan

The North Fly Health Services development Plan (NFHSDP) is a five-year health program with a budget of K23million, designed to support the health system. The design of the program entails working in partnership with other health service providers, enabling the delivery of improved health services in North Fly District consistent with PNG national standards, despite funding shortfalls.

The NFHSDP is fully financed by OTML. The program began in January 2009 and is intended to operate through the end of 2013, though it may be extended to 2018. The program was developed by JTA International in 2008 at the request of the OTML Board, after the company was compelled to address wider public health issues in North Fly District. JTA International was subsequently contracted by OTML to also manage the NFHSDP[87].

In line with the NHP, the NFSHDP addresses child immunisation, malaria, diarrhoea in children, TB transmission, maternal health, sexually-transmitted infections, medical supplies and logistics, and health infrastructure.[88]It also supports a "Healthy Village" program, providing scholarships, training and the

[87] JTA International has since acquired Abt Associates, with the new company being called Abt JTA.

[88] North Fly Health Services Development Program (2012). Annual Report 2011.

routine collection of health information and data from health facilities for the NDOH Health Management Information System.

The NFHSDP is a partnership approach with all key actors working in the health system as mentioned above. There are three tiers of governance: Tier 1 is the Program Steering Committee, comprising of the OTML Executive and JTA Executive. The Committee meets quarterly to review program progress and contractor compliance. Tier 2 is the Implementation Coordination Committee (ICC) which meets monthly with membership including all partners. The ICC is responsible for the planning and coordination of services across the District in the absence of a Government lead District Health Management Committee. Reporting to the ICC is the Program Activity Group with representatives from all partners involved in specific programs.

Ok Tedi Development Foundation

The Ok Tedi Development Foundation (OTDF) was established as OTML's sustainable development arm and was included in the mine continuation legislation, following the withdrawal of BHP. The OTDF is an independent not-for-profit foundation with the objective of supporting community development, including health, in mine-affected areas. The financing of the programs for mine-affected communities, past and present, comes largely from community compensation payments made by the mine.

OTDF's mandate is to mobilise and administer the CMCA and other community trust funds in support of community development, complementing government, community and private sector development initiatives in Western Province. The OTDF increasingly operates at arm's-length from OTML: In 2007, OTDF was restructured to enable it to operate independently of OTML. In early 2009, the OTML Board approved the transfer of one share of OTDF to PNGSDP. OTML is legally obliged to transfer the remaining three shares to other reputable development organisations prior to or at mine closure. To this end, OTDF and OTML are working with the embryonic Ok Tedi Mine Impacted Area Association which represents mine-affected communities to ensure it is fully incorporated and its capacity is built with the objective of granting it one of the shares.

The OTDF financed the feasibility studies for the design of a five-year health and development program for the Middle and South Fly districts. These studies built on the successes and lessons learned of the NFHSDP for Middle and South Fly districts. An expenditure of K43 million (US$ 19 million) was approved in December 2012.

Impact

Health data for North Fly, Western Province and PNG as a whole show that outcomes have improved in North Fly in recent years. This data, which is derived from the NDOH Health Information System, is a proxy for the impact of the NFHSDP. In 2010, Western Province was recognised as the province in PNG with the most improved health outcomes, much of which has been driven by achievements in North Fly.

Programmatic indicators have been showing positive improvements since 2009. In North Fly, a number of health indicators were better compared to other parts of the province and the national average. These include ambulatory care visits per capita, measles vaccination, antenatal care, skilled birth attendance, and family planning. Nevertheless, diarrhoeal disease in children, malaria incidence and injury rates are significantly higher in North Fly.

Plans for wider impact

Middle and South Fly Health Programs

Funds totalling K43 million from the Western Province People's Dividend Trust, are now with the OTDF to implement health improvement programs in Middle (K20 million) and South Fly (K23 million) over the next five years. Health outcomes in these two districts are poor, partly as a result of lack of services. Aid posts

operate with minimal supplies of pharmaceuticals and many have effectively closed, lacking financing, supplies and staff. Commensurate with the NFHSDP, the program was developed in close cooperation of the Provincial Government, the WPHSC, PNGSDP, the Catholic Church, ECPNG, other service providers and AusAID.

Sustainable Tabubil Town

OTML is working with the PNGSDP to develop a sustainable Tabubil town past the life of the mine, developing the town into a municipality, with fees for public services, and making Tabubil a centre of excellence for education in PNG. To this end, OTML is currently upgrading Tabubil's technical college in parallel to the projected development of Tabubil Hospital as a teaching hospital, which will ultimately involve a partnership with the upgraded technical college.[89]

PROGRAM COSTS

Tabubil Hospital

Over the past few years, costs of operating Tabubil Hospital, the PHT and associated clinics have more than doubled from US$ 5.2 million in 2007 to US$ 10.7 million in 2011. The 2012 budget was US$ 11.1 million. In 2011, the largest shares of the budget went to national salaries (39 percent),contractor payments (18 percent) and drugs (11 percent).These top 3 costs have all doubled or nearly doubled since 2007.

In 2011, the Fly River Provincial Government financed about one-third of total costs for the Hospital. In 2010, Tabubil Hospital cost approximately US$ 322 per capita.[90]

NFHSDP

The single largest cost incurred by the NFHSDP are costs for patrols, vehicles and allowances for staff who often have to travel for days to deliver maternal and child health (MCH), environmental health, malaria, HIV and TB programs to isolated populations. Expenditures on education services, in-service training, and scholarships for upgrading skills, fill a gap in the national system as virtually no government funding is currently allocated to scholarships for in-service training or systematic refresher courses for health staff.

The annual cost of the OTML-financed NFHSDP for 2009 – 2011 is in the table below[91].

Item	2009	2010	2011	Percent of Total
Core staff and program management	1,104,542	960,388	1,533,307	27
Monitoring and evaluation	222,464	70,463	99,625	4
Procurement and equipment	501,522	316,224	241,328	10
Provision of essential supplies	207,837	321,441	797,825	8
Infrastructure development	56,433	807,469	461,141	10
Education services	170,036	274,463	260,478	5
Area-wide services	829,267	1,578,645	2,365,738	36
TOTAL	**3,092,101**	**4,329,093**	**5,759,442**	**100**

NFHSDP Expenditure 2009 - 2011 (in PNG Kina)

[89] The feasibility of this plan faces much scepticism in Port Moresby and among many PNG doctors. Nevertheless, given the current health workforce crisis, the plan constitutes a potential response and partial solution to the issues.
[90] US$ 8.05 million divided by a catchment population of 25,000 people (including the PHT catchment area).
[91] NFHSDP (2011).Annual Report.

Given the expenditure in 2011 of K 5,759,446 and a catchment population of 74,522 people, the NFHSDP spent approximately K 80 (US$ 30) per North Fly resident.[92] For comparison, the NFHSDP per capita expenditure in 2010 was approximately K 62 (US$ 23).[93]

Cost Effectiveness

While health financing resources have been increasing steadily for PNG more broadly, the NHP forecasts average annual funding shortfalls of approximately US$ 185 million through to 2020, based on the financing needs identified to implement the NHP.

In 2010, the government-financed health system spent approximately US$ 53 per capita. In North Fly, due to the NFHSDP, an additional US$ 23 was spent per year, and in the Tabubil Hospital catchment area, an additional US$ 322. In other words, adding public expenditures to those by the NFHSDP and Tabubil Hospital, approximately US$ 398 was spent on healthcare per person per year. This is 7.5 times the national per capita expenditure rate for 2010. In North Fly, outside of the catchment area for Tabubil Hospital, that per capita expenditure amounted to US$ 76[94], which is still 43 percent higher than the average per capita expenditure across the country.

These figures may be used when analysing the cost-effectiveness of interventions in North Fly. Preliminary health achievements by the NFHSDP and Tabubil Hospital indicate that for a number of health outcomes, the North Fly catchment population has improved well beyond national rates. A seven-fold improvement is not in evidence, however.

Adjusted for a 6 percent inflation rate since 2007,[95] both Tabubil Hospital and the NFHSDP devote large and growing proportions of their operating budget to staffing and overhead costs. This may not reflect increased demand for services or need by the catchment population. Furthermore, population growth in Tabubil town is not commensurate with the growth in the Tabubil Hospital budget.

