

VOLUME 1 – CHAPTER 5

HEALTH IMPACT ASSESSMENT AND PUBLIC HEALTH ACTION PLAN

Table of Content

PART 1: HEALTH IMPACT ASSESSMENT	1
5.1 INTRODUCTION TO HEALTH IMPACT ASSESSMENT AND THE NT2 PROJECT	1
5.1.1 Definition, Objectives and Guiding Framework.....	1
5.1.2 Description of the NT2 Project	2
5.1.3 Project Infrastructure.....	3
5.1.4 Project Schedule	3
5.2 POTENTIAL IMPACT AREAS OF CONCERN (PIA)	3
5.2.1 Plateau Resettlement Area (PIA #1).....	5
5.2.2 Regulating Pond and Downstream Channel Areas (PIA #2)	5
5.2.3 Villages along the Xe Bangfai (PIA #3)	5
5.2.4 Nam Theun Riparian Area (PIA #4).....	6
5.2.5 Villages in the Nam Theun 2 Watershed (PIA #5)	6
5.2.6 Construction Work Camps (PIA #6)	6
5.2.7 Camp Followers: Family and Services (PIA #7).....	6
5.2.8 Transportation Corridor (PIA #8).....	7
5.2.9 Possible Additional PIA	7
5.3 MODEL OF HIA WITHIN THE NT2 PROJECT	7
5.3.1 Background	7
5.3.2 HIA Timescale.....	8
5.3.3 Scope of the HIA	8
5.3.4 Areas outside the Scope of the HIA.....	8
5.3.5 Interface of the HIA with the SDP and EAMP.....	8
5.3.6 Institutional Issues.....	9
5.3.7 HIA Study Team	9
5.3.8 Impacts Categorization.....	9
5.3.9 Direct versus Indirect Effects.....	10
5.3.10 Cumulative Impacts	10
5.3.11 General Methodology	10
5.4 SPECIFIC METHODOLOGY: SECTORAL APPROACH	13
5.4.1 Environmental Sub-Sectors	13
5.4.2 Housing.....	14
5.4.3 Water Supply, Sanitation and Food.....	14
5.4.4 Transportation	14
5.4.5 Communications, Information and Transmission Line Distribution.....	15
5.4.6 Environmental Health Areas	15
5.5 STAKEHOLDER IDENTIFICATION AND CONSULTATION	15
5.6 DATA SOURCES, STUDIES AND SURVEYS (BACKGROUND HEALTH STATISTICS)	15
5.6.1 Approach	15
5.6.2 Background Health Data.....	16
5.6.3 District Health Data.....	24
5.6.4 Baseline Household Health Data from Project Specific Surveys.....	28
5.7 HEALTH ISSUES AND IMPACTS ANALYSIS	30
5.7.1 Identification of Health Issues.....	30
5.7.2 Assessment Process.....	30
5.7.3 Plateau Resettlement Area (PIA #1).....	32
5.7.4 Regulating Pond and Downstream Channel Areas (PIA #2)	34
5.7.5 Villages along the Xe Bangfai (PIA #3)	35
5.7.6 Nam Theun riparian area (PIA #4)	37
5.7.7 Villages in the Nam Theun 2 Watershed (PIA #5)	37

5.7.8	Construction work camps (PIA #6).....	38
5.7.9	Camp Followers: Family and Service (PIA #7).....	41
5.7.10	Transportation Corridor (PIA #8).....	42
5.7.11	Summary.....	43
PART 2: PUBLIC HEALTH ACTION PLAN.....		44
5.8	INTRODUCTION.....	44
5.8.1	Summary.....	44
5.8.2	Methodology and Public Consultation.....	46
5.8.3	Objectives.....	47
5.8.4	Strategies.....	47
5.8.5	Target Groups and Beneficiaries.....	48
5.8.6	Environmental Health Areas.....	53
5.9	IMPLEMENTATION FRAMEWORK.....	55
5.9.1	The Framework.....	55
5.9.2	The Lao Ministry of Health: Strategies and Organizational Charts.....	58
5.9.3	Public Health Institutions in the NTPC Project Area.....	61
5.9.4	Organizations Supporting the Health Sector in the Project Area.....	63
5.9.5	Critical Assumptions.....	65
5.10	SECTORAL HEALTH SUPPORT.....	65
5.10.1	Infectious Disease Detection System and Outbreak Preparedness.....	65
5.10.2	Water supply and quality.....	66
5.10.3	Reproductive Health.....	67
5.10.4	Traditional Health Practices.....	69
5.10.5	Financial accessibility.....	70
5.11	RESETTLEMENT HEALTH PROGRAM.....	70
5.11.1	Activities, Implementing Institutions, Specific Inputs, Indicators and their Sources.....	74
5.12	REGIONAL HEALTH PROGRAM.....	84
5.12.1	Objectives, time frame, impact areas and general approach.....	84
5.12.2	Activities, Implementing institutions, specific inputs, indicators and their sources.....	89
5.13	PROJECT STAFF HEALTH PROGRAM.....	100
5.14	SURVEILLANCE AND MONITORING.....	101
5.14.1	Introduction.....	101
5.14.2	Objectives.....	102
5.14.3	Strategies.....	102
5.14.4	List of Activities.....	102
5.14.5	Description of Activities.....	103
5.14.6	Baseline Disease Indicators.....	105
5.14.7	Flow of Information.....	107
5.15	CAPACITY BUILDING.....	110
5.16	TECHNICAL ASSISTANCE.....	111

List of Annexes

Annex 5-1:	Selected National, Regional and Provincial Health Indicators.....	113
Annex 5-2:	Background Data Source Materials.....	116
Annex 5-3:	Health Equity Fund.....	118
Annex 5-4:	Health Staff Training Programmes.....	119
Annex 5-5:	Nakai Indigenous Medicine Changes.....	122
Annex 5-6:	Core Package of Services.....	125
Annex 5-7:	Example of an Official Consultation Meeting.....	128
Annex 5-8:	Summary of Key Baseline Health Data (Census 2000) on Khammouane Province.....	130
Annex 5-9:	Summary of Key Baseline Health Data (Census 2000) on Bolikhamxay Province.....	132

Annex 5-10:	Summary of Key Baseline Health Data (Census 2000) on Savannakhet Province.....	134
Annex 5-11:	Health Program Management Unit.....	136
Annex 5-12:	TOR and Qualifications Required of Health Program Management Unit Personnel	138
Annex 5-13:	Proposed Content for the MOU	141
Annex 5-14:	References	142
Annex 5-15:	Entitlements – Resettlement and Regional Health Programs	145
Annex 5-16:	PHAP Budget Summary	150

List of Tables

Table 5-1:	WHO Model for HIA.	11
Table 5-2:	Model for the Current HIA according to Seasonality of Health-Related Issues.	12
Table 5-3:	Health-Related Issues during Different Phases of the NT2 Project.	12
Table 5-4:	Selected Demographic, Economic and Health Indicators in the Early 2000s.....	16
Table 5-5:	Selected National Health Accounts Indicators of Lao PDR in 2001.	17
Table 5-6:	Leading Causes of Death in Lao PDR in the mid 1990s (Kobayashi et al., 2004).	17
Table 5-7:	Public Health Caseload in Lao PDR in the mid 1990s (Kobayashi et al., 2004).	17
Table 5-8:	Leading Illness Causes Within The Last 2 Weeks, In Lao PDR In The Mid 1990s.	18
Table 5-9:	Leading Causes of Injury/Accident in the Central Region of Lao PDR, as of 1996.....	18
Table 5-10:	Schoolchild Helminth Prevalence Rates (%) in 3 Lao Provinces (2000-02).	20
Table 5-11:	Schoolchild Helminth Intensity Data (%) in 3 Lao Provinces (2000-02).	20
Table 5-12:	Various Target Groups’ Knowledge, Attitudes and Practices on STI/HIV-AIDS.....	23
Table 5-13:	Infant Immunization Coverage in Potentially Affected Districts	24
Table 5-14:	Nr of Health Complaints Reported in 3 Project Districts in March/April 1996.....	25
Table 5-15:	Main Sickness Cause Ranking in 3 District Hospitals in 1995 and 2003	25
Table 5-16:	Slide Positive Rate and Malaria-related Death in Khammouane (2002-03).....	25
Table 5-17:	Schoolchild Helminths Prevalence (%) in 5 Khammouane Districts (‘00-02)	28
Table 5-18:	Walking Time to Nearest Water Source in Study Zones (all figures in %).	28
Table 5-19:	Main Source of Drinking Water in the Different Study Zones (all figures in %).	28
Table 5-20:	Sanitary Facilities by Type (all figures in %).	29
Table 5-21:	Symptoms Reported by those Experiencing Acute Illness (all figures in %).	29
Table 5-22:	Sleeping Under a Bed net the day before the Interview (all figures in %).	30
Table 5-23:	Risk Profiling of Plateau Resettlement Area (PIA #1)	34
Table 5-24:	Risk Profiling of Villages along Regulating Pond and Downstream (PIA #2).....	35
Table 5-25:	Risk Profiling of Villages along the Xe Bangfai (PIA #3)	36
Table 5-26:	Risk Profiling of Nam Theun Riparian Area (PIA #4)	37
Table 5-27:	Risk Profiling of Villages in the Nam Theun 2 Watershed (PIA #5)	38
Table 5-28:	Risk Profiling of Construction Work Camps (PIA #6).....	41
Table 5-29:	Risk Profiling of Camp followers: Family and Service (PIA #7).....	42
Table 5-30:	Risk Profiling of Transportation Corridor (PIA #8)	43
Table 5-31:	Time Frame of NT2 Project Activities and of Resettlement	45
Table 5-32:	General Overview of the two Health Programs	48
Table 5-33:	Construction Phase: (early 2005 to May 2008)	50
Table 5-34:	Operation Phase (Post Dam closure: May 2008).....	51
Table 5-35:	Number of Health Institutions and Village Health Data by District.....	62
Table 5-36:	Health Personnel of Khammouane Province for Project Districts.....	63
Table 5-37:	Support to Vertical Health Programs by Organization	64
Table 5-38:	Time Frame Resettlement Activities	71
Table 5-39:	Main PHAP Recommended Disease Indicators	105
Table 5-40:	List of Institutions involved in Surveillance and Monitoring.....	108

Table 5-41:	PHAP activities in need of TA	111
Table 5-42:	Selected National, Regional and Provincial Health Indicators (as of mid 1990's)	113
Table 5-43:	Baseline Demographic Data for the 3 Provinces Affected by the Project	114
Table 5-44:	Baseline Vital Statistics for 3 Provinces and Corresponding National Figures	114
Table 5-45:	Baseline Disease Rates and Selected Health Indicators in 3 Lao Provinces	114
Table 5-46:	Medical Personnel in the Project Area Districts (Source: World Bank, 2004)	115

List of Figures

Figure 5-1:	Evolution of Slide Positivity Rate from 1990-2003 of Khammouane Province	19
Figure 5-2:	Age-specific prevalence of <i>O. viverrini</i> (Source: Pholsena et al., 1997)	26
Figure 5-3:	Age-specific Prevalence of Soil-Transmitted Helminths (Pholsena et al., 1997)	27
Figure 5-4:	Geographical Location of Different PIA/TG	52
Figure 5-5:	Indicative Location and Size of Camps of Workers and Followers (size only)	54
Figure 5-6:	Institutional Arrangements for Supervision and Management of the NT2 Health Program	56
Figure 5-7:	Organisational Chart of the Health Program Implementation Framework	57
Figure 5-8:	Organizational Chart of the Lao MOH (under revision by MoH)	60
Figure 5-9:	Provincial to Village Level Organizational Arrangements (MoH revising)	61
Figure 5-10:	The Plateau Resettlement Area and Implantation of Health Institutions	73
Figure 5-11:	Location of 4 District Hospitals and Thakhek Provincial Hospital	87
Figure 5-12:	Information Flow	107
Figure 5-13:	Organizational Chart of S&M Task Force	109

List of Acronyms

ACFL	Amitié-Cooperation Franco-Laotienne
ADB	Asian Development Bank
ARI	Acute Respiratory infection
AS	Activity Sheet
BCC	Behavioural Change Communication
BK	Koch Bacillus
BOL	Bolikhamxay
BS	Blood Slide
BTC	Belgian Technical Cooperation
CIEC	Centre for Information, Education and Communication
CLE	Centre for Laboratory and Epidemiology
CMCH	Centre for Mother and Child Health
CMPE	Centre for Malariology, Parasitology and Entomology
CSWs	Commercial Sex Workers
DCCA	District Committee for the Control of AIDS
DF	Damiaan Foundation
DF	Dengue Fever
DH	District Hospital
DHF	Dengue Hemorrhagic Fever
DHHP	Department of Hygiene and Health Promotion
DHO	District Health Office
DOTS	Directly Observed Therapy Short-term
DPT	Diphtheria-Pertussis-Tetanus
DPT-Hep B	Vaccine against Diphtheria, Pertussis, Tetanus, and Hepatitis B
DRF	Drug Revolving Fund
DSS	Demographic surveillance system
DSS	Dengue Shock Syndrome
EAMP	Environmental Assessment and Management Plan
EMU	Environmental Management Unit
EDL	Electricité du Laos
EGAT	Electricity Generating Authority of Thailand
EHA	Environmental Health area
EIA	Environmental Impact Assessment
EMDP	Ethnic Minority Development Plan
EMF	Electro Magnetic Field
EPI	Extended Program for Immunisation
ER	Emergency Response
ESZs	Environmental Study Zones
FFW	Female Factory Workers
FHI	Family Health International
FUO	Fever of Unknown Origin
GDP	Gross Domestic Product
GI	Gastrointestinal
GIS	Geographical Information Systems
GOL	Government of Lao
HACCP	Hazard Analysis Critical Control Point
HC	Health Centre
HCC	Head Construction Contractor
HI	Handicap International
HIA	Health Impact Assessment
HIAT	Health Impact Assessment Table
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HIS	Health Information System
HP	Health Program
HPMU	Health Program Management Unit
HSIP	Health Services Improvement Project

HSS	HIV Sentinel Surveillance
HSU	Health Statistics Unit
IBN	Impregnated Bed Nets
ICHC	Integrated Community Health Centre
IDA	International Development Association
IEC	Information-Education-Communication
IFMT	Institut de la Francophonie pour la Médecine Tropicale
IMPE	Institute of Malaria, Parasitology and Entomology Centre
INDEPTH	International network for the continuous demographic evaluation of population and their health in developing countries
INGO	International NGO
Inter-DH	Inter-District Hospital
IPM	Integrated Pest Management
ITNs	Insecticide-Treated Bed Nets
JE	Japanese encephalitis
JICA	Japan International Cooperation Agency
KAH	Korea Association of Health Promotion
KAP	Knowledge, Attitudes, Practice
KAPB	Knowledge, Attitudes, Practice and Belief
KHA	Khammouane
Lao PDR	Lao People's Democratic Republic
LDTDs	Long Distance Truck Drivers
LLIBN	Long-Lasting Impregnated Bed Nets
MA	Medical Assistant
MCHC	Centre for Mother and Child Health
MDG	Millennium Development Goals
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOH	Ministry of Health
MSF	Médecins sans Frontières
MSV	Measles Vaccine
MTCPC	Ministry of Transport, Construction, Post and Communication
NCCA	National Committee for the Control of AIDS
NGO	Nongovernmental Organization
NIPH	National Institute of Public Health
NSC	National Statistics Centre
NT2	Nam Theun 2
NTC	National Tuberculosis Centre
NTPC	Nam Theun 2 Power Company
NTPC/HO	Nam Theun 2 Power Company Health Office
OPV	Oral Poliomyelitis Vaccine
PCCA	Provincial Committee for the Control of AIDS
PH	Provincial Hospital
PHA	Public Health Action
PHAP	Public Health Action Plan
PHC	Primary Health Care
PHO	Provincial Health Office
PIA	Potential Impact Areas of Concern
PM	Particulate Matter
PMP	Pest Management Plan
RAP	Resettlement Action Plan
RDF	Revolving Drug Fund
RMU	Resettlement Management Unit
RSA	Resettlement Area
SDP	Social Development Plan
S&M	Surveillance and Monitoring
S&MS	Surveillance and Monitoring Survey
SMW's	Seasonal Migrant Workers

SPPS	Sexually Transmitted Infection Periodic Prevalence Survey
SSA	Sub-Saharan Africa
SSO	Social Security Organisation
STD	Sexual Transmitted disease
STH	Soil transmitted Helminths
SwTI	Swiss Tropical Institute, Basel
STIs	Sexually Transmitted Infections
SVK	Savannakhet
SW	Service Women
TB	Tuberculosis
TBA	Traditional Birth Attendants
TBC	Tuberculosis
TT	Tetanus Toxoid
URIs	Upper Respiratory Infections
VHV	Village Health Volunteer
VKT	Vehicle Kilometres Travelled
VSSS	Village Sentinel Surveillance System
WB	World Bank
WCD	World Commission on Dams
WESR	Weekly Epidemiological Survey Report
WHO	World Health Organization

PART 1: HEALTH IMPACT ASSESSMENT

5.1 INTRODUCTION TO HEALTH IMPACT ASSESSMENT AND THE NT2 PROJECT

5.1.1 Definition, Objectives and Guiding Framework

Health impact assessment (HIA) is a structured method that usually follows a multidisciplinary approach, combines qualitative and quantitative data, and draws extensively on literature reviews and consultation with different stakeholders (Scott-Samuel, 1998, Lock, 2000, Parry and Stevens, 2001, Krieger et al., 2003). There are two essential characteristics of a HIA for a project, programme or policy. Firstly, it seeks to predict the effects of a specific action on human health. Secondly, it aims to inform policy and decision-making for prevention or mitigation of negative impacts (Parry and Stevens, 2001, Kemm, 2003). Opinions and needs expressed by the communities that will be affected by a policy, programme or project should form an integral part of HIA (Appiah-Opoku, 2001, Scott-Samuel et al., 2001, Awakul and Ogunlana, 2002). The method has recently emerged also as a potentially powerful tool for evidence-based health policy and planning (Lock, 2000), and hence sustainable development (Scott-Samuel et al., 2001). Consequently, international institutions, such as the World Health Organization (WHO) and the World Bank, increasingly support HIA (Krieger et al., 2003, Mercier, 2003, Morgan, 2003). In fact, efforts are underway to build this methodology into their operational practices, and a series of workshops have been carried out to train local people in HIA. However, it should be noted that in contrast to environmental impact assessment (EIA), which already spans a history of three decades, HIA is at an early phase in its development, as it was conceptualised only in the mid 1990s (Krieger et al., 2003). Key objectives of a HIA of a policy, programme or project are:

- to establish the baseline of existing health conditions in a project area;
- to evaluate the potential health impacts on individuals, populations and communities influenced by a project, programme or policy;
- to employ qualitative, semi-quantitative or fully quantitative data for assessment of health impacts, where impacts can be neutral, positive or negative;
- to provide a formal mechanism that involves and engages the relevant stakeholders to ensure appropriate discussions directed towards the prevention and mitigation of negative effects on health; and
- to provide a basis, if necessary, for developing formal mitigation action plans.

Within this conceptual framework, large infrastructure developments, like water resource development and management projects (e.g. dam construction for hydroelectric power production) or petroleum development and pipeline projects, invariably trigger the need for some type of HIA. It is well known that major hydroelectric water resource developments can have far-reaching and long-term impacts not only on the physical environment, but also on social and economic aspects of life, including the health and well-being of surrounding communities (Hunter et al., 1993, Jobin, 2003). However, historically, it has not always been recognized that large water resource development projects can also have an impact on the health of communities and individuals located in multiple, often distant, geographical regions besides the immediate dam construction area. These areas include:

- watershed areas;
- downstream areas;
- resettlement areas, planned;
- resettlement areas, spontaneous, also known as camp followers areas; and
- transportation corridors (e.g. roads, bridges, airstrips and associated villages and communities).

All of these areas, in addition to the construction camp locations, will be treated as Potential Impact Areas Of Concern (PIA) and 1) analysed for potential health impacts and 2) utilized to develop and put forward sound mitigation strategies. From a definitional perspective, a PIA can refer to both defined human groups (e.g., camp followers) and/or geographical areas (e.g., downstream). The PIAs relevant to the Nam Theun 2 (NT2) HIA will be presented in detail in Section 5.2.

The Nam Theun 2 Power Company's (NTPC)'s strategy during the development of the NT2 Project is based on 1) ensuring the good health of the workforce, 2) mitigating impacts and 3) promoting positive improvements in the health of the host communities. The overall public health management approach focuses on incorporating workforce and community health considerations systematically and co-operatively into project planning and management. The HIA is an important core element of this public health strategy. The HIA seeks to predict the impact on health of the project before it is implemented, so that:

- potentially significant adverse effects can be avoided or reasonably mitigated;
- potentially positive effects enhanced; and
- the probability of sustainable development increased (Birley et al., 1997, WHO, 2000).

The HIA is one of the studies required by NTPC as part of the Social Development Plan (SDP). Hence, the HIA should be read and evaluated as part of the overall suite of the SDP documents that includes the Ethnic Minority Development Plan (EMDP) and the Resettlement Action Plan (RAP). In addition, there is a detailed Environmental Assessment and Management Plan (EAMP) that contains a comprehensive assessment of potential environmental impacts. The HIA draws upon these key documents for detailed objective data that is relevant to the assessment of potential Project-related health impacts. Since the HIA is part of this suite of impact assessment materials, there will be specific cited references to both descriptive technical sections and maps contained in the SDP and EAMP. However, there will be some synoptic information presented in certain key sections of the HIA so that the reader understands the overall intersection between the human inhabitants and the geography potentially impacted by the project. Therefore, some information from both the SDP and the EAMP will be recapitulated in Section 5.2 of the HIA report. However, the materials and maps will be presented in a fashion so that they are keyed to human inhabitants and potential health impacts.

The form and content of the HIA are consistent with previously published materials from the World Bank (Birley et al., 1997, Listorti and Doumani, 2001), WHO (WHO, 2000, WHO, 2001) and the World Commission on Dams (World Commission On Dams, 2000). These sources in turn reflect the general HIA guidelines published by the national governments of Australia, Canada, and the United Kingdom. Finally, where appropriate, the relevant peer-reviewed international literature is also cited, so that the interested reader can further follow-up on these methodological and scientific issues. Our aim is to selectively cite key references rather than to provide an exhaustive literature review. We believe that this approach will facilitate convenient studying of the current document, while simultaneously providing pointed guidance for those who wish to become more familiar with the general opportunities and challenges of HIA.

5.1.2 Description of the NT2 Project

The Government of the Lao People's Democratic Republic (Lao PDR) and the NTPC are proposing to construct and operate the Nam Theun 2 Hydroelectric Project (the Project) in central Lao PDR.

Lao PDR is situated in the Centre of mainland Southeast Asia. The country covers an estimated surface area of 236,800 km². Lao PDR is a landlocked country with some mountainous areas, but the large majority of the country is located within the lower watershed of the Mekong River, which borders or traverses much of the length of the country in a generally north to south direction. In 2002, the estimated population of Lao PDR was 5.5 million (WHO, 2003b). More than three-quarter of the population currently live in rural areas, in sparsely distributed villages, where access can be problematic due to difficult terrain and the monsoonal climate. Lao PDR is bordered by the Chinese province of Yunnan to the north, Vietnam to the east, Cambodia to the south, Thailand to the west and by Myanmar to the northwest.

The Project will be located in Khammouane province, in central Lao PDR. A main dam on the Nam Theun, a tributary of the Mekong River, will create a 450 km² reservoir on the Nakai Plateau at full supply level, with a total storage volume of 3,910 million m³. Water from the reservoir will drop by approximately 350 m to a power station, located at the base of the Nakai plateau near the town of Gnommalat. The water discharged from the power station will then flow into a regulating pond and from there to the Xe Bangfai river via a 27 km long downstream channel. The power station will have a generating capacity of 1,080 MW (net 1,070 MW). Approximately 995 MW of electricity will be sold to the Electricity Generating

Authority of Thailand (EGAT) and 75 MW of electricity will be sold to Electricité du Laos (EDL). The electricity generated for sale to Thailand will be delivered by a 138 km long, double circuit, 500 kV transmission line. The transfer point is to be located on the Lao PDR-Thailand border near the city of Savannakhet. A 70 km long, 115 kV transmission line will deliver electricity from the power station to the Thakhek sub-station for connection to the EDL system.

5.1.3 Project Infrastructure

The Project will divert discharge stored on the Nakai plateau from the Nam Theun to the Xe Bangfai, in doing so producing electricity for delivery to EGAT and EDL utilizing the difference in elevations between the Nakai plateau and the plain. To accomplish this certain infrastructures will be constructed and will include:

- dam on the Nam Theun and necessary saddle dams to create the Nakai reservoir;
- structures to divert flow from the Nakai reservoir to the power station;
- power station with the necessary facilities for converting the energy to electricity;
- downstream hydraulic control and conveyance structures to direct the diverted flows to the main channel of the Xe Bangfai;
- transmission lines to interconnect the power station switchyards with the EGAT and EDL power transmission systems; and
- ancillary works to enable construction, operation and maintenance of the Project and to meet other obligations of NTPC.

5.1.4 Project Schedule

Some preliminary works will start before Financial Close. They include, among other activities, the construction of the access road from Road 8B to the site of the Nakai dam and the upgrading of existing roads to provide access to the construction camps and work sites. Further roadwork, e.g. to Residence Nam Theun, and excavation of the power station site, access and drainage tunnels, as well as campsite construction may commence at approximately the same time as Financial Close.

The construction of the Nakai dam, saddle dams, headrace channel, inlet works, tunnels and shafts, power house, tailrace channel, regulating dam, downstream channel, transmission lines, substations, plant, roads and operator's village will be initiated after Financial Close. A tentative schedule for the Project's construction is presented in Table 2.4 of the EAMP. The Nakai dam and appurtenant features are scheduled to be completed within 38 months. The mechanical and electrical installations will proceed as soon as possible in conjunction with the completion of the civil works. The total construction phase for the Project, including commissioning, is estimated to be 54 months from Financial Close. Commissioning, testing and acceptance under the EGAT PPA are scheduled to commence 46-47 months after the Financial Close date.

5.2 POTENTIAL IMPACT AREAS OF CONCERN (PIA)

As described in the EAMP, the study area includes geography that will be affected although possibly not directly impacted by the Project. The north-south dimension of the environmental study area is 240 km in length and extends from the Mekong River confluence of the Nam Kading to the point on the Mekong River where the power transmission line crosses into Thailand. The east-west extent is 110 km from the Lao PDR-Vietnam border to the Lao PDR-Thailand border. The area incorporates approximately 26,400 km².

EAMP Figure 3.1 identifies all of the study areas divided into 15 environmental study zones (ESZs). While useful for the environmental assessment, this zonal configuration has less utility for the HIA. Consequently, after substantial collaborative discussions with different key stakeholders, the Project has been divided into discrete "Potential Impact Areas" (PIA) for HIA purposes. In this conception, a PIA can represent either a "subject matter", usually composed of a specific population group (e.g., camp followers), or a defined geographical area (e.g., downstream) where Project-related health impacts have a reasonable likelihood of occurrence.

The PIAs due to the NT2 Project activities were classified into two groups with 8 PIAs which preliminarily ranked (high-low) impacts of each PIA group as followings;

- (i) Resettlement and geographical impact areas
 - PIA #1 Plateau resettlement area
 - PIA #2 Regulating pond and downstream channel area
 - PIA #3 Villages along the Xe Bangfai
 - PIA #4 Nam Theun riparian area
 - PIA #5 Villages in the NT2 watershed
- (ii) Construction work related areas
 - PIA #6 Construction work camps (workers)
 - PIA #7 Construction work related groups (locals and followers)
 - PIA #8 Transportation corridor

Those PIAs are briefly summarized below. The corresponding ESZs are given in brackets for ease of cross-reference with the EAMP. Finally, at the end of this discussion, we present one additional PIA that might potentially be included for further appraisal of health-related issues.

PIA #1: Plateau resettlement area (ESZ #1 and #3)

- Approximately 1,030 families and 5,700 people reside in the zone that will be inundated; hence, the affected population will require relocation to this newly constructed area.

PIA #2: Regulating pond and downstream channel area (ESZ #7, 8, 9 and #10)

- This area consists of (i) the power station, (ii) the regulating pond, (iii) the downstream channel area, (iv) the Nam Kathang river, and (v) the upper Xe Bangfai area. An estimated 60 households will be affected by the construction of the downstream channel, and more than 20 villages are located along the Nam Kathang and the upper Xe Bangfai between the confluence with the Nam Kathang and the Sayphou Xoy Ridge.

PIA #3: Villages along the Xe Bangfai (ESZ #11 and #12)

- Twelve villages are located along the middle portion of the Xe Bangfai, from the Sayphou Xoy Ridge to the crossing with Road 13. Numerous, fairly densely populated villages are located along the 70 km stretch of the lower Xe Bangfai ranging from the Road 13 crossing to the confluence with the Mekong River.

PIA #4: Nam Theun riparian area (ESZ #4 and part of ESZ #5)

- This area includes the small stretch of riparian land from the Nam Theun between the Nakai Dam and the Theun Hinboun Dam covering approximately 130 km². The watershed has an estimated surface area of 4,061 km².

PIA #5: Villages in the Nam Theun 2 watershed (ESZ #2)

- An estimated 5,500 people live in some 30 scattered villages located in the Nam Theun watershed area, covering approximately 3,500 km².

PIA #6: Construction work camps (parts of ESZ #6, 7 and 8)

- There are four general zones that have been identified for the development of construction work camps within the Project area. These zones, and their expected peak workforces are: (i) dam area construction camp (800 workers), (ii) Nakai work camp (600 workers), (iii) power station work camp (2,200 workers), and (iv) downstream work camp also known as Xe Bangfai (400 workers).

PIA #7: Camp followers: family & service (parts of ESZ #6, 7 and 8)

- There is a significant potential that substantial numbers of the workforces' family will co-locate in the same geographical area as the working spouse. It is reasonable to assume and anticipate that significant numbers of food, entertainment, and service vendors will try to co-locate in close proximity to the work camps and/or family followers. Based on recent experiences at other construction sites in central Lao PDR, the overall estimated total camp followers (both family and service) are 2-4 times the workforce census.

PIA #8: Transportation corridor (throughout different ESZs)

- As part of the Project, a variety of new roads and bridges will be constructed and existing roads upgraded. In addition, there will be significant overland truck utilization of existing road networks in order to supply the various construction activities across the entire Project.

5.2.1 Plateau Resettlement Area (PIA #1)



Village to be resettled

An area along the rim of the Nakai Plateau has been delineated as the area where residents of the inundated areas will be relocated. The area consists of approximately 208 km² and is located along the rim of the Plateau escarpment. The region is vegetated with secondary forest, shrubs, grasses and agricultural areas. Drainage from the area flows into the Nam Theun. At its northern end, the resettlement area is immediately adjacent to the Nakai Nam Theun – Phu Hin Poun Corridor. Current residents of this area are primarily in the villages of Nakai Tai and Nakai Neua. The district headquarters, Ban Oudomsouk, is also located in this area. At present, there is a pilot resettlement programme involving approximately 30 families. This pilot programme provides an opportunity to investigate the direct and indirect impacts of resettlement on changes and adaptations in livelihood activities, primarily farming activities, and health, which will be key to readily adapt mitigation strategies. A major focus of the HIA will be on this area.

5.2.2 Regulating Pond and Downstream Channel Areas (PIA #2)

Discharge of water from the power station will be diverted into the regulating pond and then discharged through the downstream channel to the Xe Bangfai. Approximately 60 households will be affected along the route of the 27 km long downstream channel. Construction of this channel will impact rice paddies and will require modification of the Nam Phit. Consequently, an important area of investigation of the HIA is appraisal of potential impacts on water-related vector-borne diseases and development of sound mitigation strategies for this area.

The Upper Xe Bangfai zone extends from the confluence of the Nam Kathang and the Xe Bangfai to the Sayphou Xoy Ridge located about 25 km downstream from Mahaxai. This gorge can cause backwater during flooding, and hence aggravate flooding upstream of the gorge. The primary health issues in villages along the upper Xe Bangfai are related to significantly increased discharge in the river and the related changes in land- and water-use in this area of the Xe Bangfai. Sixteen villages are located along the upper zone of the Xe Bangfai river reach and changes in water quality and quantity may affect fish populations, and hence alter nutritional patterns among villagers that rely on fishery of the upper Xe Bangfai. Thus, similar to the area affected by the regulating pond, the downstream channel and the modified Nam Kathang, the focus of the HIA of the upper Xe Bangfai will be on both water-related vector-borne diseases and nutrition-related issues.

5.2.3 Villages along the Xe Bangfai (PIA #3)

The middle Xe Bangfai zone extends from Sayphou Xoy Ridge to the Road 13 crossing. There will be an increase in dry season discharge through this reach that can facilitate navigation and improve irrigation potential. Twelve villages are located along this reach. Some of the villages have initiated dry season irrigation that may increase with additional water in the Xe Bangfai. It is conceivable that intensified agricultural production will lead to enhanced utilization of fertilizers and pesticides, which can have important negative health consequences.



Riverbank garden along lower Xe Bangfai

The increased discharges are expected to result in additional riverbank erosion with the possibility of some elimination of riverbank gardens during the dry season. The effects of altered discharges on fishery are difficult to predict, hence it is hard to anticipate whether or not this will result in changes in human nutritional patterns. In brief, both direct and indirect health effects are possible in the middle Xe Bangfai area.

The lower Xe Bangfai, or the Xe Bangfai flood plain, covers an area of about 50,000 ha ranging from its confluence with the Mekong River to where Road 13 crosses the Xe Bangfai. This includes approximately 70 km of river. The area is fairly densely populated and is a major area of rice production in Khammouane province. The lower Xe Bangfai currently experiences rainy season flooding in most years. As will be presented in Section 5.6, the baseline health and nutritional data in the lower Xe Bangfai are somewhat different than seen in the Project construction areas, i.e. significant rates of dengue fever during the rainy season, considerably lower malaria rates and high levels of subsistence fishing. Similar to the middle Xe Bangfai, it is hard to predict overall changes in fishery due to altered discharges in the lower part of the Xe Bangfai; hence, it is difficult to make predictions for nutritional-related health aspects. In the case of intensified agricultural production, it is likely that fertilizer and pesticide application to the fields will increase. Consequently, both direct and indirect health effects are possible in the middle and lower Xe Bangfai area and are a major focus of the HIA.

5.2.4 Nam Theun Riparian Area (PIA #4)

The Nam Theun riparian area covers a geographical zone 3-5 km wide by approximately 32 km long and an estimated surface of 130 km². The area includes the riparian land of the Nam Theun from the Nakai dam site to a point where the river meets the backwaters of the Theun Hinboun reservoir. There are no established villages or permanent settlements in the riparian area and hence, health impacts are generally expected to be minimal. No information about the estimated population living in the 4,061 km² wide watershed area is available from the Project documents. It is anticipated that these individuals will be affected only minimally by the Project. The HIA does, however, address this area in some detail.

5.2.5 Villages in the Nam Theun 2 Watershed (PIA #5)

The Nam Theun 2 watershed area has a human population of approximately 5,500. They belong to various ethnic minority groups, rely on natural resources, and have unique languages and cultural histories. This area will not be directly affected by the Project, and management and development of the area is covered by the operations of the Watershed Management and Protection Authority (WMPA) as defined in the SEMFOP.

5.2.6 Construction Work Camps (PIA #6)

There are four proposed construction work camps ranging in size from 400 to 2200. As currently envisioned, these camps would be located in different geographical areas in order to more efficiently perform the required construction activities. Based on past experiences in the developing world, the construction work camps are expected to be a significant source of potential impacts to the surrounding communities. These potential impacts will be discussed in subsequent sections. In addition, a permanent presence known as the Nam Theun Residence will also be constructed. Approximately 150 permanent employees will be housed at the Residence Nam Theun to enable the ongoing operation and maintenance of the facility. This new village will be constructed near the regulating dam.

5.2.7 Camp Followers: Family and Services (PIA #7)

Experience at other large construction sites in the developing world, where major infrastructure developments had been implemented, have demonstrated that large numbers of family members may follow the construction workers to the new work site. The exact numbers and locations where these family members will locate are unknown. In a recent experience within the Project area, a large, multi-month road improvement project was carried out in the district of Gnommalat and surrounding areas to

upgrade and pave Road 12 from the village of Phalbounng all the way to the Vietnamese border. Onsite inspection and interviews with local management revealed that family camp followers were strongly discouraged by direct government intervention, thereby preventing growth of adjacent squatter villages. Whether this experience will be transferable to the Project camps is uncertain, particularly because the number of workers was significantly lower than in the current Project, and because the duration of road construction was significantly shorter than that of the present Project. However, there are several factors that indicate that spontaneous settlement areas may not explosively develop. Firstly, access to some of the camp locations is physically difficult and can only be made via an easily controlled road. Secondly, the government has demonstrated that it is prepared and willing to take action to significantly curtail, if not eliminate, spontaneous settlements. Thus, previous experiences gained elsewhere in the developing world may only be of limited relevance in the context of the NT2 Project. Nevertheless, potential health-related impacts due to large influxes of family members following the camp workers could be significant; hence the current HIA will carefully explore these potential impacts in subsequent sections.

In addition to the family camp followers discussed above, and probably of even greater relevance, the HIA will examine the potential impacts of non-local ‘service’ camp followers. Under the term “service” we refer to food, entertainment (e.g. sex) and merchandise providers who live adjacent or reasonably close to new work camps. At other locations in the developing world, the potential impacts of camp followers that provide these kinds of ‘services’ have been significant, and were often related to the transmission and amplification of sexually-transmitted infections (STIs), including HIV/AIDS. Consequently, the HIA will carefully address this issue and put forward a rigorous plan to mitigate the potential health-related impacts of this group and its interaction with the surrounding villages and communities.

5.2.8 Transportation Corridor (PIA #8)

The NT2 Project will construct and/or improve a number of roads and both these new and upgraded roads will accommodate an increased volume of supply and equipment trucks expected during the construction, and to some degree also during operation of the Project. From a HIA perspective, transportation corridors are critical sources of direct and indirect impacts, including (i) traffic injuries and accidents, (ii) road dust that can lead to increase in respiratory diseases, (iii) facilitation of illicit drugs trade and (iv) facilitation of the spread of STIs, including HIV/AIDS, via long haul truckers and spontaneous development of road side bars and truck stops. Consequently, the HIA places strong emphasis on this aspect of the Project.

5.2.9 Possible Additional PIA

Because of the nature of the NT2 Project, i.e. impounding the Nam Theun, but discharge of its water into another river system, namely the Xe Bangfai, the entire ecosystem immediately downstream of the dam site, as well as along the Nam Kading between the Theun Hinboun dam and the confluence with the Mekong River will be altered. However, the EAMP documentation emphasizes that the ecosystem downstream of the Theun Hinboun dam had been altered significantly due to the construction of this dam many years ago. Hence, potential health impacts and mitigation strategies should have been addressed by this preceding project. It is currently difficult to make meaningful predictions of potential incremental changes in both ecology and human health in this area. While the HIA study team recognizes this vast geographical area as a possible additional area of concern, in line with the EAMP documents, no attempt is made to specifically address health issues in this zone.

5.3 MODEL OF HIA WITHIN THE NT2 PROJECT

5.3.1 Background

During the composition of the HIA there was not a formal screening, scoping, profiling/appraisal exercise. However, significant health-related issues have been raised by the various stakeholders during numerous meetings and consultations for developing the SDP. With the objective to strengthen local capacities in the emerging field of HIA, two WHO sponsored and led HIA workshops, which included many key government stakeholders as attendees, were held in Lao PDR in March 2003 and October/November 2003. Specific discussions regarding the NT2 Project, e.g. health surveys carried out in the NT2 project area and appraisal of health coverage in the SDP and EAMP, were presented during the March 2003 workshop. Within this context, it is clear that the NT2 project has gone through a “screening, scoping and appraisal” such that a full HIA is considered an essential part of the SDP and overall impact assessment process.

In addition, as part of the preparation of this report, the HIA team performed five days of field investigation that included numerous visits to various project areas (e.g. Nakai plateau and the Xe Bangfai downstream areas), with a particular emphasis on appraisal of current health care delivery structures (both availability and performance) from the grass-root to the district hospital level. In addition, multiple meetings were held with Ministry of Health (MOH) officials and disease and health systems specialists at the district, provincial and national level. At each village meeting, specific consultations were held with the village chief and, where appropriate, with the village health volunteer (VHV). The VHV is in charge of running the revolving drug fund (RDF) programmes and the selling and re-impregnation of insecticide-treated bednets (ITNs). It is important to note that ITNs have proven efficacious and cost-effective for the control of malaria in different ecological and epidemiological settings (Lengeler, 2000). There is growing evidence that over the past decade Lao PDR, as well as Vietnam and Cambodia, have made substantial progress in the control of malaria, which is partially explained by rigorous implementation of ITNs (Kobayashi et al., 2004, Trung et al., 2004).

5.3.2 HIA Timescale

This HIA focuses predominately on construction activity and the early commissioning and operation phases. The construction mobilization is planned to begin in 2004/2005 with full construction activities occurring over 2005-2008. Operation phase transition will occur during 2008-2009. This HIA does not address either the post handover period (that is not anticipated for 25 years) or potential decommissioning in the distant future.

5.3.3 Scope of the HIA

The focus of the HIA is on both general and specific public health issues, e.g., water and sanitation (general) malaria and HIV/AIDS (specific). Typical occupational health concerns, such as musculo-skeletal injuries, are viewed as ‘inside the fence’ risks and are considered within the Head Contractors Construction Safety Plan. Experience with other large infrastructure projects in developing countries demonstrates that the HIA should adopt a reasonably broad perspective when addressing the potential public health impacts and include not only the immediate construction areas but also 1) communities and villages within road and transmission line spheres of influence and 2) the health impact individuals who may follow the Project referred to as “camp followers.” As previously noted, “camp followers” is a generic term that refers to two groups: 1) family and relatives of project workers/staff and 2) service industry providers economically attracted to the project, e.g., food vendors, entertainment (e.g., sex), consumable goods, etc. Since the NT2 Project zone of potential influence extends cover an extremely large area, it is possible that a substantial level of the individuals within the Project geography will experience some level of impacts, potentially positive and/or negative.

5.3.4 Areas outside the Scope of the HIA

The study does not address occupational health risks on the construction sites, which are the responsibility of the Contractor’s Construction Safety Plan and Project Staff Health Plan.

The HIA is not a quantitative risk assessment, such that numerical predictions of risk are not calculated or presented.

5.3.5 Interface of the HIA with the SDP and EAMP

A variety of potential social and environmental impacts are discussed in the overall SDP and EAMP volumes. There are numerous issues that overlap across these volumes. For example, 1) labour trafficking during the construction phase and 2) particulate and vehicle emissions air pollution impacts. Labour trafficking issues are clearly a primary social concern and only secondarily and indirectly an issue for the HIA. Lao PDR is a party to several international treaties that include provisions on trafficking. Particulate and vehicle emission air pollution generates both primary health as well as environmental concerns. Air pollution impacts may also have social implications; therefore, where appropriate, other volumes are cross-referenced. However, this report was developed so that interested reviewers, who may not have the full suite of SDP and EAMP materials, could still reasonably study the HIA as a “stand-alone” report. Nevertheless, many of the most critical engineering schematics and design details are available in the EAMP and are not included in the HIA.

5.3.6 Institutional Issues

The NT2 is a complex project with a specific framework, known as the Concession Agreements, for the division of responsibilities between NTPC and the Government of the Lao PDR. This division of responsibilities is summarized in Table 6.15 in Chapter 6. For example, the leading role in the “Resettlers and Regional Health Programme” is the Government of Lao (GOL). However, the HIA will analyse and present potential health impacts regardless of “Responsible Party.” The development of a mitigation strategy, known as the Public Health Action Plan (PHAP) will be a collaborative effort between the GOL, NTPC and the relevant health stakeholders.

5.3.7 HIA Study Team

The HIA study members consisted of the following members:

Gary R. Krieger (MD, MPH, DABT; NewFields, LLC, Denver, CO, USA): Overall team leader;
Marci Balge (RN, MSN; COHN-S, NewFields, LLC, Denver, CO, USA): Public health action plans;
Jürg Utzinger (PhD; Swiss Tropical Institute, Basel Switzerland): Water-borne diseases and baseline health analysis; and
Soutsakhone Chanthaphone (MD; Deputy Director, Ministry of Health, National Center for Environmental Health and Water Supply; Vientiane, Lao PDR): Field survey facilitator and translator.

The HIA team finished the preliminary draft in March 2004, the first draft report was sent to the acting World Health Representative to Lao PDR, and HIA Taskforce of Department of Hygiene and Health Promotion Lao PDR for comment. Dr Dirk Horemans and Dr. Valery Gilbos (Belgian public health experts) and Dr Yanyong Inmuong (a Thai environmental health specialist) later worked on improvement of this HIA report. Dr Surinder Kaul (Public Health Consultant, International SOS), assisted by Drs Pany Sananikhom and Valery Gilbos revised PHAP and developed the implementation plan.

5.3.8 Impacts Categorization

In general, impacts exist in two broad categories: (i) those that are internal (within the project facilities) and are therefore directly amenable to technical and managerial control by the overall private sector contractor, and (ii) those that are external to the project facilities and require government involvement and full participation. This distinction between “internal” (private sector) and “external” (government) is a useful construct for contracting purposes but is entirely artificial from a biological and medical perspective. The potential problem of camp followers illustrates this problem. The same basic beneficial design measures that are incorporated into both internal camp construction and resettlement areas (e.g. housing design, water supply and sanitation) could be developed for camp follower areas if these develop. If camp follower areas are present, it is obvious that there will be a potentially significant interaction between the two groups; hence, the transmission and amplification of disease can easily overwhelm basic design measures if the two areas are not treated in a generally similar fashion.

The development of a nomenclature system for impacts categorization is an arbitrary but essential process. The available HIA guidance for this issue is quite general and not consistent across published materials. For the NT2 HIA a three-part risk rating system based on a recent WHO document, entitled “Human health and dams”, has been selected (WHO, 2000), as follows:

- no change (from baseline);
- significant (adverse); and
- enhancement (improvement).

Significant risks can often be mitigated (lessened) back to baseline conditions if appropriate public health action plans are developed and rigorously implemented. Conversely, the potential exists that some significant impacts cannot be mitigated and require some type of other compensatory mechanism. Similarly, there is the obvious possibility that enhancement (improvement) in a specific risk profile may occur. Typically, there is a spectrum of risks that will be identified in the HIA. The goal of the Public Health Action Plan (mitigation plan) is to potentially mitigate all identified significant risks to acceptable levels; however, it is important to recognize that in every circumstance this may not be fully possible.

5.3.9 Direct versus Indirect Effects

There are two general categorizations of impact effects, namely (i) direct and (ii) indirect. A direct effect demonstrates a specific cause-and-effect relationship. For example, the presence of service workers and the increased likelihood of STI transmission is a direct effect relationship. In Lao PDR, “service workers” is the preferred descriptive term of art rather than commercial sex workers (CSWs). An indirect effect is a secondary by-product of an interaction among multiple variables. As a hypothetical example, potential changes in water quantity and quality in the downstream area of a dam reservoir might have an impact on fishery, and hence fishing yields. This might impact overall nutritional status of populations who rely on fishery as an important part of their livelihoods, which in turn can have an impact on people’s immune status. As a consequence, this people can become more susceptible for particular diseases, which can finally result in changes in corresponding disease rates (incidence and prevalence).

Indirect effects are often of equal or greater significance than the more obviously observable direct impacts. The HIA will analyse both potential direct and indirect effects. Theoretically, there are a virtually limitless number of indirect effects that could be hypothesized. In order to manage this problem, two issues are important to highlight. Firstly, a set of most likely indirect effects should be constructed on the basis of past relevant experiences at similar projects. Secondly, a sufficiently robust monitoring and surveillance system should be developed that facilitates early detection of significant indirect effects. Therefore, the monitoring and surveillance must have sufficiently sensitive and specific endpoints so that changes in key objective endpoints (e.g. mortality, malaria slide positive rates in sentinel villages) can be documented in an appropriate and timely fashion. The overall Public Health Action Plans, including recommendations for disease monitoring and surveillance, will be discussed in Section 5.12.

5.3.10 Cumulative Impacts

As pointed out by (Brismar, 2004), there is no specific definition for cumulative impacts in the existing published environmental assessment methodologies. Not surprisingly, there is no agreed upon definition for cumulative impacts from an HIA perspective. While definitional precision has been lacking, Brismar points out that some central properties of cumulative impacts for environmental studies have been recognized:

- may arise on any type of environmental impact receptor at any scale;
- are triggered by multiple causes or impacting factors; and
- are generated by multiple impact pathways, generally involving multiple root causes and lower and higher effects, interlinked by cause-effect relationships;
- for human health impacts, an analogous configuration can be proposed;
- may arise on a human receptor at any scale;
- are triggered by multiple causes, e.g., interaction of multiple health issues on one receptor (individual);
- are generated by multiple impact pathways, e.g., water pathways changing communicable vector diseases rates coupled with changes in nutrition (increased susceptibility) due to loss of agricultural lands.

In this HIA, cumulative impacts will be considered but only in a qualitative fashion since the methodology does not currently exist to perform a fully quantitative analysis. Cumulative impacts will also be considered in the Public Health Action Plan (PHAP); however, the ability to accurately and quantitatively monitor, survey and measure for multiple effects is not methodologically well-developed in the literature.

5.3.11 General Methodology

For the current HIA, both the World Bank (Birley et al., 1997, Listorti and Doumani, 2001) and the World Health Organization (WHO, 2001) recommendations have been utilized. In addition, published HIA guidelines from Australia, the UK, Canada and the European Union have also been consulted. Other recently completed HIAs for large infrastructure projects (e.g. pipelines and other large scale oil/gas developments) have also been reviewed and utilized.

NT2 is an ambitious hydroelectric water resources infrastructure project that clearly has specific economic objectives and drivers. It is embedded in cohesive socio-economic development and poverty alleviation

rationales that are in line with internationally agreed development targets, namely the Millennium Development Goals (MDG). In order to achieve these development goals, it has been recognized that early identification of potential health impacts, both positive and negative, and mitigation of the negative ones, are of critical importance. While there is a longstanding practice, invariably embedded into legislation, for performing an EIA, a universally accepted methodology for HIA still awaits further development (Utzinger et al., 2004). Not surprisingly, there have been very few full HIAs that have been conducted and published to date. For an excellent discussion on this matter, the interested reader is invited to consult the February 2004 issue of a specialist journal entitled “Environmental Impact Assessment Review”. This observation is particularly true for large water resources projects like dams. While there is a long, complex and often controversial history surrounding dam related EIAs (Brismar, 2004), there have been virtually no full length HIAs for any of the large dam projects over the last ten years.

In keeping with the approach already developed for the EIA, NTPC has generally adopted a model for the HIA described in recent World Bank publications, namely (i) the “Environmental assessment sourcebook update” of July 1997 (Birley et al., 1997), and (ii) the “Bridging environmental health gaps” (Listorti and Doumani, 2001), as well as the recent WHO document entitled “Human health and dams” (WHO, 2000).

Due to continued concerns surrounding large water resource development and management projects and human health, WHO recently submitted a position paper entitled “Human health and dams” to the World Commission on Dams (WCD) (WHO, 2000). The WCD had previously published a detailed series of guidelines covering environmental impact assessments and water resources projects (World Commission On Dams, 2000). While the 2000 WCD guidelines contain extensive recommendations for social and environmental assessment, surprisingly little was related to human health. The WHO approach defines a general framework for completing an HIA, although it does not develop or present HIA methodology to the same level of detail as proscribed for social and environmental impacts by either (i) the World Bank EIA guidelines or (ii) World Bank Safeguard Directives covering the environment (environmental assessment, natural habitats), rural development (pest management, forestry and safety of dams), social development (management of cultural property, indigenous peoples, involuntary resettlement), and international law (international waterways and disputed areas).

As seen in Table 5-1, the WHO model assesses six general categories of health issues. The specific example and knowledge-base findings are meant to be for illustrative purposes and are not necessarily specific to the NT2 project.

Table 5-1: WHO Model for HIA.

Health issue	Example	Knowledge-base
Communicable diseases	Vector-borne	Large, reliable
Non-communicable diseases	Pesticide exposure	Reliable, generalisable
Accidents and injuries	Construction and traffic-related	Reliable, some statistics
Malnutrition	Vitamin A deficiency	Variable, potentially quantifiable
Psychosocial disorder	Substance abuse	Poor reliability, cultural variation
Social well-being	Quality of life, equity	Variable reliability

In a traditional biomedical model, these health issues are usually associated with disease timing, i.e. acute (rapid) or chronic (delayed) onset. However, for the NT2 Project, some of the timing issues are analysed as a function of seasonality, distinguishing between dry and rainy season (Table 5-2). As will be discussed in subsequent sections, seasonality is a critical parameter for many disease risks in specific PIA. For example, dengue fever rates in villages located along the Xe Bangfai are highly correlated with flooding events that occur quite regularly during the rainy season. Therefore, the NT2 HIA will analyse timing based on dry versus rainy season effects as opposed to acute or chronic onset.

Table 5-2: Model for the Current HIA according to Seasonality of Health-Related Issues.

Health issue	Seasonality	
	Dry season	Rainy season
Communicable diseases	Water-borne	Vector-borne
Non-communicable diseases	Road dust production	Drowning
Accidents and injuries	Construction, traffic related trauma	Construction, traffic related trauma
Malnutrition	Agricultural production	Agricultural production
Psychosocial effects	Availability of river gardens	Loss of river garden
Social well-being	Ease of communication, movement	Loss of communication, movement

Similarly, health issues can be compared to different Project stages. For the NT2 Project, the different phases are quite critical and are likely to generate different types and levels of impacts within these different time periods. For purposes of the current HIA, a more Project-specific set of phases has been selected. It includes the following time periods:

- baseline;
- pre-construction transition, transition and mobilization;
- active construction;
- commissioning and reservoir filling;
- early operations/post reservoir filling;
- standard operations; and
- decommissioning.

Using the basic WHO health issues categorization model, Table 5-3 summarizes some of the relevant health-related assessments, as stratified by the various Project phases. The selected “assessments” are for illustrative purposes only since more definitive rationale and assessment are presented in Section 5.7.

Table 5-3: Health-Related Issues during Different Phases of the NT2 Project.

Time period	Communicable diseases	Non-communicable diseases	Nutrition-related health issues	Accidents and injuries	Psycho-social issues
<i>Baseline</i>	Studies at province, district and village level	Studies at province, district and village level	Studies at province, district and village level	Studies at province, district and village level	Stress, anxiety
<i>Preconstruction, transition and mobilization</i>	Diseases related to lack of clean water and improved sanitation	Increased road dust	Food inflation with secondary poor diets	Increased traffic-related accidents and injuries	Stress, anxiety
<i>Active construction</i>	STIs, including HIV/AIDS, and malaria	Dust-induced respiratory problems	Loss of subsistence	Construction related, traffic	Uncertainty
<i>Commissioning and reservoir filling</i>	Changes in vector-borne disease patterns	Dust-induced respiratory problems	Changes of agricultural production	Drowning	Stress, anxiety
<i>Early operation and post-reservoir filling</i>	Water-related diseases (e.g. malaria, dengue)	Increased use of pesticides and fertilizers	Loss of river garden crops and altered fishery	Drowning, and traffic-related accidents and injuries	Displaced communities lose coherence
<i>Standard operation (3-5 years post-filling)</i>	New steady-state of vector-borne diseases	Pesticide contamination	Loss of agricultural lands	Drowning, traffic	Changes in traditional medicine practices
<i>Decommissioning</i>	Unknown	Unknown	Unknown	Unknown	Unknown

Typically, the HIA process utilizes a biomedical model of health, while recognizing that other factors or determinants contribute to health and well-being. Impacts are typically assessed using some type of qualitative risk assessment matrix. This strategy is useful for disease-specific assessment but does not always capture the impacts, positive and negative, that can occur across broad sectors such as housing, sanitation and transportation. The NT2 Project involves resettlement of almost 6,000 individuals on the Nakai plateau. In this context, the additional use of the sectoral approach, (e.g. housing, water supply and sanitation, transportation, etc), entails many potential benefits. This approach will be described in the following section.

5.4 SPECIFIC METHODOLOGY: SECTORAL APPROACH

In 1996, the World Bank released a three-volume report titled “Bridging environmental health gaps, lessons for sub-Saharan Africa infrastructure projects”. In this document, there is a clear differentiation between the traditional definition of “public health” with its disease-specific focus and the more broadly defined “environmental health” which encompasses the “human living environment.” Traditionally, public health is the combination of sciences, skills, and beliefs that are directed to the maintenance and improvement of the health of all people. Therefore, the potential impacts of a major infrastructure project to public health can be substantial in both an adverse and a beneficial manner. Historically, there has not been a set of generally accepted standard guidelines or checklists to direct the public health impacts evaluation of large infrastructure projects, particularly in the developing world. Typically, public health evaluations have primarily focused on mortality and morbidity, and more recently on burden, disability and vulnerability. Both the impacts and potential remediation measures have generally been viewed through a health sector or disease-specific perspective (e.g. malaria control programmes) and have not necessarily considered the overall potential available to the infrastructure sector to positively impact and improve the quality of life and impact disease rates. Since NT2 is a major infrastructure development activity that involves resettlement, it is appropriate to also evaluate the Project’s potential impacts in a broader perspective than restricting the analysis to the more traditional evaluation of disease-associated morbidity, mortality and disability.

According to the formulation constructed in the World Bank document, “environmental health differs from public health” in that “it stresses prevention and concentrates on the human living environment”. Within this context, the focus is shifted towards a consideration of potential impacts in both broad and narrow contextual settings, i.e. the broad perspective associated with development and mitigation of adverse environmental conditions and the more narrow context of diseases and injuries associated with water, sanitation, solid waste, housing, vector control and hazardous materials. Hence, the approach emphasizes the potential linkages between infrastructure-related activities and overall environmental health. While this is a shift from a pure disease specific focus towards an examination of the interconnectedness between overall disease burden and infrastructure impacts, the importance of certain diseases like malaria and sexually transmitted infections (STIs) is not ignored (Birley et al., 1997). For example, malaria control interventions are a traditional health sector approach and are an important consideration for a project. However, a cross-sectoral examination that combines and integrates the potential adverse and beneficial effects of non-health sectors, e.g. transportation, housing and urban development, can conceivably accomplish more than interventions initiated by separate sector initiatives (Hunter et al., 1993, Listorti and Doumani, 2001, Utzinger et al., 2002).

With the World Bank’s initial 1996 publication, and the subsequent update and expansion released in 2001 (Listorti and Doumani, 2001), this international institution has appeared to evolve in its perspective toward environmental health evaluations. Consequently, the analysis of potential health impacts for major infrastructure projects should be conducted in a manner that also incorporates this shift from pure disease-specific morbidity, mortality and disability towards a broader consideration of the linkages between the proposed project and environmental health.

5.4.1 Environmental Sub-Sectors

In the approach to public health planning within the context of an environmental assessment, the concept of environmental linkages in the overall analysis of impacts and development of potential mitigations is critical. Based on the approach set forth by the World Bank, the following four sub-sectors are evaluated:

- housing;
- water, sanitation and food;

- transportation; and
- communication, information and transmission line distribution.

5.4.2 Housing

Housing design and construction can potentially have a major impact on human health. Since there is a planned resettlement area that must be constructed, this event provides a major opportunity for positively exploiting the linkages between the housing sector and human health. Conversely, poorly planned resettlement housing will have the opposite effects. Housing and health linkages can be analysed from multiple perspectives, including:

- basic structure – intrinsic design for protection from heat, cold, moisture and pests (insect and rodent); accidents and injuries;
- location – potential for flooding, significant erosion and proximity to significant vector sources; and
- ventilation – indoor air quality, particularly from cooking sources; respiratory disease transmission (acute respiratory illness, TB); efficient movement of heat and cold, and/or moisture; ease of entry for insect and rodent pests.

5.4.3 Water Supply, Sanitation and Food

Water quality and quantity issues can be analysed from a supply and storage perspective, particularly in regards to new construction like the resettlement areas. While water supply and storage are critical, it is often forgotten that these basic factors are closely tied to sanitation, drainage and hygiene education. Solid, liquid and excreta wastes require some type of system for collection, removal and disposal. The different waste forms can all contain human and/or animal faecal matter that is directly associated with an enormous range of diseases (bacterial, viral and parasitic) that are frequently clinically recorded as Diarrhoeas and gastrointestinal disorders. Other types of water related diseases include those associated with specific vectors and water related breeding habitats, e.g. malaria, dengue, leptospirosis, Japanese encephalitis. Soil-transmitted helminths are also a significant concern and based on previous cross-sectional community-based surveys (see Section 5.6) are probably the most common sanitation-related infection.

In many respects, food and water are parallel issues, i.e. there are significant potential impacts associated with quantity, quality, processing, storage and transport. Food sanitation and hygiene are also critical issues, and like water related concerns, are invariably tied to the production of human disease. A wide variety of farm/domestic animal to human disease transmission can occur. Similarly, diseases transmitted through the habit of eating raw or undercooked fish are a significant concern, particularly in the Xe Bangfai area, where opisthorchis infection is of considerable public health significance.

5.4.4 Transportation

Roads and highways have the potential to cause direct injuries and illness and induce and facilitate human and animal migration in ways that amplify disease transmission. Transportation and health linkages include:

- road/injuries to drivers, pedestrians, cyclists from increased traffic loads, poor driving practices, poor vehicle and road maintenance, and road erosion;
- water and land pollution from unsound vehicle maintenance, surface water runoff, poor disposal practices (litter, oil, batteries, etc.);
- enhanced production of vector habitat from poor disposal practices, tires, construction debris, etc.;
- air pollution from direct vehicle emissions and road dust;
- spread of STIs, including HIV/AIDS due to increased interaction between high and low risk groups (e.g. truck-drivers and villagers);
- noise pollution; and
- transport of potentially hazardous materials with unplanned spills and/or releases.

5.4.5 Communications, Information and Transmission Line Distribution

The physical structures required for communications/information and transmission line distribution can be associated with multiple impacts. These include:

- accidents and injuries associated with construction;
- labour camp issues associated with construction;
- vector-borne disease issues surrounding construction (e.g. digging for pole placement, etc.); and
- social/societal ramifications, positive and negative, of mass media access through television and radio.

5.4.6 Environmental Health Areas

A further level of detailed investigation was performed by creating nine broadly defined **environmental health areas** that could be reasonably linked to the major sectors. The nine environmental health areas are:

- Respiratory disease: including but not exclusive to ARIs (bacterial and viral), pneumonias, TB.
- Vector-related disease, including but not exclusive to malaria, typhus, dengue.
- Sexually Transmitted Infections (STIs): including but not exclusive to HIV/AIDS, genital ulcer disease, syphilis, gonorrhoea, Chlamydia, hepatitis B;
- Soil and Water borne disease: including but not exclusive to soil transmitted helminths (STH), leptospirosis, schistosomiasis, melioidosis, cholera, water quality
- Food and nutrition related issues: including but not exclusive to stunting, wasting, micro-nutrient diseases, changes in agricultural practices, gastroenteritis (bacterial and viral); opisthorchis infection, and food safety.
- Accidents/injuries: including but not exclusive to traffic and road related, construction (home and project related) and drowning.
- Exposure to potentially hazardous materials: including but not exclusive to pesticides, inorganic and organic fertilizers, road dusts, air pollution (indoor and outdoor related to vehicles, cooking, heating or other forms of combustion/incineration), landfill refuse or incineration ash, any other project related solvents, paints, oils or cleaning agents, etc.
- Psychosocial: including but not exclusive to relocation, violence, security concerns, substance abuse (drug, alcohol, smoking), depression and communal social cohesion.
- Cultural Health Practices: including but not exclusive to the role of traditional medical providers, indigenous medicines and unique cultural or ethnic health practices.

5.5 STAKEHOLDER IDENTIFICATION AND CONSULTATION

Overall, public consultation and participation has played a significant role in the planning and pilot implementation of the SDP, including considerations of public health. We applaud the recent efforts made by WHO to launch HIA as a general knowledge area in Lao PDR. Introducing this method has been the subject of two WHO sponsored courses in March 2003 and October/November 2003 for relevant health officials and others. During the WHO courses the NT2 project was a specific topic of discussion (March 2003) and a previously completed water resource project (Nam Mang 3 dam) was used as a case study in the October/November 2003 course. The NT2 HIA has been a collaborative effort with Lao PDR government officials from the MOH (National Center for Environmental Health and Water Supply), the Resettlement Management Unit (RMU) and the Prime Minister's Office National Project Director for the NT2 Project. There has been consultation with relevant government and community stakeholders during the fieldwork for the present HIA, and external peer-review by technical specialists with HIA experience.

5.6 DATA SOURCES, STUDIES AND SURVEYS (BACKGROUND HEALTH STATISTICS)

5.6.1 Approach

This HIA incorporates an analysis of various health and nutritional surveys that have been performed at the national, provincial, district and village level (cf. Annex 5-2). These studies vary across time, location

and disease endpoint. Many of the studies were specifically commissioned by the Project in order to study significantly (potentially) impacted groups (e.g. people living in the resettlement area or along the Xe Bangfai), as well as mosquito vectors and snail intermediate hosts. Other studies are of large cross-sectional designs, measuring various disease prevalence rates. These studies were usually carried out in collaboration between the MOH of Lao PDR and international partners, such as WHO, World Bank, Japan International Cooperation Agency (JICA), Korea Association of Health Promotion (KAH), Faculty of Medicine at Chiang Mai University in Thailand, and Family Health International (FHI). In addition, there have been a number of papers published in the peer-reviewed international literature, which have been identified through computer-aided searches on the U.S. National Library of Medicine’s PubMed database, and have also been reviewed for the HIA.

5.6.2 Background Health Data

Overview of national health indicators

Table 5-4 summarizes selected demographic, economic and health indicators for Lao PDR as of 2001/2002. These data were assembled from the latest World Health Report (WHO, 2003b), World Urbanization Prospects (United Nations, 2002), and other relevant in-country and Project-related documents that were made available to the HIA team. Detailed ethnicity data for those populations in the Project areas are available in both the overall Social Development Plan (SDP) and the Ethnic Minority Development Plan (EMDP). Ethnic distribution across the major Project areas is also presented in a series of maps that are available in the EMDP.

Table 5-4: Selected Demographic, Economic and Health Indicators in the Early 2000s.

Indicator	Lao PDR
Surface (in km ²)	236,800
Gross domestic product (GDP) per capita in 2000 (constant 1995 US\$)	350
Total population in 2002 (in 1,000)	5,529
Rural (%)	80.3
Urban (%)	19.7
Population density (people/km ²)	23.3
Annual population growth rate 1992-2002 (%)	2.4
Life expectancy at birth (years)	55.1
Males	54.1
Females	56.2
Probability of dying under age 5 years (per 1,000)	131-146
Probability of dying between ages 15 and 60 years (per 1,000)	306-338

Sources: World Health Report 2003 (WHO, 2003b), World Urbanization Prospects (United Nations, 2002)

Table 5-5 highlights selected national health accounts indicators for Lao PDR in the year 2001. Note that on average, the total per capita expenditure on health in 2001 was as low as US\$ 10, accounting for only 3.1% of the country’s GDP. The JICA 2002 Study also reported that the Lao government’s expenditure on health varied markedly: by the mid1980’s it was 4-5% , falling to 3-4% in 1992-1994, and dipping to less than 2% during the Asian financial crisis. Out-of-pocket expenditure was found to account for more than half of a household’s health budget, most of this going to purchasing drugs from private pharmacies.

In the 2001 Lao PDR National Health Survey, the following major public health problems were identified: malaria, dengue, tuberculosis (TB), leprosy, acute respiratory infection (ARI), Diarrhoea/gastro-enteritis, hepatitis, maternal/child emergencies, unexploded ordinances, traffic accidents, substance abuse, sexually-transmitted infections (STIs), smoking, and alcohol.

Table 5-5: Selected National Health Accounts Indicators of Lao PDR in 2001.

National health accounts (in the year 2001)	Lao PDR
Total expenditure on health (% of GDP)	3.1
Per capita total expenditure on health at average exchange rate (US\$)	10
Per capita total expenditure on health at international dollar rate (US\$)	51
Per capita government expenditure on health at average exchange rate (US\$)	6
Per capita government expenditure on health at international dollar rate (US\$)	29
Private expenditure on health (% of total expenditure on health)	44.5
General government expenditure on health (% of total expenditure on health)	55.5
General government expenditure on health (% of total general government expenditure)	8.7
External resources for health (% of general government expenditure on health)	21.1
Out-of-pocket expenditure (% of total expenditure on health)	80

Source: World Health Report 2003 (WHO, 2003b)

National health statistics from the MOH, as of the mid 1990s, are summarized in Table 5-6 (mortality rates) and Table 5-7 (number of cases). Malaria accounted for the highest mortality rate and a total of 73,831 cases were recorded in public health facilities. In terms of mortality, malaria was followed by pneumonia, meningitis and diarrhoea, whereas influenza, diarrhoea and pneumonia were important causes of morbidity (Kobayashi et al., 2004). In view of the country's successful national malaria control programme it is reasonable to assume that malaria-attributable mortality and morbidity has been significantly reduced over the past decade (Kobayashi et al., 2004, Trung et al., 2004). This is summarized in more detail in Section 5.6.3.3.

Table 5-6: Leading Causes of Death in Lao PDR in the mid 1990s (Kobayashi et al., 2004).

Cause of death	Mortality rate(per 100,0000)
Malaria	7.62
Pneumonia	3.03
Meningitis	1.45
Diarrhoea	1.23
Tuberculosis	0.75
Accidents	0.51

Table 5-7: Public Health Caseload in Lao PDR in the mid 1990s (Kobayashi et al., 2004).

Cause of morbidity	Number of cases
Malaria	73,831
Influenza	24,110
Diarrhoea	19,699
Pneumonia	15,962
Dengue fever	7,781
Dysentery	7,010
Tuberculosis	2,711
Accidents	2,330

Against the background of malaria, acute respiratory infections and diarrhoea accounting for the majority of mortality and morbidity in Lao PDR in the mid 1990s, it is clear that symptoms such as fever, headache, cough, abdominal pain and watery diarrhoea were reported with the highest frequencies when patients were interviewed about illness episodes over the past 2 weeks (Table 5-8). A recent 2003 study by the Mahosot Hospital in Vientiane (Mahosot Microbiology Review Issue No.3 November 2003) identified that half of the cases of unexplained fever (i.e., malaria was ruled out via direct smear examination) were due to typhus, i.e., acute murine typhus (32%), scrub typhus (18%), while 12% were due to leptospirosis.

Table 5-8: Leading Illness Causes Within The Last 2 Weeks, In Lao PDR In The Mid 1990s.

Acute previous illness by symptoms	%
Fever	58
Cough	27
Headache	22
Body ache	14
Running nose	14
Stomach, abdominal and uterine pain	11
Watery diarrhoea	11

It is also important to highlight the major causes of injury and accident, as these are well-known risk factors that contribute significantly to the overall burden of ill-health, particularly in the developing world (Ezzati et al., 2002). Statistics for the Central region of Lao PDR in the mid 1990s showed that injuries and accidents related to road traffic was the dominant cause, accounting for 41% (Table 5.9). Hence, it is likely that the predicted increases in road traffic will further contribute to major losses of healthy life.

Table 5-9: Leading Causes of Injury/Accident in the Central Region of Lao PDR, as of 1996.

Causes of injury/accident for those reporting an incident	%
Road	41
Home	25
Work	15
Other	19

(Ministry Of Health, 2001). (Injury/Accident: defined as severe within last 12 months and causing loss of work time or missed school)

Overview of leading pathologies

Malaria

A comprehensive account of the epidemiology of malaria in Lao PDR and neighbouring countries comprising the greater Mekong subregion of Southeast Asia has been published as a supplement to the Southeast Asian Journal of Tropical Medicine and Public Health in 1999 (Singhasivanon, 1999). It presents national malaria databases for the years 1996-1998 and employs geographical information systems technology for mapping the total reported cases, confirmed cases, malaria incidence, and parasite species distribution. Particular emphasis is placed on the serious public health issue of drug resistant falciparum malaria, including data on population movements across international borders as an important factor in the dispersal of the disease.

Here, we briefly summarize the key features of the epidemiology and control of malaria in Lao PDR, and the greater Mekong subregion of Southeast Asia. An important observation is the strong positive association between malaria case numbers and forested areas, as well as foothill settlements. In contrast, forest-free areas are characterised by relatively fewer malaria cases; in addition, there is a tendency that cultivated field areas are relatively free of malaria, e.g. the Mekong river delta. The predominant malaria parasite species in Lao PDR is *P. falciparum*, which in turn has important implications for understanding malaria-attributable morbidity and mortality. Regarding the mosquito vector distribution, three species are generally believed to play the key role in transmission, namely *Anopheles dirus*, *A. minimus* and *A. maculatus*. However, assemblage of recently conducted entomological surveys in different geographical areas of Southeast Asia revealed that more work is warranted to fully understand the species composition responsible for malaria transmission. For example, major ecological transformations (e.g. recent changes in land use from rice cultivation to shrimp farming in Vietnam) were probably a key factor that might explain high observed densities of *A. sudaicus*, a typical brackish water breeder (Trung et al., 2004). Another potentially important observation recently made in central Lao PDR is the possible involvement of *A. nivipes*, a typical ricefield breeder, in malaria transmission (Kobayashi et al., 2000). The high rates of *P. falciparum* resistant strains to chloroquine, the current first-line antimalarial drug in Lao PDR, must be emphasised. Clearly, these findings call for informed decision-making, and an urgent need to shift to another more effective first line antimalarial, probably an artemisinin-based combination approach (Pillai et al., 2001, Mayxay et al., 2003). Finally, issues surrounding mis and over diagnosis of malaria are always a

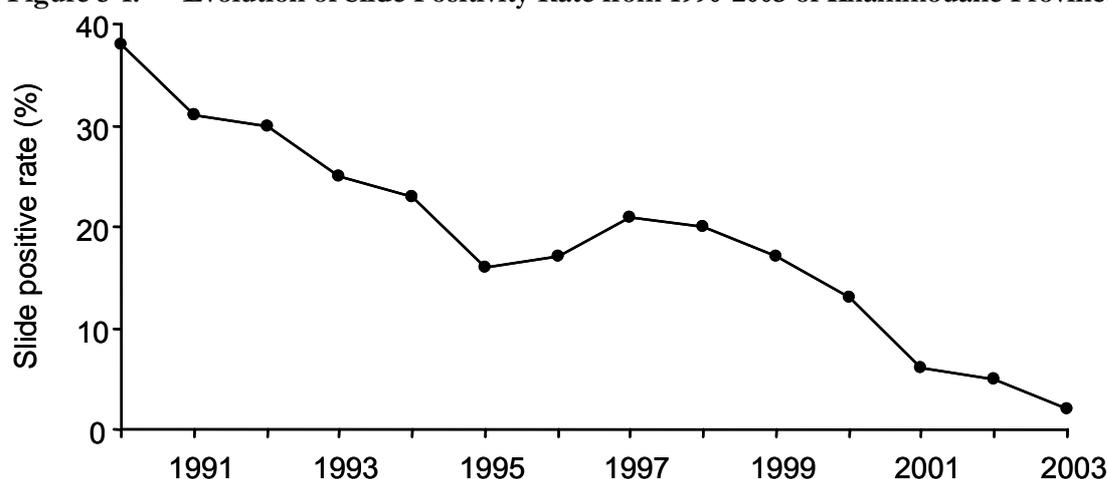
possibility since most fever is assumed to be and treated as malaria until proven otherwise. The previously discussed study of unexplained fever at Mahosot Hospital illustrates this observation.



Khammouane Malaria Station

However, as mentioned before, the national malaria control programme in Lao PDR, as well as neighbouring Vietnam and Cambodia, has been extremely successful in controlling malaria over the past years. Figure 5-1 shows the evolution of the slide positive rate in the Khammouane province. The success is largely explained by the rigorous implementation of ITNs, in combination with better access to antimalarial drugs (Trung et al., 2004).

Figure 5-1: Evolution of Slide Positivity Rate from 1990-2003 of Khammouane Province



Intestinal parasites

Over the course of two years, between May 2000 and June 2002, a national parasitological survey has been carried out in Lao PDR as a collaborative effort between the Korea Association of Health Promotion, the MOH of Lao PDR and the WHO. The objective was to investigate the epidemiological situation of intestinal parasite infection among school-age children. Overall, 29,846 schoolchildren, mostly aged 6-11 years, were enrolled from 317 schools in 79 districts scattered among all 17 provinces and the Vientiane Municipality. A single stool specimen was collected from each child, processed with the cellophane thick smear method and examined under a light microscope. The presence of helminth ova, namely *Ascaris lumbricoides*, hookworm, *Trichuris trichiura*, *O. viverrini*, *Taenia* spp. and *Hymenolopsis* spp., was recorded for each parasite species separately. In addition, approximately 10% of the faecal samples were quantitatively examined with the Kato-Katz technique (which can also detect *S. mekongi*), and 451 schoolchildren were subjected to an anal swab, employing adhesive cellophane, for examination of *Enterobius vermicularis*. The results of this study were recently published in the peer-reviewed international literature (Rim et al., 2003). Table 5-10 summarizes the key findings of this large-scale cross-sectional survey, with data presented on the national level, and the three provinces where the NT2 Project will be implemented.

Two aspects are worth highlighting. First, large variations of infection prevalences were not only observed among provinces, but also among districts within provinces, and among schools within districts. Second, it is interesting to compare these current Lao PDR national data with the recently presented global

epidemiological situation of soil-transmitted helminth infections, and drawing particular attention to South Asia, and East Asia and the Pacific Islands (de Silva et al., 2003). While prevalences for *A. lumbricoides* (34.9% versus 27% in South Asia and 36% in East Asia and the Pacific Islands) and *T. trichiura* (25.8% versus 20% in South Asia and 28% in East Asia and the Pacific Islands) were quite similar, the hookworm prevalence in Lao PDR was considerably lower than in the larger sub-region (19.1% versus 29% in South Asia and 26% in East Asia and the Pacific Islands).

Table 5-10: Schoolchild Helminth Prevalence Rates (%) in 3 Lao Provinces (2000-02).

Parasite	Province			National
	Khammouane	Bolikhamxai	Savannakhet	
<i>Ascaris lumbricoides</i>	17.4	17.8	1.6	34.9
<i>Trichuris trichiura</i>	19.0	8.7	13.4	25.8
<i>Hookworm</i>	17.1	3.0	33.1	19.1
<i>Opistorchis viverrini</i>	32.2	2.9	25.9	10.9
<i>Taenia</i> spp.	1.2	0.2	1.0	0.6
<i>Hymenolopsis</i> spp.	0.1	0.0	0.5	0.2
<i>Enterobius vermicularis</i> ^a				35.7

(Rim et al., 2003)

^a161 from 451 children examined in 3 provinces and Vientiane Municipality were found positive)

Table 5-11 summarizes the different infection intensities of the three soil-transmitted helminths (*A. lumbricoides*, *T. trichiura* and hookworm) and the food-borne trematode *O. viverrini* for the three provinces affected by the Project. Note that a light infection is defined as the presence of one or more ova on an entire cellophane thick smear; a moderate infection as 1-2 ova in each microscopic field of the cellophane thick smear; and a heavy infection as 5+ ova in each microscopic field of the cellophane thick smear. Intensity data are calculated such that the sum of the presented categories equals 100%; however, this does not mean that everyone in the entire population is infected.

Table 5-11: Schoolchild Helminth Intensity Data (%) in 3 Lao Provinces (2000-02).

Parasite	Province		
	Khammouane	Bolikhamxay	Savannakhet
<i>Ascaris lumbricoides</i>			
<i>Light infections</i>	44.5	58.2	91.4
<i>Moderate infections</i>	28.4	23.5	6.9
<i>Heavy infections</i>	27.1	18.3	1.7
<i>Trichuris trichiura</i>			
<i>Light infections</i>	88.8	94.1	94.0
<i>Moderate infections</i>	11.2	5.9	5.8
<i>Heavy infections</i>	0.0	0.0	0.2
<i>Hookworm</i>			
<i>Light infections</i>	85.8	84.9	88.5
<i>Moderate infections</i>	12.0	15.1	9.5
<i>Heavy infections</i>	2.1	0.0	2.0
<i>Opistorchis viverrini</i>			
<i>Light infections</i>	75.3	98.0	92.4
<i>Moderate infections</i>	17.6	2.0	6.4
<i>Heavy infections</i>	7.1	0.0	1.2

(Rim et al., 2003)

(161 from 451 children examined in 3 provinces and Vientiane Municipality were found positive).

It is widely acknowledged that an important focus of *S. mekongi* is located in a restricted area of the Mekong river basin, namely in the two districts of Khong and Mounlapamok that are part of the southern province of Champassak, south Lao PDR, as well as the northern part of neighbouring Cambodia (Doumenge et al., 1987). In the late 1960s, stool examination among schoolchildren living in this very

southern part of Lao PDR revealed an infection prevalence of 30%. In 1989, stool specimens from more than 2,000 individuals were examined by the Kato-Katz technique. Microscopic analysis revealed an overall prevalence of 42.2%, ranging between 15.3% and 92.3% (Urbani et al., 2002). Consequently, a schistosomiasis control programme was initiated, which was primarily based on repeated administration of praziquantel (single oral dose of 40 mg/kg) to schoolchildren. In total, six rounds of chemotherapy were administered between 1989 and 1998. Programme monitoring showed that this approach was successful in reducing the overall prevalence of infection; at the end of the programme, an average of 2.1% was found in the Khong district, and only 0.4% in the Mounlapamok district (Urbani et al., 2002). However, the control programme failed to interrupt transmission, so that an estimated 60,000 people continued to be at risk of reinfection. In May 2003, only a few years after praziquantel-based chemotherapy has been ceased, the WHO, together with the MOH, has carried out an extensive survey with more than 5,000 individuals examined for *S. mekongi*, as well as other intestinal parasites. While the average prevalence of *S. mekongi* in Mounlapamok district continued to be low (21 positive cases among 3,104 people examined; 0.7%), an average prevalence of 22.3% was found in the Khong district (524/2,345). Here, the prevalence among the 62 villages enrolled in the study ranged between 0% and 47.2% (data kindly provided by Hanne Strandgaard). This extensive epidemiological survey revealed very high prevalences for *O. viverrini*, namely 51.6% in the Khong district and 47.1% in the district of Mounlapamok. These data illustrate that a resurgence of *S. mekongi* can occur if transmission is not interrupted. Therefore, the issue of outbound emigration, attracted by potential employment opportunities, from positive areas in the southern province to the Project area is considered in later sections.