When presented with these figures and forecasts for public expenditure on health to 2020, it is not immediately evident that the much larger per capita expenditure on health in North Fly is producing or will produce commensurate results in terms of improved health outcomes. This will be an issue for Tabubil Hospital, OTML management and the NFHSDP Project Steering Committee to document and assess.

STAKEHOLDER PERSPECTIVES

Mine employees are generally satisfied with thehealth services provided. Responses from the wider public and specific demographic groups are more mixed.

A focus group discussion with village representatives outside the lease area, i.e. who do not benefit from the mine in the same way as villages in the mine lease area, do recognise the benefits they have been receiving since 1982 through provision of regular public health patrols for malaria surveillance and treatment, health and sanitation services and health promotion activities. Nevertheless, they expressed a view that since the phase-out of BHP Billiton in 2002, a lower level of services has been provided. This may be partly due to demographic changes and population influx which necessarily impact on the level of services on offer.

Village representatives more generally expressed a strong belief that they can and should take ownership of the health program through their village health committees, which are not currently financed directly by any of the financing modalities. A principal concern is that the local level government needs financial

[92] Applying the 2009 population figure of 68,000 and a 3.1% growth rate.[92].

[93] Based on an annual expenditure figure of K 4,329,093 in 2010, as per the NFHSDP 2011 Annual Report, and a catchment population of 70,108 or 3.1% growth on the 68,000 population baseline from 2009.

[94] Adding public expenditures of US$ 53 and the NFHSDP expenditure of US$ 23.

[95] International Monetary Fund (2011). World Economic Outlook

support to be able to carry out simple village-based programs to alleviate health problems at community level.

PROGRAM STRENGTHS AND CHALLENGES

Impact: Through Tabubil Hospital, supported aid posts, infrastructure investments and the NFHSDP, OTML's direct investments into the health of residents in North Fly, and increasingly, in Western Province in general are clearly yielding tangible results. The Hospital functions effectively, and delivers verified, high-quality services at an affordable rate. The challenge moving forward will be to consolidate results, build on achievements and gradually handover OTML responsibility for driving health programming in the Province, until mine closure.

Coordination and partnership: Mechanisms for coordination among health sector stakeholders are built into the NFHSDP design. This has fostered strong linkages between health stakeholders who get together in fora where strategic issues, including planning, funding, policy and coordination frameworks, are discussed. These mechanisms are functioning and important in providing a forum for all stakeholders to meet regularly, have the opportunity to share information, plan interventions and troubleshoot coordination or programmatic challenges. Nevertheless, frequency of meetings and attendance by key partners has not been adequate. Moving forward, these fora would benefit from strengthening in terms of effective and regular communication between members and collectively, to strengthen the partnerships within and outside of OTML in advance of mine closure.

Prioritising health sector governance and leadership: Any sustainability or handover plan for mine closure will be compromised by lack of public sector capacity, and health, with a complex system of inputs, actors and challenging implementation environments will be no exception. In this context, low government capacity to act as a partner in the NFHSDP in a responsive manner, particularly related to provision of human resources, is a key challenge. The acknowledged lack of capacity of the administration to oversee or manage a comprehensive health program for Western Province belies a need to target, as partners, those gaps which can reasonably be addressed, particularly through strengthening of the administrative and supervisory capacity of the Provincial and District Health authorities. By providing services directly and working at the health facility level, thus producing rapid results, the challenge for the NFHSDP is to continue to invest appropriate time and resources into developing the capacity of higher-level partners who are responsible for the oversight, management and strategic direction of the health system.

The NFHSDP has begun to address governance and oversight issues structurally at the district level, with the upgrade of the North Fly District Health Information Officer's workstation in 2011. However, beyond recording attendance at and frequency of coordination meetings, health systems management has not been a focus of programming by the NFHSDP or other health interventions thus far. Capacity building is focused on health providers' skills in delivering health services. However, if these public sector management structures are left behind, the gains made may be rapidly lost with the handover of program activities to government authorities.

Cost effectiveness: All other factors held constant, the North Fly population is receiving several times the rate of health financing per capita as compared to the rest of PNG. Nevertheless, the results, while encouraging, do not reflect the rate of return that would be envisioned given the level of investment. The sustainability issue in the longer term is the consolidation of results – if financing reduces to a rate on par with the national average past the life of the mine, this might mean a commensurate consolidation or reduction of health achievements. This is of concern since according to current forecasts, the government, even with support from development partners, will not be able to match even half the rate of current health expenditure in North Fly. A step towards maximising cost effectiveness will be taken in 2014, when DWU will commence the normalisation of Tabubil Hospital costs to ensure that quality standards are maintained while financial inputs are commensurate with other Hospitals in PNG.

Engaging communities: The NFHSDP does not appear to have fully exploited the opportunity to engage communities directly in health awareness and prevention activities, through the village health committee system, potentially due to the slower nature of local engagement in achieving results. Such engagement would potentially have significant payoffs in terms of local ownership of health outcomes. The PHT could serve as a vehicle for activating these committees in a way that reinforces the NHP “back to basics” focus, as well as providing an opportunity for villages to be engaged in and take responsibility for health at the individual and village level. Small grants for community-led projects could provide incentives for communities to organise and develop solutions for health issues in their localities, and further alleviate the outreach work and resources required of the PHT team. The NFHSDP budget is generous enough to allow for village-level allocations and implement local health programs, provided active participation of the villages in the NFHSDP.

Exit strategy: Regardless of the timeframe for the life of the mine, OTML-funded or managed programs would benefit from in-built exit strategies which set objectives for phaseout and develop the necessary capacities, institutional frameworks and partnerships to handover from the beginning of any project. This would allow not only for an appropriate amount of time to implement an exit strategy, but also for this strategy to be clearly communicated to beneficiaries and other stakeholders. Steps have been taken by extending the life of the NFHSDP to 2018, allowing for a maturation of program institutions and results alongside the nascent Middle and South Fly health programs.

Monitoring, evaluation and documentation: Data on all NFHSDP program activities are routinely collected for monitoring, reporting and planning purposes and all parties have access to and share program information and evaluations. In addition, it would be useful to document the benefits of the resources invested in smaller programs, including a reassessment of the PHT budget within the Tabubil Hospital financial framework and its relationship vis-à-vis the NFHSDP. More generally, further documenting, analysing and sharing the lessons learned by OTML in developing and implementing health programming in Western Province would be useful in providing the global mining health community with a good practice nexus on partnerships, community engagement, stakeholder coordination, health system strengthening and social license. Communication and dialogue about these lessons and experiences, through written documents, conferences and other fora would help build a valuable body of knowledge regarding mining health programs and partnerships.

CONCLUSIONS

Western Province in general and North Fly district in particular have had some of the worst health outcomes in PNG. That improvement in health indicators has been achieved in North Fly, one of the most geographically challenging environments in PNG, is a credit to the program and the cooperation it has harnessed with stakeholders.

OTML is continuing to push for improved health outcomes through various development entities established by the company to oversee social investment, even as mine closure looms either in 2015 or 2025. Extensive focus has been placed on building capacity of the health workforce to improve service delivery. However, by all accounts, progress is hampered by the lack of capacity of partners in taking up the challenge of managing and implementing the NFHSDP and other health activities, despite active coordination mechanisms in place for health stakeholders in Western Province.

The challenge for OTML and all stakeholders is to address the obvious gap in the Government’s capacity to administer the health system in Western Province. As has been seen nationally over the past 50 years, health indicators in PNG are by no means given, and the stagnation and decline of the health status of the population of PNG, as noted in the NHP 2011-2020, is a real possibility. With this knowledge and the possibility of addressing longer term governance issues, the challenge is for OTML to once again support the improvement of the health system at all levels and ensure sustainability of the systems and results created under OTML programming.

8.3 Annex 3. Case study summary – Lihir Gold Mine

SITUATION ANALYSIS

Company Profile

Lihir Gold Mine (LGM) is owned and operated by Newcrest Mining Limited, an Australian mining company with operational mines in four countries. The open pit mine is located on Niolam Island, also known as Lihir Island, which is part of the Lihir Island group off the northern coast of New Ireland Province.[96]Port Moresby is located some 900 kilometres southeast of Lihir. The gold deposit was discovered in 1982 and feasibility studies and developments for the mine were managed by Rio Tinto until October 1995, when the mine was spun off as an independent company – Lihir Gold Limited (LGL) –until its merger with Newcrest Mining in August 2010. LGM is today one of the largest gold mines in the world, producing a record 853,000 ounces of gold in 2009. LGM began gold production in 1997 and has an expected mine and processing life past 2040.

The mine currently employs about 5,000 people of whom 3,000 are direct employees. Some 90 percent of employees are PNG nationals, and about 35 percent of all employees are Lihirians.

The mine contributes approximately K36.5 million (US$ 13.7 million) in taxes to the national government annually.[97]The New Ireland Provincial Government received 50 percent of royalties (20 percent each goes to Kavieng and Namatanai Districts); 30 percent to the Nimamar Rural Local Level Government (NRLLG); and 20 percent to landowners. Estimated total payments for 2012 were K60 million (US$ 22.5 million).

Demographic Profile

The Lihir Island group is geographically remote and economically underdeveloped. Prior to the mine, public services and transport systems were limited, and the majority of health and education services were provided by the Catholic Church.

The population of Lihir prior to mining was estimated at 7,000, with about 75 percent living on Niolam, where the LGM is located. In 2010, the total resident population was 20,000, with about 15,000 Lihirians and 5,000 non-Lihirians.[98]

The Lihir community has gone through extensive social and economic changes since the beginning of large-scale mining 16 years ago. Approximately 300 people have been resettled with compensation packages including new housing, public services and recurrent compensation payments.

Health Status

While there is no integrated health information system on Lihir, data can be derived from the 2010 Lihir Social and Demographic Health Survey (LSDHS).[99]In general, access to a health facility for the vast majority of Lihirians is relatively easy, due to good road infrastructure. The vast majority of the population lives near the sea, and there is an all-weather ring road around the island, which has improved access to health facilities.

---

[96]The Lihir Islands Group also includes Mahur, Malie and Masahet islands

[97] Estimate using social and impact monitoring data from Newcrest, based on non-inflation-adjusted annual average tax payments from 1997 – 2010 inclusive.

[98]These figures are based on the village recorder system maintained by Newcrest in cooperation with local authorities. They do not include the “fly-in-fly-out”, predominately male, workforce of up 3,000 which typically works in shifts of 4 weeks on and 4 weeks off.

[99]Besides the LSDHS, a considerable amount of data on health in Lihir is derived from individual health providers. Since it is not possible to systematically aggregate and analyse such different datasets, a complete picture of health status, health system performance or trends cannot be provided.

The IMR on Lihir was estimated at 13.6 per 1,000 births, potentially the result of a strong MCH program on the Island.[100]According to the Lihir Island Community Health Plan 2009 – 2013, the number of recorded maternal deaths during the three years prior to development of the plan was zero. The total fertility rate of 4.0 for Lihirians is below the PNG average of 4.7.

The leading causes of morbidity and mortality include malaria, pneumonia, diarrhoea and TB. Moreover, it is evident that sexually transmitted infections (STIs) play an important role. There have been over 70 confirmed HIV cases since 2003.

Malaria has increased over the last 20 years on the island. Surveys from 2008 and 2010 indicated there was an important positive difference between malaria prevalence in mine-affected villages relative to other Lihirian villages. This may be because of vector control activities conducted by International SOS (I-SOS), who manage the Lihir Medical Centre (LMC) on behalf of Newcrest; a better socio-economic profile; better screening of houses; higher use of repellents; and easier access to the LMC and thus medicines that are effective in elimination of the transmissible stage of malaria. Trend data on malaria for Putput clinic, a government-run clinic located some 50 meters from the mine fence within a community that was relocated by the mine, indicate resurgence of malaria since 2000, peaking in 2009.[101] The majority of the patients who attend the clinic are from mine-affected villages.

About one third of new TB cases are non-Lihirians. All stakeholders recognise that TB, implementation of Directly Observed Treatment (DOTS) and community follow-up remain a key problem: in 2009, approximately 40 percent of cases under treatment were reportedly in default.[102]

Lymphatic filariasis had a reported prevalence of 18 percent in 2003, though since then, its control with Mass Drug Administration (MDA) has been very successful. From 2003 to 2008, the MDA program led by I-SOS reduced prevalence rates by 79percent, to 3.7percent. There has been an upward trend in yaws cases from 1999 – 2012.[103]

Local health system structure, functioning, accessibility and stakeholders

Health service delivery on Lihir is characterised by complexity. There are five major health actors in Lihir in a configuration that has evolved since the mine was established. These are:

- **Government**: The New Ireland Provincial Government is responsible for all government primary health services and programs, except for the provincial hospital which is located in Kavieng, the provincial capital. There is a district health centre or rural hospital in Namatanai which, in the absence of the LMC, would be the referral point for all health facilities in Lihir. This facility is run-down and does not normally have a doctor on staff. In addition, there are three government aid posts on Lihir and a Sub-Health Centre on Masahet Island. The District Health Office (DHO) in Namatanai coordinates and implements government programs, including water and sanitation and pharmaceutical supplies distribution to registered, government-financed facilities, in coordination with the Provincial Health Office in Kavieng. The DHO also coordinates with church-run health facilities and other providers, such as the LMC, to ensure national and provincial health priorities are implemented.

- **Lihir Islands Community Health Plan (LICHP)**: The LICHP 2009-2013 is a community initiative to improve the quality of community health services provided through non-mine managed health services. At the request of the Lihir Sustainable Development Plan (LSDP) Committee, the LICHP was developed by JTA in 2008. It commenced as a partnership between the LSDP, Lihir Mine Area Landowners Association (LMALA) and JTA International and seeks to empower Lihirians as future health providers and managers. The LICHP has since suffered from a shortage of resources, reportedly due to diversion of funds to other

[100]Newcrest Mining Community Relations Group (2012).Lihir Demographics, Draft mimeo.
[101] Data gathered from the case study mission team visit to Putput clinic, August 2012.
[102]According to data from the LSDHS.
[103] Data gathered from records at Putput clinic during case study mission team visit, August 2012.

sectors by the NRLLG and LMALA. How funds are spent and the outcomes achieved are not fully communicated to the LSDP Committee.[104]The LICHP aims to fill gaps, avoid duplication and to work collaboratively with all stakeholders and service providers to integrate healthcare services across Lihir. The LICHP is consistent with NDOH health objectives and minimum standards, and extensive stakeholder consultations were undertaken during its development to determine the community's actual and perceived healthcare needs.

- **Lihir Medical Centre (LMC):** The LMC was constructed in 1996/97 and was jointly funded by the Government (which contributed toward the cost of the public ward)and Lihir Gold Limited as a development condition for the mine, which required that it would provide services to the general population and to PNG nationals working at the mine, also acting as a referral centre for Lihir. The LMC has been operated by I-SOS since its inception. The Government continues to provide a small operating subsidy for the LMC in the order of K 150,000 (US$ 61,200) annually. The LMC is Newcrest's main vehicle for inside the fence health services and directly-funded outside the fence health programming. It is located in Londolovit, the main town created on the mining lease for support of the project, and has international standard diagnostic capacity as well as providing a wide range of outpatient and inpatient services.

- **Catholic Church**: Initially the main health service provider on Niolam, the Catholic Church has managed the Palie Health Centre since well before PNG's independence. It is now the second largest health facility within the Lihir Islands, seeing approximately 60 patients per day, with a staffing complement of two nursing officers, one health extension officer and three community health workers – supplemented by a weekly visit by a doctor from the LMC. There are four inpatient wards, but the facility lacks basic medical equipment, cold chain as well as stable electricity and water supply. A small user fee is charged to contribute to the facility's overhead costs.

- **NRLLG:** The District government has established and staffed four aid posts and the Putput clinic outside the fence of the mine, operated within the framework of the LICHP. The NRLLG has been plagued by governance issues, including mismanagement of funds. Recently, the LMALA has insisted that the LICHP operate under its direct supervision rather than under the direct supervision of the LSDP Committee, which has the effect of reducing the role of the NRLLG. This move has caused friction between various parties on the LSDP Committee and is not likely to be resolved until the overall agreements are formally reviewed. Furthermore, the lack of transparency in terms of expenditures and outcomes on the program makes it difficult to determine if these royalties are being effectively spent.