HIV/AIDS

In 1997, the government initiated a limited HIV Sentinel Surveillance (HSS) programme in order to better understand the basic countrywide prevalence rate. A large-scale study was not completed; however, there were limited more focused efforts in specific target populations (Phimphachanh et al., 2000). By 1999, the decision was made to establish a second generation surveillance system to study both HIV-related risk behaviours and the prevalence of HIV and STIs. The results of these efforts are the two publications, “HIV Surveillance Survey and Sexually Transmitted Infection Periodic Prevalence Survey, Lao People’s Democratic Republic, 2001” and “Behavioral Surveillance Survey Lao People’s Democratic Republic, 2000-2001”. These studies will be presented in greater detail (cf. Annex 5-2 Background Data Source Material); however, the main focus of the discussion will be directed towards those factors that are relevant to the assessment of potential impacts from the NT2 Project.

The 2001 ‘HIV Surveillance Survey and Sexually Transmitted Infection Periodic Prevalence Survey’ (HSS and SPPS) targeted three populations:

- Service women (SW) – defined as any woman who worked in a small drink shop, nightclub or guesthouse and had direct contact with patrons. All SW do not necessarily sell sex. SW in the survey were not pre-screened to determine if they sold sex prior to study enrolments. Total sample size was 300.
- Female factory workers (FFW) – worked in the garment factories in Vientiane Municipality and lived in dormitories either on the factory grounds or in close proximity. Total sample size was 300.
- Male long distance truck drivers (LDTD) – included drivers and drivers’ assistants who drove both within the country and internationally. Total sample size was 300.

Only 3.5% of FFW reported current STI symptoms and only 5.7% within the last year. Among SWs, almost 21% reported a current STI symptom and approximately 39% had a symptom within the last year. Few of the LDTDs reported a current STI symptom and 11% had a symptom within the last year.

HIV or syphilis was not found in the FFWs. The prevalence of HIV among all SW was 0.9% and only 1.1% for those who reported selling sex. Syphilis prevalence was 0.2%; however, the prevalence of Chlamydia was 32% and gonococcal infection was 13.9%. For LDTDs, no HIV was detected and the prevalence of syphilis was 1.3%. Chlamydia was 9.3% and gonococcal infection was 1.3%.

Based on the full report, there are several observations relevant to the NT2 Project that can be drawn from the overall HSS and SPPS study:

- Relative to other countries, the HIV prevalence rate in Lao PDR is extremely low in all target groups surveyed. These results are in stark contrast to Sub-Saharan Africa, but also to Khmer (2.7), Thai (1.8), and Vietnamese (0.3) prevalence rates: Lao PDR prevalence was just 0.1% in 2001 (UNAIDS 2002)
- The rates of ulcerative STIs were low in all populations surveyed. Ulcerative STIs are well established as potent cofactors for HIV transmission;
- Compared to commercial sex workers in many other countries, Lao SW who reported selling sex had a relatively low frequency of partner change (average 19.5 clients over the previous 12 months) and relatively high rates (60%) of consistent condom use with clients;
- Chlamydia rates were high in all populations surveyed and appeared to be associated with sex in general rather than commercial sex in particular;
- While LDTDs had low ulcerative STI rates and were HIV sero-negative, they nevertheless exhibited high levels of reported risk behaviours;
- Treatment of symptoms or STIs is not typically from qualified medical practitioners and this is felt to be a major contributor to the high rates of STIs observed in the survey.

The five most populous provinces, along Route 13, the main land transportation route of Lao PDR were selected for the study of the behavioural surveillance survey. Two study provinces, namely Khammouane and Savannakhet, are immediately relevant to the NT2 Project, particularly the former. Target groups included male and female cross border seasonal migrant workers (SMWs), female factory workers (FFW), service women (SW), long distance truck drivers (LDTDs), police and military. While there are no “Khammouane truck drivers,” this is probably not significant since the Project will potentially draw drivers from the length of the Route 13 corridor

Based on the full report, there are several observations that are quite relevant to the NT2 Project that can be drawn from the overall behavioural surveillance survey. They include:

- Paying for sex in the past year: LDTD (33%) and police (25%).
- Partner change rate within the last year (three or more): LDTD (21%) and police (13%).
- Any commercial sex partner within the last year: military (12%) and male MW (6%).
- Condom usage: Fewer than one third of all men consistently used condoms with non-regular partners; however, usage rates with a commercial partner (defined as those who had sex in exchange for money) were higher for LDTD (75%).
- Sex rates with a non-regular partner in the past 12 months: police (29%), LDTD (20%), military (18%), and migrants (12%).
- Partner change rate SW: majority of the service women had no more than 5 partners per year.
- Condom usage SW: with commercial partners (73%); with non-regular partners (44%).
- HIV education or services within the last 6 months: military (65%); police (55%); SW (46%); LDTD (43%); factory workers (29%); male SMW (22%); female SMW (15%).

The condom usage rates appear to be quite high; however, these data are self-reported and particularly high primarily for the commercial partner interaction. Whether similarly high condom usage rates could be expected in the Project area is unknown. Table 5-12 presents a more extensive summary of the knowledge, attitudes, practice and belief (KAPB) data for the different target groups:

Table 5-12: Various Target Groups' Knowledge, Attitudes and Practices on STI/HIV-AIDS

Target group	Identify 3 means for reducing HIV risk (%)	No misconceptions about AIDS* (%)	Received HIV information in last 6 months (%)	Report STI symptom last in 12 months (%)	Ever had voluntary HIV test and know result (%)	Know someone living with or died from HIV (%)
Male						
LDTD	74	33	43	1.9	9.8	7.9
Military	75	48	65	2.5	4.9	3.3
Police	75	57	55	5	13.2	11.2
SMW	62	23	22	1.3	6.9	14
Female						
SW	59	24	15	3.9	5.3	9.1
FW	73	21	29	1	0.4	9.4
SMW	65	23	46	21.1	19.7	7.5

The two HIV/AIDS surveys are recent and highly relevant for use in the NT2 Project HIA. At present, HIV/AIDS rates are extremely low in all targeted groups particularly LDTD and SWs. Some of the critical factors known to impact transmission and amplification of the epidemic, i.e. partner change rates and degree of ulcerative genital disease, are quite low, while condom usage for commercial sex partner interactions is relatively high. The KAPB data indicates that a substantial opportunity for targeted education for different risk groups is present. Aggressive surveillance and treatment for the curable STIs would also be a highly critical activity, particularly if diagnostic and treatment capability were enhanced within the potential impact areas of concern (PIA). An additional issue is the potential differences in KAPB between different ethnic groups, i.e., more “behaviourally conservative” *Lao Loum* versus more “liberal” *Lao Suung and Lao Theung*. There may be marked differences in attitudes toward sexual intercourse and partner change rates as a function of ethnicity; however, this area has not been extensively investigated (Personal communication Dr. Peter Odermatt, March 2004).

Tuberculosis

In Lao PDR, the diagnosis of tuberculosis (TB) is made by a combination of clinical presentation and smear positive microscopy using the Ziehl-Neelson method. At present, diagnoses are not culture confirmed. Studies in the literature have demonstrated that 5,000-10,000 bacilli/ml are required for a positive smear detection. In contrast, cultures are positive at extremely low bacilli levels of 10-100 organisms. Not surprisingly, smears are positive in 50-80% of patients with active pulmonary TB (American Thoracic Society, 2000). Despite these limitations, TB is still a commonly made diagnosis and is considered to be one of the more important causes of morbidity and mortality in Lao PDR in general (see Tables 5-6 and 5-7), and the districts affected by the Project (Table 5-15) in particular. Given the disparity in sensitivity between smear and culture, it is highly likely that TB is currently significantly under diagnosed in Laos PDR. Thus, the actual burden of TB is probably significantly higher, particularly in remote rural areas where diagnostic equipment may not be readily available.

In many developing countries, TB is strongly associated with HIV/AIDS and is frequently the leading cause of death for AIDS patients. While the current burden of HIV/AIDS in Lao PDR is quite low, as previously discussed in Section 5.6.3.5, this situation could change if the epidemic accelerates. A rapid rise in HIV/AIDS cases would significantly and adversely impact the overall TB situation in Lao PDR.

Overall, TB should be considered a critical disease that is highly likely to be under diagnosed and managed. During the HIA study team's visits to several Project area district hospitals several observations were made: (i) basic smear microscopy was available and in use; (ii) smear positive TB was a frequent diagnosis, up to 20% of all smears were positive; (iii) an active case finding/control programme (which is not formally part of DOTS) was not functioning; and (iv) DOTS programmes appeared to be available in the hospitals visited; however, this is probably not indicative of the overall status of DOTS across the entire Project area (Personal communication Dr. Peter Odermatt, March 2004).

Dengue

Dengue, both hemorrhagic and non-hemorrhagic forms, is frequently diagnosed in Lao PDR. In the Project area, dengue is considered to be a critical health issue in the lower Xe Bangfai region, particularly

during the rainy season during periods of when flooding occurs. In fact, the lower Xe Bangfai has some of the highest reported rates of dengue morbidity and mortality in Lao PDR. The accuracy of reported dengue cases is difficult to ascertain since reports are based on clinical presentation without laboratory confirmation. Nevertheless, the current burden of seasonal dengue in the affected Project regions is considered highly significant. The role of water jars is also potentially related to dengue fever rates. In Savannakhet province, water jars are now produced and sold by a local company and are implicated in the rise of dengue rates in rural districts (Personal communication Dr. Peter Odermatt, March 2004).

Typhus

Typhus, both murine and scrub forms, are significantly under reported causes of fever. In a recent study at Mahosot Hospital in Vientiane, scrub and murine typhus were found to be significant causes of “Unexplained Fever.” An individual was considered to have an “unexplained fever” if they were blood culture negative and malaria smear negative. In a recent study of 364 adults with unexplained fever, 32% demonstrated serological evidence of murine typhus, 18% scrub typhus and 12% leptospirosis. Therefore, given the frequent presentation of fever, it is reasonable to assume that there is a substantial burden of typhus that is currently unrecognised and unreported.

This overview of the leading pathologies in the area highlights the need for their sustained epidemiological monitoring. While baseline data are available on malaria, on intestinal parasites and on TB (NTPC Socio-economic Household Survey 2001), additional studies are needed a/o on dengue and on typhus.

5.6.3 District Health Data

Selected health indicators

Tables 5-13 to 5-16 summarize key baseline data for the eight districts that will be affected by the Project (6 districts in Khammouane province, and 1 district each in the provinces of Bolikhamxay and Savannakhet). These data were derived from (i) the 2003 World Bank survey tables (World Bank, 2004), (ii) detailed parasitological surveys conducted in March/April 1996 in numerous study villages throughout the Project area by a joint research team from Lao PDR and Thailand (Pholsena et al., 1997), and (iii) results from the HIA study team’s own rapid appraisal of health problems reported at district hospitals on the Nakai plateau and the Xe Bangfai area. As previously stated, detailed ethnicity population data within the defined Project zones are available in the EMDP.

Table 5-13: Infant Immunization Coverage in Potentially Affected Districts

Province	District	Population (x 10 ³)			Immunization coverage (%)			
		Male	Female	Total	BCG	OPV	DPT	MSV
Khammouane	Nakai	9.3	9.6	18.9	69	48	47	19
	Gnommalat	12.4	13.2	25.6	43	41	37	24
	Mahaxai	14.8	14.8	29.6	80	53	49	45
	Tahket	39.6	39.3	78.9	59	57	56	54
	Nongbok	21.0	21.7	42.7	59	60	60	30
	Xe Bangfai	11.4	11.9	23.3	72	66	67	49
Bolikhamxai	Khamkeut	NA	NA	47.8	48	59	47	47
Savannakhet	Xaybuly	25.0	25.4	50.4	70	71	71	63

(Source: World Bank, 2004).

Table 5-14: Nr of Health Complaints Reported in 3 Project Districts in March/April 1996

Complaint	District			Total
	Nakai	Gnommalat	Mahaxai	
Digestive	3	13	7	23
Eyes	7	4	5	16
Ears	7	4	5	16
Skin	9	2	4	15
Genitourinary	1	6	3	10
Nervous System	2	4	2	8
Respiratory	4	2	1	7
Musculoskeletal	3	3	0	6
Cardiovascular and circulation	0	2	2	4

(Source: Pholsena et al., 1997).

Table 5-15: Main Sickness Cause Ranking in 3 District Hospitals in 1995 and 2003

Cause of sickness	Nakai		Gnommalat		Mahaxai	
	1995	2003	1995	2003	1995	2003
Malaria	1	4	1	3	1	4
Gastro-intestinal complaints (diarrhoea, dysentery)	2	1	3	1	3	3
Acute respiratory infection (pneumonia, cold, cough)	3	2	2	2	2	1
Tuberculosis	ND	3	ND	5	ND	5
Accidents and injuries	ND	ND	ND	4	5	2
Mental illness	ND	ND	ND	6	4	ND

(Source: Pholsena et al., 1997 and HIA study team's own appraisal in February 2004).

ND: not determined

Malaria

Table 5-16 shows the slide positivity rate for the six districts in the Khammouane province that will be affected by the Project, for the years 2002 and 2003. These low rates confirm the successful implementation of malaria control programmes in Lao PDR, mainly achieved through the rigorous administration of ITNs and major improvements in access to antimalarial drugs (e.g. through drug revolving funds implemented at the village level).

Table 5-16: Slide Positive Rate and Malaria-related Death in Khammouane (2002-03)

District	2002		2003	
	Slide positivity rate	Death	Slide positivity rate	Death
Nakai	0.7	0	0.3	0
Gnommalat	4.2	1	1.3	0
Mahaxai	15.4	0	6.6	0
Tahket	7.3	0	2.0	0
Nongbok	1.2	0	0.5	1
Xe Bangfai	10.9	0	1.8	1

(data kindly provided by the Khammouane Malaria Station)

Intestinal parasites

Figures 5-2 and 5-3 show age-prevalence curves for *O. viverrini* infections and infections with the three soil-transmitted helminths, namely *A. lumbricoides*, *T. trichiura* and hookworms. These data were derived from the series of cross-sectional, community-based parasitological surveys carried out in multiple villages in four of the Project districts in March/April 1996. The Kato-Katz thick smear method was employed on faecal samples and diagnosis was confirmed by detection of parasite ova under a microscope. Data from

different villages in a given district were pooled; hence they are aggregated on the district level. The Kato-Katz thick smear method also facilitates diagnosis of *S. mekongi*, however, not a single case was found.

It is important to note that the overall prevalence rates of *O. viverrini* were low in Nakai and Khamkeut, but very high in the districts of Gnommalat and Mahaxai. Interestingly, the prevalence of infections increased with age in the latter two districts, which strongly suggests that the habit of eating raw or undercooked fish is continued throughout the life-course. The possibility of ethnicity as a significant explanatory factor must also be considered since typically *Lao Suung* and *Lao Theung* do not eat uncooked fish (Personal communication Dr. Peter Odermatt, March 2004). Prevalence rates, as a function of ethnicity, were not presented in the study.

With regard to soil-transmitted helminths, the highest prevalences were found for *A. lumbricoides*, followed by *T. trichiura* and hookworm, similar to more recent findings at the national level (see Table 5.17) (Rim et al., 2003). Young children showed the highest prevalence rates of *A. lumbricoides*, whereas *T. trichiura* and hookworm showed similar prevalences across age.

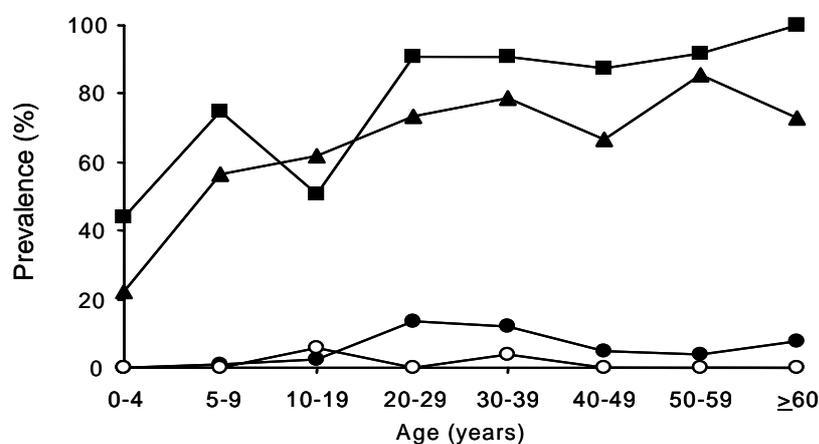


Figure 5-2: Age-specific prevalence of *O. viverrini* (Source: Pholsena et al., 1997)
 NB: Nakai (●), Gnommalat (■), Mahaxai (▲), Khamkeut (○)

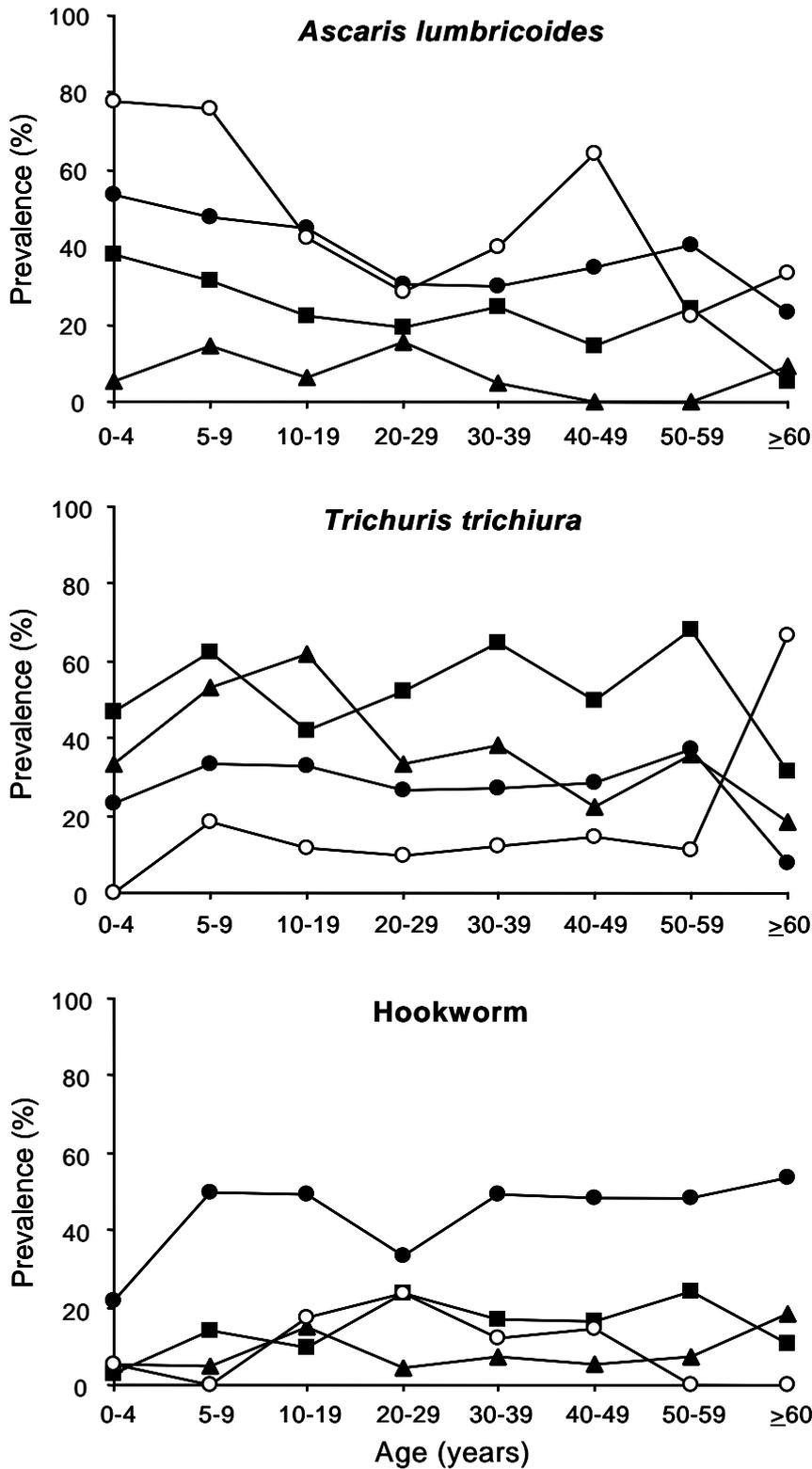


Figure 5-3: Age-specific Prevalence of Soil-Transmitted Helminths (Pholsena et al., 1997)

NB: Nakai (●), Gnommalat (■), Mahaxai (▲), Khamkeut (○)

Table 5-17 summarizes the latest data on intestinal parasites among schoolchildren for 5 of the project districts in the Khammouane province. These data were generated during the large-scale 2000-2002 parasitological survey carried out in Lao PDR (Rim et al., 2003).

Table 5-17: Schoolchild Helminths Prevalence (%) in 5 Khammouane Districts ('00-02)

District	<i>Ascaris lumbricoides</i>	<i>Trichuris trichiura</i>	Hookworm	<i>Opisthorchis viverrini</i>	Taenia spp.	Hymenolopsis spp.
Gnommalat	25.3	42.9	11.6	36.4	0.0	0.5
Mahaxai	6.8	21.1	3.7	43.7	1.6	0.0
Tahket	18.1	15.2	13.5	26.3	1.2	0.0
Nongbok	2.3	1.5	25.1	24.7	0.8	0.0
Xe Bangfai	3.6	3.2	12.5	40.0	2.9	0.0

(Rim et al., 2003)

5.6.4 Baseline Household Health Data from Project Specific Surveys

The selected data presented in the following sections are derived from recent in-depth households surveys conducted by the Project on the Nakai plateau (more than 5,000 individuals from over 800 households enrolled) and the Xe Bangfai area (more than 10,000 individuals enrolled). The data presented below are based on the original forms that were entered electronically, but for which analytic results are not expected before December 2004. The household survey data in this section were extracted by the HIA Team Leader (Dr. J. Utzinger) for presentation and analysis in this HIA section.

Water supply and sanitation

Tables 5-18 to 5-20 summarize the key findings regarding access to currently utilized water sources, the type of water collected and the availability of sanitary facilities.

Table 5-18: Walking Time to Nearest Water Source in Study Zones (all figures in %).

Time to water source (minutes)	Nakai Plateau	Nam Kathang	Xe Bangfai				National average
			Upstream	Upper	Middle	Lower	
< 5	17.6	23.8	12.5	10.0	13.9	25.6	16.6
5-10	67.3	32.8	75.0	54.6	32.2	38.7	48.4
> 10	15.1	43.4	12.5	35.4	53.9	35.7	35.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 5-19: Main Source of Drinking Water in the Different Study Zones (all figures in %).

Source of water	Nakai Plateau	Nam Kathang	Xe Bangfai			
			Upstream	Upper	Middle	Lower
Pond, river or stream	56.9	18.1	65.9	30.0	22.6	20.6
Dug well or spring						
Unprotected	34.3	20.1	0.6	5.5	28.2	6.9
Protected	1.1	7.4	0.0	0.5	1.2	7.0
Tube-well/borehole with pump	5.1	1.6	0.0	0.0	6.2	19.0
Rainwater collection	0.0	33.4	30.7	36.8	22.3	23.2
Piped water	2.5	1.6	0.0	1.2	7.4	4.4
Public tap	0.0	0.0	0.0	0.0	0.0	1.2
Tanker truck, vendor, bottled water	0.1	1.6	0.0	0.9	2.8	0.5
Underground water	0.0	16.2	2.8	24.8	9.0	17.2
Other	0.0	0.0	0.0	0.3	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 5-20: Sanitary Facilities by Type (all figures in %).

Type of latrine	Nakai Plateau	Nam Kathang	Xe Bangfai			
			Upstream of upper	Upper	Middle	Lower
Absence of latrine	89.3	89.5	59.2	67.9	86.1	77.8
Presence of latrine						
Pit latrine	2.1	1.2	8.3	7.5	5.6	1.9
Pour flush	1.5	6.4	32.5	21.7	2.2	19.4
Flush to sewage system	0.1	0.0	0.0	0.8	0.0	0.4
Not specified	7.0	2.9	0.0	2.1	6.1	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

In the Resettlement Area, only one in ten households have a toilet. In the Regional Area, numbers increase as one moves closer to the cities, from one in five to three in five. On average, pour flush latrines seem most popular.

Main complaints

Table 5-21 presents the main complaints of those study participants who had an acute illness during the two weeks preceding the interview. Note that many individuals complained of multiple symptoms, which explains that the total sum by far exceeds 100%.

Table 5-21: Symptoms Reported by those Experiencing Acute Illness (all figures in %).

Symptoms	Nakai Plateau (n=409)	Nam Kathang (n=132)	Xe Bangfai			
			Upstream of upper (n=23)	Upper (n=81)	Middle (n=85)	Lower (n=378)
Fever	70.4	28.8	91.3	44.4	65.9	42.6
Headache	42.5	30.3	60.9	48.1	43.5	33.6
Joints pain	10.0	6.1	8.7	1.2	2.4	2.1
Shivers/chills	18.1	3.8	4.3	22.2	21.2	4.8
Cough	15.9	15.9	39.1	23.5	20.0	33.1
Cough with phlegm	31.8	6.1	4.3	9.9	10.6	14.8
Cough with blood	1.7	0.0	4.3	2.5	1.2	2.6
Whooping cough	1.7	2.3	0.0	0.0	0.0	1.3
Chest pain	10.8	8.3	0.0	13.6	9.4	9.0
Running nose/sneezing	25.9	8.3	47.8	32.1	16.5	12.7
Sore throat	12.5	2.3	4.3	6.2	7.1	11.4
Difficulty/pain in swallowing	2.9	0.8	13.0	1.2	3.5	4.0
Difficulty/abnormal breathing	4.6	0.0	0.0	3.7	5.9	8.7
Watery diarrhoea	5.1	3.0	0.0	2.5	7.1	7.4
Diarrhoea with blood/mucus	1.5	1.5	0.0	1.2	1.2	1.3
Body ache/body pain	33.3	18.2	34.8	33.3	22.4	22.0
Vomiting	13.0	7.6	8.7	11.1	7.1	4.5
Weakness/malaise	0.7	9.1	8.7	9.9	11.8	8.2
Rash	5.4	1.5	0.0	0.0	0.0	2.4
Stomach/abdominal pain	0.2	13.6	0.0	4.9	3.5	14.8
Pain in passing urine	0.7	1.5	0.0	0.0	0.0	0.8
Backache	0.0	2.3	0.0	1.2	2.4	4.2
Blood in urine/black urine	70.4	0.0	0.0	2.5	0.0	0.0
Unknown	42.5	0.0	4.3	0.0	1.2	1.1

Malaria

Table 5-22 convincingly shows that a very high proportion of the population interviewed currently sleeps under a bed net, which is one of the key strategies of the national malaria control programme in Lao PDR.

Table 5-22: Sleeping Under a Bed net the day before the Interview (all figures in %).

Sleeping under a bed net	Nakai Plateau	Nam Kathang	Xe Bangfai			
			Upstream of upper	Upper	Middle	Lower
Yes	78.5	90.7	99.8	94.4	86.7	84.5
No	18.2	1.4	0.1	0.9	1.7	2.3
Don't know	3.3	7.9	0.1	4.7	11.6	13.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

5.7 HEALTH ISSUES AND IMPACTS ANALYSIS

5.7.1 Identification of Health Issues

The process used to identify and assess the potential impacts on health involved:

- an in-depth review of available national, regional, provincial and district health data;
- analysis and synthesis of Project study area specific baseline health and nutritional surveys;
- comparison of study area data to national, regional and provincial and district health data;
- field survey visit by the HIA study team; and
- consultation with relevant health stakeholders, particularly MOH officials at the national, district, provincial and local level.

5.7.2 Assessment Process

Not all of the potential issues in the HIA are clinical medical problems. Potential impacts can also relate to access to health care facilities, socio-economic factors and cultural practices, e.g., traditional medical providers, indigenous drugs and practices. Hence, a purely biomedical model will not necessarily capture the full range of potential impacts. It is apparent that some important health issues are health determinants that relate to the social and psychological environment. Health determinants are factors that are known or postulated to be causally related to health status (WHO, 2000). Typically, there has been a tendency to focus on the biophysical environment via a life-cycle model of disease while downplaying key social determinants such as economic status, cultural practices and psychological effects associated with cultural disruption, most notably resettlement (WHO, 2000). The NT2 HIA has tried to incorporate critical psychosocial and culturally important health determinants into the overall assessment of potential impacts.

The NT2 Project has multiple factors that make the efficient assessment of impacts a complex undertaking:

- widespread geography involving multiple types of terrain and habitats;
- different types of receptor groups, e.g., construction workers, camp followers, resettlement villagers, etc., and special at risk subpopulations within these groups (e.g. children under the age of 5 years, pregnant women and elderly) distributed across time and space;
- timing issues, e.g. construction mobilization, actual construction, reservoir filling, operations, etc., associated with different phases of construction that impact different receptors and locations;
- seasonality considerations, i.e. rainy versus dry season, where there are potentially significant differences in agricultural/cultivation practices, water use and associated disease transmission dynamics;
- variability of existing health care infrastructure across different Project areas; and
- coordination and alignment with existing national disease control programmes and strategies (e.g. TB, HIV/AIDS and malaria).

While these factors can be separately listed and described, it must be understood that they are simultaneously present such that there are direct, indirect and cumulative interactions producing additivity, antagonism, synergy and even potentiation of effects or impacts. Given the size and magnitude of the

overall Project, the potential “universe of outcomes” is virtually limitless. Therefore, in order to impose some type of rationale structure on this universe of outcomes, the HIA considered analysing impacts through three different filters.

1. Health issues as defined by WHO (WHO, 2000), namely: (i) communicable diseases, (ii) non-communicable diseases, (iii) accidents and injuries, (iv) malnutrition, (v) psychosocial effects, and (vi) social well-being.
2. Key sectors as defined by the World Bank (Listorti and Doumani, 2001), including: (i) housing and urban development, (ii) water, food and sanitation, (iii) transportation, communication and information access and associated linked environmental health areas. These include: respiratory diseases, vector-related diseases, sexually transmitted infections, water-borne diseases, accidents and injuries and exposures to potentially hazardous materials.
3. Disease or chemical specific agents of concern. These include malaria, dengue, soil-transmitted helminths (STH), acute respiratory infections (ARIs), opisthorchis infection, TB, STIs, HIV/AIDS, gastroenteritis (bacterial and viral), schistosomiasis, Japanese encephalitis (JE), leptospirosis, psychological disturbances, including substance abuse, malnutrition, trauma/accident related, air pollution (indoor and outdoor), pesticides, organic and inorganic fertilizers.

Clearly, there is overlap and redundancy across these three filters. In order to minimize redundancy, while capitalizing on the fact that many of the specific disease agents can be easily classified under broader headings (e.g. respiratory, vector-borne, etc.), the HIA has expanded and modified the World Bank environmental health approach by both increasing and broadening the linkage between sectors and broadly defined environmental health. The result of this effort was the creation of nine named environmental health areas:

1. Respiratory diseases, including but not exclusive to ARIs (bacterial and viral), pneumonias and TB.
2. Vector-related: including, but not exclusive to malaria, dengue, JE.
3. STIs: including, but not exclusive to HIV/AIDS, genital ulcer disease, syphilis, gonorrhoea, Chlamydia, hepatitis B.
4. Soil- and water-borne: including, but not exclusive to STHs, leptospirosis, schistosomiasis, meliodosis and cholera.
5. Food and nutrition: including, but not exclusive to stunting, wasting, micronutrient deficiencies, changes in agricultural practices, gastroenteritis (bacterial and viral); opisthorchis infection.
6. Accidents and injuries: including, but not exclusive to traffic and road related, construction (home and project related) and drowning.
7. Exposure to potentially hazardous materials: including, but not exclusive to insecticides/pesticides, inorganic and organic fertilizers, road dusts, air pollution (indoor and outdoor, related to cooking, traffic, or other forms of combustion/incineration), landfill refuse or incineration ash, any other Project-related solvents, paints, oils or cleaning agents, etc.
8. Psychosocial: including, but not exclusive to violence, security concerns, substance abuse (i.e. drug, alcohol, smoking), depression and communal social cohesion.
9. Cultural health practices: use of traditional medicine providers, indigenous drugs and behavioral practices, e.g. post-partum “lying by the fire (*yuun fai*)”.

An overall health impact assessment table (HIAT) for each of the 8 defined potential impact area of concern (PIA) has been constructed. These PIA specific tables show the nine environmental health areas on the Y-axis with project timing (construction and operation), population age groups affected, and impact levels on the X-axis.

Overall ratings were given by an expert panel with each member of the HIA team performing an independent rating, followed by discussion and consensus agreement of an overall rating. In addition, input from key stakeholders and external reviewers was also considered and included. This type of exercise invariably and unavoidably involves subjective professional judgment; hence, there is always room for debate and disagreement over the relative ranking of impacts. Therefore, the impact ratings should be considered in broad terms across the Project.

The health impacts analyses are made according to the nine environmental health areas of each PIA.

5.7.3 Plateau Resettlement Area (PIA #1)

Overall assessment: High impact, multiple sectors.

Risk profiling: Table 5-23.

Short description:

The most significant potential negative impact relates to the changing agricultural practices/livelihoods, while the most significant enhanced impact relates to multiple sectoral improvements with consequent health benefits. There will be multiple psychosocial, cultural health impacts, which could be significant (adverse) and/or beneficial.

During the initial construction phases of the Project, impacts in all nine environmental health areas will be significant. However, these impacts will be a mixture of positive and negative effects. There should be substantial improvement across all four sub-sectors (housing and urban development; water, food and sanitation; transportation; and communication and information access). The sectoral improvements should directly affect burdens of disease across many of the environmental health areas (respiratory; vector-borne; soil/water; and potentially food nutrition). These positive impacts can only be achieved by significant efforts in environmental areas (health infrastructure), as well as programme management; hence, a detailed implementation plan is essential as described in the SDP..

The potential for negative impacts clearly exists, particularly related to environmental health areas #3 (STIs) and #5-7 (accidents, exposures to hazardous materials, nutrition/food). Interaction and mixing with construction workers and or camp followers could adversely affect STI and HIV/AIDS transmission rates. Psychosocial effects of relocation could be significant and more difficult to manage than currently perceived (Lumsden, 1993, Desjarlais et al., 1995). As part of the relocation, there will be required changes in agricultural cultivation practices and livelihoods. These changes may have serious impacts on food production and subsequent nutritional and micro-nutritional effects. Initially, given the tremendous effort currently underway in this area (per SDP) we expect improvement; however, it is unknown if the proposed change in production/cultivation habits will either work in the intermediate term or be truly sustainable in the long term.

Given the poor soils on the plateau, increased use of organic and inorganic fertilizers are inevitable. Similarly, the use of pesticides will probably increase. The increased use of fertilizers can have significant short- and long-term impacts on water quality by increasing nitrogen loads via both surface water runoff and discharge to the reservoir and movement into groundwater. Increased levels of nitrogen in drinking water have been associated with significant outbreaks of methemoglobinemia in infants and young children.

During the full construction phase there will be potentially significant changes (particularly in the dry season) on air pollution levels from both vehicle emissions and road dusts with potential respiratory disease impacts. At present, families in the pilot village are infrequently (if at all) cooking indoors. Whether increased dust and noise levels will in any way change this practice is unknown. Road traffic will increase with subsequent increased risk of accident and injury. If there is improvement, as projected in the SDP, across major sectors then overall vector borne (#2) and soil- and water borne (#4) diseases should significantly decrease. There is a concern that rodent related diseases (e.g., leptospirosis, typhus) could increase during active construction due to changes in local habitat; however, these potential impacts are felt to be low based on the current experience in the pilot resettlement village (see SDP Vol3 /Appendix F). Japanese encephalitis (JE) has not been documented and is not expected. Nevertheless, full implementation of environmental management plans in addition to active monitoring and surveillance are required for vector-borne diseases.

During the early operations and reservoir filling stage, the possibility of changes in vector related diseases exists. In the resettlement area, villages will not be in close proximity to forest cover so that contact with the major malaria vectors will be lessened; however, a change in the vector mix (e.g., *Anopheles nivipes* versus *An. minimus*, *dirus* and *maculatus*) cannot be discounted since villages will be extremely close to the

reservoir. This issue has been discussed earlier in the Section and the possibility also exists for other downstream areas.

Regardless of Project phase, the potential for significant disruption in the current communal political, social, cultural and economic relationships across the plateau exists; however, this issue is covered in other sections of the SDP. If there are substantial and unmanaged disruptions to community cohesion then significant psychosocial impacts including increases in substance abuse, violence and other psychiatric disorders are possible. Impacts to the traditional medicine practitioners are already ongoing and related to the RDF. The RDF appears to have significantly altered the reliance on and utilization of traditional practitioners, with the notable exception of traditional birth attendants (TBA). These changes are currently unrelated to the Project but will probably accelerate with better delivery and access to medical care.



Lying by the fire (yuu fai)

Similar impacts are expected on post-partum medical practices. The current post-partum “lying by the fire (*yuu fai*)” practice is complex and deeply rooted in the culture. Traditionally, after delivery, Lao women remain for 15-30 days on their bed under which a fire with charcoals is made. A strict dietary regime of rice soups and chicken breast meat is followed. If this dietary practice is rigidly adhered to for long duration, the women are at risk for anemia, and micronutrient deficiencies. The newborn could be similarly impacted.

At the University Hospital Mahosot in Vientiane, 16% of all admissions between 1990 and 2000 were due to infant Beri-Beri (personal communication from Dr. Peter Odermatt, IFMT, February, 2004). The importance of this practice and the level of vitamin B1 deficiency in the Project area are unknown. Despite the negative potential impact, the current practice has many positive attributes, e.g., family cohesion, socialization, supportive role of the male spouse and other direct family relatives. The post-partum duration appears to be highly flexible ranging from 2-6 weeks. In addition, the nutritional and caloric composition of the diet also appears to be highly variable (personal communication from Dr. Sophie Odermatt, medical consultant to IFMT and UNICEF, February 2004). Based on the HIA Team’s observations, both the nutritional practices and the length of the lying by the fire were highly variable and potentially dependent on the specific ethnicity of the woman. In addition, recent data from a Mahosot Hospital study (Soukaloun et al., 2003) demonstrated that both rice cooking practices, food selected by the lactating mother and the families socio-economic status were highly related to the rate of clinically significant thiamine deficiency in breast fed infants in Lao. Thus, the potential adverse effects of the *yuu fai* may be amenable to educational intervention strategies. The potential impact of the Project on this post-partum practice is unknown. The opportunity exists to improve and reinforce the beneficial aspects while ameliorating the negative potential nutritional aspects via educational outreach. Whether relocation and “urbanization” will change the overall practice is unknown since this practice already flourishes in urban areas, including Vientiane (personal communication from Dr. Sophie Odermatt).

Legend for tables

Population affected	
A	Children/infants < 5 years
B	Children age 5-14 years
C	Women of reproductive age 15-49 years
D	Men and female 15-60 years
E	Elderly > 60 years

Impact level	
High	
Medium	
Low	
None	
Enhanced	

Table 5-23: Risk Profiling of Plateau Resettlement Area (PIA #1)

Environmental health area (EHA)	Project timing									
	Construction					Operation				
	Age groups									
	<5 years	5-15 years	♀ 15-49 years	♂ 15-60 years	>60 years	<5 years	5-15 years	♀ 15-49 years	♂ 15-60 years	>60 years
Respiratory diseases										
Vector-related diseases										
Sexually-transmitted infections										
Food, water and soil-borne										
Accidents and injuries										
Exposure to hazardous materials										
Nutrition, food source										
Psychosocial										
Cultural health practices										

5.7.4 Regulating Pond and Downstream Channel Areas (PIA #2)

Overall Assessment:

High impact: Altered agricultural practices and fisheries as an underlying health determinant in the first years of operation (see also nutrition assessment); construction phase related activity (respiratory, accidents/injuries);

Moderate Impact: Malaria, typhus, dengue, meliodosis, pesticides, nutrition, psychosocial, cultural health practices, and infrastructure

Low Potential Impact: Schistosomiasis, opisthorchis infection

Risk profiling: Table 5.24.

Short Description:

The major impacts in this PIA are related to (i) changes in agricultural practices and fishing yields due to increased year-round availability of relatively large volumes of water, and (ii) construction activities in areas adjacent to population centers. Enhanced water availability will probably allow for dry season rice cultivation, but may adversely affect fishing yields. Hence, the possible significant impacts – positive or negative – are largely related to the changing water flow dynamics in the Xe Bangfai, significantly higher water discharges all year long, and altered water quality. Adverse nutritional impacts are primarily related to potential decreases in fishing yields and, probably to a lesser extent, to somewhat smaller areas for riverbank gardening. These potential adverse impacts are uncertain but assessed as “significant” since fishing provides an important source of dietary protein for local populations as described in both the EAMP and NTPC’s “Xe Bangfai Socio-Economic Health and Fisheries Survey, 2001”. High water volumes during the dry season could impact riverbank gardening practices since there is a limited area for this type of cultivation practice. The highest potential impact rating was not given since it is unknown if these impacts will be experienced and, if so, to what degree, and for what duration. For example, local fishermen are likely to adapt their fishing gear as a result of permanently elevated water discharges.

The vector-related diseases have a moderate likelihood of increasing due to increased water availability. Malaria is already prevalent in this area; however, as previously discussed, a change in dominant vector

species to *An. nivipes* is considered possible based on the experience seen in Thailand and India (see Section 5.6). Also, there is some suggestive evidence related to this hypothesis based on the published work of Kobayashi et al (2000). Increased rice field exposure may increase melioidosis rates, a bacterial disease associated with rice farming. A second water resource driven dry season rice cultivation will increase the need and demand for fertilizers and pesticides. The current Pest Management Plan (PMP) describes the pattern and utilization of these chemicals in the Xe Bangfai region. With increased utilization, exposure, residue accumulation and surface water runoff are considered likely. This sequence of events already occurs, it is the degree to which it will be augmented that is unknown.

Opisthorchis infection is highly prevalent in villages along the Nam Kathang and upper Xe Bangfai, but the increased availability of water resources is unlikely to change this situation. Schistosomiasis is not present in the region; however, the intermediate host snail has been documented in multiple locations. Transmission of schistosomiasis is currently restricted to two districts in the very south of Lao PDR with an estimated 60,000 people at risk (Urbani et al. 2002). While there is some possibility of 1) workers emigrating from these endemic areas in the south, 2) relocating to the Project area, and 3) completing the transmission cycle, the chances of this scenario appear to be low. In addition, it has been suggested that the increased overall water flow levels create a less favourable habitat for the intermediate host snails.

While there may be limited relocation of some households along the downstream channel, the number of affected individuals is small and the relocation distance is also quite minimal. In addition, unlike for the Nakai resettlement area, a potential change in lifestyle is not at issue. The food/nutrition situation could actually improve by virtue of a second rice growing season; however, there could be a short-term impact during construction and filling phases since there will be a loss of land under cultivation. The psychosocial impacts due to loss of land, change in cultivation practices and accident-related death and injury were rated moderate since these changes will be timing restricted with eventual improvement. Changes to cultural health practices are felt to be moderate.

Table 5-24: Risk Profiling of Villages along Regulating Pond and Downstream (PIA #2)

Environmental health area (EHA)	Project timing									
	Construction					Operation				
	Age groups									
	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years
Respiratory diseases										
Vector-related diseases										
Sexually-transmitted infections										
Food, water and soil-borne										
Accidents and injuries										
Exposure to hazardous materials										
Nutrition, food source						+	+	+	+	+
Psychosocial										
Cultural health practices										

5.7.5 Villages along the Xe Bangfai (PIA #3)

Overall Assessment:

High impact: Fishing practices as a health determinant (see also nutrition assessment); dengue in case current seasonal flooding is increased (this impact will be low if current flooding levels will not be intensified)

Moderate Impact- Malaria, nutrition, dengue, meliodosis, and pesticide

Low Potential Impact- Schistosomiasis, opisthorchis infection

Risk profiling: Table 5-25

Short Description:

The major impacts in this PIA are related to changes in agricultural practices and fishing yields due to increased year round availability of relatively large volumes of water. Enhanced water availability will probably allow for dry season rice cultivation, but may adversely affect fishing yields. Hence, the possible significant impacts – positive or negative – are largely related to the changing water flow dynamics in the Xe Bangfai, significantly higher water discharges all year long, and altered water quality. Adverse nutritional impacts are related to both potential changes in fishing yields and less significantly to river bank gardens. These potential adverse impacts are uncertain but assessed as “significant” since fishing provides an important source of dietary protein for local populations as described in both the EAMP and NTPC’s “Xe Bangfai Socio-Economic Health and Fisheries Survey, 2001”. Some level of continued river bank gardening is still anticipated since the river bank capacity appears to be substantially higher in the lower Xe Bangfai regions than in the upper regions. The highest potential impact rating was not given since it is unknown if these impacts will be experienced and, if so, to what degree and for what duration. For example, local fishermen are likely to adapt their fishing gear as a result of permanently elevated water discharges.

Table 5-25: Risk Profiling of Villages along the Xe Bangfai (PIA #3)

Environmental health area (EHA)*	Project timing									
	Construction					Operation				
	Age groups									
	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years
Respiratory diseases										
Vector-related diseases										
Sexually-transmitted infections										
Food, water and soil-borne										
Accidents and injuries										
Exposure to hazardous materials										
Nutrition, food source										
Psychosocial										
Cultural health practices										

A major potential for significant impacts is related to any augmentation of the current rainy season flooding pattern. Dengue is highly prevalent during the seasonal flooding season. Anything that prolongs the presence and distribution of standing water will increase this situation. Current EAMP documents clearly state that the Project will NOT contribute to flooding. Assuming that this assertion is correct, then dengue impacts will likely be unchanged. As discussed in Section 5.6.3.7, the role of water jars (associated with improving economic conditions) in dengue incidence rates is unknown. A second dry season rice crop will be possible since the availability of water resources during the dry season will substantially

improve. Currently, irrigation water is already being pumped from the Xe Bangfai; however, the addition of Project water will facilitate this practice by lowering overall pumping costs. The psychosocial impacts are rated moderate during operation because the perception, whether hydrological correct or not from an engineering perspective, are that the Project will diminish local fisheries on which thousands of people depend for their livelihoods, and will increase flooding with subsequent disease (dengue) impacts.

5.7.6 Nam Theun riparian area (PIA #4)

Overall assessment: Moderate to low impact; timing-specific.

Risk profiling: Table 5-26.

Short description:

There is a mixture of Project phase-specific low or moderate level impacts for at risk individuals in this area. There will be an isolated construction work camp in this area, so there will be some possibility of interaction between the construction camp workers and villagers living in scattered villages in the Nam Theun watershed area. However, in view of the remoteness and isolation of this area, access is difficult, hence potential interactions between workers and villagers is unlikely to occur at a significant level. There are some potential issues associated with the dramatically reduced water quantity, as well as the likely changes in water quality, downstream of the dam site once the dam has been completed and reservoir filling commences. These ecological changes will reduce fishing yields, which in turn might impact on the food and nutrition base of those few fishermen who currently utilize the riparian area as fishing and hunting grounds. Because of these uncertainties, psychosocial effects were felt to be possible during the reservoir filling and operation phase. Cultural health practices are likely to be unaffected.

Table 5-26: Risk Profiling of Nam Theun Riparian Area (PIA #4)

Environmental health area (EHA)*	Project timing									
	Construction					Operation				
	Age groups									
	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years
Respiratory diseases										
Vector-related diseases										
Sexually-transmitted infections										
Food, water and soil-borne										
Accidents and injuries										
Exposure to hazardous materials										
Nutrition, food source										
Psychosocial										
Cultural health practices										

5.7.7 Villages in the Nam Theun 2 Watershed (PIA #5)

Overall assessment: Low impact.

Risk profiling: Table 5-27.

Short description:

In general, there is a low likelihood of new or increased health impacts to this area. The area will be fundamentally unaffected by direct construction activities; hence, induced access into these areas will be minimal. The incremental Project induced interaction between the villages in the Nam Theun 2 watershed area and construction workers and/or camp followers is uncertain, but expected to be very low. If this interaction were to substantially increase via economic incentive for commercial trading of goods and services, then the possibility of more subtle direct, indirect and cumulative impacts would exist. Impacts across the four major defined sectors (housing and urban development, water, food and sanitation, transportation and communications and information access) are expected to be insignificant. There is felt to be a possible, albeit low, psychosocial potential for impacts, but this is restricted to the reservoir-filling phase.

Table 5-27: Risk Profiling of Villages in the Nam Theun 2 Watershed (PIA #5)

Environmental health area (EHA)*	Project timing									
	Construction					Operation				
	Age groups									
	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years
Respiratory diseases										
Vector-related diseases										
Sexually-transmitted infections										
Food, water and soil-borne										
Accidents and injuries										
Exposure to hazardous materials										
Nutrition, food source										
Psychosocial										
Cultural health practices										

5.7.8 Construction work camps (PIA #6)

Overall assessment: high impact, multiple sectors.

Risk profiling: Table 5-28.

Short description:

The development and presence of multiple construction camps during the various phases of the Project will be an obvious source of both enhanced and adverse impacts. While most of the workers will probably be males, the adjacent community interactions and potential impacts are expected to occur across all ages and genders. The most significant potential negative impacts are (i) transmission and potential amplification of STIs, including HIV/AIDS; (ii) use and distribution/sale of illicit drugs, especially injectable drugs, (iii) secondary developments triggered by camp followers living in close geographical proximity to construction work camps (see PIA #5 and 6); and (iv) overwhelming of local management and programme management systems. On the other hand, the presence of the construction work camps will clearly be a major economic stimulus that in turn acts a huge health determinant. Consequently, the presence of the camps can act as a significant stimulus for both health care delivery infrastructure and technology enhancement.

Potential significant adverse impacts could occur across all environmental areas; however, most of these potential impacts will probably be time limited and directly related to the presence or absence of the

camps. In contrast, changes in the shape and slope of the HIV/AIDS epidemic curve would be profound and long lasting. The current level of HIV/AIDS in the major Project province (Khammouane) is extremely low (see Section 5.6). Factors that change mixing rates (interaction between high and low risk groups with disparate seropositive prevalence rates) and partner change rates (increased disposable spending money leading to increased purchase of commercial sex) directly affect the shape and size of the epidemic curve (Krieger et al., 2004). This situation is often characterized as “The Four “M’s”: men, money, mixing and movement.

The construction work camps clearly have all of these parameters in simultaneous interaction. Therefore, a well developed, monitored, and sustained multi-component HIV/AIDS programme is of paramount importance. Given the low baseline levels in the resident population, the HIV/AIDS impacts are potentially so significant that the development, review, funding, coordination (or direct management) with/by the national programme should be a key requisite prior to construction camp development. This calls for a joint approach of Public Health and the Project Staff Health programs and will be addressed under PSHP section.

A rapid assessment conducted around the nascent camp sites (Oct’04) by the MoH Department of Hygiene and Prevention found that HIV/AIDS awareness and condom use was acceptably high in the area. This must be linked to the last 2 years’ STI/HIV prevention efforts conducted in Khammouane by Population Services International on an ADB grant. PSI works alongside their Lao counterparts of the National, Provincial and District Committees for the Control of Aids, and will continue doing so with support of NIPC.

In terms of the other nine defined environmental health areas, the construction work camps can be viewed as an exercise in rapid urban planning with all the well-known and expected positive and negative consequences. There are a myriad of enhanced and negative effects that can and will occur. However, our assessment is that there are several key environmental health areas that could be significantly (adversely) affected and “spill-over” into adjacent villages/communities:

Respiratory: (i) rapid spread of viral upper respiratory illness; (ii) TB

Based on data analysed in Section 5.6, TB is undoubtedly under-diagnosed. In addition, there is currently no formal case finding system; hence, reported prevalence rates are likely to be higher. TB and HIV/AIDS are covariate with each other in almost all epidemiological settings, i.e. in sub-Saharan Africa approximately 70% of the TB cases are HIV positive. In Vietnam the corresponding figure in 2002 was 3,6%, while it was just 0,66% in Laos. The current health infrastructure and management systems capacity for TB diagnosis, treatment and case finding and surveillance would be overwhelmed by a dramatic upsurge in TB regardless of whether it was triggered by HIV/AIDS.

Vector-borne: malaria

Dramatic progress has been made regarding the control of malaria in the Project areas over the past several years, most likely through a combination of village-level early diagnosis (symptom-based) and treatment (via the revolving drug fund) and the large-scale implementation and utilization of ITNs. As mentioned before, chloroquine is currently employed as the first-line drug despite repeated reports of high levels of resistance across the country. This is of considerable public health significance and the situation could further aggravate due to demographic and environmental alterations. Introduction of resistant strains via in-migration of non-local workers has been observed elsewhere, and is of concern in the present setting. Non-local workers (even from other malarious areas) may not have adequate resistance (immunity) to specific local malaria strains; hence the use of chemoprophylaxis and overt treatment may significantly increase. Construction activities may alter ecosystems in unanticipated ways and change the pattern, distribution and dominant vector species. A comprehensive malaria control programme is essential.

Sexually transmitted infections (STIs)

The earlier HIV/AIDS discussion also applies to STIs, as the same biomedical and behavioural issues are also relevant for the curable STIs, e.g. gonorrhoea, Chlamydia, syphilis, etc.

Soil and water

Relating mainly to waste management and rodent control, there is significant potential for rodent control problems associated with both construction camp development and “steady-state” operation. There are detailed environmental management plans for this activity; however, if these plans are not fully and successfully implemented then rodent related diseases in adjacent villages/communities could become significant (e.g., leptospirosis, murine and scrub typhus).

Food and nutrition

Relating mainly to (a) food pricing inflation as a health determinant with impacts on overall community nutritional status and (b) opisthorchis infection. While the Project construction camps may provide a significant positive market based signal for enhanced agricultural production, price inflation both at a macro camp level and at a micro individual construction worker level (individual purchases from nearby markets) is possible. The least productive members of the community could be nutritionally marginalized if there is significant food price inflation.

Opisthorchis infection prevalence rates currently are low in the Nakai plateau area, but extremely high in the lower regions of the Xe Bangfai. Movement of opisthorchis infection positive workers into the Plateau area with subsequent introduction of the parasite into local waters and fisheries and introduction of different dietary practices could change transmission rates considerably.

Accidents/Injuries

There will be significant numbers of both light and heavy vehicles entering and leaving the construction areas. The likelihood of accident and injury with community/village individuals will significantly rise simply as a function of increased traffic and activity. Consequently, we expect, regardless of the implementation of a required traffic management plan, a significant (adverse) rise in traffic related injuries, accidents and fatalities with subsequent pressure on health care infrastructure and delivery systems.

Exposure to potentially hazardous materials

While there is some potential for community/village level exposure to project related hazardous materials, this is considered low. In contrast, potentially significant exposure to increased levels of air pollution is a certainty. Overall air pollution will increase as a direct function of Vehicle Kilometres Travelled (VKT). The planned level of construction will significantly increase VKT in the various construction areas. Since many of the roads will not be paved, an increase in fugitive dusts is a certainty. Similarly there will be construction related (earth works) fugitive dust releases. Road related fugitive dust releases typically have varied particle sizes. Particle size distribution curves from mechanical forces (e.g., tires) versus combustion (e.g., engines, incinerators, etc.) are quite different. Mechanical fugitive dusts tend to have larger and less breathable particles; however, there will be an overall increase in particulate matter (PM) of 10 microns (PM 10) or less, including smaller and toxicologically more significant particles less than 2.5 microns (PM 2.5).

Psychosocial

Relating mainly to (a) substance abuse- drug, alcohol, smoking; (b) security and violence, the SDP considers both the numerous psychosocial impacts that could be triggered by the Project and the available mitigation strategies for these impacts (see Volume 2 Chapters 6 and 17). The introduction of the construction camps and large numbers of workers with disposable money is potentially associated with community/village level changes in existing alcohol and substance abuse rates and adverse interaction with local members of nearby communities. Smoking prevalence rates, using home grown or inexpensive national or foreign cigarettes, appear to already be quite high so it seems less likely that these rates will be significantly impacted. Labour trafficking issues are described in Volume 4 Chapter 10.

Table 5-28: Risk Profiling of Construction Work Camps (PIA #6)

Environmental health area (EHA)*	Project timing									
	Construction					Operation				
	Age groups									
	<5 years	5-15 years	♀ 15-49 years	♂ 15-60 years	>60 years	<5 years	5-15 years	♀ 15-49 years	♂ 15-60 years	>60 years
Respiratory diseases										
Vector-related diseases										
Sexually-transmitted infections										
Food, water and soil-borne										
Accidents and injuries										
Exposure to hazardous materials										
Nutrition, food source										
Psychosocial										
Cultural health										

5.7.9 Camp Followers: Family and Service (PIA #7)

Overall assessment: High impact, multiple sectors. Most significant potential negative impacts: all environmental health areas but particularly (a) Housing, (b) Waste management/sanitation (c) Soil/ water, (d) Vector –borne, (e) STIs and HIV/AIDS

Risk profiling: Table 5-29.

Short description:

Potential significant adverse impacts could occur across all environmental areas; however, most of these potential impacts will probably be time limited and directly related to the presence or absence of the camps. In terms of the eleven defined environmental health areas, the camp followers can rapidly turn into an uncontrolled “squatter settlement” with all the well-known and expected negative consequences. There are a myriad of negative effects that can and will occur if this process is uncontrolled and unmanaged. The most significant adverse impacts will be derivative from the major sectors: 1) housing, 2) water, food, and sanitation and 3) transportation. All nine of the listed environmental health areas will be at issue if large camp follower settlements are allowed to develop. Estimates that population levels 2-4 times the labour force will be co-located in proximity to the construction camps will place a severe burden on all sectors and environmental health areas. Whether these potential peri-urban settlements could be managed without negatively diverting resources away from other mandatory efforts is problematic. The geography of the Nakai area is rough terrain with extremely limited access via one road. Passive migration into the proposed Nakai Plateau area construction camp will be quite difficult without passing through the single available transportation corridor. However, the other proposed construction camps have more direct access, particularly via the recently upgraded Road 12. Therefore, unless a major commitment in money and material for an across the board sector development and upgrade is made for the camp settlers, some form of strict access control will be necessary to prevent severe adverse impacts in all named environmental health areas.

The analysis of camp services suggests additional emphasis should be placed on control of STIs. If a large camp follower service sector is allowed to develop, the previously described phenomenon of men, money, mixing and movement is assured. The obvious consequences of this development would be a potentially

explosive rise in STIs. Therefore, both access control and comprehensive area wide plans for STIs (including HIV/AIDS) are to be developed and implemented. Since 2002, PSI has been active in Khammouane. As partners at every level AIDS Control Committees, organisations such as PSI and CARE may be recruited by the PSHP and PHAP to address these concerns as of early 2005.

Table 5-29: Risk Profiling of Camp followers: Family and Service (PIA #7)

Environmental health area (EHA)*	Project timing									
	Construction					Operation				
	Age groups									
	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years
Respiratory diseases	■	■	■	■	■					
Vector-related diseases	■	■	■	■	■					
Sexually-transmitted infections	▨		■	■	▨					
Food, water and soil-borne	■	■	■	■	■					
Accidents and injuries	■	■	■	■	■					
Exposure to hazardous materials	■	■	■	■	■					
Nutrition, food source										
Psychosocial	■	■	■	■	■					
Cultural health practices										

5.7.10 Transportation Corridor (PIA #8)

Overall Assessment: High

Most Significant Potential Negative Impacts: (a) accidents/injuries, (b) air pollution, (c) releases of potentially hazardous materials from rollovers, accidents; (d) demand for health infrastructure capacity (trauma); (e) cultural health practices

Risk profiling: Table 5-30

Short description:

The transportation corridor impacts are expected to be significant in multiple areas due to the high VKT (vehicle kilometres travelled) required during construction related activities. Many of the potential impacts related to air pollution, hazardous materials, trauma services, cultural health practices and health infrastructure have been presented in other PIA discussions and will not be repeated.

Table 5-30: Risk Profiling of Transportation Corridor (PIA #8)

Environmental health area (EHA)*	Project timing									
	Construction					Operation				
	Age groups									
	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years	<5 years	5-15 years	♀ 15-49 years	15-60 years	>60 years
Respiratory diseases	■	■	■	■	■	■	■	■	■	■
Vector-related diseases										
Sexually-transmitted infections	■		■	■	■			■	■	
Food, water and soil-borne										
Accidents and injuries	■	■	■	■	■	■	■	■	■	■
Exposure to hazardous materials	■	■	■	■	■	■	■	■	■	■
Nutrition, food source										
Psychosocial	■	■	■	■	■	■	■	■	■	■
Cultural health practices										

5.7.11 Summary

As presented, there are mixtures of impacts across the eight PIAs that are timing dependent. In general, high impacts in PIA #1, 2, 6, 7 are related to active construction phases of the Project. However, this pattern changes for PIA #3 where the opportunities for potentially high impacts are predicted during reservoir filling and operations phases.

The assessment process clearly involves professional judgement and is not intended to be a quantitative predictor of the actual probability of risk. In the next section, the Public Health Action Programme (PHAP) for the mitigation of the assessed impacts will be described. If successfully and fully implemented, this programme will substantially change the likelihood and severity of predicted impacts.

PART 2: PUBLIC HEALTH ACTION PLAN

5.8 INTRODUCTION

5.8.1 Summary

The PHAP covers two Health Programs which are responsible for preventing and mitigating the adverse effects of the Nam Theun 2 Project.

- ❖ The Resettlement Health Program
- ❖ The Regional Health Program

The Concession Agreement defines the obligations and responsibilities of these two Health Programs.

Most construction activities of the project and the creation of the Nakai Lake take place in 4 remote and rural Districts with a low level of development. The population of these Districts are amongst the poorest in the Lao PDR. The national poverty rating classifies Nakai and Khamkheut as very poor districts and Gnommalat and Mahaxay as poor Districts.

The PHAP is only one of the many sections of the Social Development Plan and the Environmental Assessment and Management Plan. Both the SDP and the EAMP contain many activities which are directly interlinked with health and thus with the PHAP. Certain activities such as water supply, water quality control, construction of sanitary facilities and waste management are budgeted and will be implemented by other plans/chapters than the PHAP. They will however need collaboration with the health sector and thus with the PHAP when it comes to specification, guidelines and inspections.

The two Health Programs have each their own objectives, budget, target groups, activities and time frame. Table 5-32 gives a summary overview of these aspects by Program.

The development of the Resettlement Health Program and the Regional Health Program are the responsibility of the NTPC. The two Health Programs will be concerned with more or less the same diseases and health problems, but in slightly different areas and populations. The Resettlement and the Regional Health Program will implement their activities through the public health institutions. For these reasons the two Health Programs must collaborate routinely during both planning, implementation and evaluation. This should result in synergies, cost-effectiveness and would avoid duplication.

This PHAP is the logical result of the Health Impact Assessment (HIA). The HIA identified 9 Environmental Health Areas (EHA), groups of diseases and adverse health effects, and 8 Possible Impact Areas of Concern (PIA). For each of the PIA the HIA developed a risk profile rating the risk for each of the EHA. The Regional and Resettlement HP are based on the HIA. They utilise the EHA in order to identify the required prevention and mitigation activities. The 8 PIA have been regrouped into 6 Possible Impact Area/Target Group (PIA/TG). For planning purposes they are used to identify the geographical areas and as such they define where specific activities should take place.

The major and most immediate adverse health impacts are expected in areas where construction and camps of workers and camp-followers (families of workers and service providers) are concentrated. Most likely they will consist of communicable diseases (food and water-borne, STI & HIV/AIDS) and accidents (road traffic accidents - RTA - and construction related accidents).

The NT2 project activities and related events could be classified in the following two time periods:

1. Construction + early Resettlement Transition Period
2. Operations Period + stability period of resettlement

Each period generates its own types of Health Impacts. While identifying the EHA and their risks, the HIA looked at each period separately. The reservoir will start to fill soon after the beginning of construction works because of the construction of a cofferdam. (see Table 5-31).

The Resettlement Health Program and the Regional Health Program are planned to cover an eight year period. They will start from before the financial close (±start of the construction works) till three years after Commercial Operations Date (COD), which is the moment the dam will start to operate.

Both health programs need to foresee a preparation phase before Financial Close for putting in place the required infrastructure and equipment and for developing the needed health professional skills. Health education and prevention activities will also be a priority, as local communities need to be well informed about possible health risks and how to prevent them in order to adapt their possible risk behaviours.

Baseline data have been collected at community level on a number of indicators. This information is derived from a number of studies and surveys conducted in the recent past. A comprehensive list of all indicators appears in section 5.14 under Surveillance and Monitoring which will be used for future monitoring and assessment of health status of the populations in the project area.

Table 5-31: Time Frame of NT2 Project Activities and of Resettlement

Description	2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		Ongoing
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
Construction																					
Reservoir Filling																					
Operation																					
Resettlement																					

The Monitoring and Surveillance of Health are regarded as essential. On the one hand it will provide a tool for the NT2 project to prove the impact and the effectiveness of their prevention and mitigating activities. On the other hand it will assist the Lao Government and the local communities to request for additional support when needed. Surveillance and monitoring will also include the Infectious Disease Detection System, developed by WHO and the National Centre for Laboratory and Epidemiology for 18 diseases.

Planning, coordination, management and supervision of both the Resettlement and the Regional Health Program will be assured by a Health Program Management Unit (HPMU).

Implementation of most of the planned activities of the Resettlement and the Regional Health Program will be assured by the Lao public health institutions.

- Promotional, preventive and curative service delivery activities will be conducted by Village Health Volunteers, Health Centres, District Hospitals and District Mobile Teams. The Provincial Hospital of Thakhek will have an important role as a referral hospital.
- Support, supervision and inspection activities will be the responsibility of the District Health Offices (DHO), the Provincial Health Office (PHO) and for specific aspects the Ministry of Health through its central level departments.
- Training activities will be conducted by a variety of institutions amongst others the Thakhek Provincial Public Health School, the Provincial Health Office, different central level departments and divisions of the MOH, the provincial and central hospitals. The Institute Francophone pour la Médecine Tropical (IFMT) and Thai Health Institutions may also be involved in training in special areas.
- Specific activities, as social marketing for condoms and antiretroviral treatment will be contracted out to specific NGOs (e.g.: PSI and MSF).
- Mass movement organization such as the Lao Women’s Union and the Lao Youth Union will be involved in promotional and preventive activities.

The Resettlement and the Regional Health Program will put a lot of emphasis on improving the functioning of the public health institutions. This will include the following supports: human capacity building, development of management systems, infrastructure, equipment, transport, medicine and medical supplies, operational costs, and also technical assistance.

The problem of financial accessibility will be addressed. Different financing mechanisms will be used during different periods and will be targeting specific groups. Those of households elsewhere clearly suffering illness as a result of the construction work activities will also be subsidised. Additionally the Health Programs will try to render the existing health services and cost recovery system more efficient and transparent.

This PHAP proposes planned activities, a schedule and budget for the total project period. The program period for the Resettlement is about 8 years, while the Regional Health Program has two components namely the 4 year construction period followed by 5 years of mainly monitoring any impacts from the new water regimes.

Therefore, after 4 years a midterm review will evaluate the pertinence of the PHAP and make the required adjustments. One decision then to be taken regards the feasibility of community health insurance, since more experience with this novel form of cost recovery in Lao will then have been accumulated. Detailed planning and budgeting will be done on a yearly basis. The yearly planning and budgeting exercise should run concurrently with the GOL financial year (1st October-30th September). Its development will be the responsibility of the HPMU. It will be developed in collaboration with Thakhek PHO and concerned DHOs. After approval by the Health Program Steering Committee the yearly plan and budget will be integrated in the District and Provincial Health Plans.

The annual plan and budget for the financial year 2005-6 will address mainly the following aspects:

- Development of a comprehensive curative system (designing the referral system, rehabilitation of transport corridor HCs, rehabilitation of Nakai and Mahaxay DH, development of Gnommalat DH as first referral level)
- Construction of sanitary facilities, waste management and domestic water supply for the camp followers
- Conducting health education activities sensitizing the local communities on the changing health risks

5.8.2 Methodology and Public Consultation

This PHAP has been developed by a taskforce of the Lao Ministry of Health with technical support from public health consultants and an environmental health specialist both provided by NTPC. It is also based on the (earlier described) Health Impact Assessment. Many public and official consultation meetings were held at different levels, from village authorities to the Provincial Governor including::

- Village authorities of the target villages;
- District authorities of Nakai, Gnommalat and Mahaxay;
- District Health Offices of Khamkheut, Nakai, Gnommalat, Mahaxay, Xebangfai, Nongbok, Xaybuli and Thakhek;
- Provincial Health Offices of Borikhamxay, Savannakhet and Khammouane;
- Different MOH departments;
- The MOH Steering Committee;
- Different development Organizations active in the field of health in Lao PDR.

During these meetings the taskforce presented the identified Environmental Health Areas as well as the preliminary action plans with their proposed mitigating activities. These presentations were followed by discussions in groups. The different groups reviewed and commented on the plans. They did share their

worries and proposed some supplementary activities. This PHAP has incorporated most comments and recommendations made at these consultation meetings.

The MOH Steering Committee proposed that the inputs for promotional, preventive and curative activities required for limiting and mitigating the impacts of the NTPC project be covered by one of the two Health Programs. This includes rehabilitation, construction, provision of equipment and operational costs related to the improvements of the DHs and HCs of Nakai, Gnommalath and Mahaxay.

Due to the different dimensions and many overlapping areas of the various Health Programs, the lay-out of this PHAP document is rather complex. This introduction is followed by general aspects. Then the two Health Programs are presented, each with an introduction, activity lists and specific inputs. Monitoring and surveillance as well as capacity building are discussed jointly for the Resettlement and the Regional Health Program as they are crosscutting issues.

5.8.3 Objectives

Each of the two Health Programs is having its own objectives.

Objectives of the Resettlement Health Program:

- Prevent and mitigate effects of resettlement on the resettled population of the Nakai plateau
- Improve the health situation of the resettled population of the Nakai plateau
- Build the capacity of the Public Health Institutions for addressing their target populations' needs

Objectives of the Regional Health Program:

- Prevent and mitigate effects of construction and of operation of the NT2 Dam on the local population
- Prevent and mitigate effects of the population influx (workers & camp-followers) on the local population
- Improve the health situation of the local population
- Build the capacity of the Public Health Institutions for addressing their target populations' needs

5.8.4 Strategies

The PHAP is committed to follow the national health policy and will provide technical advise and financial support to strengthen the existing system in 5 major areas of concerns : infrastructure development, training of health personnel, surveillance and monitoring, awareness and education on health as well as supporting health service delivery in terms of cost efficiency and consistency with the national policy. If there is a specific need to be carried out then the project will take it into account, in a manner consistent with the national policy/guideline on this matter.

The above mentioned objectives will be achieved through several strategies, which will address the whole chain of services required for obtaining their objectives. They are as follows:

- The Prevention and Mitigation activities addressing the 8 Environmental Health Area's will be implemented by the MOH institutions;
- Therefore the Resettlement and Regional Health Program (and possibly the Project Staff Health Program) will support improvement of the Public Health Institutions and Programs. This support will include: Capacity building, Infrastructure, Equipment, Transport, Medicine and Medical Supplies, Operational Costs;
- Implementation and planning of the mitigating activities will be done in an integrated way whenever possible.
- The two new planned Health Centres for the resettlement area will be developed and function as Integrated Community Health Centres (same approach as BTC and HSIP);

- In order to assure comprehensive curative care a referral system will be developed integrating the Health Centres, the rehabilitated District Hospitals of Nakai and Mahaxay, the rehabilitated and upgraded District Hospital of Gnommalat and the Provincial Hospital of Thakhek
- Capacity building is recognized as a major component and will get a detailed plan based on a training need assessment.
- The “Monitoring and Surveillance” system will be strengthened regarding the completeness, comprehensiveness, cost effectiveness, quality of existing data collection system which can be done routinely at all level of care. The HPMU will coordinate with several MOH departments’ data collection systems and structure this information for continuous monitoring and surveillance.
- An “Infectious Disease Outbreak Rapid Response Preparedness” taskforce will be developed. A contingency fund to be used in case of outbreak will be available and easily accessible.
- Financial Accessibility will be assured through special funding for the resettlers’ and affected construction area families’ medical expenses.

Table 5-32: General Overview of the two Health Programs

Health Programs	Resettle ment	Regional
Objectives		
Prevent and Mitigate effects of Resettlement	✓	
Prevent and Mitigate effects of Constructions and of Operation of the NT2 Dam		✓
Prevent and Mitigate effects of the population influx (workers & camp-followers)	✓	✓
Preventive and curative measures ensuring Health and Safety of the workforce		
Improve the health situation of the local Population	✓	✓
Period		
2005 - 2009 Construction (Reservoir Filling)	✓	✓
2009 - 2013 Operation of dam	✓	✓
Target Groups		
Resettlement	✓	
Downstream Channel and Nam Kathang Area		✓
Xebangfai Riparian Area		✓
Transportation Corridor		✓
Camp followers		✓
Major Work Camps (Workforce)		
Geographical concentration		
Nakai	✓	✓
Ngommalat		✓
Mahaxai		✓
Khamkheut		✓

5.8.5 Target Groups and Beneficiaries

The HIA divided the Project into discrete “potential impact areas of concern” (PIA). In this conception, a PIA can represent either a “subject matter”, usually composed of a specific population group, or a defined geographical area where Project-related health impacts may reasonably occur. For the NT2 HIA, it distinguished 8 different PIA. The 8 PIA were described in Section 5.2 of the HIA and include:

- PIA #1: Plateau resettlement area
- PIA #2: Regulating Pond and Downstream Channel areas
- PIA #3: Villages along the Xe Bangfai
- PIA #4: Nam Theun riparian area
- PIA #5: Villages in the Nam Theun 2 watershed
- PIA #6: Construction work camps

- PIA #7: Camp followers: families and service providers
- PIA #8: Transportation corridor

Based on the 8 PIA the PHAP identified the target groups for the two Health Programs. These target groups have been called Possible Impact Areas/Target Groups (PIA/TG). The PHAP will work with 6 PIA/TG.

For planning purposes the PIA/TG were in each of the two Health Programs converted to geographical areas as such defining where specific activities should take place. For the geographical location see Figure 5-4).

Direct Beneficiaries (or Target Groups)

The population of the 6 PIA/TGs are the direct beneficiaries of the three Health Programs.

Indirect Beneficiaries

The indirect beneficiaries will be the whole population of the supported districts as they will also benefit from the improved health facilities.

Intermediate Beneficiaries

The District, Provincial and Central Health Departments and Institutions, and their personnel will be the intermediate beneficiaries. They are both implementers and beneficiaries. They will be responsible for the management and delivery of health services and outreach activities. In addition, they will benefit from the enhanced capacity and increased motivation of health staff, from the improved service delivery systems and guidelines developed, and from the improved infrastructure and equipment available in the institutions.

Wider Beneficiaries

These Health Programs are taking place in a situation of reform and development of the health sector in Lao PDR. Some of the results and approaches of this intervention will be documented and distributed. Due to provincial and central level involvement, the lessons learned (comprehensive curative referral system, equity funds, improved and integrated monitoring and surveillance system, outbreak response preparedness, integrated mother and child services) will have the potential to influence future health interventions in the Lao PDR. The wider beneficiaries are potentially the population of the whole of Khammouane Province and of other provinces of the Lao PDR.

Table 5-33: Construction Phase: (early 2005 to May 2008)

	Geographical Areas and Project Components	Vills	Hhs (6 per./hh)	Population	Environmental Health Area (0 to 5)								
					Respiratory	Vector related	STD	food, water, soil borne	Accidents	Exposure to Hazd. Mats.	Nutrition	Psycho-social	Cultural Health
Reservoir related resettlement													
1	Nakai Plateau RA	17	1,100	6,600	4	1	4	??	4	4	3	4	0
2	Khamkerd Villages	2	56	336	0	0	2	2	0	0	2	1	0
Project Lands and Construction related													
3	Khamkerd	14	2,157	13,819	5	0	5	0	5	2	0	5	0
4	Gnommalart Plain:	22	1,624	9,744	5	3	5	3	5	5	3	5	0
5	Mahaxai	5	369	2,034	5	1	4	0	5	1	3	4	0
6	Rd 12: Tkk to Mahaxai	17	1,135	5,710	5	0	5	0	5	0	0	5	0
Downstream													
7	Xe Bangfai	89	7,096	40,600	0	0	0	0	0	0	0	0	0
7.1	<i>Mahaxai District</i>	21	1,215	6,494	0	0	0	1	0	1	0	0	0
7.2	<i>Xe Bangfai District</i>	16	1,503	7,867	0	0	0	1	0	1	0	0	0
7.3	<i>Nongbok District</i>	20	1,915	10,677	0	0	0	1	0	1	0	0	0
7.4	<i>Xaibouly District</i>	32	2,963	15,563	0	0	0	1	0	1	0	0	0
8	Nam Katang (Gnom),	14	1,131	6,786	0	0	3	4	0	2	0	0	0
9	Nam Phit (Gnom/Maha)	17	1,372	8,232	0	0	3	2	0	2	0	0	0
10	Nam Theun, tributaries	45			0	0	0	0	0	0	0	0	0

Table 5-34: Operation Phase (Post Dam closure: May 2008)

	Geographical Areas and Project Components	Vills	Hhs (6 per./hh)	Population	Environmental Health Area (0 to 5)								
					Respiratory	Vector related	STD	food, water, soil borne	Accidents	Exposure to Hazd. Mats.	Nutrition	Psycho-social	Cultural Health
Reservoir related resettlement													
1	Nakai Plateau RA	17	1,100	6,600	0	4	3	0	2	0	2	4	0
2	Khamkerd Villages	2	56	336	0	1	1	0	0	0	2	2	0
Project Lands and Construction related													
3	Khamkerd	14	2,157	13,819	0	0	(2)	0	0	0	0	0	0
4	Gnommalart Plain:	22	1,624	9,744	0	0	(2)	0	0	0	0	0	0
5	Mahaxai	5	369	2,034	0	0	(2)	0	0	0	0	0	0
6	Rd 12: Tkk to Mahaxai	17	1,135	5,710	0	0	(2)	0	0	0	0	0	0
Downstream													
7	Xe Bangfai	89	7,096	40,600	0	0	0	0	0	0	0	0	0
7.1	<i>Mahaxai District</i>	21	1,215	6,494	0	2	0	2	2	0	2	1	1
7.2	<i>Xe Bangfai District</i>	16	1,503	7,867	0	2	0	2	2	0	2	1	1
7.3	<i>Nongbok District</i>	20	1,915	10,677	0	2	0	2	1	0	2	1	1
7.4	<i>Xaibouly District</i>	32	2,963	15,563	0	2	0	2	1	0	2	1	1
8	Nam Katang (Gnom),	14	1,131	6,786	0	2	0	2	0	0	2	1	0
9	Nam Phit (Gnom/Maha)	17	1,372	8232	0	2	0	2	0	0	2	1	2
10	Nam Theun, tributaries	45			0	2	0	2	0	0	2	1	0

Figure 5-4: Geographical Location of Different PIA/TG

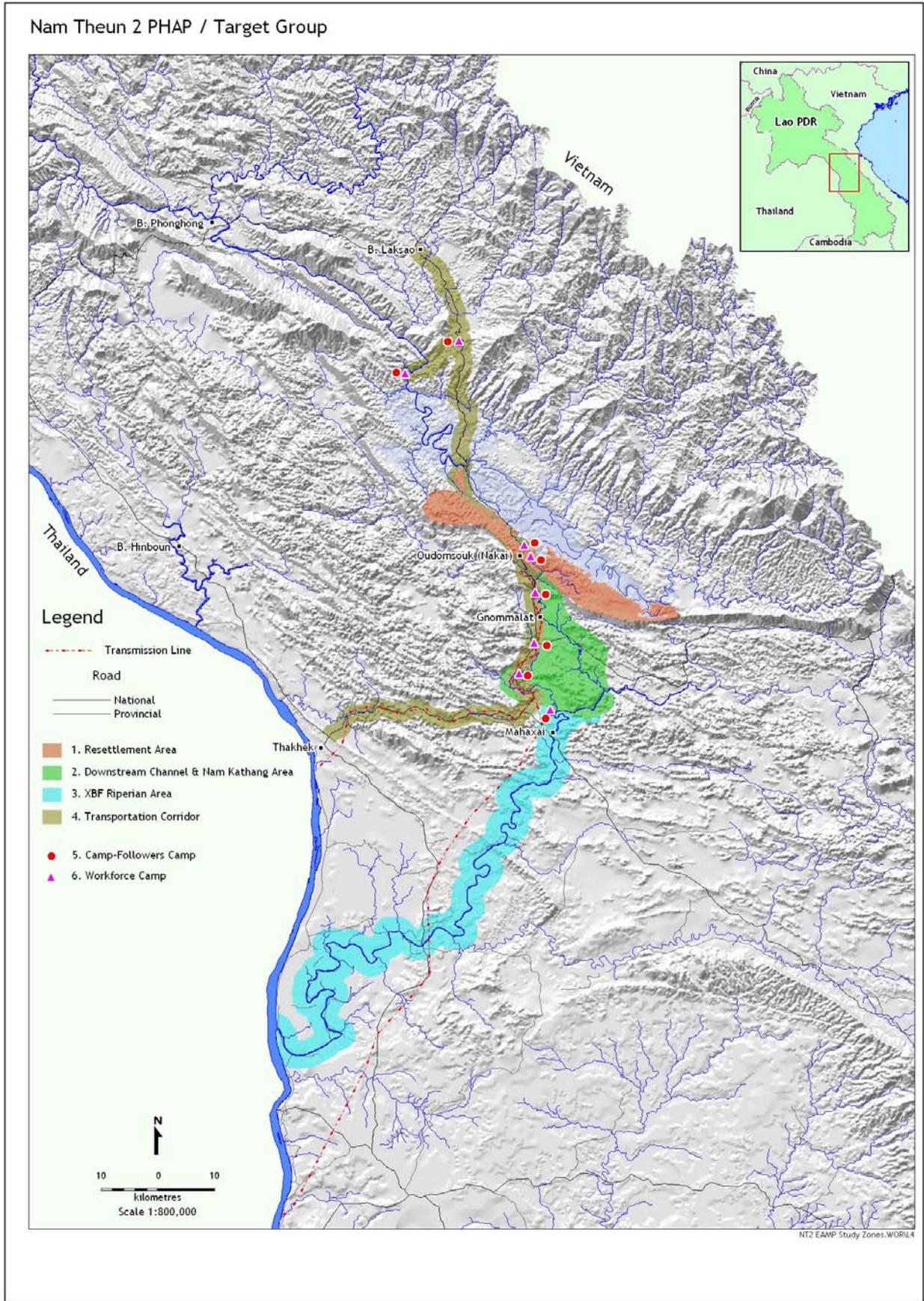
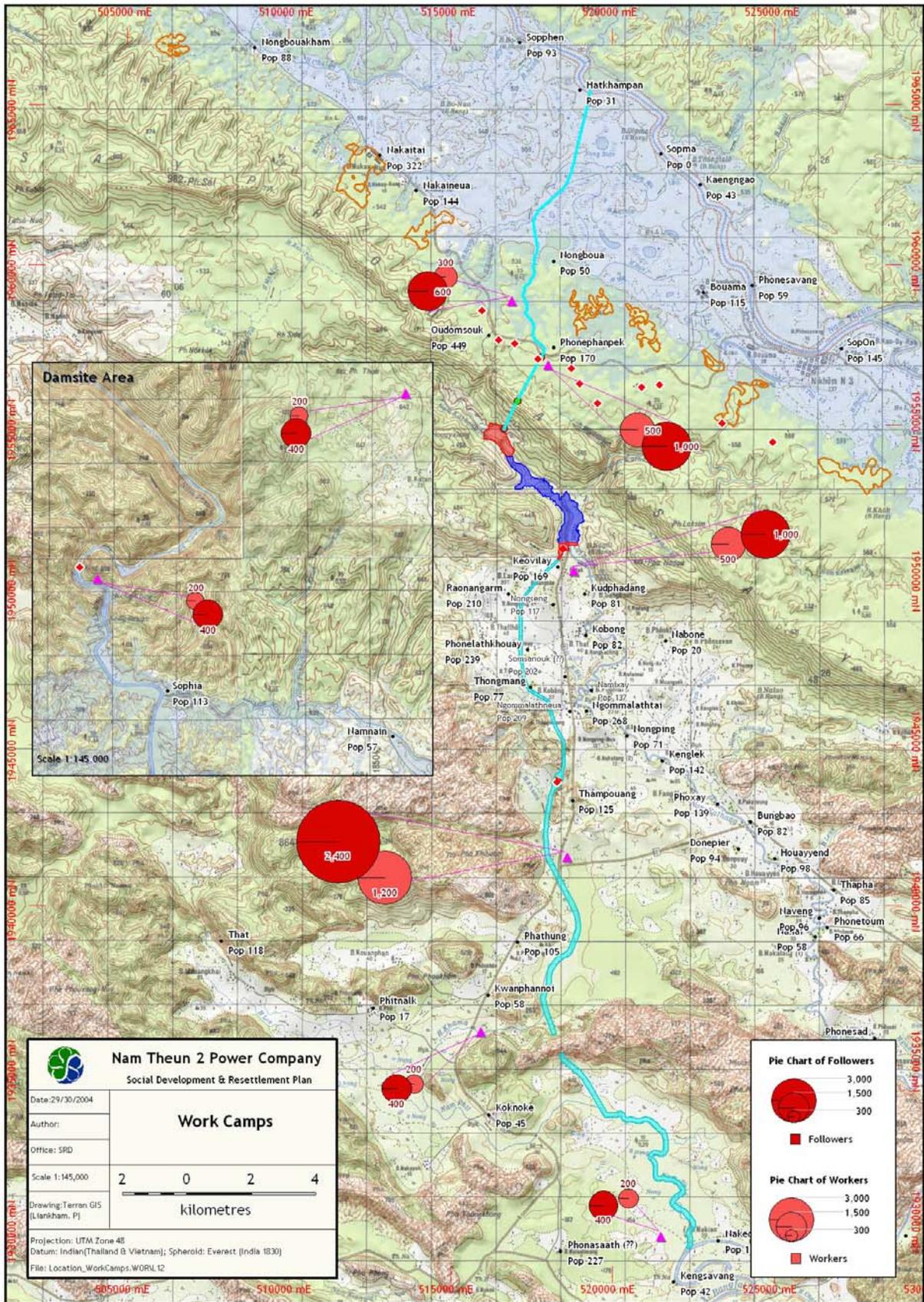


Figure 5-5: Indicative Location and Size of Camps of Workers and Followers (size only)



5.8.6 Environmental Health Areas

The Health Impact Assessment identified nine Environmental Health Areas which are logical groups of diseases and/or adverse health effects. The nine environmental health areas were described in Section 5.4.6 of the HIA and include: (i) respiratory diseases, (ii) vector-related diseases, (iii) Sexually Transmitted Infections (STIs), (iv) soil- and water borne diseases, (v) food and nutrition related issues, (vi) accidents and injuries, (vii) exposure to potentially hazardous materials, (viii) psychosocial, (ix) cultural health practices.