PROGRAM CHARACTERISTICS

Conception Process

The LSDP covers capacity building, trust fund payments, compensation to impacted villages, training, infrastructure development, town and village planning, commercial and contractual management opportunities, and social well-being programs.[105]Following its signature in 2007, it quickly became apparent that the various implementing parties to the LSDP, including those responsible for the health program, did not have sufficient capacity for implementation and funds management. This led to the commissioning of the LICHP by the LSDP Committee who, through a tender process, engaged JTA to develop the Plan. Implementation of LICHP is done in partnership between LMALA and Abt-JTA. The broad objectives of the LICHP are to:[106]

- Improve the quality of community health services
- Improve delivery of preventative health programs to communities

[104]While relevant documents are said to exist they were not made available by LMALA to the study team or to Newcrest, notwithstanding that Newcrest is a full partner in the LSDP Committee
[105]Environmental Resources Management (2010).Mining Community Development Agreements – Practical Experiences and Field Studies. p. 51
[106]Lihir Islands Community Health Plan 2009-2013, p 30

- Increase community empowerment and responsibility for their own health
- Develop human resource capacity on Lihir for delivery of sustainable health services in the future.

The LMC has continued providing ambulatory, hospital care, and importantly, diagnostic services for the population. However, with the advent of the LICHP, the LMC curtailed preventive health programs by the mine outside of the mining lease and handed over responsibility for community health in non-mine affected areas to the LICHP.

Health Program – Inside the Fence

The health program of Newcrest is delivered by I-SOS through the LMC, for both inside and outside the fence programming. The LMC is designed to support employees and their dependants, as well as to provide services to mine contractors and the general population. The LMC also works with a mine clinic located within the production area, which provides accident and injury emergency care and first aid for all workers on the site, including initial stabilisation of any major accident before referral to the LMC.[107]

The facilities at LMC include 20 inpatient beds including an obstetric delivery bed; a TB ward for up to five patients; two outpatient stations – one for mine employees and dependants, the other for the general public; an operating theatre with full anaesthetic capabilities; well-equipped laboratory facilities; a dental unit operated by a private provider on a periodic basis; a pharmacy; an equipped emergency station with ambulance bay; and an environmental laboratory and office.

LMC is managed by an expatriate professional hospital manager and has two international doctors on rotation. Locally-recruited staff includes doctors, health extension officers, nurses and community health workers, most of whom operate on a "fly-in, fly-out" rotational basis. In August 2011, there were 85 staff on the payroll at the LMC.[108] This compares well with other facilities in PNG, even major hospitals.
Ambulatory care numbers at the LMC are significant and growing rapidly, from 36,759 visits per annum in 2005 to 75,495 in 2011. This equals a doubling of the workload over the period or an annual increase of almost 18 percent[109]. Patients seen at the LMC are from across the Lihir Island group, meaning that many bypass church and government health facilities for health issues that could be dealt with at lower level.
The LMC has the highest salary scale among health service providers on Lihir, followed by government-employed health workers from public facilities and employees of Church-run facilities. This has caused a drain of human resources from the public sector to the LMC, which has in turn likely affected the quality and level of staffing in government- and Church-run facilities.

In addition, I-SOS, through the LMC, implements several specialised health programs for Newcrest employees and contractors, addressing:

- **Malaria**: A significant vector control program has been maintained within the fence, with a primary focus on malaria prevention, including promotion of long-lasting insecticide-treated nets, source reduction, larvicide spraying, residual spraying, fogging and identifying and backfilling of draining sites.

- **Tuberculosis**: The LMC diagnoses and treats TB for mine workers as well as the general population and implements DOTS for Newcrest employees and contractors living within the mining lease. The LMC also monitors any indication of multi-drug resistance.

- **Occupational Health and Safety**: Using the same standards as for Newcrest's Australian operations, the Occupational Health and Hygiene section has made significant advances in recent years in identifying

[107] Newcrest is currently expanding its occupational health services to include pre-employment health checks and regular medical check-ups for staff, which will also be conducted by the LMC.
[108] Lihir Community Health Plan 2009-2013, p 21.
[109] Another data source, also from the LMC, indicates there were 82,298 ambulatory care visits in 2011. This would mean a growth rate of over 20 percent per annum. The lower number was used for analysis in this document.

hazards, designing procedures and documenting protocols to implement in the workplace, including a formal health risk assessment and the categorisation of exposed groups into high, medium and low.

- **HIV and Aids**: The HIV awareness program at Newcrest is modest, notwithstanding the relatively high levels of both STI and TB prevalence, and the growing number of HIV cases confirmed on Lihir. However, the LMC is a registered VCT Centre and supplies and administers anti-retroviral therapy according to national protocols. The LMC is the only facility currently offering this service on Lihir.

Health Program – Outside the Fence

Exclusively outside the fence, Newcrest is also involved in:

- Supporting village MCH via a dedicated LMC-staffed MCH facility in Londolovit,
- Partnership with Medicines for Malaria Venture (MMV), following a commissioned review of all Newcrest operating sites and including the development of a suggested strategy for malaria control and elimination from Lihir,
- Support for a Lihir-wide lymphatic filariasis elimination project[110]
- Support for data management and best practice reviews with all partners
- Financing and implementation of the social and demographic health survey.

Newcrest's largest financial contribution to health outside the fence by far is through the LSDP. LGM payments to various stakeholders are earmarked for reinvestment, for example for health programs at the provincial, district and local levels. For instance, through the LSDP, Newcrest indirectly finances the entire LICHP budget.

Partnerships and Coordination

A Memorandum of Agreement (MOA) with the Government of PNG and the LSDP[111]are the two documents currently linking the various tiers of government (national, provincial, and local level), the Lihir community and Newcrest in partnership. They outline funding, benefits, rights and obligations arising from the mine. The LSDP builds on previous agreements, which were more limited to the rights and benefits associated with the mine. It outlines a roadmap for the development of Lihir more broadly – enabled by mine revenues, but sustainable past the life of the mine.[112]The overall budget for the LSDP is K20 million (US$ 7.5 million) per annum for five years. Renewed in 2007, the latest iteration of the LSDP is pending renegotiation. Newcrest's adherence to and implementation of these agreements forms the basis of the company's social license to operate in Lihir.[113]

The LSDP Committee overseeing these agreements comprises Newcrest, the Lihir Mine Area Landowners Association, the Nimamar Rural Local Level Government, Petztorme Women's Association, Mineral Resources Lihir and the Catholic Church. For example, NRLLG responsibilities include capacity development, health and education plan support, law and order and other key core government functions; LMALA responsibilities include land use payments, general compensation, special issues and payments, inconvenience payments projects and operational support.

Plans for Wider Impact

Malaria: Newcrest has entered into a partnership with MMV to explore the possibility of a targeted program to provide best practice malaria management guidance to Newcrest as a whole, and as part of this program to investigate the feasibility of eliminating malaria in Lihir. Planned as a five-year alliance, the

[110]LMC staff formally documented a suggested protocol for this, based on a wide range of work in PNG and by LMC on Lihir. This has recently been accepted by WHO as the revised international standard and protocol for filariasis elimination.
[111] The initial IBP was agreed in 1995, to be revisited every five years as per the current Mining Act. It took until 2007 to conclude a revised agreement, now formally called the LSDP. Preliminary work by stakeholders is now underway in preparation for the review process, which is managed by the MRA.
[112] Centre for Social Responsibility in Mining (2011). Good Practice Note: Community Development Agreements. p. 7
[113]Newcrest (2009).LihirLuksave Long Komuniti, (Social Awareness Training), pp12

partnership focuses on developing best practice malaria management and treatment.[114]Moreover, I-SOS is currently preparing to re-start community vector control activities. I-SOS will also conduct bednet distribution to non-Lihirian PNG migrants who are not currently covered by the LICHP program.[115]

HIV and Aids: The Sustainability Department of Newcrest and I-SOS have noted that existing efforts to prevent HIV and educate Lihir residents are not in proportion to the high-risk context of Lihir. The company is monitoring research on Lihir to better understand current challenges to a scaled-up HIV response.