The Regional and Resettlement HP are based on the HIA. They utilise the EHA in order to identify the required prevention and mitigation activities.

For planning and simplicity, some of the environmental health areas have been combined and other split up. The Resettlement and the Regional Health Program will work with the following groups:

- Respiratory diseases
- Vector-related and pest borne diseases
- Sexually Transmitted Infections (STIs) and HIV/AIDS
- Food, Soil and Water borne disease
- Nutrition and micronutrients related issues
- Accidents/injuries, chemical exposures and poisoning
- Psychosocial
- Cultural Health Practices

5.9 IMPLEMENTATION FRAMEWORK

5.9.1 The Framework

An NT2 Resettlement Committee (RC) was established through the Committee for Planning and Cooperation by Decree 12/CPC, signed by the Deputy Prime Minister on January 25, 1995. Its members are appointed from the GoL's Ministerial Steering Committee and from the affected Province's Governors' Offices. The RC ensures that those aspects of the SDP that are GoL's responsibility to implement are carried out on time and on budget. It reports to the Vice Prime Minister with the overall responsibility for directing, guiding, and managing the Resettlement Process in accordance with the Concession Agreement (CA). Its main roles and functions include a/o:

- Monitoring and supervising the implementation of the obligations of both the GoL and the NTPC with respect to the Resettlement Process;
- Facilitating transparency and accountability of management and activities undertaken under the RC's supervision;
- Convening and chairing biannual meetings to review past activities and future plans;
- Reviewing and resolving issues and problems as they arise, generally as identified or brought to the RC by the RMU and NTPC's RO, and as arising among various Government Authorities and the Company relating to the Resettlement Process.

As such, the Resettlement Committee is also responsible for controlling and steering the various NT2 health programs. The actual responsibility for implementation and outcome results of the Resettlement and the Regional Health Programs is shared between

- NTPC¹ and
- The Lao Ministry of Health, which includes;
 - (i) The Provincial Health Office (PHO) in Thakhek
 - (ii) The District Health Offices (DHO), in Khamkeut, Nakai, Gnommalath, Mahaxay, Xe Bangfai, Nongbok and Xaibouly Districts.

Planning, coordination, management and supervision of both the Resettlement and the Regional Health Program will be assured by a Health Program Management Unit (HPMU). The HPMU office will be based at the PHO in Thakhek. It will be headed by one PHO and one counterpart NTPC Health Manager. The HPMU reports to the Provincial Health Director in Thakhek and to the Social & Resettlement Office in Vientiane. It serves as a relay node for health inputs provided by various MoH Institutions and Programs, and by NGO's contracted under the PHAP framework (see Figures 5-6 and 5-7).

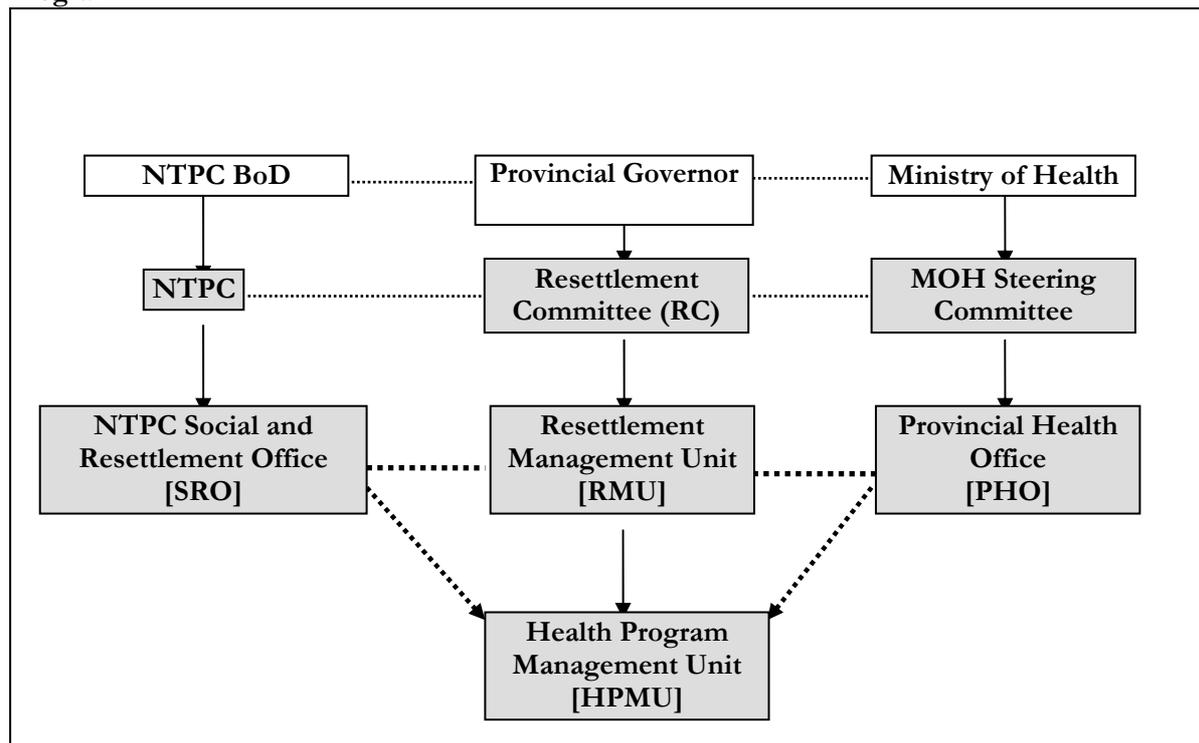
The Health Project Management Unit in Thakhek directs and supervises the activity of three NTPC officers. The Health Administration & Finance Officer based in Thakhek and is responsible for documenting and organising all administrative and accounting transactions.

The HPMU will have the following structure:

- NTPC Health Manager (an international Public Health Consultant)
- Health Operations Officer – Public Health Doctor (Lao National)
- Health Educator (Lao National)
- Social Scientist (Lao National)
- 3-4 NTPC district level facilitators
- Secretary
- Driver

¹ The outcome results of the Project Staff Health Program will be the responsibility of the Head Construction Contractor. The necessary structures for coordination and collaboration with the PHAP will be specified in the PSHP before December 2004.

Figure 5-6: Institutional Arrangements for Supervision and Management of the NT2 Health Program



All staff will be based in Thakhek. The team will work as cohesive team supporting each other in all aspects of work, with taking the main responsibility of their special areas. Each member will provide input into the surveillance and monitoring and appropriate data collection for the same.

The health manager will provide direction and support in the implementation of the PHAP and will be responsible for the program.

The Health Operations Officer is responsible for organising and supervising health related logistics, training and infrastructure.

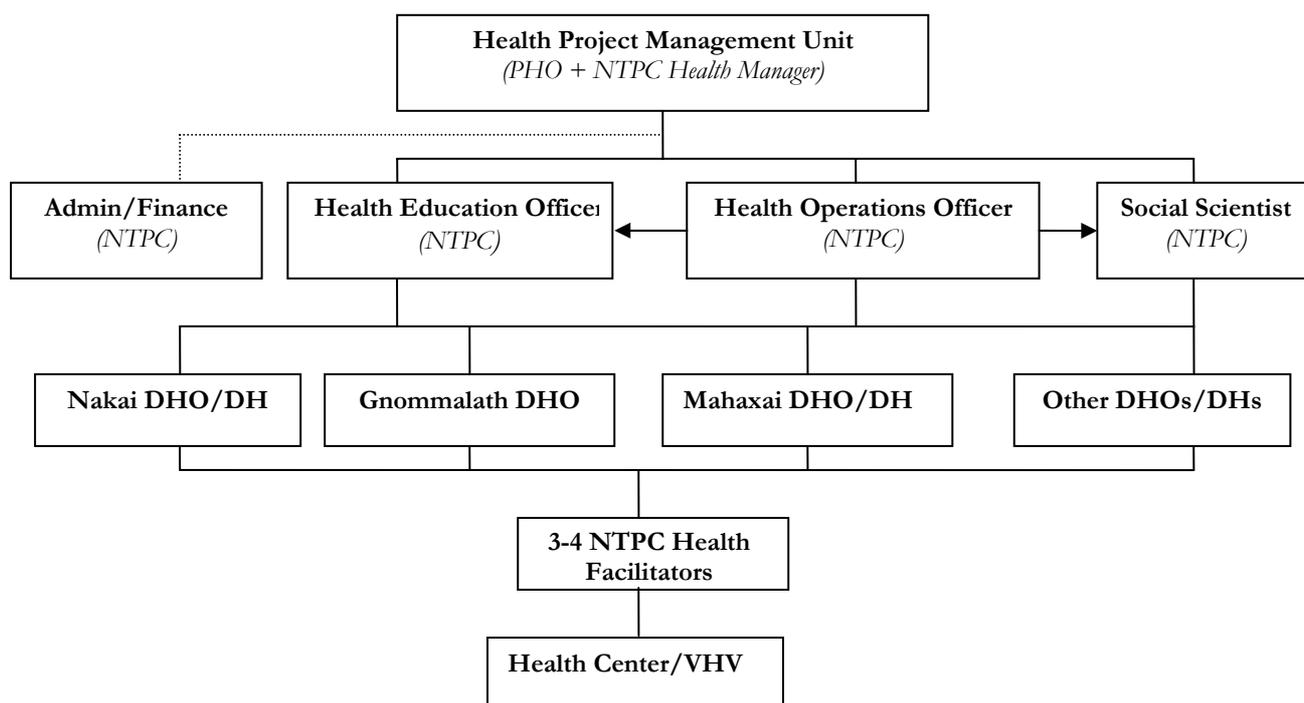
The social scientist will work with the resettled villages to facilitate the settlers to make the best use of their new surroundings, particularly educating the community on preventable problems. Appropriate utilisation of health services and other vertical programs. The district level facilitators will provide support and assistance to the social scientist.

Health Educator will be responsible for coordinating all health education activities from village level to the health centre. Health educator will also coordinate with the district health office in health education and awareness programs. The district level facilitators will also provide support and assistance to health educator where required.

The NTPC health facilitators at district level will be the main link between village, health centre level and the DHO. They will work closely with HC staff and they will serve as an important link between the recipients of health services and the project health team. They will also collect and maintain all information at the HC level for the HPMU.

The team will travel between base and field stations, as and when required. Senior officer will need to travel to the headquarters in Vientiane, and for discussions with other partners as appropriate.

Figure 5-7: Organisational Chart of the Health Program Implementation Framework



At each of the District Health Offices of Khamkeut, Nakai, Gnommalath and Mahaxay one DHO person will be appointed as the counterpart to an NTPC contracted Field Health Facilitator. Together they are responsible for coordinating and reporting on the PHAP activities implemented at various levels. Section 5.9.1 and 5.10.2 specify the planned activities at the various implementing institutions.

Most promotional, preventive and curative service delivery activities are provided by Village Health Volunteers, Health Centre, District Hospital and District Mobile Teams. Support, supervision and inspection activities will be the responsibility of the District Health Offices (DHO), the Provincial Health Office (PHO) and for specific aspects (including technical assistance) the Ministry of Health through its central level departments. The planned training activities will be conducted by several institutions amongst others the Thakhek Provincial Public Health School, the Provincial Health Office, different central level departments and divisions of the MOH, the provincial and central hospitals as well as the Institute Francophone pour la Médecine Tropical (IFMT).

The Provincial Hospital of Thakhek will play an important role as a referral hospital. The NGO Amitié Cooperation Franco Lao supports and will further develop the Thakhek Provincial Hospital at least until 2007. Two surgeons and two anaesthetists will complete their training at Mahosot Hospital in late 2004. NTPC will support training of other staff active in departments impacted by the Project (emergency medicine & nursing, bacteriology) Specific activities such as social marketing for condoms and antiretroviral treatment will be contracted out to other specialised NGOs.

Different vertical health program activities such as the Tuberculosis Program, the Expanded Program for Immunization and the Family Planning Program will be implemented in collaboration and with assistance of the existing support organisations (UNICEF, UNFPA, Damiaan Foundation, Global Fund, etc.).

Mass movement organization such as the Lao Women’s Union and the Lao Youth Union will be involved under DHO coordination, in promotional and preventive activities.

Since low utilization of health services in Lao PDR is mainly due to poor quality of services offered, financial and geographical inaccessibility and traditional and cultural beliefs on health events. Therefore the Resettlement and the Regional Health Program will put a lot of emphasis on improving human

capacity, on developing management systems, on supporting infrastructure, equipment, transport, medical supplies and operational costs and also by giving technical assistance.

NTPC will provide technical assistance to the public health institutions for both overall coordination and for implementation of specific activities of the Resettlement and the Regional Health Programs. This technical assistance will be provided by NGOs contracted by NTPC in addition to the NTPC Health Program Management Unit. The NGO and the HPMU involved in program coordination must have in-house expertise in the field of public health (health system management, health data processing and health financing) and preferably have working experience in the Lao PDR or the region. Presently in country sources of technical assistance appear sufficient. Technical assistance required for health program coordination will be funded as an NTPC staff cost.

Based on the approved and final PHAP a “Memorandum of Understanding” (MOU) will be signed by the different partners. The different partners will be the Ministry of Health, the Provincial Health Office of Khammouane, the SDP as well as the HCC. A draft MOU will be prepared and reviewed by the partners before approval of the final PHAP. This MOU will specify at least the following: each partner’s responsibilities, their contributions, the financial procedures, the procurement procedures, the different taxes applicable, the reporting procedures, the health related mandate and responsibilities of the Resettlement Committee and of the Health Program Management Unit.

Specific contracts will be signed with the different teaching/scientific institutions and NGO’s, to whom activities will be contracted out or with whom will be collaborated. It is proposed that the “Institut Francophone pour la Médecine Tropicale” (IFMT) plays an important role in surveys and in surveillance, as also in training. Other NGOs and their specific roles will be identified and formulated as appropriate.

5.9.2 The Lao Ministry of Health: Strategies and Organizational Charts

The Public Health Institutions of the Lao Ministry of Health will be responsible for the implementation most of the activities of the Resettlement and Regional Health Program. This section gives a short description on the MOH Strategies and their Organizational Structure.

According to the Ministry of Health’s “Health strategy up to year 2020” discussion paper, the major goal of the Lao PDR health sector is to “free the country from the state of underdevelopment by the year 2020 and ensure that all Lao people have access to health care services.” Health programs described within this chapter are developed in accordance with the six major directions for the Lao Ministry of Health by the year 2020:

- strengthen the ability of health care providers;
- improve community-based health promotion and disease prevention;
- improve and expand hospitals at all levels and in remote areas;
- promote and strengthen the use of traditional medicine with the integration of modern and traditional care, ensuring the quality, safety and rational use of food and drug;
- promote the operational health research; and
- ensure effective health administration and management, self-sufficient financial system and establish health insurance fund.

In coordination with these MOH defined directions, the “Lao Health Master Planning Study” report of November 2002 identifies the “Very High Priority Programs”. This study was conducted by the LAO MOH. It received technical assistance from and was funded by JICA. The activities proposed by the Resettlement and the Regional Health Program are broadly in agreement with these “Very High Priority Programs” (cf. infra)

List of Very High Priority Programmes (Short List)(MoH/ JICA 2001)

PLANNING AND MANAGEMENT

- (1) PM-1 Sector-Wide Coordination Programme
- (2) PM-2 Capacity Building Programme for Health Management and Health Information System

HUMAN RESOURCES DEVELOPMENT

- (3) HR-2 Programme for Improving Management, Allocation, and Motivation of Health Personnel
- (4) HR-3 Programme of Reforming Job Descriptions of Health Personnel, Organization of the Government Health Sector
- (5) HR-4 Programmes for Strengthening Regional/Provincial Education and Training Institutions for Health Workers
- (6) HR-5 Programme for Reformulating Nurse Education Policies
- (7) HR-9 Programme for Improving Quality of Teachers for Health Worker Education/Training
- (8) HR-10 Programme for Reformulating Medical Doctor Education Policies
- (9) HR-13 Textbook Development Programme for Nurse Education in Lao Language

HEALTH FINANCE

- (10) HF-1 Financial Management Improvement Programme for the Health Sector
- (11) HF-2 Programme for Reforming the Revolving Drug Fund and User Fee Systems

HEALTH EDUCATION

- (12) ED-1 Radio Broadcasting Programme for Health Education
- (13) ED-3 Programme for Promoting IEC Activities at District Hospitals

INFECTIOUS DISEASE CONTROL

- (14) ID-2 Programme of Improving Skills in Diagnosis & Care/Treatment of Infectious Diseases at District Hospitals and Health Centres
- (15) ID-4 Programme for Integrating EPI and Other Health Services
- (16) ID-6 Programme of Strengthening Control of HIV/AIDS and STDs
- (17) ID-7 Programme for Strengthening Malaria Control and other PHC Activities

PRIMARY HEALTH CARE

- (18) PH-1 Programme for Supporting the Operationalisation of the “Policy of Primary Health Care”
- (19) PH-2 Programme to Develop/Adapt Flexible Guidelines and Regulations for Strengthening District Health Systems based on the PHC Approach
- (20) PH-3 Programme of Implementing the PHC Approach to Strengthen District Health Systems

MATERNAL AND CHILD HEALTH

- (21) MC-1 MCH Networking and Coordination Programme
- (22) MC-2 Programme for Strengthening and Promotion of MCH
- (23) MC-3 Programme for Strengthening Family Planning

NUTRITION

- (24) NT-1 Programme of Developing a Core Organization for Providing Support and Oversight to Nutrition Activities
- (25) NT-3 Nutrition Information/Education Programme

HOSPITAL SERVICES

- (26) HS-1 District Hospital Improvement Programme
- (27) HS-2 National Programme for Strengthening Maintenance System of Health Facilities by Provincial Maintenance Units
- (28) HS-3 Hospital Management Improvement Programme

MEDICAL LABORATORY TECHNOLOGY

- (29) ML-1 Programme for Strategy Formulation and Capacity Building for Health Technology-Based Medicine

ESSENTIAL DRUGS

- (30) DR-2 Rational Use of Drugs Programme
- (31) DR-4 Village-Level Revolving Drug Fund (RDF) Programme

Figure 5-8: Organizational Chart of the Lao MOH (under revision by MoH)

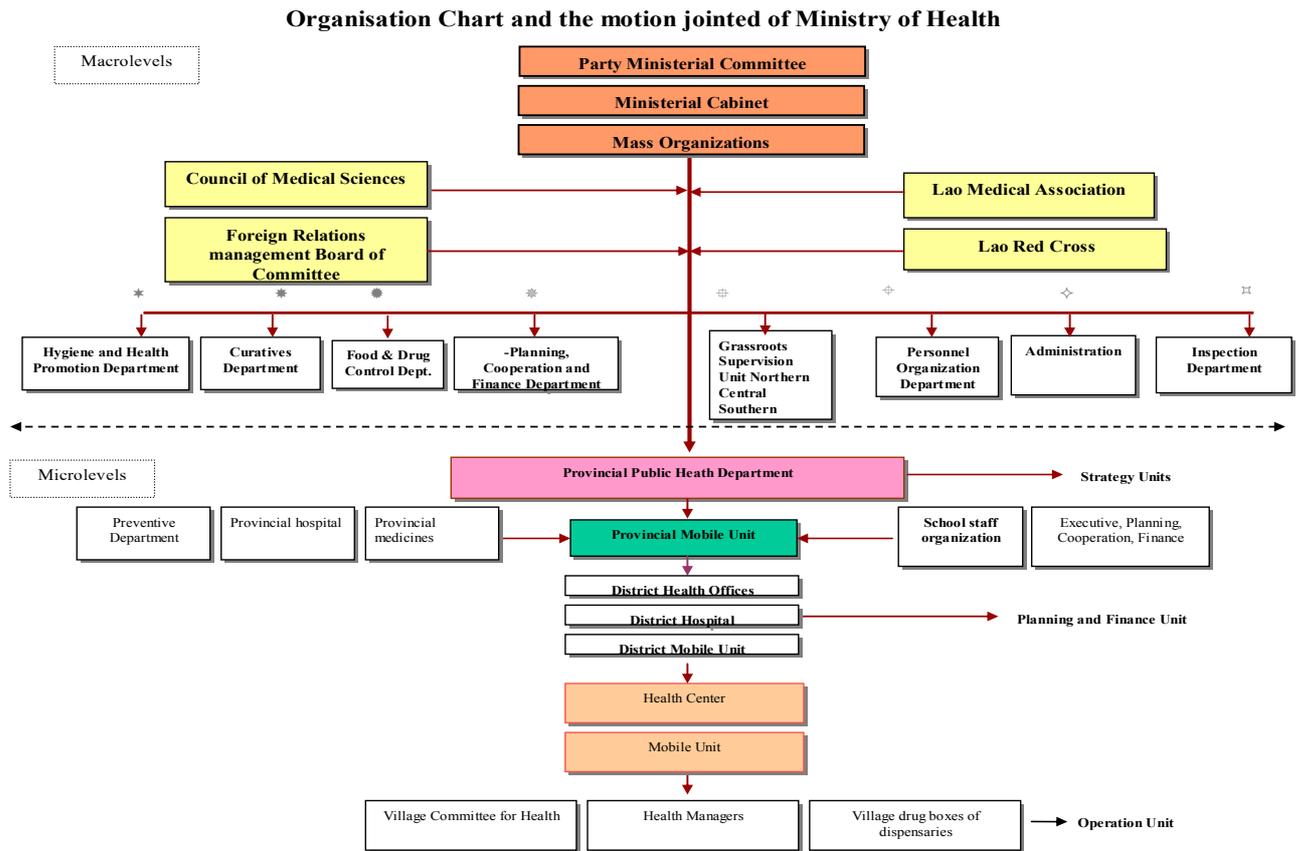
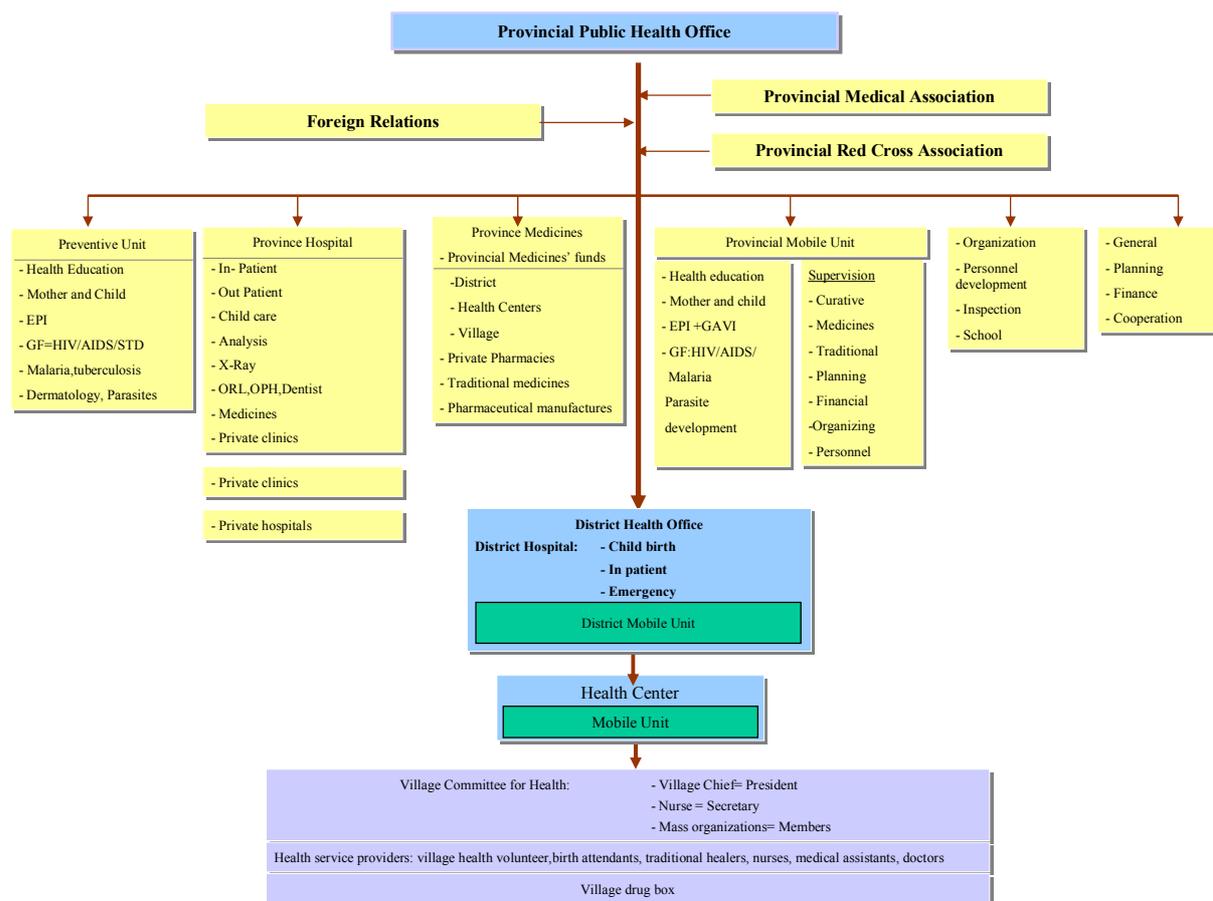


Figure 5-8 shows the overall organizational chart of the Lao MOH. Figure 5-9 shows the organizational arrangements from Provincial level down to Village level in more detail.

Chapter 3 of the “Lao Health Master Planning Study” Final Report November 2002 (JICA-MOH Lao), Volume 4 page 3-1 to 3-19, describes in detail the organization of the Lao health Sector.

Figure 5-9: Provincial to Village Level Organizational Arrangements (MoH revising)



5.9.3 Public Health Institutions in the NTPC Project Area

At present the District Hospitals of Nakai, Gnommalat and Mahaxay are typical examples of Lao District Hospitals. They are comparable to a Health Centre in many other countries. They provide outpatient and basic inpatient care with 10-15 beds, mother and child services. The District Health Office organizes, coordinates, and supervises the health services in the district and provides (limited) logistic support to the health facilities in the district.

Low utilization of health services in Lao PDR is a generalized problem. It is mainly due to poor quality of services offered, financial and geographical inaccessibility and traditional and cultural beliefs on health events.

A brief visit to the three DHs was not sufficient to allow evaluation of the quality of their services. It was however observed that Mahaxay DH was exceptionally clean for Lao standards and that most beds were occupied at the moment of the visit. This was not the case at Nakai and Gnommalat DH.

Thakhek provincial hospital, 62 km from the site of the planned Gnommalat municipality will receive most of the referred cases. For the moment it is having the capacity to deal with emergencies and most major surgical cases. It has an intensive care unit and a blood bank.

The following tables give some quantitative data on the different health institutions in the NTPC project area. As will be noted, Nakai has the highest number of health workers (VHV+TBA's) per 1000 population, while Gnommalat is also above the provincial average. Mahaxay, with only 3.6/1000, remains below the provincial average at 4.1/1000.

Table 5-35: Number of Health Institutions and Village Health Data by District

Khammouane Districts	Hosp. Level	PH beds	DH beds	No. HC	No. HC functioning	No. Villages	Poor Village	> 3 hrs to HC	VHV's	TBA's	Nr.health workers/1000 pop	Drug Kit
Thakhek	PH	150	26	13	12	141	0	8	220	64	3,5	15
Mahaxay	DH		15	6	6	89	69	31	91	11	3,6	33
Nongbok	DH		15	10	10	72	20	0	72	72	3,3	29
Hinboon	DH		15	17	17	166	13	22	87	36	2,0	34
Gnommalat	DH		15	5	5	71	57	58	71	71	5,5	42
Bualapha	DH		15	4	3	82	78	52	93	30	5,4	11
Nakai	DH		15	5	5	67	49	48	100	70	9,1	20
Xebangfay	DH		15	7	6	50	2	0	105	10	4,7	46
Xaybuathong	DH		15	4	3	68	61	52	66	66	7,1	5
Total		150	146	71	67	806	349	271	905	430	4,1	235

Data Source: PCU/MOH, Nam Saat/MOH, Dept, Food & Drugs/MOH

These data are extracted from the HSIP Baseline Survey Report which dates from March 2004. The sources of the data are reports from different MOH departments. The data themselves are describing situations in 2002 and 2003.

Table 5-36: Health Personnel of Khammouane Province for Project Districts

PERSONNEL	Personnel by Facility					TOTAL	Personnel by Districts					
	PHO	PH	DHO	DH	HC		Provincial	Thakhek	Mahaxay	Nongbok	Gnommalat	Nakai
Medical Staff												
Postgraduate level, higher	7	2				9	9					
University graduate level	13	30	6	11	3	63	43	2	2	4	1	2
Medical Doctor	5	27	6	7	2	47	32	1	1	3	1	2
Pharmacist	8	1		2	1	12	9	1		1		
Dentist		2		2		4	2		1			
Nurse						0	0					
Laboratory Specialist						0	0					
Middle-level	35	48	46	39	5	173	83	5	9	14	8	8
Medical Assistant	21	17	30	18	4	90	38	4	5	8	6	4
Nurse	1	4	4	6	1	16	5		1	4		1
Midwife						0	0					
Assistant Pharmacist	4	3	2	5		14	7		2			2
Assistant Dentist		4				4	4					
Physiotherapist		7	1	4		12	7			1		
Laboratory Assistant	3	9	3	6		21	12	1	1	1	1	1
Hygienist	5		4			9	5					
Prosthetics Assistant	1	4	2			7	5				1	
Low-level	34	99	100	84	104	421	133	50	23	50	28	16
Nurse	26	92	95	77	99	389	118	49	21	49	27	16
Midwife						0	0					
Laboratory Technician		3	1	1		5	3					
Pharmacy Technician	8	4	4	6	5	27	12	1	2	1	1	
Non-Medical Staff	13	19	13	3	41	89	32	2	7	2	5	10
University and Higher Level	1					1	1					
Middle Level		1	1			2	1				1	
Primary Level	4	6	4			14	10	1				1
Support Staff		6	1	2	4	13	6		2		1	
Contracted Staff	8	6	7	1	37	59	14	1	5	2	3	9
TOTAL	102	198	165	137	153	755	300	59	41	70	42	36

Data Source: Baseline Survey Report - Health Services Improvement Project- MOH/WB – March 2004

Further information on Service Delivery, Activities and Demography by district, institutions and programs for Khammouane, Bolikhamxay and for Xaybuli and Khantabuly District of Savannakhet Province can be found in Annexes 5-8, 5-9 and 5-10.

5.9.4 Organizations Supporting the Health Sector in the Project Area

Different Organizations are already active in Khammouane Province in the field of health and/or are planning different activities. A consultation meeting with several organizations was conducted by the taskforce at the MOH. The preliminary draft HIA and PHAP were shared with them. The following organizations and projects were present: HSIP, ADB-CRM, PSI, NCCA, JICA, UNICEF, SSO, WHO.

Afterwards the taskforce met some of the organizations on an individual base, collecting data on their actual and future projects.

The “Health System Improvement Project” will be active in different districts of Khammouane Province. The HSIP is a Lao Government Health Project, financed by an IDA Loan (World Bank). It will support the improvement of identified health institutions and health training institutions in 8 provinces of Central and Southern Lao PDR, and in Vientiane Municipality. Depending on need their support covers different aspects: civil works, equipment, capacity building, consumables and operational costs.

The MOH Steering Committee proposed that its planned support to Thakhek Provincial Hospital should remain. It was estimated at 568,000US\$ of Civil Works and 318,000US\$ of hospital equipment. This support is required for the improvement of departments whose well-functioning allows its role as a referral hospital.

The MOH Steering Committee decided to withdraw the proposed HSIP support to the construction and rehabilitation works of Mahaxay DH and Nakai DH. They requested the NTPC Health Program to be responsible for these works as both these institutions will play a major role in the implementation of the PHAP. The HSIP will shift this planned support to other Khammouane districts.

The HSIP plans to set aside limited funding for certain operational cost for Nakai, Gnommalat and Mahaxay Districts. These supports are conditional on specific requests, when no other funding is available. However, the HSIP is not yet effective (Oct’04) and that final appraisal is not planned before September 2005.

The Regional Health Program plans to rehabilitate the Gnommalat DH. Even so, Gnommalat is interested to get a new DH later as they will shift their municipality to a new site some 4 kilometre to the south.

At present Thakhek Provincial Hospital is receiving support from a French NGO “Amitié-Cooperation Franco-Laotienne” (ACFL). They have constructed and equipped the new surgical wing and also provide some of the required medical consumables. Several times a year French health professionals come to perform specific interventions and provide training. ACFL also grants scholarships for such longer term trainings. It could play a role in the development of the curative referral system for the NT2 project area, and also in the field of training. It is likely they will continue their support in the coming years, certainly till 2007. The Regional Health Program will provide funds for a requested training in emergency medicine, bacteriology and wound dressing (2 staff/topic – 6m period).

Most vertical health programs implemented in the project area are already receiving support from different international organizations.

Table 5-37: Support to Vertical Health Programs by Organization

Vertical Program Supported	Organization	Major types of Support
Extended Program of Immunization	UNICEF	Vaccines, operational costs
Malaria Control Program	Global Fund	IBN, Operational Costs, Trainings, Microscopes, Anti-Malaria drugs, etc
Tuberculosis Control Program	Global Fund, Damiaan Foundation	Anti TBC Medecine, Microscopes, Operational Costs, Trainings
Reproductive Health	UNFPA	Family Planning Medicines, operational costs, trainings, IEC
STI & HIV/AIDS control Program	ADB, Global Fund, PSI	Condoms, Social Marketing, IEC, STD Clinics

Some of these supports are countrywide while others are limited to specific provinces and districts. The inputs and support provided by these organizations is limited by their project periods and thus conditional to continuation and renewal of the country project or program.

The Resettlement and the Regional Health Program will depend on some of these inputs. For reasons of standardisation, continuity, feasibility and economics of scale it is preferable that supports like anti-

tuberculosis drugs medicine, condoms and family planning medicine continue to come from these organizations.

The Resettlement and the Regional Health Program will give important support to all vertical programs and this with the objectives of covering the increased demand as well as to improve the quality of service delivery. They will provide utility vehicles to the three focal Districts and motorbikes to the 6 target HCs. They will also provide funding for per diems and vehicle operation and maintenance in order to increase the number of integrated outreach activities.

Therefore the different organizational supports need to be evaluated on a yearly basis and should be considered during the yearly planning and budgeting exercise of districts and province for integration in their annual plans.

5.9.5 Critical Assumptions

As most of the activities are to be implemented by the Lao public health institutions the institutional development is an important underlying principle of the Resettlement and the Regional Health Program.

It is stated in many official documents, including those issued by the MOH that the main weakness of the Lao public health system lies in its human resources.

The following issues are regarded as the most important assumptions for the successful implementation of the Health Programs:

- The Ministry of Health assures the required staff both in number and by qualifications.
- The trainings provided are of a good quality. This includes the selection of the candidates, the content of the training to be problem based, the methodology to be as participative as possible.
- The Ministry of Health assures that the staff trained by the programs remain in the project districts.
- Staff of the local communities trained by the program are employed in the targeted institutions by the MOH.
- The language barrier between the health service providers and the resettled communities poses no problem.
- The preparative work (construction, rehabilitation, equipment, trainings) for the improvement of the Health Institutions should be finished before the commencement of the works and influx of workers.
- The Thakhek Provincial Hospital will continue to receive support from ACFL.
- The NTPC project area continues to get support in the field of Extended Program of Immunisation, Family Planning, Condoms and IEC on STI and HIV/AIDS, the Malaria, and Tuberculosis Control Program from the existing support organizations.
- The developed and applicable health and environmental regulations (road safety, sanitations, food hygiene, dengue control, waste management, dust control, etc.) are enforced and respected by the HCC, the workers, the camp-followers and the local communities.

5.10 SECTORAL HEALTH SUPPORT

5.10.1 Infectious Disease Detection System and Outbreak Preparedness

A very important aspect is the development of an **Infectious Disease Detection System and Outbreak Preparedness**. A big influx of people is expected, ± 4000 workers and between 8,000 and 16,000 camp-followers (families and service providers). Some 2,000 workers will be Lao, others will come from neighboring countries (China, Vietnam, Thailand, Cambodia), another and much smaller group will come from overseas countries such as Australia, France, Italy, South Africa, etc.

The project with the support of the Lao government will try to balance restrictive measures of movements of workers and camp-followers with organizational and preventive measures. Efforts will be made to educate and change behaviour on different risk behaviours (promiscuity, hygiene, IBN, etc.). The project will provide the required sanitary facilities and domestic water supplies. Workers could be screened for certain contagious diseases.

Nevertheless the risk of outbreaks of contagious or vector-borne disease is very real. There could be outbreaks of classical diseases as cholera, dysentery, malaria, dengue, etc. but also outbreaks of new emerging diseases such as SARS and bird flu.

Therefore the project will strengthen the National Center for Laboratory and Epidemiology's weekly reporting system consisting of 18 diseases. This improvement will consist of technical and financial support to the existing system in terms of training, monitoring and supervision work at all level of care. The reporting system is functioning at present from health center to district; and from district to provincial level and finally to the central level. An appropriate institution will be contracted to draw out a detailed plan and procedures at the start of the project, providing detailed response in an event of an outbreak. An outline of the Outbreak Response Preparedness is described in the section on "Monitoring and Surveillance".

A detailed Outbreak Response Strategy will be developed soon after FC and the start of the project. The strategy will cover all aspects of eventualities of an outbreak, the detailed plans to manage them and the agencies involved. The Strategy will be developed by experts (an academic institution) in the area in collaboration with HPMU, and the national and provincial officers connected with the project.

A fund will utilize flexible procurement procedures in order to allow emergency purchases of inputs required in case of an outbreak. Certain items will be purchased beforehand; they are protective clothing, rapid skin thermometers and dengue spraying equipment.

5.10.2 Water supply and quality

Populations on the Plateau, and along the receiving river, the Xe Bangfai, are worried that the water quality of the lake might deteriorate due to anaerobic fermentation of the organic matter and might render the lake water unusable for human consumption and other domestic uses as has happened after the filling of the Nam Ngum Reservoir.

Thus, in the Resettlement Area of the Nakai Plateau, the Project, through its resettlement infrastructure program, is responsible for:

- Provision of water-sources for the resettlement villages (see Volume 2 Chapter 11);
- Assuring that the water quality of these water sources is safe for domestic use and complies with national standards.

The Pilot village program is testing different approaches which will be replicated in the future resettlement villages if proven successful. They consist of rainwater collection at household level, and a piped water system originating in a new small reservoir (which will become part of the larger reservoir in the future) supplying filtered water to each group of three households (see Volume 2 Chapter 11 for design). The tap water is the only source of water during the dry season and originates from the lake. In case the water quality of the lake deteriorates to the extent that the filtration system cannot cope, then the tap water system will have to be replaced by village boreholes. However, the reservoir clearance program should avoid the occurrence of such poor quality water, and the pilot village lake is an example where much of the biomass was removed, and provides good water for the villagers.

In villages along the Xe Bangfai, the mitigation and compensation program (see Volume 3 Chapter 8) includes the replacing of any domestic water-sources affected by the Project with alternative water sources.

Terms of Reference for the "Water Quality Monitoring and Assessment Program" have been developed under the responsibility of the Environmental Monitoring and Management Plan (Sub-Plan 4). These TOR specify all aspects of the quality control of surface water, of ground water, of the existing domestic water sources and of domestic water supply systems developed by NTPC. It specifies the frequency of the

controls, the parameters to be checked, the sampling methodology, the reporting requirements. In case conductivity values are in excess of Lao Water Quality Standard, further investigation including major ion analysis will be undertaken.

The testing requirements are based on the GOL resolution No. 953/MoH, on International standards and on WHO Guidelines.

At present the national strategy on drinking water for rural villages is that everybody should boil its drinking water. The MOH is finalizing a new strategy document defining guidelines and specification for the construction of domestic and drinking water-sources. National Water Supply and Environmental Health Program published a strategy for rural water supplies and environmental health sector, setting up parameters and maximum values indicated in the Lao PDR²

In collaboration with the division of Nam Sahaat (clean water for villages) of the MOH, the SDP has agreed on standardized design and quality specifications for domestic water sources. The same exercise will be done for sanitary facilities, and so will need to be finalized before their actual construction.

The HPMU will collaborate with the RMU in monitoring the quality of the domestic water sources affected by the project and propose corrective measures if required.

5.10.3 Reproductive Health

Reproductive Health Issues are not grouped and presented in a separate list of planned activities but will be followed under MOH Maternal and Child Health program at village and health center levels.

The PHAP regards the following Reproductive Health Subgroups as important to the NT2 project:

- STI and HIV/AIDS;
- Safe Motherhood (antenatal care, normal deliveries, Emergency Obstetric Care, post natal care);
- Family Planning; and
- Health Education on the previous issues, including sexual education for adolescent.

Only for Sexually Transmitted Infections (STI) and HIV/AIDS has a specific group/ list of activities been developed.

Nevertheless all other aspects will be covered extensively through activities in the newly developed and the improved facilities and also through integrated outreach activities.

As for the other health issues most of the services will be offered through the public health institutions and NTPC will support the improvement and functioning of these institutions.

Gnommalat Improved District Hospital will be equipped and staffed to stabilise and refer critical patients including for Emergency Obstetric Care.

Both the Resettlement Health Plan and the Regional Health Plan propose many prevention and control activities in the field of Sexually Transmitted Infections (STI) and HIV/AIDS. As for other activities detailed planning and budgeting needs to be done on a yearly basis with the Health Districts and the Province in synchronization with their other activities. Many prevention and treatment activities are already taking place. The District Hospitals have newly equipped STI consultation rooms and their personnel have been trained in the syndromic treatment approach for STIs.

An important issue is that most STI patients are receiving treatment from private pharmacies rather than from the public health institutions. Officially the private pharmacies (type 2) are not entitled to prescribe treatment for STI cases; this is specified under the national guidelines. The project with MOH assistance will work with pharmacies in developing a more acceptable approach of providing treatment to those seeking STI treatment.

² National Water Supply and Environmental Health Program. A strategy for rural water supplies and environmental health sector, setting up parameters and maximum values indicated in the Lao PDR. MOH June 2004.

Population Services International (PSI), a NGO, is specialised in social marketing of condoms and public awareness campaigns. They are active already in the project area. The PHAP and the PSHP would benefit by further collaboration with PSI.

Condoms need to be made available at strategic spots such as restaurants and bars in addition to the pharmacies and public health services which are not accessible at night.

The STI and HIV/AIDS is regarded as a very important topic needing urgent attention. Therefore NTPC will support health education activities and condom promotion starting from September 2004. A rapid assessment fact finding mission will be carried out to assess the situation.

Antenatal and postnatal care will be assured through integrated outreach activities and at the ICHC and the DH.

Child birth assisted by a trained health worker will be encouraged and promoted.

The ICHC for the resettlement population will be receiving training and equipment. They will have a specific room equipped for antenatal care and deliveries. This will allow them to conduct normal deliveries and to transfer cases. Ambulance transfer of women in labour will be arranged through the DHO.

In case that Emergency Obstetric Care is required women will be referred to the DH of Nakai or to the Gnommalat Improved DH for assessment and transfer to provincial hospital. The transport will be assured by the utility vehicle of Nakai DH or the ambulance of Gnommalat.

The supported DHs and Gnommalat Improved DH will offer similar transfer and referral services to the non-resettlement population.

In the whole project area Family Planning Services are provided by the public health institutions (VHV level up to DH level). UNFPA is providing all contraceptives free of charge and has trained different levels of service providers. Funding until 2006 is secured by ADB, JICA and the Global Fund. Funding through 2006-2011 is secured by the UN Development Assistance Framework (UNDAF), catering to the needs of the 20 Least Developed Countries.

The country program responsible for the free provision of contraceptives started in 2002 and will end in 2006. Thereafter the GOL is requested to contribute to the cost of the contraceptive medicine. For the moment a lot of the funding for contraceptives is coming from JICA.

Health Education on the different Reproductive Health topics will be implemented through the already planned integrated outreach activities and specific health education activities.

UNFPA in collaboration with UNICEF and the Ministry of Education do have a pilot project on Education of Sexual Health and Reproductive Rights in certain primary and secondary schools of some provinces. In Mahaxay and Gnommalat three primary schools and one secondary school are supported through UNICEF. The teachers are trained in teaching a package which is called "Life Skills". NTPC will promote similar activities in the schools of the target populations notably those close to the construction site and work camps through the services of NGO's. One MOE official is to be trained to head the Provincial Drug Control Unit. This person will conduct IEC sessions in the target schools mentioned.

The HCC has a very important role to play in the control and prevention of STI and HIV/AIDS. The Owner's Requirements of the EAMP specify their obligations on screening for STI's and on health education activities. The Project Staff Health Plan will specify the required health activities in detail. As workers and camp-followers are now arriving in the area for the preparative construction works, the HCC has already started with health education plus condom promotion and distribution. Upon reception, all workers will be clinically checked for STI's, with Voluntary Counselling and HIV Testing available.

The different fields of reproductive health provided by public health professionals in the area will follow trainings as required. Staff at HC and DH level may e.g. receive intensive training in delivery practices.

NTPC's Project Staff Health Program and Public Health Action Program will work closely to link on common areas of programs. A number of education and awareness programs will be organized for construction workers and other employees in following programs:

- Specially designed program with company workforce on awareness and education on STIs and HIV/AIDS
- Education program for individuals during annual medical checks.
- Public events on World AIDS day (1st December) and Candle Light Night (Remembering people died of AIDS - May)
- Posters in prominent places
- Billboards in strategic points
- Toilet stickers of HIV/AIDS awareness
- Educational materials (pamphlets etc) on STIs and HIV/AIDS
- Programs for promotion 100% condoms use
- Regular checks for STIs for service women
- Education and awareness program for SW in and around workers' camps

The PSHP and PHAP will work with NGOs like PSI for expert advice in carrying out the above mentioned programs effectively.

5.10.4 Traditional Health Practices

Based on previous surveys and common knowledge it is assumed that the possible impact of the NT2 project on Traditional health practices will be limited to the Nakai Resettlement Population.

1. In the Xebangfai area the issue is regarded as not pertinent:
 - Baseline surveys in that area have shown that many people have shifted from traditional health practices to the use of modern medicine;
 - The current traditional health practices should not be influenced notably through the NT2 project (little impact on vegetation and curative public health services).
2. In the Nam Theun Watershed area the issue is not regarded as important:
 - The NT2 project will have little impact on the practice of traditional medicine. Neither flora nor fauna will be disturbed by the NT2 project. Therefore availability of ingredients will remain as before.
The accessibility to public health institutions and services would not change notably;
 - Within this remote area traditional health practices are still very important in comparison to the use of modern medicine.
3. For the Nakai Plateau population the possible impact of the NT2 project on their use of traditional health practices has been assessed:
 - The importance of traditional medicine has been assessed;
 - The plants and other sources for the ingredients of Traditional Medicine growing exclusively (or almost) on the Nakai plateau will be identified.

NTPC has conducted a preliminary study and has planned a complementary survey for 2005, to look in more detail at Traditional Health Practices on the Nakai Plateau. The first preliminary conclusion is that western (allopathic) medicine seems gradually to win the argument over the value of traditional medicine. This is certainly the case with the more magical practices, but even with herbal remedies. Only the elder and the remote now still seem to believe in it (see Annex 5-5).

The TOR of the full assessment include the following topics:

- Identification of the traditional health practitioners;

- Identification of the most common traditional health practices used;
- Identification of the ingredients for traditional medicine which are found (almost) exclusively in that area of the Nakai Plateau that will be flooded (ie, below 538 EL). The names of plants should be specified in Lao and Latin names, and if possible English;
- Specify their importance for the essential and common traditional health practices;
- Assess and specify whether these ingredients could be grown in a botanical garden (herbariums) in the resettlement area and whether there are special conditions for growing; and
- Describe the relative importance of traditional health practices as compared to modern medicine.

The project will work closely with Traditional Medicine Research Center to undertake surveys to identify the medicinal plants and other traditional practices used by settlers. Measures will also be taken if any unique plants are identified in the Nakai Plateau to be submerged, to relocate them.

5.10.5 Financial accessibility

The 3 concentration districts are amongst the poorest in the country. Nakai and Gnommalat Districts received a national poverty rating as very poor and Mahaxay as poor. Khamkheut district is also classified as very poor.

It doesn't need much explanation that financial accessibility will limit the utilization of the provided health services even if quality improves. Therefore the Resettlement and the Regional Health Program will try to assure financial accessibility for their target communities.

The Resettlement Health Program will reimburse direct health costs for the patients identified as poor. Such "Equity Funds" are financial schemes which compensate the health institutions for services provided to the poor. It will likewise fund the indirect costs incurred by the patient or their family (food, transport, opportunity costs). The Fund is managed by a third party (e.g. CARE) and as such insures the so called "purchaser-provider split". A more detailed explanation is found in Annex 5-3.

The HPMU will be responsible for the planning, the setting up and the supervision of the Equity Fund.

For resettlement health program, provision of medical services will be provided free of charge for the period of three years after relocation. For the period from three to six years after relocation, the Company will subsidize 50% of the medical services, after which medical services will be charged at the rate applicable in the rest of the country. The poor families will be identified and will continue to receive free health care through the Equity Fund. Poor families covered by the Regional Health Program can claim compensation for illness episodes agreed by the Fund management to be due to the Dam's impact.

Contingent on Mid-term Review recommendations, the health program could support the Districts with the development of Community Health Insurance.

5.11 RESETTLEMENT HEALTH PROGRAM

The **Objectives** of the Resettlement Health Programme are the following:

- To prevent and mitigate significant adverse health effects due to the resettlement;
- To improve the health situation of the local population.
- To build the capacity of the Public Health Institutions for addressing their target populations' needs

The projected **time frame** for the Resettlement Health Programme is 8 years. It will start 6 months prior to the expected day of the financial close. This will allow to prepare (capacity building, purchase of equipment, infrastructure works) and to be ready before the first resettlement takes place (see time frame for resettlement Table 5-38). It will also permit to provide certain health services to this population while they are still living in their old villages, as such reducing the burden of living in doomed villages. The program will end 5 years after the dam has started to operate. Continuous monitoring for long term effects might be required after the 10 year period.

Table 5-38: Time Frame Resettlement Activities

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
key Nakai Plateau Resettlement activities											
1 Establish Pilot Village	█										
2 Establish a 2nd Pilot Village (tentative)				█							
3 Topographic and soils surveys			█	█	█						
4 Consultations			█								
5 Detailed Resettlement Planning			█								
6 Relocation - village group 1					█						
7 Relocation - village group 2						█					
8 Livelihood development											
Develop irrigation: Nong Boua and Nam Pan only		█		█							
Develop irrigation systems									█		
Agriculture: rain fed						█	█	█			
Agriculture: irrigated									█		
Forestry		█		█				█			
Fisheries									█		
Construction related work				█							
Tourism and other services									█		

The prevention and mitigation activities will address the expected health effects identified in the Health Impact Assessment and are grouped by Environmental Health Area.

Most of the planned activities will be directly **implemented by** the public health institutions of the target areas at district and provincial level. Other activities as surveys, specific trainings, social marketing, and policy development will require the support of national health program departments at central level, non-governmental organisations and training institutions. Mass movement organizations such as Lao Women’s Union and Lao Youth Union will support health promotion activities.

Different aspects will necessitate inter-sectoral collaboration with schools, agricultural departments, road traffic police, drinking water provision and others. The detailed planning of this collaboration will be done during the initial phase of the implementation.

As most of the activities will be implemented by district public health institutions and programs, the Resettlement Health Program will put a lot of emphasis on improving their capacities in the required fields. This will include the following supports: human capacity building, development of management systems, infrastructure, equipment, transport, medicine and medical supplies, operational costs, technical assistance.

Most of the planned activities are included in the different vertical national health program policies. Therefore the Resettlement Health Programme will at District level facilitate and strengthen all national (vertical) health programs that are in place for Curative Care

- Malaria
- Dengue
- Tuberculosis
- Sexual Transmitted Infections
- HIV/AIDS
- Soil transmitted helminths
- Expanded Programme of Immunization
- Maternal Health Care
- Nutrition and micronutrients
- Sanitation
- Clean water supply
- Utilization of iodised salt
- Vitamin A distribution

The Project will follow the national programmes and will provide financial and advise in filling the gaps – training on HIS, regular supervision, completeness of routine data collection system. The program will

focus first on programmes that, if executed appropriately, are designed to mitigate the potential health impacts identified within this document.

Most of these programs are identified as “very high priority” in the JICA produced Lao Health Master Planning report of 2002 (Japan International Cooperation Agency (JICA) and Ministry Of Health, 2002).

For reasons of quality, continuity, effectiveness and efficiency the health institutions will implement most of the service delivery activities in an **integrated and comprehensive way**.

The “Health Services Improvement Project” developed a “Core Package of Services” by level of public health institution. Both the Resettlement and the Regional Health Programme will adopt this core package as the standard when supplying the targeted health institutions (HC, DH, Inter-DH).

The Resettlement Health Program will focus only on the “**Possible Impact Areas/Target Groups**”, PIA/TG #1, the “Plateau Resettlement Population”. There are ±5,700 persons coming from 17 villages which will be flooded. They will be resettled in 14 newly to be constructed villages and 1 pilot village (already constructed and in use) in the resettlement area along the Southern border of the future Nakai Reservoir. (See map 5-8) The activities of the Resettlement Health Programme will be **geographically** limited to this area in Nakai District (they will however cover the two villages of Khamkeuth District like Sophia and Namnian).

The health services of the resettlement population will be covered for by the Nakai District Hospital, by two to be constructed Health Centres and by integrated PHC outreach activities to their villages.

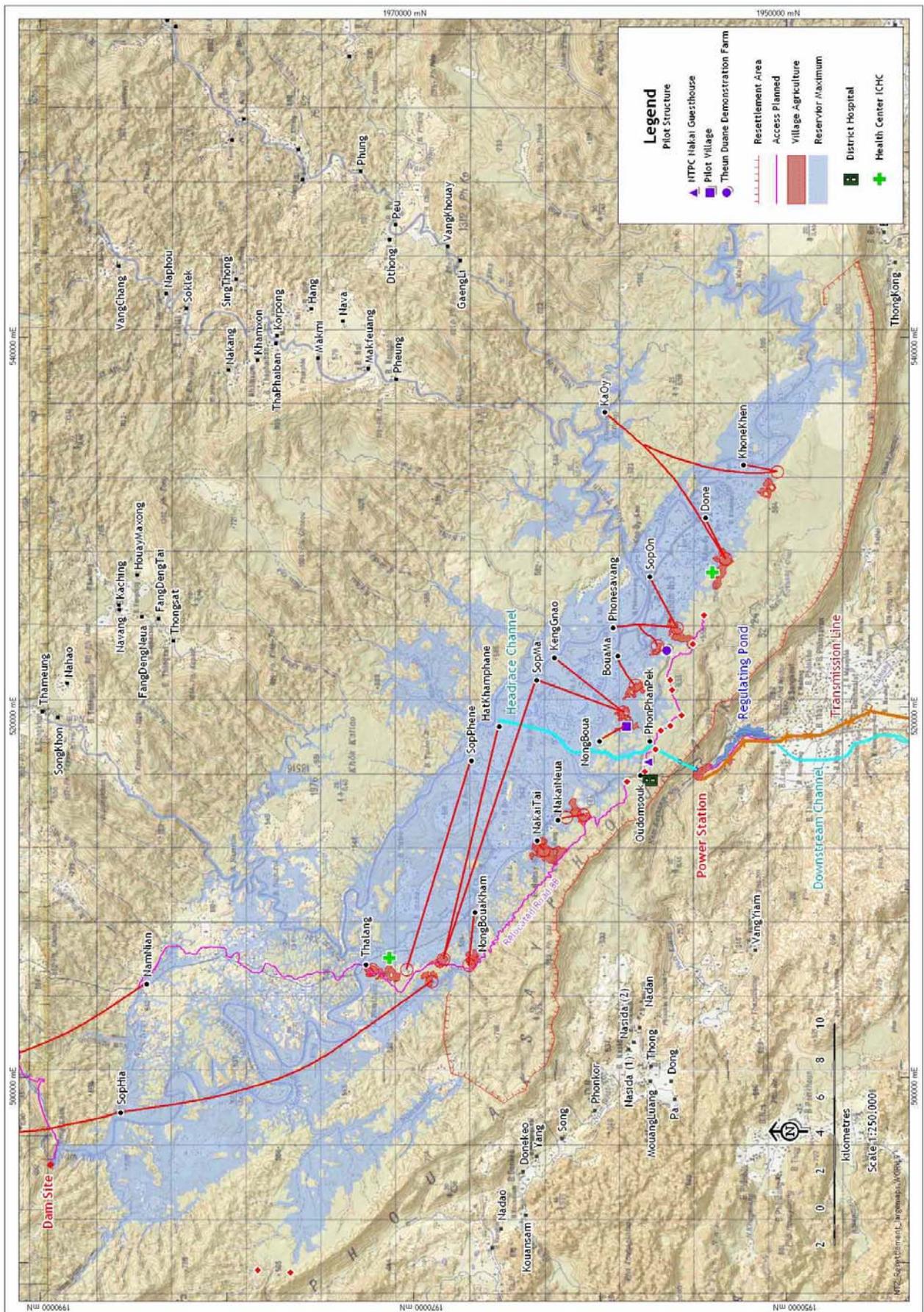
The precise site of implantation of the new HCs still has to be decided but is proposed to be close to the far end villages from the District Hospital. No resettlement villagers will have to travel further than 8 km to the nearest health facility. Initially the catchment population of this HC will be only around 1,000 persons. This might however increase fast when spontaneous resettlers will be attracted by different opportunities the lake will offer.

Nakai District Hospital will be rehabilitated and provided with all equipment required to offer the health services type B(cf. table 5.6).

Gnommalat Inter District Hospital will be the referral hospital offering the complementary health services as listed in the Core Package of Activities for District Hospitals. The programme provides an ambulance to Gnommalat Inter-DH and a utility vehicle to Nakai DHO and will fund the operation costs. Referral protocols and procedure need to be developed.

Though many persons of this target group belong to different ethnic minorities most of them do speak and understand enough Lao to communicate with the public health staff. The programme will train some 4-6 local persons as Primary Health Care workers, a 3 year training. They will be employed by the MOH to work in the 2 ICHC of the resettlement area. During selection of candidates ethnic minority languages skills should be one of the criteria. Certainly if observed that access to health services is hampered because of language.

Figure 5-10: The Plateau Resettlement Area and Implantation of Health Institutions



The 2 new resettlement HCs will be developed as **Integrated Community Health Centres (ICHC)**. ICHCs are providing the Minimal Package of Activities (MPA) in an integrated, comprehensive, continuous and accessible way. A detailed development plan has been developed by the “Health System Reform and Malaria Control Project (World Bank -BTC)” and covers the following aspects:

- Develop Active Community Participation through Zonal Health Committees
- Assure capable and motivated personnel speaking the local language (capacity building and motivation schemes)
- Provide required and adapted technical, administrative management and monitoring systems
- Develop a financing system assuring financial accessibility (balancing accessibility with sustainability through equity fund, community based health insurance)
- Conduct family census and introduce family files
- Assure required Infrastructure (buildings, water, sanitation electricity)
- Assure a steady supply of medical and non-medical consumables
- Provide required medical and non-medical equipment
- Provide transport for outreach activities and transfer of patients
- Provide operational funds
- Assure adequate support and supervision by DHO (PHO)

Financial accessibility will be guaranteed by the programme. Initially health services for recent resettlers (first 3 years) will be free of charge followed by a period of another three years at half the cost, other half being paid by the company. After that period poor families affected by the project works will be identified and receive free health care as well.

The programme will set up an “Equity fund” for reimbursing direct and indirect health costs for these groups. Equity funds are financial schemes which reimburse the institutions for services provided to the poor and fund some of the indirect costs incurred by the patient or their family (food, transport, opportunity costs). They are managed by a third party (NGO) as such insuring the purchaser-provider split. (For further information see Annex 5-3.)

Subject to mid-term review recommendations, the programme could support the District with the development of a Community Health Insurance.

Some of the villages which will be flooded will not shift before late 2007. The programme will support the delivery of health services to these villages through outreach. The situation of their domestic water sources will be evaluated. The programme will consider the construction of wells to certain of these villages given the importance of the water problem and the delay before resettlement (cf. Resettlement Infrastructure Development Plan /Chapter 11 in Volume 2).

5.11.1 Activities, Implementing Institutions, Specific Inputs, Indicators and their Sources

This section describes the different activities grouped by the EHA of this programme. All activities and supports are targeted at the resettlement population of the Nakai District Resettlement area.

The planned activities are listed in 9 groups, 8 for each EHA and 1 for support to the public health institutions and programs. The grouping by EHA results in some repetition of activities. It does however allow for cross-reference with the EHAs of the HIA and simplifies verification whether all possible adverse effects are covered by prevention and/or mitigation activities.

For each activity the institution(s) responsible for its implementation is (are) mentioned.

After each of the activity groups we will list the objective verifiable indicators and specific inputs required for those activities. As such too much repetition is avoided.

With specific inputs we mean those inputs which are required solely for that group of activities.

For each of the listed indicators the source is mentioned. Source “Special System” means that this information is not found in the HIS or WESR and needs to be retrieved from the registers or from a special collection system.

Respiratory Diseases (Resettlement Program)

Geographical location: Nakai Resettlement villages and Oudomsouk.

Promotion and Prevention	Implementing Institution
BCC on prevention and management of ARI and Tuberculosis (development and providing of adapted materials and implementation)	VHV, HC, DHO, PHO
Implement the national EPI program at the institutions and through outreach.	HC, DHO
Ensure that design of new housing constructed in resettlement areas have separate, ventilated kitchen areas	Resettlement Infrastructures Devt
Diagnosis and Detection	
Improve the Tuberculosis laboratory of Nakai DH diagnostic capabilities in a collaborative approach with the 3 Districts	DHO, PHO
Conduct contact tracing of all patients diagnosed with active TB through visits to the patient's village to interview and examine family members and close relatives	DHO
Sputum collection at HC level without required hospitalisation of the patients (in the 2 new Resettler ICHCs)	HC, DHO, PHO
Treatment	
Assure treatment of ARIs through the HCs and the DH	HC, DHO
Assure DOTS treatment at DH level	DHO
Pilot the DOTS treatment at HC level with support of the VHV	VHV, HC, DHO, PHO
Capacity building	
Provide training for health care providers regarding appropriate diagnostic and treatment protocols for respiratory diseases (Resource: Diagnosis and treatment in district hospitals, Ministry of Health in Lao P.D.R., 2nd edition, 2004)	Dept. Cur. Med., Central Hospitals, IFMT
Capacity building of the health care providers of the 3 districts and of the HCC after need assessment in the following domains: <ul style="list-style-type: none"> – National DOTS program (promotion, prevention, treatment, monitoring, program management) – Required laboratory skills – Behavioural Change Communication 	DHO, PHO, MOH central level
Monitoring and Surveillance	
Supervise compliance with diagnostic and treatment protocols for respiratory diseases (tuberculosis, upper respiratory infections) (Resource: Diagnosis and treatment in district hospitals, Ministry of Health in Lao P.D.R., 2nd edition, 2004)	DHO, PHO
Conduct Quality Control of BK laboratory examinations at the District Hospital	PHO
Conduct a KAP survey at the beginning of the operation including issues on ARI and Tuberculosis.	DHO, PHO, Specialised organisat.
Assure monitoring and surveillance of respiratory health covering ARIs and TBC through HIS and through vertical reporting system for TBC indicators	VHV, HC, DHO, PHO

Specific Inputs

- Anti-Tuberculosis Drugs
- Microscope and laboratory consumables for KB examination in District Laboratories

- Operational Cost for training and outreach activities related to the TBC Control Program.
- Vaccines and consumables for EPI

All inputs required for the TBC Control Program are funded by the Global Fund and the Damiaan Foundation. Vaccines and consumables for the EPI program are financed by UNICEF. Both groups of inputs are conditional to renewal of the country programs of those organisations.

Vector-related diseases (Resettlement Program)

Promotion and Prevention	Implementing Institutions
Conduct education programs regarding the prevention and treatment of Dengue (including the provision of health education materials on Dengue)	VHV, HC, DHO, PHO
Conduct village campaigns supporting the elimination of Dengue larvae breeding grounds	VHV, HC, DHO
Conduct education campaigns annually regarding the prevention and treatment of Malaria, more specifically on the use of Long-Lasting Impregnated Bed Nets (LLIBN)	VHV, HC, DHO, PHO
Assure 100% coverage by Impregnated Bed Nets (IBN) to all resettlement villages of Nakai District through provision and replacement of LLIBN	HC, DHO, PHO
Conduct IEC campaigns regarding the prevention of leptospirosis (only in case the leptospirosis proves to be an important cause of diseases (studies on fever of unknown origin)	HC, DHO, PHO
Develop and Implement waste management plans for all resettlement villages of Nakai District	EnvMonit&MngtPlan Sub-Plan 12
Diagnosis and Detection	
Assure Malaria Testing at HC and DH level (antigen test and/or microscopy)	HC, DH
Treatment	
Assure adequate malaria treatment at HC and DH level (considering parasite resistance)	HC, DH
Assure adequate management (not only treatment alone but also know how to manage/give advise to a sick person on proper care at their level of care) for Dengue Fever, Dengue Hemorrhagic Fever, Dengue Shock Syndrome and other disease with fever as presenting argument at HC and DH level (including transfer to PH if required)	HC, DH, PH
Capacity Building	
Provide training for health care providers regarding prevention strategies, and appropriate diagnostic and treatment protocols for malaria, dengue (DF, DHF, DSS) and other diseases with fever as presenting argument (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao P.D.R., 2nd edition, 2004) also for PH.	Dpt. Cur. Med., CMPE, IFMT
Capacity building of the health care providers of the Nakai district after need assessment in the following domains: <ul style="list-style-type: none"> – National Malaria and Dengue Control Programs (promotion, prevention, treatment, monitoring, program Management) – Required laboratory skills – Behavioural Change Communication 	PH, PHO, CMPE
Monitoring and Surveillance	
Conduct Quality Controls for laboratory examinations	DHO, PHO, CMPE
Supervise compliancy with established medical diagnostic and treatment protocols for Malaria, Dengue and other diseases with fever as presenting argument	DHO,PHO

Specific Inputs

- Dipsticks for Malaria detection
- Operational costs for malaria blood slide examination quality control
- Long Lasting Impregnated Bed Nets
- Operational cost for distribution of LLIBN

Some inputs for Malaria Control activities are provided by the Global Fund. During implementation detailed planning should avoid possible overlapping and coordinate activities. These inputs are conditional to renewal of the Global Fund country program.

Sexually Transmitted and Blood Borne Infections (Resettlement Program)

Promotion and Prevention	Implementing Institutions
Provide and implement BCC programs regarding STI/HIV-AIDs and prevention strategies (including provision of IEC materials)	HC, DHO, DCCA, PHO, PCCA, PSI
Implement comprehensive school-based HIV/AIDS and sex education programme	DHO, DCCA, PHO, PCCA
Implement the national guidelines/policy for the control of blood-borne pathogens (proper disposal of sharps, autoclave equipment, in house medical waste collection, destruction and storage)	HC, DH, DHO, PH, PHO, Dpt. Hyg.
Provide condoms and educate regarding use and disposal, targeting high risk groups. (Free of charge and/or through social marketing e.g. by contracting an NGO)	HC, DHO, PHO, PSI
Diagnosis and Detection	
Treatment	
Provide correct treatment for STIs through the HCs and the DH	HC, DH
Provide VCT and ARV therapy for seropositive resettler patients	MSF
Capacity building	
Educate concerned workers regarding hazards of medical waste handling and the uses of appropriate personal protective equipment.	DHO, PHO
Provide training for public health care providers (and private pharmacies) regarding prevention strategies, and appropriate diagnostic and treatment protocols for STI and HIV/AIDS	Dpt. Cur. Med., IFMT
Capacity building of the health care providers of the 3 districts and of the HCC after need assessment in the following domains: <ul style="list-style-type: none"> – National HIV/AIDS and STI program (promotion, prevention, treatment, monitoring, program Management) – required laboratory skills – HIV counselling – Behavioural Change Communication 	PH, PHO, PCCA, Savannakhet PH, MSF
Monitoring	
Supervise compliance with blood borne pathogens/infection control program	DHO, PHO, MOH
Supervise compliancy with established medical diagnostic and treatment protocols for curable STI's	DHO, PHO, MOH
Monitor blood borne pathogen exposure accidents	DHO, PHO

Specific Inputs

- DPT-Hepatitis B vaccines

- Condoms, VCT, ARV's
- Financing for school based education programs
- Finance PSI social marketing

Some inputs required for the HIV/AIDS and STI Control Program are funded by the Global Fund and an ADB project. During implementation detailed planning should avoid possible overlapping or gaps and coordinate activities. Vaccines and consumables (including Hepatitis B) for the EPI program are financed by UNICEF. Both groups of inputs are conditional to renewal of the country programs of those organisations.

Food, Soil and Water borne diseases (Resettlement Program)

Promotion and Prevention	Implementing Institutions
BCC on drinking water systems, treatment of water and family latrines based on the MOH water and environmental sanitation program (including the provision of health education materials)	DHO, PHO
BCC programs regarding fecal/oral transmission of diseases, and transmission of helminthic diseases (opisthorchis, trichinosis, cysticercosis, ascaris, pinworm, etc.) (including the provision of health education materials)	DHO, PHO
Provide domestic water sources (wells) to the old villages conditional to the seriousness of their water supply problem and the delay before resettlement	SDP, Infrastructural development program
Provide domestic water sources and sanitation to all households of the resettlement villages, complying with national standards and in coordination with Infrastructural development program	SDP, Infrastructural development program
Provide local markets with the following: 1) latrines, 2) waste receptacles and waste removal system 3) domestic water	EAMP
Include de-worming for children 2-6 during the integrated PHC activities	HC, DHO, PHO
Introduce and Implement the primary school deworming program	DHO, PHO
Diagnosis and Detection	
Assure laboratory diagnostic capabilities required for diagnosing food, water, and soil borne infections at DH level	HC, DH, DHO, PHO
Treatment	
Assure correct treatment of food, water and soil borne diseases at HCs and DHs	HC, DH
Capacity Building	
Capacity building of the health care providers after need assessment in the following domains: <ul style="list-style-type: none"> – National Water supply, Sanitation, food hygiene and Control of Diarrhoeal Diseases Programs (promotion, prevention, treatment, monitoring, program Management) – Required laboratory skills – Behavioural Change Communication 	DHO, PHO, MOH
Provide training for health care providers regarding prevention strategies, and appropriate diagnostic and treatment protocols for food, water and soil borne diseases (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao P.D.R, 2 nd edition 2004).	DHO, PHO
Monitoring and Surveillance	
Supervise compliance with established medical diagnostic and treatment protocols for food, water and soil related diseases (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao P.D.R., 2nd edition, 2004)	PHO
Monitor prevalence of water, food and soil borne infections through routine HMIS data and Surveys (see section on "Monitoring and Surveillance")	HC, DH, DHO, PH, PHO, MOH

Test water quality of villages receiving new domestic water sources by project, at hand-over of the well and later yearly	EAMP, PHO, MOH
Monitor water quality of surface and ground water in the NT2 area (standards EAMP)	EAMP

Specific Inputs

- Construction of latrines
- Construction of domestic water-sources
- Landfills
- Financing of BCC for food handlers
- Financing inspection and enforcement inspection visit for food handlers
- Financing school deworming program
- Financing operational costs for water quality inspections

Nutrition and micronutrients related issues (Resettlement Program)

Promotion and Prevention	Implementing Institutions
Conduct BCC regarding adequate nutrition choices to avoid malnutrition and micronutrient deficiencies (including the provision of IEC materials)	HC, DHO
Conduct BCC on correct child weaning and child feeding practices adapted to changed types of food (including the provision of IEC materials)	HC, DHO
Implement Vitamin distribution programs (vitamin A, Folic Acid, FeSu) for children and pregnant women	HC, DHO
Collaborate with local villagers to develop alternate sources of sustainable protein to replace potential losses of fish as a staple in the local diet	HC, DHO, Dep of Agriculture (Volume 3 Chapter 8)
Therapeutic Activities	
Assure correct management of malnutrition and micronutrient deficiencies at HCs and DH	HC, DH
Include severely malnourished children into village supplementary feeding programs	HC
Capacity Building	
Capacity building of the health care providers of the 8 districts after need assessment in the following domains: <ul style="list-style-type: none"> – National nutrition and micronutrient programs (promotion, prevention, treatment, monitoring, program Management) – Behavioural Change Communication 	PHO, Division of nutrition MOH,
Provide training for health care providers regarding prevention strategies, and appropriate diagnostic and treatment protocols for malnutrition and micronutrient deficiencies (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao P.D.R., 2004)	PHO
Monitoring and Surveillance Activities	
Supervise compliance with established medical diagnostic and treatment protocols for malnutrition and micronutrient deficiencies (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao P.D.R., 2004)	PHO
Detection and monitoring of nutrition status of "Children under Five" through integrated Primary Health Care Services (Growth monitoring)	HC, DH, DHO
Conduct nutritional assessment status through Growth Monitoring MCH programs in specific PIA/IG	HC, DHO

Specific Inputs:

- Fund for nutritional supplements for malnourished cases
- Vitamin A supplementation
- Ferro Sulphate and Folic Acid
- Nutritional Surveys

Vit A for children (6-59 months) and for postpartum women is financed by UNICEF. This support is conditional to renewal of the country programs of those organisations.

Accidents/injuries, chemical exposures and poisoning (Resettlement Program)

Promotion and Prevention	Implementing Institutions
Provide education programs regarding road safety, in collaboration with the Ministry of Transport, Construction Post and Communication (see Chapter 3 in EAMP)	MTCPC at District level, HIB, HCC, DHO, PHO
Provide education programs for electrical safety in the house, in collaboration with the MTCPC	PTCPC, HIB, DHO, PHO
Provide education programs on correct management of pesticides and fertilizers (see Chapter 3 and Annex M in EAMP)	DAFO, DHO, PHO
Treatment	
Provide first aid for mechanical and chemical traumas and poisoning at the HCs and DH	HC, DH,
Develop and maintain a referral system for cases requiring transfer	HC, DH, PH, DHO, PHO
Capacity building	
Provide training for health care providers regarding prevention strategies, and appropriate diagnostic and treatment protocols for accidents, injuries, chemical exposures and poisoning	PHO, PH, Vientiane Central hospitals
Monitoring and Surveillance	
Monitor number of cases of mechanical and chemical injuries and exposures through HMIS	HC, DH, DHO, PH, PHO
Supervise compliance with established medical diagnostic and treatment protocols for accidents, injuries, chemical exposures and poisoning	PH, PHO

Specific inputs

- Financing of different inter-sectoral BCC session
- Arrangements for the availability of transport for referral

Psychosocial Disorders (Resettlement Program)

Promotion and Prevention	Implementing Institutions
IEC in schools on substance abuses	DEO
BCC on mental health for villages	PHO
Coordinate with the Community Development components of the Project <ul style="list-style-type: none"> – Respect existing indigenous and ethnic institutions, culture and practices in all aspects of resettlement (village allocation, housing, labour, etc.) 	Resettlement Unit

<ul style="list-style-type: none"> – Organize community events (sporting, cultural, handicraft) in order to strengthen the social tissue in the new villages – Prevent uncertainties and stress through adequate information on the future through regular communication and consultation 	
Support the development and functioning of the District Committee for Drug Control	Resettlement Unit
Treatment	
Assure recognition of psychosocial problems at village level by VHV and HC.	VHV, HC
Assure recognition of psychosocial problems and limited treatment capacities at DH level and referral if required.	DH
Referral to Provincial Hospital	PH
Capacity building	
Provide training for health care providers (VHV, HC) regarding preventive strategies and appropriate diagnostic and treatment protocols for psychosocial problems.	Dpt. Of Psychiatry (Mahosot)
Provide training for resource person of the provincial drug control unit of the MOE (drug abuse education in schools)	National Committee for Drug Control
Monitoring and Surveillance	
Monitor the psychosocial situation through surveys	MOH, PHO, Dpt. Of Psychiatry (Mahosot)

Specific Inputs

- Psychotropic drugs at provincial level
- Support BCC in Schools
- Support District Committee for Drug Control

Cultural Health Practices (Resettlement Program)

	Implementing Institutions
Set up botanical garden/ herbarium with medicinal plants near Nakai DH and/or resettlers to grow medicinal plants near settlement	DHO, resettlement unit
Promote cultural sensitivity among hospital staff for traditional rituals (e.g <i>yu fai, sou khwan</i>)	DH, DHO, HPMU
Ensure BCC messages are congruent with ethno-medical frames of representing disease, cure and prevention.	HPMU, PHO
Assess and Monitor the Traditional Health Practices and the availability of ingredients of traditional medicines through specific baseline and follow up surveys.	MOH, PHO

Specific Inputs

- Design of cross-cultural health messages and materials
- Creation of Traditional Health Department
- Creation and maintenance of botanical garden

Support and Development of Public Health Institutions (Resettlement Program)

Comprehensive activities	Implementing Institutions
Development of 2 new resettlement HCs as Integrated Community Health Centres which are providing the Minimal Package Activities (MPA) in a integrated, comprehensive, continuous and accessible way	PHO, DHO

Develop Active Community Participation through Zonal Health Committees for 2 new HC	
Define catchment areas for the 2 ICHC and the DH in the new resettlement area	DHO
Creation of Zonal Health Committees	HC, DHO
Study tour for committee members to existing ICHC (Champone or Longxane)	HC, DHO, PHO,
Conduct family census and establish family file system.	HC, DHO
Monthly zonal Health Committee Meetings	HC, DHO
Provide required and adapted technical, administrative management and monitoring systems for 2 new HCs , DH and DHO	
Adapt ICHC management systems and required forms (see ICHC manual)	PHO + HPMU
Provide Training in application of new system	PHO + HPMU
Develop a yearly activity plan by institution	HC, DHO
Assure technical support and supervision	DHO, PHO, HPMU
Develop and introduce a financing system for 2 new HCs	
Developing partial financial independence through income revenue systems (DRF, fee paying, community health insurance,) and GOL	DHO, PHO, HPMU
Introduce and support a Equity Fund system for poor patients	DHO, PHO, HPMU
Initial cost recovery will be based on a DRF	DHO, PHO, HPMU
Develop a transparent cost-recovery system with flat fees once quality of services is acceptable	DHO, PHO, HPMU
Decide on development of community health insurance during mid term review	DHO, PHO, HPMU
Adapt ICHC accounting systems and required forms (see ICHC manual)	DHO, PHO, HPMU
Provide Training in application of new system	DHO, PHO, HPMU
Develop a yearly budget by institution	DHO, PHO, HPMU
Assure technical support and supervision	DHO, PHO, HPMU
Ensure that the 2 new HC and the DH have the required number of capable staff able preferably speaks the local language (capacity building and motivation schemes)	
Assure 3 professional health staff at the new HCs (1 MA, 2 nurses)	DHO, PHO
Provide package of training to HC staff on management of HC and different PHC programs and technical trainings (diagnosis and treatment, DRF management, planning, HC hygiene, HC nursing practices, maternal care, EPI, etc.)	PHO + HPMU
Study tour for staff from new HC and DHO to existing ICHC (Champone or Longxane)	PHO + HPMU
Practical training for ICHC staff - two one month training programs	PHO + HPMU
Training of DHO and DH staff will depend on training need assessment (see capacity building plan)	PHO + HPMU
Assure continuity of services	
Ensure 24 hours a day, 7 days a week services at the HC and DH (overtime allowance)	HC, DH
Assure integrated PHC outreach activities to villages	

1 day outreach in each resettlement village every 2 months (2 staff, from HC or DHO)	HC, DHO
Assure adequate support and supervision	
Support & supervision visit of DHO and DH by PHO 3 days monthly for team of 4 persons	PHO
Support & supervision visit of 2 new HC by DHO 3 days monthly for team of 3 persons per HC	DHO
Support & supervision visit of other HC by DHO 1 days monthly for team of 3 persons per HC	DHO
Infrastructure (building including sanitation, water, electricity)	
Construction of 2 new HCs in the resettlement area	NTPC, PHO, DHO
Construction of 6 Staff houses (3 for each new HC)	NTPC, PHO, DHO
Rehabilitation of District Hospital of Nakai	NTPC, PHO, DHO
Rehabilitation of District Health Office of Nakai	NTPC, PHO, DHO
Provide required medical and non-medical equipment 2 new HC and DH	
Provide Medical equipment and furniture for 2 ICHC (for list see ICHC development document)	PHO + HPMU
Provide Medical equipment and furniture for DH (need to be assessed)	PHO + HPMU
Provide Non-medical Equipment and furniture for 2 ICHC (for list see ICHC development document)	PHO + HPMU
Provide Non- Medical equipment and furniture for DH and DHO (need to be assessed)	PHO + HPMU
Provide vehicles for 2 new HC, DH and DHO	
Provide a motorbike to each of the new HC and to the DHO (outreach, supervision)	PHO + HPMU
Provide a motorbike for each ICHC	PHO + HPMU
Provide an utility vehicle to Nakai DHO (support, supervision, ambulance)	PHO + HPMU
Assure financing and steady supply of consumables and operational costs for 2 new HC and for DH	
Provide an initial stock of Drugs and medical supplies (DRF) for 2 HC and DH (purchase through PHO)	PHO
Provide annually a fund for operational cost (stationary, office material, cleaning material, electricity, water, telephone, meeting costs)	NTPC
Provide annually a fund for functioning and maintenance of the vehicles (motorbike, car)	NTPC
Provide annually a fund for functioning and maintenance of equipment and infrastructure	NTPC
Provide funds for outreach activities (other than integrated) 3 days for 2 persons per month per HC	NTPC

The HIS and activity reports will provide all **indicators** required to evaluate these activities.