Review of the Lihir health system: Newcrest has prioritised an independent review of the existing Lihir health system, which would form the basis of an integrated plan for the health system for Lihir, to be funded through the LSDP. Such a review would also involve defining the role of Newcrest's Sustainable Development Department in relation to health service provision and the management of the Integrated Health Operations Group, in order to ensure clear roles and responsibilities and enhanced cooperation among the health service providers.

PROGRAM COSTS

Inside the Fence

From June 2010 to July 2012, the operational costs of the LMC and a small on-site clinic was K 30.25 million (US$ 11.3 million), equalling a monthly cost of K 1.21 million (US$ 453,000) and an average annual cost of K 14.52 (US$ 5.4 million). However, more recently, the LMC cost K9.64 million (US$ 1.4 million) per month - demonstrating that operational costs are rising. A rough estimate of the costs of the LMC attributable to inside the fence health services would be 65-70 percent of this total. For the 2010 – 2012 average this would be K 9.5 – 10.2 million (US$ 3.5 – 3.8 million).[116]

Newcrest does not see a reduction in public access to the facility as an option for cost containment – public access is a significant aspect of the company's social licence to operate as there are effectively no user fees for health services and prescribed pharmaceuticals are free. There is also a Health Services Agreement between LGL and the State under which the company is committed to providing a public outpatient service.

Outside the Fence

The costs of outside the fence services provided by the LMC account for an estimated 30-35 percent of the total budget of the LMC, totalling about K 5 – 5.9 million per annum (US$ 1.9 - 2.2 million).

The LIHCP program is financed via LSDP funds earmarked for the LMALA to manage, and thus is indirectly financed by Newcrest but not overseen or managed by the company. As can be seen in the table below, over the period 2006-2011, accumulated expenditures financed by contributions from the mine have exceeded K20.8 million (US$ 7.8 million), with the LICHP accounting for three-quarters of this total.[117]

---

[114]Newcrest Mining Limited (2012). Draft Review of Health on Lihir by Newcrest Lihir Sustainability Department, mimeo.
[115]Newcrest stopped its vector control program outside the fence in 2004, on the understanding that the LICHP would sustain the work in communities. This handover did not materialise.
[116]There are smaller, additional programs inside the fence, for example relating to malaria prevention, which have not yet been fully costed.
[117]Newcrest Mining Limited (2012). Draft Review of Health on Lihir by Newcrest Lihir Sustainability Department, mimeo, p.10.

Sub-component	2006	2007	2008	2009	2010	2011	Total 2006 - 2011	Percentage of Total
Community Health Program	6,100	85,789	557,780	224,289	60,367	8,406	942,731	4.5 %
Health Program		80,000	500,000				580,000	2.8 %
LICHP				4,591,860	8,805,357	3,481,662	16,878,879	81.0 %
Community Health Program (other)					951,708	741,038	1,692,746	8.1 %
Health Infrastructure Maintenance					4,448		4,448	0.02 %
Health Administration Office						750,574	750,574	3.6 %
TOTAL	**6,100**	**165,789**	**1,057,780**	**4,816,149**	**9,821,879**	**4,981,420**	**20,849,378**	**100%**

Lihir Sustainable Development Plan health budget 2006 - 2011 (in PNG Kina)

Financing Modalities

There are three main financing modalities for health services on Lihir: directly from Newcrest; indirectly through royalty payments to local and provincial government; and via the TCS which is newly available to the mine. Examples for direct financing include:

- All operational costs of the LMC for inside and outside the fence services, with the exception of some small fees collected for a few services and the small government subsidy that continues under the MOA.
- Social research on the Lihir population, which includes health-related issues as a basis to design health interventions and help build consensus on development options.
- A planned Lihir-wide malaria program,
- An in-process independent review of the overall health strategy for Lihir

Cost Effectiveness

Newcrest and I-SOS operate consistent with NDOH guidelines and minimum standards for health facilities, staffing, pharmaceutical supplies, and technical design of programs. These standards help ensure the health system is operating on a cost-effective basis.

Rough cost-effectiveness calculations are possible based on approximate population and employee data, as well as expenditure figures for the LMC and the LICHP. Extrapolating figures based on a target population of 15,000 Lihirians, the LICHP has cost an average of US$ 71 per person per year. The LMC budget, spread over all 20,000 residents of Lihir, amounts to an average of US$ 366 per capita per annum since 2006.This compares to Government expenditure of US$ 53 per person per annum under the publicly-financed health system.[118]

Without comprehensive health data it is not possible to state conclusively that the investments in health on Lihir have been cost-effective. However, it is possible that the health outcomes for Lihirians are not several times better than those of PNG nationally, aside from remarkable improvements in maternal mortality reported on Lihir Island[119].

STAKEHOLDER PERSPECTIVES

Employees generally appreciate the services and the high quality of healthcare provided by the LMC. Mothers attending MCH clinic were reported as being satisfied with the services provided; it is evident that many women from across the island attend the clinic for MCH services. Health professionals from Palie

[118] NHP 2011 – 2020, pp. 40

[119] Macintyre, M. (2004). Thoroughly modern mothers: Maternal aspirations and declining mortality on Lihir Island, Papua New Guinea

Health Centre, the LMC and LICHP all recognise the importance of the MCH clinic and the LMC as being very supportive of MCH needs. It is also recognised that they have played an important role in reducing infant and maternal mortality on Lihir.

Discussions with residents of Lipuko village indicate that there was an appreciation of the efforts to reduce malaria around its environs. Nevertheless, there was a concern that not enough was being done, coupled with an awareness that much more could be done.

ANALYSIS OF PROGRAM STRENGTHS AND CHALLENGES

There are indications that Lihirian health status can be drastically improved given the appropriate application of current resources, as demonstrated in the low IMR and MMR on Lihir. These achievements are widely recognised and credited to improved access and utilisation by women of antenatal care and obstetric care services, for example, as well as to improved transportation and communication infrastructure more generally. Expanding these results to the broader health status, and strengthening the health system of Lihir is the task ahead.

Displacement of patients: There has been a tendency for service delivery silos to develop notwithstanding the objective of the LICHP to avoid duplication, fill identified gaps, and focus on outcomes. The LMC clearly provides a quality of care not currently available within government financed-health institutions, resulting in displacement of patients from the public system. Given that the LMC is overseen by non-Lihirians, this is seen as an issue for Lihirian self-determination. Efforts have been made to reduce the displacement of patients through decentralisation of services to lower level facilities and provision of qualified physicians to these facilities on a weekly basis. However, the issue of ownership is not yet resolved, and while the LMC and Newcrest are capable of doing more in health for Lihir, community and institutional stakeholder desires to have more direct control of service provision on Lihir limits this.

As a result of this tension, a formal agreement was reached among stakeholders in 2010 to establish a new coordination body – The Integrated Health Operations Group (INHOG). The aim of INHOG is to "better coordinate the provision of health services between the different providers, especially in relation to how the LICHP operates within the existing framework". The INHOG agreed to meet on a quarterly basis and is comprised of service provider representatives from NRLLG, I-SOS, Catholic Health Services, LICHP, and New Ireland Provincial Government Sub District Administration. INHOG is still embryonic in meeting its objectives, including sharing details of each parties' operational data. Due to lack of buy-in from stakeholder members, the INHOG has rarely met.

Stakeholder consensus and coordination: The missing link in terms of effectively using what are very considerable resources is stakeholder consensus and collaboration, particularly with regard to financing and oversight. The LSDP and the LICHP are, on paper, excellent plans for executing a health strategy on Lihir, but are fraught with poor or non-existent funding flows and lack of cooperation on the part of steering committee members. With vested interests for all parties, circumventing this barrier to progress is a complicated task, and the INHOG is thus far not sufficiently relevant or empowered to address the issue. Besides funding and technical expertise, tackling vertical eradication programs will require cohesive oversight on the part of stakeholders. This is unlikely to be feasible as long as there is tangible discord among major health stakeholders.

Government capacity: Though the life of the mine extends into the next generation of Lihirians, the capacity of the public sector to coordinate and guide development on Lihir for Lihirians is key. The Lihir Sub District Health Office has the responsibility for overseeing the health system, but does not have the funding and is not at a level of functionality or capacity to perform its mandated responsibilities, particularly vis-à-vis the better-organised LMALA and NRLLG. An effective assessment of capacity and institutional gaps in public health sector governance on Lihir, followed up by activities to strengthen the stewardship capacity of

the Sub District Health Office, could ensure a more level playing field in the stakeholder dynamic on Lihir and move the public sector towards the coordination and oversight role they are intended to play.