5.12 REGIONAL HEALTH PROGRAM

5.12.1 Objectives, time frame, impact areas and general approach

The **Objectives** of the Regional Health Programme are the following:

- To prevent and mitigate significant adverse health effects resulting from the immigration of construction worker and construction camp followers; and
- To mitigate significant adverse health effects due to the construction works and increased traffic; and
- To prevent and mitigate significant adverse health effects resulting from changes of water levels and flows; and
- Improve the health situation of the local population.

The projected **Time Frame** for the Regional Health Programme is 4 years intensive with a following 5 years of monitoring and on-going assistance.. It will start at least 6 months prior to the expected day of the financial close. This will allow to prepare (capacity building, purchase of equipment, infrastructure works) so as to cope when big numbers of workers and camp-followers arrive. The program will end 5 years after the dam has started to operate. Continuous monitoring for long term effects might be required after the 10 year period.

During the first four years the program will emphasize on possible effects resulting from construction, construction related activities and from the concentration of people (workers and camp-followers). Afterwards the accent will shift to mitigation and monitoring of the possible adverse health effects resulting from the changes in water levels and qualities.

The mitigating activities will address the expected health effects identified in the Health Impact Assessment and are grouped by Environmental Health Area.

Most of the planned activities will be directly **implemented by** the public health institutions of the target areas at district and provincial level. Other activities as surveys, specific trainings, social marketing, policy development will require the support of national health program departments at central level, non-governmental organisations and training institutions. Mass movement organizations such as Lao Women's Union and Lao Youth Union will support health promotion activities.

Different aspects will necessitate inter-sectoral collaboration with schools, agricultural departments, road traffic police, Nam Papaa and others. The detailed planning of this collaboration will be done during the initial phase of the implementation.

As most of the activities will be implemented by district and provincial public health institutions and programs, the Regional Health Program will put a lot of emphasis on improving their capacities in the required fields. This will include the following supports: human capacity building, development of management systems, infrastructure, equipment, transport, medicine and medical supplies, operational costs, technical assistance.

Most of the planned activities are included in the different vertical national health program policies. Therefore the Regional Health Programme will facilitate and strengthen all national (vertical) health programs that are in place:

- Curative Care
- Malaria
- Dengue
- Tuberculosis
- Sexual Transmitted Infections
- HIV/AIDS
- Soil transmitted helminths
- Expanded Programme of Immunization

- Maternal Health Care
- Nutrition and micronutrients
- Sanitation
- Clean water supply
- utilization of iodised salt
- vitamin A distribution

The project will follow the national programmes and will provide financial support and advise in filling the gaps – training on HIS, regular supervision, completeness of routine data collection system). The program will focus first on programmes that, if executed appropriately, are designed to mitigate the potential health impacts identified within this document.

Most of these programs are identified as “very high priority” in the JICA produced Lao Health Master Planning report of 2002 (Japan International Cooperation Agency (JICA) and Ministry Of Health, 2002).

For reasons of quality, continuity, effectiveness and efficiency the health institutions will implement most of the service delivery activities in an **integrated and comprehensive way**.

The “Health Services Improvement Project” developed a “Core Package of Services” by level of public health institution. The Regional Health Programme will use this core package as a standard when HSIP is introduced nationally.

Objectives, time frame, impact areas and general approach

The Regional Health Program will focus mainly on the following “**Possible Impact Areas/Target Groups**”, as identified in the HIA:

- ❖ PIA/TG #2: Downstream Channel and Nam Kathang Area
- ❖ PIA/TG #3: Xe Bangfai Riparian Area
- ❖ PIA/TG #4: Transportation Corridor
- ❖ PIA/TG #5: Camp followers

Geographically the program will be active in 8 Districts and 3 Provinces. However support will concentrate on the three districts of Nakai, Gnommalat and Mahaxay. Here risks for important adverse health effects are highest. Most construction activities and camps of workers and camp-followers will be located there. In this geographical area we will find the following PIA/TG: PIA/TG #2: Downstream Channel and Nam Kathang Area; PIA/TG; PIA/TG #4: Transportation Corridor; and PIA/TG #5: Camp followers.

This area will also be affected by changes in water levels and quality.

In Khamkheut District the important health effects expected will be due to construction activities, increased road traffic and concentration of people. They will take place along road 8b near the Nam Theun dam construction site and near the camps of workers and camp-followers.

In the Districts of Xaybuli, Nongbok and Xebangfai the possible adverse health effects would be the result from changes in water levels and water quality in and along the Xebangfai river, the PIA/TG #3: Xebangfai Riparian Area. There will be no impacts before water discharge starts, this is planned to begin in the middle of 2009. In this area the Regional Health Program will limit its activities to:

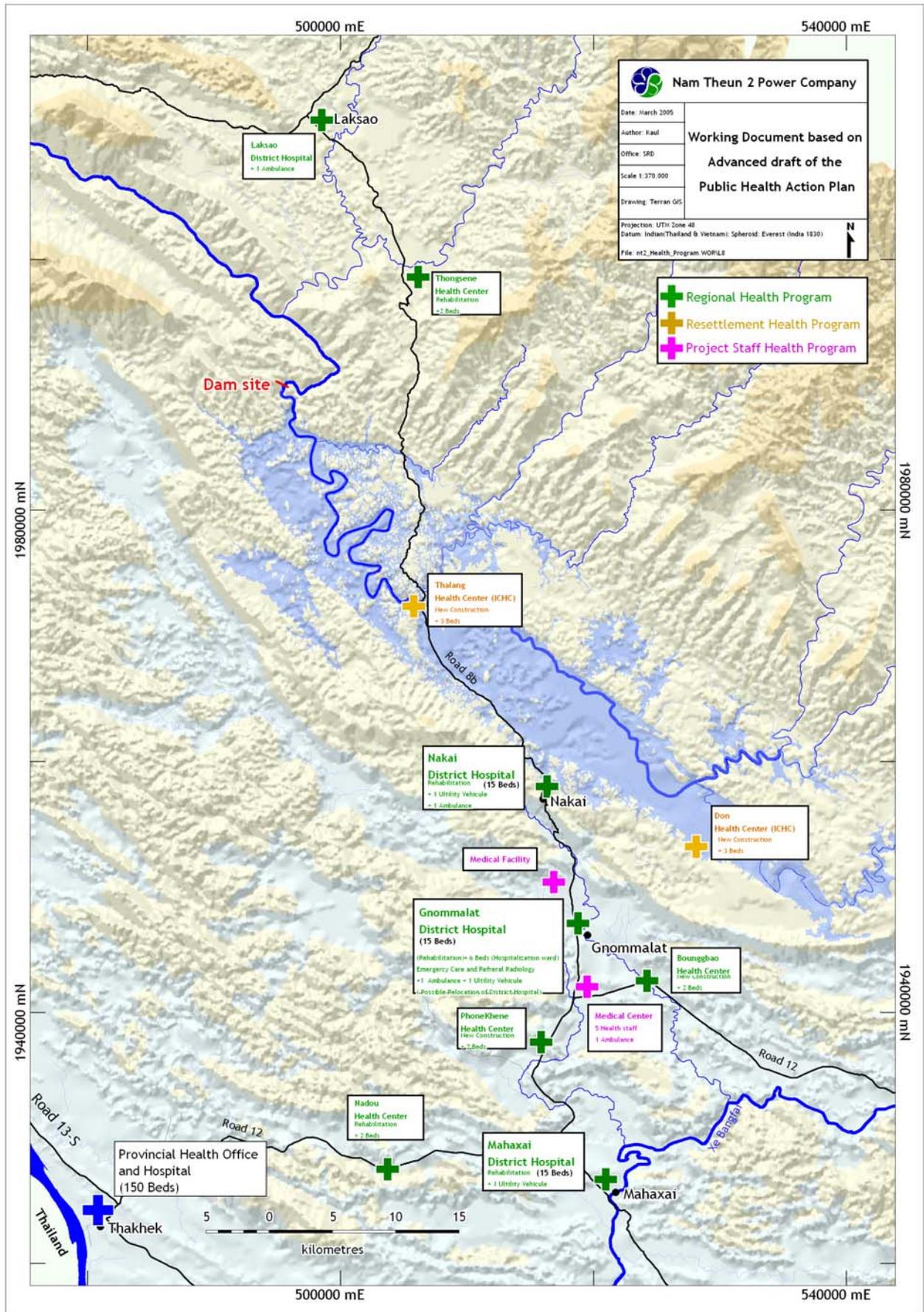
- constructing alternative domestic water sources for households and villages who lost their existing sources
- monitoring and surveillance of vector population possibly affected by the water levels
- monitoring and surveillance of nutrition status
- development of outbreak preparedness

It is expected that Thakhek District and municipality will have few adverse health effects directly resulting from the NT2 project. Some impact is to be expected due to increased road traffic and increased night live and social/sex activities in drink shops, night bars and guesthouses.

The major impact will come from the increased burden on the Provincial Hospital. The PH will play a major role as referral hospital for the Districts of Nakai, Gnommalat and Mahaxay. The PHAP therefore proposes to train additional staff in relation to trauma and communicable disease.

Due to the increased population and the increased health risks in the different EHA the demand for curative services in the project area will drastically increase. One of the major expected health problems will be injuries due to the construction works and increased road traffic. The biggest share of accidents/injuries and other diseases resulting directly and indirectly from the project are expected to happen in the districts of Nakai, Gnommalat and Mahaxay.

Figure 5-11: Location of 4 District Hospitals and Thakhek Provincial Hospital



At present all three district have **District Hospitals** with limited capacity offering mainly primary health care services. Officially they have 15 hospitalisation beds. They are classified as type B District Hospitals. Given the small size of the individual districts and the short distance to TKK this could suffice. However, in the context of the project, increased population and increased risk exposures, it will be necessary to develop in this area the following capacities:

- Emergency Care Unit, stabilization of injured patients prior to transfer;
- Intermediate surgical interventions (fractures, wound-suturing,) and Emergency Obstetric Care;
- Small stock of blood from Provincial Blood Bank for emergencies;
- X-ray facility

These services should be guaranteed on a continuous base, 24 hours a day, 7 days a week. Because this will demand an important number of staff with specific qualifications and because of the small size of the districts, only one of the DH should be chosen to be upgraded and offer these supplementary services. The other DH could keep the same package of activities but need to improve the quality of their services. They will offer the services as proposed in the “Core Package of Service for District hospitals Type B” by the “Health Services Improvement Project” (see list in Annex 5-4). The Regional Health Program in collaboration with other organization will provide the necessary support for those improvements (infrastructure, training, equipment, operational funds).

The ideal would be to build and develop a new Inter-District Hospital at the site for the new Gnommalat municipality. This would be the best location for a new upgraded hospital for the following reasons:

- It is central (17 km from Nakai, 12km from Mahaxay);
- The location of the biggest workers and camp-followers camp and near to the other camps;
- At the road junction of road 12 and road 8b.

At present however the district authorities have no concrete planning and timing for moving the town to the new site. At least for some years to come the biggest part of the population will continue to live near the existing DH.

We therefore propose that the Regional Health Program assumes the following tasks:

- Rehabilitate the existing DH;
- Develop a Intensive Care Unit (2-4 beds);
- Develop a Blood transfusion services (blood-bank, laboratory);
- Develop X-ray and ultrasound facilities;
- Develop an operation theatre assuring intermediate surgical interventions, including emergency obstetric care;
- Develop a New Hospitalisation Ward for 10 extra beds.

Certain patients will need referral. Depending on the type of services required the patient will be referred to Thakhek provincial hospital, Savannakhet provincial hospital, Vientiane Central Hospitals or a hospital in Thailand. The regional health program will support the development of a referral system (transportation (12 motorbikes, 3 utility cars and 3 ambulances), communication, referral protocols, operational funds, financing system).

Thakhek provincial hospital, 62 km form the site of the planned Gnommalat municipality will receive most of the referred cases. For the moment it is having the capacity to deal with emergency cases and most major surgical cases. It has an intensive care and a blood bank.

At present it relies on support it receives from a French organisation “Amitié-Cooperation Franco-Laotienne”. Their support includes new infrastructures, training, equipment and consumables. Apparently the good functioning of the hospital depends a lot on the ACLF support.

The proposed “Health Services Improvement Project” (World Bank loan) plans to finance 568,000US\$ of Civil Works and 318,000US\$ of hospital equipment. This support is required for the improvement of departments whose current proper functioning allows its role as a referral hospital.

Savannakhet Provincial Hospital, ±100 km south of Thakhek, has a bigger surgical capacity. It also has a CT scan. Certain cases could be referred there.

The **Nakhom Panom Provincial Hospital**, a Thai hospital is located just across the Mekong from Thakhek. They have a bigger medical and surgical capacity and also have a CT scan. They could play an important role for certain referral cases.

The Vientiane Central Hospitals and different Thai hospital will probably participate in the referral system. It is important that before the commencement of the works adequate referral protocols are developed.

As described above the **HCC** will be responsible to ensure the health and safety of the workforce

Another important aspect is the development of an **Infectious Disease Detection System and Outbreak Preparedness**. A big influx of people is expected, ± 4000 workers and between 8,000 and 16,000 camp-followers (families and service providers). Some 2,000 workers will be Lao, others will come from neighbouring countries (China, Vietnam, Thailand,...) and from distant places as Australia, France, Italy, South Africa, etc.

The project with the support of the Lao government will try to control movements of workers and camp-followers. Efforts will be made to educate and change behaviour on different risk behaviours (promiscuity, hygiene, IBN, etc.). The project will provide the required sanitary facilities and domestic water supplies. Workers could be screened for certain contagious diseases. Nevertheless the risk of outbreaks of contagious or vector-borne disease is very real. These could be outbreaks of classical diseases as cholera, dysentery, malaria, dengue, etc. but also outbreaks of new emerging diseases such as SARS and bird flu. Therefore the project plans to develop and support a provincial Infectious Disease Detection System and Outbreak Preparedness. The infectious disease detection system is described in the section “Monitoring and Surveillance”. Not knowing which diseases might cause outbreaks the programme will reserve an immediately accessible fund allowing for emergency purchases of inputs required in case of an outbreak. Certain items will be purchased preliminary, they are protective clothing, rapid skin thermometers and dengue spraying equipment.

5.12.2 Activities, Implementing institutions, specific inputs, indicators and their sources

This section will describe the different activities grouped by the EHA of this programme. For each of the EHA activity groups the geographical locations will be specified.

The planned activities are listed in 9 groups, 8 for each EHA and 1 for support to the public health institutions and programs. The grouping by EHA results in some repetition of activities. It does however allow for cross-reference with the EHAs of the HIA and simplifies verification whether all possible adverse effects are covered by prevention and/or mitigation activities.

For each activity the institution(s) responsible for its implementation is (are) mentioned.

After each of the activity groups we will list the objective verifiable indicators and specific inputs required for those activities. As such too much repetition is avoided.

With specific inputs we mean those inputs which are required solely for that group of activities.

For each of the listed indicators the source is mentioned. Source “Special System” means that this information is not found in the HMIS or WESR and needs to be retrieved from the registers or from a special collection system.

Respiratory Diseases (Regional Program)

In the districts of Nakai, Gnommalat and Mahaxay all activities will be supported.

In Khamkheut District the camp-followers, the villages near the workcamps and the transportation corridor will be covered by the promotional and preventive activities. The HCs responsible for those villages will benefit from the treatment, training and monitoring activities.

Promotion and Prevention	Implementing Institutions
BCC on prevention and management of ARI and Tuberculosis (development and providing of adapted materials and implementation)	VHV, HC, DHO, PHO
Implement the national EPI program at the institutions and through outreach.	HC, DHO
Diagnosis and Detection	
Improve the Tuberculosis laboratory diagnostic capabilities in a collaborative approach with the 3 Districts	DHO, PHO
Conduct contact tracing of all patients diagnosed with active TB through visits to the patient's village to interview and examine family members and close relatives	DHO
Treatment	
Assure treatment of ARIs through the HCs and the DH	HC, DHO
Assure DOTS treatment at DH level	DHO
Pilot the DOTS treatment at HC level with support of VHV	VHV, HC, DHO, PHO
Capacity building	
Provide training for health care providers regarding appropriate diagnostic and treatment protocols for respiratory diseases (Resource: Diagnosis and treatment in district hospitals, Ministry of Health in Lao P.D.R., 2nd edition, 2004)	PHO, PH
Capacity building of the health care providers of the 3 districts and of the HCC after need assessment in the following domains: <ul style="list-style-type: none"> – National DOTS program (promotion, prevention, treatment, monitoring, program Management) – Required laboratory skills – Behavioural Change Communication 	DHO, PHO, MOH
Monitoring and Surveillance	
Supervise compliance with diagnostic and treatment protocols for respiratory diseases (tuberculosis, upper respiratory infections) (Resource: Diagnosis and treatment in district hospitals, Ministry of Health in Lao P.D.R., 2nd edition, 2004)	DHO, PHO
Conduct Quality Control of BK laboratory examinations at District Hospitals	PHO
Assure monitoring and surveillance of respiratory health covering ARIs and TBC through HMIS and through vertical reporting system for TBC indicators	VHV, HC, DHO, PHO

Specific Inputs

- Anti-Tuberculosis Drugs
- Microscope and laboratory consumables for KB examination in District Laboratories
- Operational Cost for training and outreach activities related to the TBC Control Program.
- Vaccines and consumables for EPI

All inputs required for the TBC Control Program are funded by the Global Fund and the Damiaan Foundation. Vaccines and consumables for the EPI program are financed by UNICEF. Both groups of inputs are conditional to renewal of the country programs of those organisations.

Vector- and pest-borne diseases (Regional Program)

Geographical location:

In the districts of Nakai, Gnommalat and Mahaxay all activities will be supported.

In Khamkheut District the camp-followers, the villages near the work camps and the transportation corridor will be covered by the promotional and preventive activities. The neighbouring HCs workload will consequently increase. Monitoring and surveillance, and outbreak preparedness will cover all 8 Districts.

Promotion and Prevention	Implementing Institutions
Conduct education programs regarding the prevention and treatment of Dengue (including the provision of health education materials on Dengue)	VHV, HC, DHO, PHO
Spraying campaign against adult Aedes mosquitoes in case of Dengue outbreaks	DHO, PHO
Application of larvicide for dengue larval control in case Dengue outbreak	DHO, PHO
Conduct campaigns supporting the elimination of Dengue larvae breeding grounds	VHV, HC, DHO
Conduct education campaigns annually regarding the prevention and treatment of Malaria, more specifically on the use of Long-Lasting Impregnated Bed Nets (LLIBN)	HC, DHO, PHO
Assure coverage by LLIBN in all villages of the PIA/TG and for camp-followers in the district of Nakai, Gnommalat, Mahaxay and Khamkheut to complement the existing National Malaria Control Programme up to 12,500 LLIBNs	HC, DHO, PHO
Conduct IEC campaigns regarding the prevention of leptospirosis (only in case the leptospirosis proves to be an important cause of diseases (studies on fever of unknown origin))	HC, DHO, PHO
Develop and implement non-hazardous waste management plans for Gnommalat and Nakai Township such that: <ul style="list-style-type: none"> – Number of garbage cans and dumpsters provided are sufficient to hold accumulated garbage – Garbage is stored in rodent proof containers, and with tight fitting lids – Sanitary and solid waste is collected daily and covered daily with a solid layer of soil (15 - 30 cm) or incinerated to prevent insect and rodent access – Create landfills adequate to deal with the garbage of the different target populations 	See EAMP, SDP
Diagnosis and Detection	
Assure Malaria Testing at HC and DH level (antigen test and/or microscopy)	HC, DH
Treatment	
Assure adequate malaria treatment at HC and DH level (considering parasite resistance)	HC, DH
Assure adequate management (including treatment and how to manage/give advise to a sick person on proper care at their level of care) for Dengue Fever, Dengue Hemorrhagic Fever, Dengue Shock Syndrome and other disease with fever as presenting argument at HC and DH level (including transfer to PH if required)	HC, DH, PH
Develop rapid response preparedness for Dengue or Malaria outbreak (see infectious disease outbreak rapid response preparedness)	DHO, PHO, CMPE
Capacity Building	

Provide training for health care providers regarding prevention strategies, and appropriate diagnostic and treatment protocols for malaria, dengue (DF, DHF, DSS) and other diseases with fever as presenting argument (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao P.D.R., 2nd edition, 2004) also for PH.	PH, PHO
Capacity building of the health care providers of the 3 districts after need assessment in the following domains: <ul style="list-style-type: none"> – National Malaria and Dengue Control Programs (promotion, prevention, treatment, monitoring, program Management) – Required laboratory skills – Behavioural Change Communication 	PH, PHO, CMPE
Conduct training in dengue vector control, incl. use of insecticide and spray equipments for DHO and HC staff in case of outbreak	PHO, CMPE
Monitoring and Surveillance	
Develop and Implement a Dengue surveillance program (see Health monitoring and surveillance plan)	CMPE, CLE, PHO, DHO
Develop and Implement an Malaria surveillance program (see Health monitoring and surveillance plan)	CMPE, CLE, PHO, DHO
Supervise compliancy with established medical diagnostic and treatment protocols for Malaria, Dengue and other diseases with fever as presenting argument	DHO,PHO

Specific Inputs

- Dipsticks for Malaria detection
- Operational costs for malaria blood slide examination quality control
- Long Lasting Impregnated Bed Nets
- Operational cost for distribution of LLIBN
- Spraying machines for Aedes mosquito control (2 per district)
- Insecticides for Aedes spraying campaign
- Larvicides for Aedes larvae control

Some inputs for Malaria Control activities are provided by the Global Fund. During implementation detailed planning should avoid possible overlapping or gaps and coordinate activities. These inputs are conditional to renewal of the Global Fund country program.

Sexually Transmitted and Blood-borne Infections (Regional Program)

Geographical location:

In the districts of Nakai, Gnommalat and Mahaxay all activities will be supported.

In Khamkheut District the camp-follower camps, the villages near to the workcamps and the transportation corridor will be covered by the promotional and preventive activities, the HCs responsible of those villages will benefit from the treatment, training and monitoring activities. Monitoring and surveillance will take place in all 8 Districts.

Promotion and Prevention	Implementing Institutions
Provide and implement BCC programs regarding STI/HIV-AIDs and prevention strategies (including provision of IEC materials)	HC, DHO, DCCA, PHO, PCCA, PSI
Implement comprehensive school-based HIV/AIDS and sex education programme	DHO, DCCA, PHO, PCCA
Conduct annual provincial advocacy workshop on HIV/AIDS & STI prevention for project area authorities and health professionals, on policy, evolution and situation	DHO, DCCA, PHO, PCCA

Implement the national guidelines/policy for the control of blood-borne pathogens (proper disposal of sharps, autoclave equipment, in house medical waste collection, destruction and storage)	HC, DH, DHO, PH, PHO, Dpt. Hyg.
Implement Hepatitis B Vaccination of Children through the national EPI program (DTP + Hep B)	HC, DHO
Provide condoms and educate regarding use and disposal, targeting high risk groups. (Free of charge and/or through social marketing)	HC, DHO, PHO, PSI
Strengthen District STI services for education and awareness on STI and HIV/AIDS, including counselling. (existing STI clinic at DHs will be improved by providing intensive support and advise through regular training, supervision and supplies)	DHO, PHO, MOH
Conduct health checks on SW	PCCA, DCCA
Diagnosis and Detection	
Develop a mechanism for Voluntary Counselling and HIV testing in collaboration with the Provincial Hospital laboratory. (This activity already exist at Provincial Hospital in Thakhek in close collaboration with PCCA. The hospital currently receives support from ACFL (French NGO), will receive further support from the project and the HSIP/WB. in terms of supplies, human capacity building and infrastructure development).	DCCA, PCCA, PH
Treatment	
Provide correct treatment (to ensure that treatment given would be appropriate through the provision of regular training, supervision, supplies, ...) for STIs through the HCs and the DHs	HC, DH
Explore mechanisms (including improve and regulate treatment as well as to find out the proper mechanism to reach the goal) of involving private pharmacies (including type 3) in the treatment of STIs.	Private Pharmacies, DHO, PHO, MOH
Provide pre test and post test counselling (VCT)	DCCA, PCCA, PHO
Stock limited supply of blood from Provincial Blood Bank for emergency purposes.	Gnommalat DH, PH,
Capacity building	
Educate concerned workers regarding hazards of medical waste handling and the uses of appropriate personal protective equipment.	DHO, PHO
Provide training for public health care providers regarding prevention strategies, and appropriate diagnostic and treatment protocols for STI and HIV/AIDS (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao PDR, 2nd edition, 2004)	PCCA
Provide training for private health care providers and pharmacies regarding prevention strategies, and appropriate diagnostic and treatment protocols for sexually transmitted infections (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao PDR, 2nd edition, 2004)	PCCA, PH
Capacity building of the health care providers of the 3 districts and of the HCC after need assessment in the following domains: <ul style="list-style-type: none"> – National HIV/AIDS and STI program (promotion, prevention, treatment, monitoring, program Management) – required laboratory skills – HIV counselling – Behavioural Change Communication 	PH, PHO, PCCA, Savannakhet PH, MSF
Monitoring	
Supervise compliance with blood borne pathogens/infection control program	DHO, PHO, MOH

Supervise compliancy with established medical diagnostic and treatment protocols for curable STIs	DHO, PHO, MOH
Develop and Implement an STI, HIV/AIDS surveillance program based on the HIS (see Health monitoring and surveillance plan)	DHO, PHO, MOH, DCCA, PCCA, NCCA
Include private pharmacies in data collection on STIs	DHO, PHO, MOH
Monitor blood borne pathogen exposure accidents	DHO, PHO

Specific Inputs

- DPT-Hepatitis B vaccines
- Condoms
- Financing for school based education programs
- Annual provincial advocacy workshop
- Contract PSI for BCC and social marketing
- Arrangements for small stocks of Blood from Provincial Blood Bank

Some inputs required for the HIV/AIDS and STI Control Program are funded by the Global Fund and an ADB project. During implementation detailed planning should avoid possible overlapping and coordinate activities.

Vaccines and consumables for the EPI program are financed by UNICEF.

Food, Soil and Water borne diseases (Regional Program)

Geographical location:

In the districts of Nakai, Gnommalat and Mahaxay all activities will be supported.

In Khamkeut District the camp-follower camps, the villages near to the work camps and the transportation corridor will be covered by the promotional and preventive activities, the HCs responsible of those villages will benefit from the treatment, training and monitoring activities. Monitoring and surveillance will take place in all 8 Districts.

The newly provided domestic water-sources which are replacing the affected water sources in the Xe Bangfai riparian area will undergo regular water quality control; these villages will also receive health promotion activities.

Promotion and Prevention	Implementing Institutions
BCC on drinking water systems, treatment of water and family latrines based on the MOH water and environmental sanitation program (including the provision of health education materials)	DHO, PHO
BCC programs regarding fecal/oral transmission of diseases, and transmission of helminthic diseases (opisthorchis, trichinosis, cysticercosis, ascaris, pinworm, etc.) (including the provision of health education materials)	DHO, PHO
BCC on food sanitation awareness programs to local restaurants, open stall markets near construction camps followers areas	DHO, PHO
Conduct regular inspections enforcing compliance with national hygiene regulations for restaurants/food vendors/abattoirs in the district centres of Nakai, Gnommalat and Mahaxay, Project facilities and those providing to camp-followers and workforce.	DHO, PHO
Provide domestic water sources complying with national standards to villages/households whose water supply has been affected by the project, to be implemented by in coordination with Infrastructural development program	SDP, Infrastructural development program
Provide adequate sources of domestic water to camp-followers	(cf. Volume 2 Chapter 11)
Provide adequate pour-flush latrines within to camp-followers	(cf. Volume 2 Chapter

	11)
Provide local markets with the following: 1) latrines, 2) waste receptacles and waste removal system 3) domestic water	(cf. Volume 2 Chapter 11)
Introduce and Implement the primary school worm treatment program to PIA/TG group villages in Nakai, Gnommalat and Mahaxay	DHO, PHO
Diagnosis and Detection	
Assure laboratory diagnostic capabilities required for diagnosing food, water, and soil borne infections at DH level	HC, DH, DHO, PHO
Treatment	
Assure correct treatment of food, water and soil borne diseases at HCs and DHs	HC, DH
Develop a food or water borne illness outbreak response plan and investigation procedures, (see Infectious Disease Outbreak Rapid Response Preparedness)	IFMI, DHO, PHO, Dpt. Hyg.
Capacity Building	
Capacity building of the health care providers after need assessment in the following domains: <ul style="list-style-type: none"> – National Water supply, Sanitation, food hygiene and Control of Diarrhoeal Diseases Programs (promotion, prevention, treatment, monitoring, program Management) – Required laboratory skills – Behavioural Change Communication 	DHO, PHO, MOH
Provide training for health care providers regarding prevention strategies, and appropriate diagnostic and treatment protocols for food, water and soil borne diseases (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao P.D.R, 2 nd edition 2004).	PHO
Monitoring and Surveillance	
Supervise compliance with established medical diagnostic and treatment protocols for food, water and soil related diseases (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao P.D.R., 2nd edition, 2004)	PHO
Monitor prevalence of water, food and soil borne infections through routine HIS data and Surveys (see section on "Monitoring and Surveillance")	NCLE, HC, DH, DHO, PH, PHO, MOH
Test water quality of villages receiving new domestic water sources by project, at hand-over of the well and later yearly	EAMP,
Monitor water quality of surface and ground water in the NT2 area (see Water Quality Monitoring Plan in EAMP Chapters 3&6)	EAMP

Specific Inputs

- Construction of latrines
- Construction of domestic water-sources of affected Xebangfai villages
- Construction of domestic water sources and latrines for camp-followers
- BCC for food handlers
- Financing school deworming program
- Training of PHO Nam Sahaat for water quality inspection
- Provide required water testing equipment and consumables to Nam Sahaat PHO

Nutrition and micronutrients related issues (Regional Program)

Geographical location:

In the districts of Nakai, Gnommalat and Mahaxay all listed activities will be supported.

In Khamkheut, Xebangfai, Nongbok and Xaybuli Districts only Monitoring and Surveillance activities will be supported. However if the monitoring shows an increase in malnutrition or micronutrient deficiencies due to the project the NTPC will support the treatment of these cases.

Promotion and Prevention	Implementing Institutions
Conduct BCC regarding adequate nutrition choices to avoid malnutrition and micronutrient deficiencies (including the provision of IEC materials)	HC, DHO
Conduct BCC on correct child weaning and child feeding practices adapted to changed types of food (including the provision of IEC materials)	HC, DHO
Implement Vitamin distribution programs (vitamin A, Folic Acid, FeSu) for children and pregnant women	HC, DHO
Collaborate with local villagers to develop alternate sources of sustainable protein to replace potential losses of fish as a staple in the local diet	HC, DHO, Dep. of Agriculture
Therapeutic Activities	
Assure correct treatment of malnutrition and micronutrient deficiencies at HCs and DH	HC, DH
Provide supplementary feeding for malnourished children	HC, DH, DHO
Capacity Building	
Provide training for health care providers regarding prevention strategies, and appropriate diagnostic and treatment protocols for malnutrition and micronutrient deficiencies (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao P.D.R., 2 nd edition, 2004)	PHO
Monitoring and Surveillance Activities	
Supervise compliance with established medical diagnostic and treatment protocols for malnutrition and micronutrient deficiencies (Resource: Diagnosis and Treatment in district hospitals, Ministry of Health in Lao P.D.R., 2004)	PHO
Detection and monitoring of nutritional status of "Children under Five" through integrated Primary Health Care Services (Growth monitoring)	HC, DH, DHO

Specific Inputs:

- Nutritional supplements for malnourished cases
- Vitamin A
- Ferro Sulphate and Folic Acid
- Nutritional Assessments of all children under five
- Vit A for children (6-59 months) and for postpartum women is financed by UNICEF.

Accidents/injuries, chemical exposures and poisoning (Regional Program)

Geographical location:

In the districts of Nakai, Gnommalat and Mahaxay all activities will be supported.

In Khamkheut District the camp-followers, the villages near the workcamps and the transportation corridor will be covered by the promotional and preventive activities. The HCs responsible of those villages will benefit from the treatment, training and monitoring activities.

Monitoring and surveillance will take place in 5 Districts along the transportation corridor.

Promotion and Prevention	Implementing Institutions
Provide education programs regarding road safety	DTCPC HIB, DHO, PHO

Provide education programs for electrical safety in the home in collaboration with the DTCPC	DTCCPC HIB, DHO, PHO
Provide education programs on correct management of pesticides and fertilizers (see Chapter 3 and Annex M in EAMP)	DAFO, DHO, PHO
Treatment	
Provide first aid for mechanical and chemical traumas and poisoning at the HCs and DH	HC, DH,
At Gnommalat DH provide 24 hours a day: <ul style="list-style-type: none"> – Emergency Care Unit (2-4 beds) – Small stock of blood for emergency use from the Provincial Blood bank. – X-ray and ultrasound services – A facility to stabilize seriously injured/ill patient before referral to the Provincial Hospital 	DH, DHO, PHO
Develop and maintain a referral system for cases requiring transfer	HC, DH, PH, DHO, PHO
Capacity building	
Provide training for health care providers regarding prevention strategies, and appropriate diagnostic and treatment protocols for accidents, injuries, chemical exposures and poisoning	PHO, PH, Vientiane Central hospitals
Monitoring and Surveillance	
Monitor number of cases of mechanical and chemical accidents/injuries and exposures through HIS	HC, DH, DHO, PH, PHO
Supervise compliance with established medical diagnostic and treatment protocols for accidents, injuries, chemical exposures and poisoning	Dpt. Cur. Med., PH, PHO

Specific inputs

- BCC session
- Rehabilitation of Gnommalat DH
- Portable X-ray machine and table
- X-ray development equipment
- X-ray consumables
- Ultrasound machine
- Minor Surgical equipment (suction machine, anaesthesia, instruments, sheets,...)
- Small stock of blood from Provincial Blood Bank (Fridge)
- Ambulance 24hrs
- Operational budget for ambulance
- Emergency care equipment & furniture
- Emergency care consumables

Psychosocial disorders (Regional Program)

In the districts of Nakai, Gnommalat and Mahaxay all activities will be supported. Monitoring and surveillance will take place in 8 Districts along the transportation corridor.

Promotion and Prevention	Implementing Institutions
IEC in schools on substance abuses	DEO, DHO
BCC on psychosocial problems for villagers	DHO

Support the development and functioning of the District Committee for Drug Control	DO, HPMU
Treatment	
Assure recognition of psychosocial problems at village level by HC.	HC
Assure recognition of psychosocial problems and limited treatment capacities at DH level and referral if required.	DH, PH
Assure diagnostic and treatment capacity of PH Thakhek	PH
Capacity building	
Provide training for health care providers (VHV, HC, DH, PH) regarding preventive strategies, and appropriate diagnostic and treatment protocols for psychosocial problems.	PH
Provide training for resource person of the provincial drug control unit of the MOE (drug abuse education in schools)	PEO, PHO
Monitoring and Surveillance	
Monitor the psychosocial situation through special data collection	DHO, PHO

Specific Inputs

- Development of a psychosocial training curriculum for HC and DH staff
- Psychotropic drugs at Provincial Hospital
- Support BCC in schools
- Support District Committee for Drug Control

Cultural Health Practices (Regional Program)

Geographical location:

In the districts of Nakai, Gnommalat and Mahaxay all activities will be supported.

Promote cultural sensitivity among hospital staff for traditional rituals (e.g yu fai, sou khwan)	DH, DHO, HPMU
Ensure BCC messages are congruent with ethno-medical frames of representing disease, cure and prevention.	HPMU
Collaborate with Traditional Medicine Research Center for study of Traditional Health Practices in the region	DHO, PHO, TMRC

Specific Inputs

None

Support and Development of Public Health Institutions (Regional Program)

Geographical location:

For most support activities the locations will be mentioned. If not mentioned the support will address the institutions of Nakai, Gnommalat, Mahaxay covering the PIA/TG 1-4 and the HC of Khamkheut covering the camp followers and the surrounding villages.

This sector includes the support required for the development and functioning of a provincial management unit, responsible for planning, support, supervision and reporting.

Provide required and adapted technical, administrative management and monitoring systems for DH and DHOs	Implementing Institutions
Support improvement of management systems and required forms (see ICHC manual)	PHO + HPMU
Develop the procedures for the referral system	PHO + HPMU

Provide training in application of new systems	PHO + HPMU
Develop a yearly activity plan by institution	HC, DHO
Assure technical support and supervision	PHO + HPMU
Develop and introduce a financing system	
Developing partial financial independence through income revenue systems (DRF, feepaying, community health insurance,) and GOL	DHO, PHO, HPMU
Support a Equity Fund System for poor affected households	DHO, PHO, NTPC
Initial cost recovery will be based on a DRF	DHO, PHO, HPMU
Decide on development of community health insurance during mid term review	DHO, PHO, HPMU
Adapt accounting systems and required forms (see ICHC manual)	DHO, PHO, HPMU
Provide training in application of new system	DHO, PHO, HPMU
Develop a yearly budget by institution	DHO, PHO, HPMU
Assure technical support and supervision	DHO, PHO, HPMU
Ensure that the HC and the DH have the required number of capable staff	
Assure 3 professional health staff at each HCs (1 MA, 2 nurses)	DHO, PHO
Provide package of training to HC staff on management of HC and different PHC programs and technical trainings (diagnosis and treatment, DRF management, planning, HC hygiene, HC nursing practices, maternal care, EPI, etc.)	PHO + HPMU
Training of DHO and DH staff will depend on training need assessment (see capacity building plan)	PHO + HPMU
Assure continuity of services	
Ensure 24 hours a day, 7 days a week services at the HC and DH (incentive allowance)	HC, DH
Assure integrated PHC outreach activities to villages	
1 day outreach in each resettlement village every 2 months (2 staff, from HC or DHO)	HC, DHO
Assure adequate support and supervision	
Support & supervision visit of DHO and DH by PHO 3 days monthly for team of 4 persons	PHO
Support & supervision visit of HC by DHO 3 days monthly for team of 3 persons per HC	DHO
Infrastructure (building including sanitation, water, electricity)	
At Gnommalat DH construction of: <ul style="list-style-type: none"> – Room for X-ray services – Room for 2 bed Emergency Care Unit – Room for minor surgical cases 4 beds (will be included in the emergency unit) 	NTPC, PHO, DHO
At Mahaxay DH rehabilitation of existing hospital	NTPC, PHO, DHO
Rehabilitation and/or construction of the following HCs <ul style="list-style-type: none"> – Rehabilitation of Nadou HC (Mahaxay) – Construction of Phone Khene HC (Gnommalat) – Construction of Boungbao HC (Gnommalat) 	NTPC, PHO, DHO

– To be decidedHC (Khamkheut/Mahaxai)	
Provide required medical and non-medical equipment	
Provide medical equipment and furniture for HC (needs to be assessed)	PHO + HPMU
Provide medical equipment and furniture for DH (needs to be assessed)	PHO + HPMU
For Gnommalat DH provide equipment and furniture required for: <ul style="list-style-type: none"> – Portable X-ray unit – Small stock of blood from the Provincial Blood Bank for emergency cases – 2 bed Emergency Care Unit – Minor surgical service – Room for minor surgical cases 4 beds (will be include in the emergency unit) 	PHO + HPMU
Provide non-medical equipment and furniture for HC (needs to be assessed)	PHO + HPMU
Provide non- medical equipment and furniture for DH and DHO (need to be assessed)	PHO + HPMU
Provide office equipment and furniture for PHO/ NTPC health programme management unit.	PHO + HPMU
Provide vehicles	
Provide a motorbike to each of the covered HC and to the DHO (outreach, supervision), to be replaced after 5 years.	PHO + HPMU
Provide an ambulance vehicle, for ambulance use only, to Gnommalat DH covering the 3 districts, to be replaced after 5 years.	PHO + HPMU
Provide a utility vehicle to Mahaxay and to Gnommalat DHO (support, supervision, ambulance).	PHO + HPMU
Provide a utility vehicle to PHO TKK, for project support and supervision	PHO + HPMU
Assure financing and steady supply of consumables and operational costs (supplementary to regular GOL support)	
Provide an initial stock of Drugs and medical supplies (DRF) for HC and DH (purchase through PHO)	PHO, HPMU
Provide annually a fund for operational cost (stationary, office material, cleaning material, electricity, water, telephone, meeting costs)	NTPC
Provide annually a fund for functioning and maintenance of the vehicles (motorbike, 3 utility cars and 1 ambulance)	NTPC
Provide annually a fund for functioning and maintenance of equipment and infrastructure	NTPC
Provide funds for outreach activities (other than integrated) 3 days for 2 persons per month per HC	NTPC

The HIS and activity reports will provide the **indicators** required to evaluate these activities.