Health system strengthening: The presence of the LMC is clearly skewing the health system on Lihir by creating a parallel health service and decreasing the imperative for improving the quality of services offered by the publicly-financed health system. In the short- to medium-term, the technical resources of the LMC could be further shared with other clinics and health centres on Lihir, as a complement to infrastructure investments. Interim support by the LMC could also come in the form of more frequent visits by doctors or qualified nurses, as well as by administrative and pharmaceutical staff from the LMC to assist other facilities in operations management and in assuring the quality of clinical services.

Human resource imbalances are a concern as the LMC attracts well-qualified staff through a generous salary and benefit scheme. While this benefits the population with access to the LMC, in the long run this is likely to weaken the public health system. The current environment presents a good opportunity to invest in human resources for health, capitalising on the quality of services, equipment and training opportunities available through the LMC, and incentivising medical professionals to fill posts in government- and Church-run facilities.

Financial transparency: There is a lack of transparency regarding the level of resources and how they are being deployed under the LSDP and the LICHP – for health or other sectors. It is known that resources have not been made available to the LICHP as planned through diversion to other uses. Moreover, the LICHP was forced to close for some time in 2011 due to a lack of financing. There is also a need for full transparency on the use of funds by LMALA, LSDP and the local government. These are public monies and should be subject to the same public oversight and auditing as for all public expenditures. The LSDP renegotiation phase again provides an opportunity to enshrine and make explicit fund management and oversight practices for the use of LGM royalties. This would address not only the usual issues related to public funding flows but could also serve to communicate to the Lihirian community that the use of development funds is being appropriately monitoring and tracked. An independent financial monitoring mechanism, through audits or ongoing reporting mechanisms, could lend credibility.

Data sharing: The failure to share health program information with all stakeholders via the mechanisms established under the LSDP or under INHOG makes evaluation of the achievements of the collective health program on Lihir all but impossible. The lack of detailed and solid data on the benefits and resource inputs into health programming on Lihir is a strategic issue – meant to be addressed by the INHOG, which however is not effective. Coordinated data sharing would not only give a better idea of the epidemiological profile of the population but also provide a concrete exercise in collaboration among health stakeholders.

Cost-effectiveness analysis: The costs of the highly successful mother and child health program, for example, appear to be relatively marginal, but the exact cost-effectiveness of this investment is not known. Overall, the resources available for investment are great, but costs of the LMC are also increasing – cost containment in the form of investing in efficient health interventions would show stewardship on the part of financial management of Newcrest interventions, create a tradition of more sustainable investments by minimising costs and maximising impact, and make Newcrest's investment stretch further into the future.

CONCLUSIONS

Past achievements in malaria reduction and current achievements in IMR and MMR reduction highlight what health status improvements are possible on Lihir. Against these standards, eradication programs planned are ambitious but in the realm of the possible given the inputs and intention for all health stakeholders on Lihir.

The main barrier to achieving these results is a lack of effective coordination among planning and implementation partners and low capacity of stakeholders to deliver on ambitious plans. The Lihir context

is decidedly complex, making simple solutions difficult to realise. Nevertheless, with the LSDP under renegotiation, the Lihir health system is at a crossroads in terms of redefining progress for the future and the possibilities of breaking with the past five years of relatively limited results.

A review of the health system of Lihir seems a sensible approach to the observed problems with health service provision and the current tensions between service providers and associated stakeholders. It will be important for all stakeholders to fully participate cooperatively in this review. Feeding the results of this review into the discussion of the new LSDP may neutralise some of the current tensions by focusing on common goals and known strengths, including making appropriate use of the capacities of Newcrest and building the capacities of other, long-term stakeholders, such as government authorities and health staff.

Reaching agreement is an important mechanism for partnership. All parties in Lihir agree that programs should respond to community needs, be technically sound and consistent with international best practice as well as NDOH policies and standards. The issue is how best to marshal resources to maximise health outcomes, including through agreement on a health strategy, a realistic program of work and an agreement to share relevant information.

8.4 Annex 4. Additional information on governance and regulatory Issues

Additional information on the NHP

The NHP centres on rehabilitating the current system to a level where each facility is fully operational; and on improving the ability of individuals to take responsibility for their own health. A three-pronged approach is proposed, with the following broad goals:

- Investing in improved service delivery in economically disadvantaged areas, both rural and urban;
- Improving health systems related to workforce, financing, information, medical supplies, leadership, and governance; and
- Commitment to reversing the trend in health indicators. A series of prioritised health outcomes has been agreed for primary attention, based on diseases and situations that have caused the greatest levels of morbidity and mortality over the previous ten years, as well as on areas that are likely to become threats to public health.[120]

The NDOH recognises that the challenges facing the health sector have their roots in:

- **Structural changes** in the governance of the health sector, including flawed provincial governance and financing arrangements;
- **Limited administrative capacity** to address a weakening medical supply chain, poor infrastructure maintenance and building of new infrastructure and to sustain operational information systems;
- The long-term **decline in real recurrent resources per** capita – including for health – since independence in 1975. This is another major reason for the weakening of core systems of government and has meant that government now has weak absorptive capacity to undertake basic routine activities; and
- A rapidly **emerging health sector workforce crisis** triggered by an aging workforce; limited pre-service training capacity to replenish the workforce; weaknesses in the curriculum of training programs supplying new entrants to the direct service delivery workforce; an absence of systematic in-service training, especially for rural health.

Additional information on PPPs as a government priority

The Government's official national strategies - Vision 2050 and the Papua New Guinea Development Strategic Plan 2010-2030 - emphasise the importance of partnership and cooperation, framed within the recognition of a need for a "whole of government" approach to PPPs and cooperation. Specific strategies include:

[120] Government of PNG (2010).Transforming our health system towards Health Vision 2050: National Health Plan 2011-2020, pp 19-20.

- Collaboration between central agencies
- Resourcing and enforcing the coordination functions of the central agencies and monitoring their directives
- Ensuring sectoral coordination meetings are institutionalised, encouraging networking both within and between agencies
- Fostering a global search for ideas, expertise and innovation and effectively use global knowledge to solve real problems.

Additional information on the MRA

The MRA was established through the enactment of the Mineral Resources Authority Act 2005 by Parliament, which came into effect in 2006 and was operationalized in 2007. The MRA is the successor organisation to the Department of Mines (DOM). Despite inheriting responsibilities from the DOM, which was financed by national budget appropriation, the MRA is funded via a new levy on mining operations. Therefore the MRA has greater security and independence from the public service in funding and operations.

The principal functions of the MRA are as follows:[121]

a. To advise the Minister for Mining on matters relating to mining and the management, exploitation and development of PNG's mineral resources
b. To promote the orderly exploration for and development of the country's mineral resources
c. To oversee the administration and enforcement of any legislation relating to mining or to the management, exploitation or development of PNG's mineral resources[122]
d. To negotiate mining development contracts and Memoranda of Agreement under the Mining Act
e. To act as agent for the State in relation to any international agreement relating to mining
f. To receive and collect any fee, levy, rent, security, deposit, compensation, royalty, cost, penalty, or other money or account payable under relevant legislation
g. To administer any public investment program relating to mining or mining impacted communities
h. To provide small scale mining and hydrogeological survey data services, and occupational health and safety community awareness programs
i. To conduct systematic geoscientific investigations into the distribution and characteristics of PNG's mineral and geological resources and to collect, analyse, store, archive, disseminate and publish geoscientific information about these resources

Additional information on the Mining Act

The first Mining Act of 1967 (Bougainville Copper Agreement) provided for the establishment of the Bougainville copper mine and set the initial precedent that the Government would bear the cost of construction and operation of a hospital to serve mine employees and the wider community in mine-affected areas.[123]

Following the renegotiation of this agreement in 1974, which resulted in a "super profit" tax being applied to the mine, the general policy approach was that Government would tax the mine and redistribute the benefits in the interests of the nation.[124]At the time, there was confidence that the State could both generate significant revenues through this arrangement and effectively deliver social services, including for health, in mine-affected areas. This approach was consistent with the prevailing view of mining companies that they should not be directly responsible for public service provision.

---

121 MRA (2008).Corporate Profile.pp 9 – 10.

122 This includes but is not limited to the Mining Act 1992 and the Mining (Safety) Act (Chapter 195A), the Mining Development Act (Chapter 197), the Ok Tedi Acts and the Ok Tedi Agreement, the Mining (Bougainville Copper Agreement) Act (Chapter 196) and the agreements scheduled to that Act

123Thomason, J. and Hancock.M. (2011). PNG Mineral Boom: Harnessing the Extractive Sector to Deliver Better Health Outcomes. Australian National University Development Policy Centre Discussion Paper 2. pp. 11

124 The new arrangements involving a "super profit tax" for the mine became international best practice as an approach to taxation of mining. At the time of introduction it was considered a very radical approach. Kennecott Mining Limited which held the rights to the Ok Tedi project at the time delayed project proposals to the PNG Government and eventually pulled out because of the Government's insistence on the new tax. BHP Billiton took over the project and the new tax framework was applied to a new project for the first time globally.

Later mining arrangements, initially for the Ok Tedi mine and then for all large-scale mining operations coming online, have included collaboration agreements between the State and the company on the provision of health services. The underlying premise has been that Government or faith-based organisations operate health facilities, beyond the specific mine hospital or clinic. Within the framework of the Mining Act of 1992, PNG established the Development Forum, for example.

Additional information on royalty revenues

Mining royalties are a significant source of public revenue and can be used for public service provision, including for health services. Royalties are distributed as per the agreements reached in the Development Forum process, but are in the first instance receivable by the relevant provincial Government. The table below shows the estimated royalty payments to six provinces in PNG. It demonstrates that across those six provinces a total of K132.7 million is received per annum. This equals almost 18 percent of total provincial revenues on average but differs strongly from province to province.

For example, in Western Province, OTML royalties amounted to about K57 million in 2012, accounting for over 45 percent of provincial revenues. In New Ireland, Lihir royalties from LGM accounted for K20.5 million or over 22 percent of provincial revenues.

Province	Royalties & Dividends	Total Provincial Revenue	Royalties as percentage of Provincial Revenue
Western	57.2	125.9	45.4
Central	3.1	89.1	3.5
Southern Highlands	23.6	139.4	16.9
Enga	14.1	91.7	15.4
Morobe	14.2	202.9	7.0
New Ireland	20.5	91.3	22.5
Total	**132.7**	740.3	**17.9**

2012 royalties and dividends to six provinces (in million PNG Kina)

There is considerable variation between mining projects on how these resources are managed and allocated for spending, depending on specific project agreements as well as on the priorities of those who manage funds. Such royalties and dividends are public funds and, at least in theory, subject to full accountability under public sector financial management legislation.

8.5 *Annex 5. Other health mining programs and partnerships in PNG*

Listed results of literature review 1: Overview of PNG mines and health PPPs where applicable

The following tables were developed based on the results of a wide literature search undertaken before the case studies and national consultations. It is possible that the information provided in the table is incomplete and that health PPPs exist for which no information or mention was found at the time of the literature review.

Mine	Operator / Owner	Date started production / set up	Mineral	Health PPP*	Source of basic information on mine
Porgera	Barrick Gold and PNG government	2009	Gold	Yes	http://www.barrick.com/globaloperations/australiapacific/porgerajv/default.aspx
Hidden Valley	Newcrest Mining and Harmony Gold as 'Morobe Mining Joint Ventures'	2009	Gold-Silver	Yes	http://www.har.co.za/f/HAR_AR2010.pdf
Wafi-Golpu		Construction expected to start in 2014	Gold	Yes	http://www.morobejv.com/files/factsheets/WafiGolpu-Factsheet.pdf
Ok Tedi	PNG owned (Government and the PNG Sustainable Development Program Ltd (previously BHP Billiton and Inmet)	1984	Gold – Copper	Yes	http://www.oktedi.com/
Lihir Gold Mines	Newcrest	1997	Gold	Yes	http://www.newcrest.com.au//operations.asp?category=8
Simberi Oxide Gold Project	Allied Gold	2008	Gold-Silver	Yes	http://www.mpi.org.au/simberi.aspx
Woodlark	Kula Gold	In pre-production. Production expected 2013	Gold	Yes	http://www.kulagold.com.au/index.php?option=com_content&view=article&id=44&Itemid=26
Ramu Mine	China Metallurgical Construction Company, Highlands Pacific Ltd, Mineral Resources Ramu (state-owned), landowner company Mineral resources Madang (landowner company)	2010 production started 2012	Nickel-Cobalt	Poor information suggests support to a health centre	http://www.pngindustrynews.net/storyview.asp?storyid=8684607
Misima	Placer DomerInc and Orogon Mines Ltd (state-owned)	1990 and closed 2004	Gold-Silver	Poor information suggests support to filiariasis campaign	http://www.miningwatch.ca/sites/www.miningwatch.ca/files/PD_Case_Study_Misima_0.pdf
Salwara	No data	No data	No data	No data	http://tubunagraun.com/mining.html
Edie Creek	Niuminco	Historical area since 1926, 2008 reports state	Gold- Silver	No	http://www.mra.gov.pg/Portals/0/Publications/bulletin/janmar08/eddie%20creek.pdf

		Nuiminco aiming to regenerate			
Laloki	Niuminco	Historical area, 2008 reports state Nuiminco aiming to regenerate	Copper-Gold	No	http://www.mra.gov.pg/Portals/0/Publications/bulletin/janmar08/eddie%20creek.pdf
Frieda River	Xstrata Copper and Highlands Pacific Ltd	2007 development began. Remains in pre-production phase	Copper- Gold	No	http://www.friedariver.com/EN/Pages/Home.aspx
Imwauna	PNG Gold	Exploration phase	Gold	No	http://www.pnggold.com/s/Imwauna.asp
Kainantu	Barrick Gold (Previously Highlands Pacific Ltd)	Prior to 2006. Closed in 2009	Gold	No	http://tvnz.co.nz/world-news/two-png-mines-stop-production-2456480
Mt. Bini (Kodu/Elo)	Frontier Resources Ltd	Exploration since. Exploration licence renewal refused in 2008	Gold, Copper, Molybdenum	No	http://eyeonmining.wordpress.com/where-we-work/papua-new-guinea/mt-bini/
Mt. Kare	Indochine Mining Ltd	2011 exploration started. Currently in pre-feasibility stage	Gold-Silver	No	http://www.indochinemining.com/projects/mt-kare
Panguana	Bougainville Copper Limited (Rio Tinto is major share holder)	Closed when occupied by rebel groups in civil war over the autonomous Bougainville region in the 1990s. Possible re-opening in short-term.	Copper (gold-silver)	No	http://bcl.nlawebdesigns.com/
Sinivit	New Guinea Gold	No production to date. Attempting to renew licences.	Gold-Silver	No	http://www.pnggold.com/s/Imwauna.asp
Solwara 1 (Off-shore)	Nautilus Minerals	Start planned for 2013	Copper-Gold and Seafloor Massive Sulphide	No	http://www.nautilusminerals.com/s/Projects-Solwara.asp
Tolukuma	Petromin PNG Holdings Ltd (nationally owned)	1995	Gold	No	http://www.actnowpng.org/content/tgm-nationalises-workforce
Yandera	Marengo Mining and Petromin PNG Holdings Ltd (nationally owned)	Pre-production	Gold, Copper, Molybednum	No	http://www.marengomining.com/projects-yandera.html

Listed results of literature review 2: Detailed overview of mining health programs in PNG

Program	Partnership	Financing	Scope	Alignment with national policies	Beneficiaries and Impact	Costs
OK TEDI NORTH FLY HEALTH SERVICES DEVELOPMENT PROGRAM 2009– current	Ok Tedi Mining Limited (OTML), North Fly River District Government, the Evangelical Church of PNG, Catholic Health Services, Ok Tedi Development Foundation, PNG Sustainabl Development Program Ltd., Abt-JTA.	Fully-financed by OTML.	Strengthening comprehensive health services with additional focus on HIV/AIDS and malaria. Comprehensive improvements to health service availability in North Fly District –construction of health centres / posts, quality improvements in care provided by existing practitioners, expansion of outreach activities New urban clinic run by Abt-JTA; other supported facilities run by existing service providers; either government or mission Malaria-specific intervention focused on improved prevention through distribution of insecticide-treated nets (ITNs) HIV specific intervention focused on improved education, use of condoms, VCT, provision of free treatment Community first aid and child birth volunteers trained Annual 'health patrols' to remote villages in partnership with church groups and provincial authorities Extensive in-service training programs as well as scholarships for university courses	Follows NDOH priorities targeting the "Back to Basics" approach of the NHP 2011 – 2020. Aims to raise health service delivery in the target area to national standards based on national policy. Conducts disease-specific interventions in line with national policy.	Beneficiaries are considered to be those living within 40km of the mine. Availability of quality health services greatly increased. Infant mortality reported as falling from the baselir 129 deaths per 1,000 live births, to 15 (OTML, 2012 Malaria parasite prevalence in children, reported to have fallen from over 70% to less tha 6% but dates not availabl (OTML, 2012). Limited progress on improvements in matern health indicators and reduction in diarrhoeal disease incidence Public health services strengthened: increase in proportion with functioning cold chain, impressive increase in proportion HCs reporting in NHIS, and having a functioning radio.	K 20m or approximately US$ 9.5 millionprogram funded by revenue from the Ok Tedi Mine through its Development Foundation over 5 years from 2009.
TABUBIL HOSPITAL 2007 - present	OTML and Abt-JTA. From 2012, Divine World University, based in Madang, has taken over the management of the Hospital from Abt-JTA.	OTML finances 50% of the budget of the Hospital, with the other 50% coming from the FRPG in the form of withheld	Provides comprehensive hospital services to OTML employees and dependents free of charge, and to the rest of the population at low cost. Services include OPD, Inpatient,	Hospital data are all shared with the NDOH and respective vertical programs, such as the National AIDS Council.	OTML employees and dependents, Tabubil residents and residents of Western Province in general, who come from some distance to	From 2007 - 2011, the annual budget has been increasing, with an average budget of US$ 2.8 million per year.

		royalties by OTML.	emergency, blood bank, lab, x-ray, dentist, and VCT. There is also a public health outreach team based at the Hospital.		take advantage of high-quality services. Malaria and TB rates are decreasing, but attribution of impact is difficult due to the multiplicity of health actors in the area of primary health care.	
WOODLARK COMMUNITY MALARIA INITIATIVE	Kula Gold, Rotary Against Malaria, LLG	Kula Gold	Provision of medicines and equipment to the local public health centre Distribution of insecticide treated mosquito nets to the all communities on Woodlark Island	Focus on malaria and improvement to public facilities is in line with national policies but at initial stages of mine development and limited scope so far.	No data	No data
LIHIR ISLANDS COMMUNITY HEALTH PLAN (LICHP) AND MEDICAL CENTRE (LMC) 2009 - present	Lihir Gold Limited/Newcrest Mining, Lihir Mining Area Landowner Alliance, Local Level Government (LLG), Catholic Health Service, district and provincial government, National Department of Health, Abt-JTA.	Lihir Gold Mine Revenues. Initiated through the Lihir Sustainable Development Plan, which is funded by the Integrated Benefits Package (the primary compensation package agreed between Lihir Gold Ltd. and the communities)	Strengthening of comprehensive primary health care with additional focus on HIV/AIDs. Opening aid post and renovation of health centre and support to operation in partnership with the National Department of Health Provision of drugs and services to all government and mission-run health facilities throughout the Lihir group of islands on behalf of the Government. Training on quality of care in line with national policies. Strengthening partnerships and management including Local Level and Provincial government	Design was based on the Government's Minimum Standards for District Health Services. It promotes delivery of services in line with national standards and policy (with additional program specific elements) and builds capacity of public health staff, including health workers and management, in national policy.	Increase in voluntary HIV testing rates from 72% to 80% (2007 – 2008) The Infant Mortality Rate on Lihir is 13.6/1,000 live births, compared with the most recent figures nationally of 733/1,000 live births in 2006. The 2010 Lihir Social and Demographic Health Survey (LSDHS) indicates that there is almost universal access to pre-natal and paediatric care	From mid-2010 to mid-2012, the LMC cost approximately US$ 450,000per month. Over the last half of 2012, this cost rose to 1.4 million per month. Corresponding outside the fence programming for health costs between US$ 1.9 million and US$ 2.2 million per year.
HIV PREVENTION AND CONTROL IN RURAL DEVELOPMENT ENCLAVES	Porgera Joint Venture Mine, Barrick Gold (Canada), Asian Development Bank, National Department of Health, District health	Financed by Barrick Gold Mine revenue and through its links to the wider US$ 25 million, 4-year ADB, Australia, NZ and	Strengthening primary care services specifically as a platform for improved control of HIV/AIDS. Renovation and equipping of health centres and aid posts including accommodation for	Strong alignment to national policy and working closely with government at national and lower levels to implement. Part of a	Reduced stigma Improved rates of people who know their HIV status No data on impact on rates of new infection	From 2006 – 2012, the project spent approximately US$ 5.6 million on PPPs; US$ 7.4 million on condom social and behaviour

2006 - 2012	authorities, Paiam Hospital and the National AIDS Council. *Note: the PJV has provided support to hospital and health facility care since the 1980s, the specific involvement in the ADB HIV enclaves program began in 2007*	PNG government-supported project.	health workers Training of health workers Initiation of additional VCT services Referral to Paiam hospital for ART treatment Condom distribution Community education and awareness-raising Women-centred programs and specific gender focus Supporting strengthened government immunisation services	wider national initiative to accelerate progress towards MDG 6.	or HIV positive people accessing treatment.	change (implemented by PSI); US$ 3.38 million on HIV surveillance in coordination with the NDOH and National Research Institute, and US$ 4.6 million on project management and related expenses.
MOROBE PROVINCE JOINT VENTURES COMMUNITY HEALTH PROGRAM	Harmony Gold Mining Ltd, Newcrest Mining Ltd, National and Provincial Health Departments	Morobe Province Joint Ventures	Building of aid posts (4) Renovation and extension of 1 health centre Building of 1 new health centre Village health patrols for malaria treatment and immunisation Health and hygiene promotion through awareness	The health program is a component of the Hidden Valley 5-year Community Regional Development Plan developed in alignment with Morobe Provincial Government, LLG and district ward plans. It responds to national plans to expand access through increased health facility infrastructure and to expand access through outreach. Focus on malaria and immunisation is in line with national plans. Appears to be implemented in close partnership with government.	No data	No data
FILARIASIS	Unclear information but it	No data	Disease-specific intervention	Conducted as part of the	A reduction of	No data

ERADICATION INITIATIVES	appears that Misima, Ok Tedi and Lihir Gold mines each established partnerships with provincial and national government to provide support in their impact areas.		programs to support national filariasis eradication campaign	national filariasis eradication campaign. In Misima at least the community networks that were established continued to function as part of national implementation model.	filariasisprevalence from 70% to 15% on Misima Island.	
SIMBERI GOLD COMPANY LIMITED/ ALLIED GOLD HEALTH PROGRAM	Allied Gold and local government. Limited partnership.	No data	Increasing access to quality healthcare by making mine health services available to community. Structural support to community health clinics (water supply, renovation) Medicines and ambulance Allowances for public staff Mine doctor visits local clinics daily Assistance with serious cases	Limited alignment. Focus is on immediate provision of basic health care by mine medical personnel.	No data	No data
OIL SEARCH HEALTH FOUNDATION	Joint Venture Company PPP est. in 2011. Multiple partners	Global Fund Principal Recipient for malaria and HIV	Management of core public health programs in 5 oil-producing areas for HIV, malaria and child health programs including: Improving maternal health services Emergency obstetric care training (sole provision) Expanded program of immunisation	Strong alignment to national policy. The Foundation has a cooperative agreement with the NDOH re: Global Fund activities and respects the stewardship function that needs to be performed by the NDOH, aiming to work closely with the NDOH as the program is implemented.	By end 2011, 14,000 HIV test sites established Annual malaria incidence per 1000 people decreased from 315 in 2010 to 120 in 2011 Vaccination coverage increased from 52% in 2010 to 77% in 2011	Managing US$ 60 million in grant funding