5.13 PROJECT STAFF HEALTH PROGRAM

While not part of this PHAP, it is worth noting the **Objectives** of the Project Staff Health Programme, which are:

- To ensure preventive and curative measures safeguarding health and safety of workers and their families; and
- To prevent and mitigate health effects due to construction works and the influx of project staff on the local population (communicable diseases).

There are overlapping areas where PSHP and Public Health Action plan will benefit from working together. Preventive measures for awareness and education for the workforce will be the joint areas of activity. Some of these activities are listed here:

- Specially designed program with company workforce on awareness and education on STIs and HIV/AIDS
- Education program for individuals during annual medical checks-up
- Public events on World AIDS Day (1st December) and Candle Light Night (remembering people who died of AIDS - May)
- Posters in prominent places
- Billboards in strategic points
- Toilet stickers of HIV/AIDS awareness
- Educational materials (pamphlets etc) on STIs and HIV/AIDS
- Programs for promotion of 100% condoms use for workers
- Regular checks on STIs of service women in PHAP areas will have an indirect effect on project staff.

The PSHP and PHAP will work with NGOs like PSI and MSF for expert advice and delivery of some services in carrying out the above mentioned programs effectively.

The draft plan of the Project Staff Health Program will be available by in November 2004. Annex L of the EAMP contains the Head Construction Contractor's Environmental Requirements, which includes the TOR for the Project Staff Health Program.

The HCC will provide health services to their workforce of 4,000 to 5,000 (PIA/TG#6). 2,500 to 3,000 of their workforce might be Lao while others will originate from regional and overseas countries. Whatever institutions they will use to provide these health services, Lao public health institutions or private dispensaries, HCC is obliged to make timely preparations.

The HCC is required to introduce his draft plan not later than 3 months before Commencement Date.

5.14 SURVEILLANCE AND MONITORING

5.14.1 Introduction

Surveillance and monitoring (S&M) is an integral and essential part of the Public Health Action Plan (PHAP). On the one hand, surveillance and monitoring consist of similar activities, including the systematic collection, analysis and interpretation of health data, and the dissemination of key findings to potential users and various stakeholders. On the other hand, there are important differences between the two activities. For example, surveillance is mainly used to describe continuously the health status of a population, thereby facilitating the detection of early severe health outcomes that can inform health policy and decision makers to implement appropriate interventions. In contrast, monitoring is used to follow-up a clinical and public health intervention with the aim to determine its efficacy and cost-effectiveness. In broad terms, monitoring consists of the systematic follow-up of input, process and output indicators of interventions, as well as the continuous recording of health outcomes. Another common ground of surveillance and monitoring is that outcome indicators of a monitoring system might also be subject to surveillance. It follows that the delimitation of the two activities is not always straightforward.

The importance of a well established and functioning S&M system can not be overestimated. It provides crucial information on the emerging adverse health problems and indicates when, how and where to intervene. In a broader sense it is a tool for health authorities to guide the investment of the resources available to the populations in need.

Moreover, in case of a non-expected magnitude of an emerging disease, S&M is an excellent tool that provides sound evidence to increase the budget needs, a crucial element to convince donor agencies for an increased support.

S&M also allows to measure the efforts undertaken by governments to mitigate adverse health outcomes, a most important outcome of this PHAP activity.

Unambiguous definitions of the indicators to be followed and reported are of major importance for an efficient and cost-effective surveillance and monitoring system. The current section presents the necessary background, definitions and information available to date.

Surveillance and Monitoring is so much of a crosscutting issue over the Health Programs that it is presented as a separate section covering all PHAP activities. Monitoring activities are not planned per Health Program. They do however have to be budgeted by the Resettlement and the Regional Health Program. A separate budget is presented in this section, but is already integrated in the Resettlement and the Regional Health program budgets under the budget line Monitoring and Surveillance. For its part, the PSHP has also budgeted to provide workers with initial and yearly follow-up health checks.

5.14.2 Objectives

The overall objective of the surveillance and monitoring (S&M) activity is to provide health information on the populations affected by the Nam Theun 2 (NT2) Project, related to dam construction, filling and subsequent operations, and to assess and quantify progress of the implementation of the public health actions (and interventions) executed. Therefore, regular and systematic collection, analysis, interpretation and dissemination of information on health, disease risk factors and public health actions are mandatory. The information collected must be available in a timely manner to health authorities and HPMU to facilitate adequate responses to emerging diseases and health risks. This is certainly the case for data related to outbreaks.

5.14.3 Strategies

The following strategies will be implemented:

1. Establish task force consisting of members of MOH, NTPC health office, health departments, IFMT/SWTI and other institutions responsible for the various activities of the S&M.
2. Establish new and support existing appropriate public health information collection systems and initiate and maintain a steady flow of information (from community to central level and backwards).
3. Initiate and implement appropriate response interventions.

5.14.4 List of Activities

- To establish the task force for S&M: define the members (MOH, NTPC health office, health departments and other institutions) and the role and responsibility of each member (MOH: overall responsibility; NTPC health office: executive secretary; departments and institutions to be defined).
- To define the meeting schedule of the task force (proposed: bi-annual; extra-ordinary meetings can be called in on request by MOH and NTPC health office).
- To strengthen the existing Infectious Disease Detection System managed by the National Center of Laboratory and Epidemiology
- To define surveillance and monitor indicators.
- To establish routine collection of public health data by re-enforcing existing routine data collection systems.
- To propose, plan and implement specific S&M surveys which complement and enhance routine data collection systems.
- To analyze, interpret and report surveillance data on a regular basis.
- To define and plan specific public health interventions addressing newly identified public health problems
- To inform the Outbreak Response Team when an outbreak emerges
- To initiate and monitor efficacy and cost-effectiveness of new public health interventions.

5.14.5 Description of Activities

A description of major S&M activities follows below. More details of these activities including objectives, description, timing, implementing institutions and preliminary budget are provided in the specific activity sheets in 5.12.7

Task Force: Objectives, members and main responsibilities

The objective of the task force is to plan and coordinate the implementation of all S&M activities. The following 10 members of the task force are proposed:

- Chair: Ministry of Health, Hygiene&Prevention: chair (= overall responsibility of all activities)
- Executive secretary: NTPC public health office: executive secretary (practical implementation of all S&M activities in collaboration with members of the task force and further institutions; reporting of activities)
- Members: CMPE, CLE, NSC, IFMT/SWTI, WHO and provincial health departments of Khammouane, Borikhamxay and Savannakhet.

The responsibilities are defined as follows:

- Chair:
 - o overall responsibility of S&M activities
 - o to chair task force meeting
 - o to facilitate S&M activities within the MOH
- Executive secretary:
 - o to establish agenda of task force meeting
 - o to propose plan of implementation of activities
 - o to provide information and feed-back on implemented activities
 - o to coordinate implementation activities between members of the task force
 - o to provide financial resources
 - o to facilitate S&M activities with NTPC
- Members of task force:
 - o to propose plan of implementation of activities
 - o to execute grass-root S&M activities
 - o to report on activities (including financial statements)
 - o to facilitate S&M activities within the institution
 - o to provide scientific and epidemiological support
 - o to provide feed-back information to health institutions

The task force meets bi-annually. Either the chair and/or its secretary are calling for a meeting. Extraordinary meetings can be called in by the chair or its secretary. Decisions are made based on majority of votes of partners present in the meeting. Chair and secretary have the right to veto task force decisions.

On the first task force meeting the exact roles and responsibilities of the task force meeting will be discussed and defined. More details of the planning of task force meeting is provided in 5.12.7.1.

The systematic collection of the routine S&M data will be a crucial and very time-consuming task and requires consistent monitoring. S&M will be managed by the HPMU.

Data Collection Sources

A comprehensive list of indicators to be followed has been established. The indicators are based on the recommendations of the Health Impact Assessment (HIA)³ and on the Public Health Action Plan (PHAP)⁴.

³ Nam Theun 2 Hydroelectric Project: Health Impact Assessment and Public Health Action Plan, March 22, 2004

⁴ Public Health Action Plan: List of Interventions established joined meetings MOH and NTPC head office. June 2004

It is the responsibility of the S&M task force to put in place an adequate data collection system. Mainly five data collection sources will be used: the Health Information System (HIS), the Weekly Epidemiological and Surveillance Report (WESR), the data from vertical programs such as Malaria, TB, Mother Child Health and HIV/AIDS. Additional demographic information will be available through the National Statistic Centre (NSC) which conducts national population surveys every 5 and 10 years. Where ever necessary, surveys on specific important health outcomes and risk factors will be conducted to complement the routine data collection. A summary description of the data sources is provided below.

Health Information System (routine data)

The Health Information System (HIS), currently in place has been operating since 1991⁵. It has continuously evolved over time. However, the system falls short in a number of areas, particularly in its completion, comprehensive analysis and feedback to the people who collect this data. The weaknesses lies at the grassroot levels where data collection takes place. These gaps will be addressed under the PHAP by HPMU. The MOH with the support from WB under HSIP plans to improve this system by replacing it with Health Management Information System (HMIS). Public Health Action Plan will adapt itself to take on board the system when it is implemented in the country.

Weekly Epidemiological Surveillance Report of CLE (WESR, Centre for Laboratory and Epidemiology)

The Weekly Epidemiological Surveillance Report (WESR) is a weekly reporting of cases and deaths of 18 target diseases (24 indicators). The information is telephoned or faxed by Monday and Wednesday from district to provincial and from provincial to central level, respectively. A bulletin in the form of summary tables is compiled, printed and distributed weekly. The data tables are stratified by diseases, provinces and new and cumulative cases and deaths. A list of diseases monitored is given below:

Notifications related to following diseases are reported:

(1) Acute Flaccid Paralysis, (2) Measles, (3) Neonatal tetanus, (4) Tetanus (all ages), (5) Diphtheria, (6) Pertussis, (7) Severe diarrhoea, (8) Dengue fever, (9) Dengue hemorrhagic fever, (10) Dengue shock syndrome, (11) Bacillary dysentery, (12) Amoebic dysentery, (13) Unspecified dysentery, (14) Food poisoning, (15) Typhoid, (16) Anthrax, (17) Unspecified Hepatitis, (18) Hepatitis A, (19) Hepatitis B, (20) Meningitis, (21) Encephalitis, (22) Plague.

The WESR is a routine activity performed by CLE under MOH. Systematic methodology is used and working procedures are in place. Currently, 64% of districts are satisfactorily providing the reports (Personal communication with Dr Phengta, Deputy Director, CLE). In common with HIS, weakness lies at the level of data collection and this will be addressed under PHAP by HPMU.

Sources of Vertical Programs (TB, Malaria, MCH, NCCA)

Various vertical national programs such as the malaria control program, tuberculosis, mother-child-health (MCH) program and the National Centre for the Control of AIDS (NCCA) are collecting their specific data on a routine basis. Quality of data collected and collated is good but completeness and timely collection of data can be improved. This information complements information of the HIS, WESR and the NSC. Therefore, it will be important that information is routinely collected from district level for these programs.

Population Surveys of the National Statistic Centre (NSC)

At the national level health and demographic information is collected by the National Statistic Centre (NSC). The NSC has the mandate to perform a Reproductive Health Survey every 5 years (last survey conducted in 2000, next survey is due in 2005) and a national census every 10 years (next survey is due 2010). This is information which will be taken into account for the surveillance of the public health status of the NT2 affected populations.

⁵ HIS Guidelines approved by Ministry of Health, 6th May 1991

Surveillance and Monitoring Surveys

Wide ranging information is already available on the nine environmental health areas from a number of surveys conducted during HIA. A variety of other studies conducted in the past five years or so is also available on a number of diseases for the project area. Additional surveys will only be conducted in areas where important information is missing. It must be borne in mind that surveys are expensive and time consuming and require lengthy periods of planning by experts in the field. Routinely collected data can provide adequate information for S&M.

Mid-term Survey

Mid term survey will be carried out early part of 2009 and planning will start in later part of 2008. This will be a well-planned survey which will be contracted out to an institution with an experience of carrying out big surveys. The survey will include both resettlement area as well as the communities covered by the regional program. The survey will provide assessment of health of the people living in the areas and possible effects of the construction of the dam on their health. The survey findings will identify specific effects of the project on the populations and make recommendations for the possible solutions.

5.14.6 Baseline Disease Indicators

Important health indicators are listed in the following table:

Table 5-39: Main PHAP Recommended Disease Indicators

No.	Indicator	Health Area	Covered by	Status	Plans
Demographic Indicators					
1.	Total births/year	General	Administrative	Ongoing	Strengthen System
2.	Total deaths/year	General	Administrative	Ongoing	Strengthen System
3.	Total population	General	Administrative	Ongoing	Strengthen System
4.	Male population	General	Administrative	Ongoing	Strengthen System
5.	Female population	General	Administrative	Ongoing	Strengthen System
6.	% of children <1 year old	General	Administrative	Ongoing	Strengthen System
7.	% of children <5 years old	General	Administrative	Ongoing	Strengthen System
8.	% of people between 5-14 years old	General	Administrative	Ongoing	Strengthen System
9.	% of people 15-44 years old	General	Administrative	Ongoing	Strengthen System
10.	% of people >45 years old	General	Administrative	Ongoing	Strengthen System
11.	No of villages	General	Administrative	Ongoing	Strengthen System
12.	No of households	General	Administrative	Ongoing	Strengthen System
Children Under Five					
1.	Crude Birth Rate/1000 population	MCH/General	HIS	Ongoing	Strengthen System
2.	Still Birth Rate/1000 births	MCH	HIS	Ongoing	Strengthen System
3.	Neonatal Mortality Rate/1000 live births	MCH	HIS	Ongoing	Strengthen System
4.	Infant Mortality Rate/1000 live births	MCH	HIS	Ongoing	Strengthen System
5.	Under 5 Mortality Rate/1000 live births	MCH	HIS	Ongoing	Strengthen System
6.	No of death due to malaria	MCH	HIS/WESR	Ongoing	Strengthen System
7.	No of death due to dengue	MCH	HIS/WESR	Ongoing	Strengthen System
8.	No of death due to severe diarrhea	MCH	HIS/WESR	Ongoing	Strengthen System
9.	% BCG Immunized	MCH	HIS/WESR	Ongoing	Strengthen System
10.	% Polio Immunized	MCH	HIS/WESR	Ongoing	Strengthen System
11.	% DPT Immunized	MCH	HIS/WESR	Ongoing	Strengthen System
12.	% Measles Immunized	MCH	HIS/WESR	Ongoing	Strengthen System
13.	% Hepatitis B Immunized	MCH	HIS/WESR	Ongoing	Strengthen System
14.	% Low Birth Weight <2500 Gms	MCH	HIS	Ongoing	Strengthen System
15.	% Severe malnutrition – Wt for Ht/age	MCH	HIS	Ongoing	Strengthen System
16.	% Moderate malnutrition	MCH	HIS	Ongoing	Strengthen System
17.	% Children <5 treated for Worms	MCH	HIS	Ongoing	Strengthen System
18.	% of Children 5 to 9 treated for Worms	MCH	HIS	Ongoing	Strengthen System
Women 15-44 (Reproductive Age)					
1.	% Localities with total women 15-44 population	MCH/General	HIS	Ongoing	Strengthen System
2.	% Localities calculate expected births	MCH	HIS	Ongoing	Strengthen System
3.	% Pregnant Women attending ANC 1+	MCH	HIS	Ongoing	Strengthen System
4.	% Pregnant Women attending ANC 4	MCH	HIS	Ongoing	Strengthen System
5.	% TT Immunized Pregnant Women	MCH	HIS	Ongoing	Strengthen System
6.	% Pregnant Women received Worm Treatment (2 nd Trimester)	MCH/General	HIS	Ongoing	Strengthen System
7.	% Pregnant Women Received Fe+Fol as supplement	MCH	HIS	Ongoing	Strengthen System
8.	% Pregnant Women Screened for Anemia	MCH	HIS	Ongoing	Strengthen System
9.	% Hb Below 8gm/% during pregnancy	MCH	HIS	Ongoing	Strengthen System
10.	% Receiving Supervised Delivery	MCH	HIS	Ongoing	Strengthen System
11.	% Required Assisted Birth	MCH	HIS	Ongoing	Strengthen System
12.	% of assistance at delivery by trained health workers	MCH	HIS	Ongoing	Strengthen System

13.	% of assistance at delivery by untrained health workers	MCH	HIS	Ongoing	Strengthen System
14.	% Referred to hospital for complications	MCH	HIS	Ongoing	Strengthen System
15.	% Caesarian Section deliveries	MCH/General	HIS	Ongoing	Strengthen System
16.	No. Maternal Deaths and cause- Register	MCH	HIS	Ongoing	Strengthen System
17.	% Women Practicing Family planning	MCH	HIS	Ongoing	Strengthen System
18.	% Male Practicing Family Planning	MCH	HIS	Ongoing	Strengthen System
19.	% of Contraceptive users on Depo	MCH	HIS	Ongoing	Strengthen System
20.	% of Contraceptive users on Pill	MCH	HIS	Ongoing	Strengthen System
21.	% of Contraceptive users on IUD	MCH	HIS	Ongoing	Strengthen System
22.	% of PNC within first week of birth				

No.	Indicator	Health Area	Covered by	Status	Plans
Diseases Notification					
1.	No of Measles cases reported	MCH	HIS/WESR	Ongoing	Strengthen System
2.	No of Whooping Cough cases reported	MCH	HIS/WESR	Ongoing	Strengthen System
3.	No of Neonatal Tetanus	MCH	HIS/WESR	Ongoing	Strengthen System
4.	No of other Tetanus cases reported	MCH/General	HIS/WESR	Ongoing	Strengthen System
3.	No of Malaria Cases reported	Malaria	HIS/WESR	Ongoing	Strengthen System
5.	No of death due to Malaria	Malaria	HIS/WESR	Ongoing	Strengthen System
6.	No of Dengue Cases reported	Malaria	HIS/WESR	Ongoing	Strengthen System
7.	No of death due to dengue	Malaria	HIS/WESR	Ongoing	Strengthen System
8.	No of <5 presenting with diarrhea	MCH	HIS/WESR	Ongoing	Strengthen System
9.	No of <5 presenting with dehydration	MCH	HIS/WESR	Ongoing	Strengthen System
10.	No of <5 death due to diarrhea	MCH	HIS/WESR	Ongoing	Strengthen System
11.	No of <5 presenting with ARI	MCH	HIS/WESR	Ongoing	Strengthen System
12.	No of <5 death due to ARI	MCH	HIS/WESR	Ongoing	Strengthen System
13.	No of reported typhoid cases	General	HIS/WESR	Ongoing	Strengthen System
14.	No of reported pertussis cases	General	HIS/WESR	Ongoing	Strengthen System
15.	No of reported TB cases	TB	HIS/WESR	Ongoing	Strengthen System
16.	No of reported meningitis cases	MCH/General	HIS/WESR	Ongoing	Strengthen System
17.	No of reported encephalitis cases	MCH/General	HIS/WESR	Ongoing	Strengthen System
18.	No of reported dysentery cases	General	HIS/WESR	Ongoing	Strengthen System
19.	No of reported hepatitis cases	General	HIS/WESR	Ongoing	Strengthen System

No.	Indicator	Health Area	Covered by	Status	Plans
STI and HIV/AIDS at health facility					
1.	Total No of STIs treated	STIs	HIS	Ongoing	Strengthen System
2.	No of cases of Gonorrhoea treated	STIs	HIS	Ongoing	Strengthen System
3.	No of cases of Syphilis treated	STIs	HIS	Ongoing	Strengthen System
4.	No of cases of NSU (non specific uritheritis) treated	STIs	HIS	Ongoing	Strengthen System
5.	No of HIV tested	STIs	HIS	Ongoing	Strengthen System
6.	No of HIV+	STIs	HIS	Ongoing	Strengthen System
7.	No of HIV+ on treatment	STIs	HIS	Ongoing	Strengthen System
8.	No of STI education sessions held	STIs	HIS	Ongoing	Strengthen System
9.	No of Condoms distributed/sold	STIs	HIS	Ongoing	Strengthen System

No.	Indicator	Health Area	Covered by	Status	Plans
Accidents, Injury and Poisoning					
1.	No of reported RTA cases	A&P	Hospital	Ongoing	Strengthen System
2.	No of reported motor cycle accidents	A&P	Hospital	Ongoing	Strengthen System
3.	No of reported Small tractor accidents	A&P	Hospital	Ongoing	Strengthen System
4.	No of reported heavy vehicle accidents	A&P	Hospital	Ongoing	Strengthen System
5.	No of reported traffic related pedestrians injuries	A&P	Hospital	Ongoing	Strengthen System
6.	No of reported poisoning cases	A&P	Hospital	Ongoing	Strengthen System
7.	No of reported domestic accidents	A&P	Hospital	Ongoing	Strengthen System
8.	No of reported alcohol related accidents	A&P	Hospital	Ongoing	Strengthen System
9.	No of reported drowning cases	A&P	Hospital	Ongoing	Strengthen System

No.	Indicator	Health Area	Covered by	Status	Plans
Psychosocial Problems					
1.	No of reported domestic violence	Psychosocial	To develop	Ongoing	Strengthen System
2.	No of reported alcohol related violence	Psychosocial	To develop	Ongoing	Strengthen System
3.	No of known suicidal attempts	Psychosocial	To develop	Ongoing	Strengthen System
4.	No of known suicides	Psychosocial	To develop	Ongoing	Strengthen System
5.	No of reported substance abuse cases	Psychosocial	To develop	Ongoing	Strengthen System
6.	No of reported clinical depression	Psychosocial	To develop	Ongoing	Strengthen System

Table 5-39 lists a comprehensive list of indicators, which will provide base line for all the nine environmental health areas under consideration. Most of the data is routinely collected. The PHAP under HPMU will strengthen the collection of data and its quality by working closely with the village level workers and health centers. Training programs will be organised to make health workers understand value of data collection and its importance. District health teams will also be strengthened through training in supervision and support that they are required to provide to health centers.

5.14.7 Flow of Information

Figure 5-12 depicts the information flow data sources to the surveillance and monitoring task force. The HPMU located in the provincial health department in Khammouane province, will maintain summary data for analysis.

Most of the data will be provided by the provincial health department of Khammouane. As NT2 affected areas include also parts of the Northern Borikhamxay province and Southern Savannakhet province agreements for health data exchange will be obtained from these provinces. Districts directly affected by NT2 will be asked to transmit health data directly to the HPMU in Khammouane province for further processing.

Any surveys planned will be initiated by the task force and implemented from the community level through to the district and provincial levels.

Figure 5-12: Information Flow

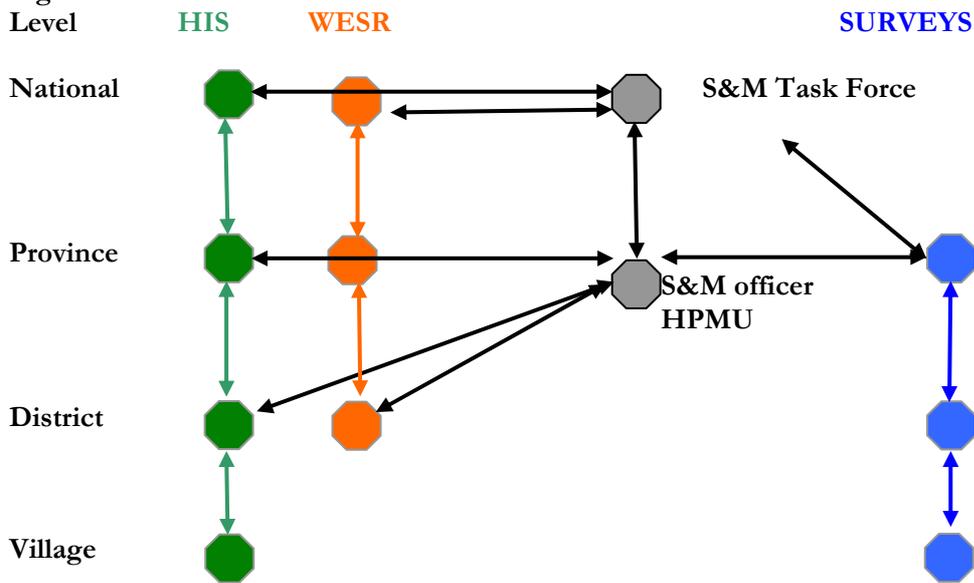


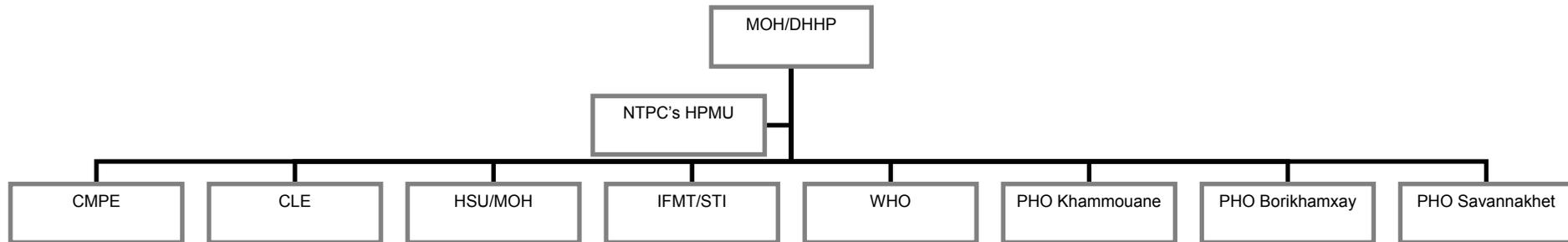
Table 5-40: List of Institutions involved in Surveillance and Monitoring

ID	MOH/DHHP	HPMU	HSU/MOH	CLE	CMPE	IFMT/SwTI
Name	Ministry of Health, Department of Hygiene and Health Promotion	Health Officer of the Nam Theun Power Company	Health Statistics Unit, dept. of Planning, Cooperation and Finance, MOH	Centre for Laboratory and Epidemiology	Centre for Malaria, Parasitology and Entomology	Institut de la Francophonie pour la Médecine Tropicale/ Swiss Tropical Institute.
Description of competence	Department of Hygiene and Health promotion at the Ministry of health of Lao PDR. Policy and strategy development and evaluation of matters in the field of Hygiene, Health Prevention and Promotion	Responsible for the implementation of the Public Health Action Plan for NTPC, technical and logistic support to PH activities	HSU of the MOH is the national reference centre for the collection, analysis and dissemination of statistics within the MOH. The data of the HIS will be collected by the department.	National reference centre for laboratory diagnosis and epidemiological surveillance of 24 priority diseases. Parasitic disease control except malaria and entomology are the new responsibilities of the centre.	National reference centre for malaria and dengue control and research activities. Coordination of network of malaria stations at provincial and district level with technical staff.	IFMT: Regional institute for tropical medicine. Training is main activity (post-graduate course in tropical medicine). In addition service support and research projects are implemented. SwTI is a research, training and service support institution in Switzerland supporting IFMT since 2000.
Location	Vientiane	Vientiane	Vientiane	Vientiane	Vientiane; malaria stations in provinces and districts	IFMT: Vientiane; SwTI: Basel, Switzerland
Responsibility	(1) overall responsibility and coordination of S&M activities.	(1) overall responsibility of implementation of S&M activities for NTPC, (2) assistance to MOH/DPH for implementation PHAP	(1) collection of HIS, (2) reporting to HPMU and MOH/DPH	(1) collection of WESR, (2) reporting to HPMU and MOH/DPH	(1) implementation of malaria and dengue related surveys (disease and vectors) through the network of malaria stations and technical personnel reporting to MOH/DPH	(1) epidemiological and clinical expertise for S&M activities, (2) implementation of specific S&M surveys, (3) reporting to HPMU and MOH/DPH
Contact	Dr Bounlay Phommasack	Health Officer, NGOs	MOH, Dept. Planning/Finance, Dr Zawadi	Dr Sithat Insisiengmay	Dr Samlane Phompida	IFMT: Pr M Strobel SwTI: Pr M. Tanner

The different Provincial Health Offices will be responsible for the collection and forwarding of routine data in their provinces. They will be consulted and participate in the different surveys.

WHO will be requested to participate and/or advise on technical issues.

Figure 5-13: Organizational Chart of S&M Task Force



5.15 CAPACITY BUILDING

Many documents recognise the poor skill and training levels of Lao health professionals as one of the most important weaknesses of the Lao Public Health System. This problem is even worse in the rural and remote areas where the Health Programs will be active. Therefore the PHAP regards capacity building as a major strategy for realising its objectives.

Skills required for implementing the PHAP activities include the following:

Technical Areas:

- Importance of preventive measures in the improvement of the health of the communities
- Diagnosis and treatment training for DH and HC staff
- Intermediate surgery, specifically addressing accidents but also for Emergency Obstetric Care
- Emergency and Intensive Care (stabilization of seriously injured patients requiring transfer)
- Disaster management (multiple person accidents)
- Maternal care, normal deliveries, complicated deliveries, Emergency Obstetric Care
- Blood transfusion
- Laboratory services
- X-ray
- Ultrasound
- Sexual Transmitted Infections
- Management of psychosocial problems
- Nutrition and growth monitoring
- Family Planning
- School deworming program
- Basic nursing skills
- Behavioural Change Communication
- Counselling

Managerial and administrative areas:

- ICHC management systems (Family file management, community participation, study tours, all management aspects)
- Different monitoring and surveillance systems
- Outbreak response preparedness
- Drug Revolving Fund management
- Health program management
- Management of ambulance services
- Inspection of food handlers
- Medical waste handling

The above list is not exhaustive and needs to be reviewed during detailed yearly planning. A training needs assessment would be more constructive in its planning than in its intelligence aspects: training needs assessment should be an integral part of on-the-job training, where the first week's performance is compared to the last's. Hands-on training generates confidence, and is best conducted at Provincial or National level, so as to increase the caseload and enhance nascent skills.

First training topics should be addressed as soon as possible. Some of the urgently needed skills (intermediate surgery, radiology, etc.) might require training periods of up to nine months. Therefore the MOH will need to post health professionals with those specific skills, even temporary, while other staff is being trained. Emergency medicine skills training for 10 staff from the project area is already planned for February 2005.

The training budget has been calculated based on current Khammouane staff numbers. The HSIP provides a list of courses, institutions and teachers available for capacity building. The PHAP training component will follow this road map wherever possible.

MOH will provide staff for the two new Integrated Community Health Centres of the resettlement area and the Nakai District Hospital. The HPMU will be responsible for organising and supervising implementation and quality of the training.

5.16 TECHNICAL ASSISTANCE

Following table illustrates how technical assistance could be distributed over the various activities and tasks the PHAP foresees. Many of the required interventions would find useful documents and materials already available, and these could readily be adapted. Others are less so, and only an initial literature review can ascertain whether original research is warranted.

Table 5-41: PHAP activities in need of TA

TMRC Staff	months
Monitor traditional health practices and ingredients for traditional medicines	1
Set up a botanical garden/ herbarium with medicinal plants near Nakai DH	1
Create a Traditional Medicine Department at the District Hospital,	1

Epidemiologist	months
Establish links with IFMT for scientific support	1
Analyse WESR functioning in Khammouane and identify improvement possibilities	3
Run an STD surveillance program for P&DCCA staff in STI control & data management	6
Develop a food / water borne illness outbreak response plan & investigation procedures	2
Develop and implement the cohort Village Sentinel Surveillance System	30
Monitor the mental health situation through surveys	3

Laboratory Technician	months
Conduct Quality Controls for malaria laboratory examinations	2
Improve the TB laboratory diagnostic capabilities in collaboration with the 3 Districts	2
Develop & implement lab capabilities for HIV testing in collaboration with the 3 Districts.	2

Medical Anthropologist	months
Together with the MTCPC, design education messages and programs re road safety	1
Design BCC messages and formats for prevention and management of ARI and TBC	1
Monitor traditional health practices and ingredients for traditional medicines	1
Design BCC messages and sessions on food sanitation awareness for local restaurants and open stall markets / Design BCC messages and programs regarding fecal/oral transmission of diseases and helminths	2
Design messages & methods to improve treatment of STI by private pharmacies / Design messages & methods to sensitize private pharmacies re data collection on STI's	2
Design education messages and programs regarding prevention & treatment of dengue Design IEC messages & campaigns re preventing murine / scrub typhus & leptospirosis	2
Design BCC messages on correct child weaning/feeding with changing food types	2

Health Logistics Officer	months
Develop procedures for a patient referral system	1
Conduct training in dengue vector control, incl. use of insecticide and spray equipments for DHO and HC staff in case of outbreak	3

Health Manager / Economist	months
Provide technical, administrative, management & monitoring systems for HC, DH, DHO	30
Adapt ICHC accounting and management systems & required forms (cf. ICHC manual)	3

Design a system for cost recovery of consumables and operations (HC, DH)	10
Psychological Anthropologist	
Identify adapted HIV counseling content and techniques for volunteer testers	1
Design BCC messages and campaigns on mental health for villagers	1
Design IEC messages for schools on substance abuses	1
Train staff on diagnosis and treatment of psychosocial disorders in PH Thakhek	3

Management expertise is best transferred through on-the-job training, and can then quickly phase out foreign assistance. ICHC techniques have been amply documented in various application manuals. The various medical research institutes can provide all pertinent laboratory expertise. The Traditional Medicine Research Centre has been setting up herbal gardens and medicinal hospital departments elsewhere. They are also well versed in monitoring practices and ingredients.

It should be noted that in particular BCC cannot be effective if the messages brought are not both compatible with current cultural representations, and delivered by a person whom the audience relates to (preferably using their mother tongue and revisiting regularly). Just telling people what to do without answering the questions implied by their way of understanding events, has no effect on behaviour change. Posters have often been found to be the least appealing channel for information dissemination, a visiting curative team to be the best.

A separate implementation plan for PHAP is under preparation and will be available by Mid March 2005.

Annex 5-1: Selected National, Regional and Provincial Health Indicators

The following table summarizes selected health indicators for Lao PDR with statistics aggregated at the national and regional level (Central) and, where appropriate, at the provincial level (Khammouane).

Table 5-42: Selected National, Regional and Provincial Health Indicators (as of mid 1990's).

Selected health indicators	National	Central region	Khammouane province
Fever			
Within last 2 weeks (%)	1.9	1.7	
With symptoms suspected of malaria		66	
Malaria			
Positive blood tests of those who sought healthcare (%)	16	16	
<i>Plasmodium falciparum</i> prevalence assessed by rapid test/dipstick (%)	3	4	
Morbidity (per 1000 population)	48.5		104.7
Acute respiratory infection			
Illness with cough, accompanied by rapid/difficult breathing, chest problem, blocked nose in previous 2 weeks (age: years)	1% (<5 years)	<5	10.7 (incidence rate)
Tuberculosis			
Case detection rate (%)	48		
Diarrhoea			
≥ 3 watery stools per day among children aged < 5 years (%)	6.2	7.2	
Vital statistics			
Crude birth rate (per 1,000 population)	34	33	
Crude death rate (per 1,000 population)	6.4	6.2	
Maternal mortality rate, related to pregnancy, delivery and 6 weeks post-partum (per 100,000 live births)	530	440	
Neonatal mortality rate (within 28 days) (per 1,000 births)	36.2		44.0
Infant mortality rate (per 1,000 live births)	82.2	75.7	91.5
Under-5 mortality rate (per 1,000 live births)	106.9	98.9	116.2
Micronutrient deficiency			
Vitamin A supplementation to children aged 6-59 months (last 6 months) (% of age group)	28.8	26.2	
Low serum retinol in all age groups (< 0.7 µmol/l) (%)	30.9	31.7	
Goiter among children aged 6-12 years (%)	9.1	6.6	
Urine iodine secretion among children aged 8-12 years (< 5 µg/dl)	7.1	5.6	
Iron deficiency among all age groups (< 7 g/dl)	1.2	1.1	
Child malnutrition			
Stunting (%)	40.7	37.0	
Wasting (%)	15.4	12.7	

Source: (Ministry Of Health, 2001)

The next data sheets (Tables 5-43 to 5-46) are derived from the 2003 World Bank survey tables, hence are intended to provide the latest available statistics for Lao PDR, both at the national and provincial level (World Bank, 2004). Presentation of statistics is restricted to those three provinces where the NT2 Project will be implemented, namely Khammouane, Bolikhamxai and Savannakhet.

Table 5-43: Baseline Demographic Data for the 3 Provinces Affected by the Project

Indicator	Province		
	Khammouane	Bolikhambxai	Savannakhet
Population (in 1,000)	310.0	186.6	766.2
Number of districts	9	6	15
Total villages	450	378	1,375
Number of households	55,231	33,061	124,302
Average household size	5.7	5.9	6.1
Life expectancy (years)			
Males	57	50	58
Females	54	48	55

(Source: World Bank, 2004).

Table 5-44: Baseline Vital Statistics for 3 Provinces and Corresponding National Figures.

Indicator ^a	Province			National
	Khammouane	Bolikhambxai	Savannakhet	
Crude birth rate	37.0	36.9	37.4	34.0
Neonatal mortality rate	44.0	10.8	43.1	36.2
Infant mortality rate	91.5	26.0	98.7	82.2
Under-5 mortality rate	116.2	47.7	123.9	106.9
Total fertility rate	5.4	5.0	5.0	4.8

Table 5-45: Baseline Disease Rates and Selected Health Indicators in 3 Lao Provinces

Disease rates and other health indicators	Province			National	Data source
	Khammouane	Bolikhambxai	Savannakhet		
Malaria					
Total cases	34,379	8,861	49,816	267,454	CMPE, 2002
Total slides examined	32,738	8,441	47,149		
Cases at hospital	1,641	420	2,667		
Total severe cases	76	16	14		
Malaria-attributable death	18	2	17		
Slide positivity rate (%)	4.43	1.27	12.87		
Morbidity (per 1,000)	104.7	44.9	61.5	48.5	MoH, 2002
Mortality (per 1,000)	5.48	1.01	2.1	3.54	
Coverage rate ITNs (%)	62	31	53		EU, 2002
Population protection rate (%)	83.2	76.5	83.5	73.3	EU, 2002
Diarrhoea (children < 5 years)					
Total cases	1,476	871	3,182	17,792	MoH, 2002
Incidence rate (per 1,000)	2.8	2.8	2.5	2.0	
Severe cases	118	128	7	2,042	
Treated at health care facility (%)	80.6	90.5	75.0	81.3	
Acute respiratory infection					
Total cases children < 5 years	5,562	1,535	14,064	48,235	MoH, 2002
Incidence rate (per 1,000)	10.7			5.5	
HIV/AIDS					
People with HIV infection	92	9	487	1,102	NCCA, 2003
Total AIDS cases	17	9	286	599	
Know how HIV is	65.5	49.6	81.3	69.3	LRHS,

transmitted (%)					2000
Know how STIs are transmitted (%)	45.9	36.2	49.0	52.0	
Water supply and sanitation					
Households with access to clean water (%)	38	65	66	50	LECSII, 1998
Households without improved sanitation (%)	86	78	89	71	LECS 2
Nutrition					
Households with iodised salt (%)	76	NA	NA	NA	ADB, 1999
Child aged 6-59 months who received 2 doses of vitamin A	12	NA	NA	NA	ADB, 1999

Table 5-46: Medical Personnel in the Project Area Districts (Source: World Bank, 2004).

Province	District	District health office staff	District health staff	District health beds	Medical doctors	Health centre	Health centre staff	Village health volunteer	Traditional birth attendant
Khammouane	Nakai	12	11	15	2	5	15	72	114
	Gnommalat	22	15	15	2	5	6	71	71
	Mahaxai	17	16	15	0	6	12	91	11
	Tahket	19	18	26	2	13	22	220	64
	Nongbok	21	28	15	4	11	21	72	72
	Xe Bangfai	24	13	15	2	7	12	105	10
Bolikhambxai	Khamkeut	19	69	60	8	9	25	169	36
Savannakhet	Xaybuly	5	10	14	1	10	25	97	88

Annex 5-2: Background Data Source Materials

“Nam Theun 2 Hydroelectric Project, EAMP, December 1995”. Appendix 3.2-1, Public Health and Medico Ecological Surveys.

Cross-sectional survey carried out among 501 individuals from 5 villages located in the reservoir area in 1989/1990. High prevalences were found for intestinal parasites (*Ascaris lumbricoides*: 46%, hookworm: 25%, *Opisthorchis viverrini*: 22%, *Trichuris trichiura*: 21%) and malaria (*Plasmodium falciparum*: 53%, *P. vivax*: 44%, *P. malariae*: 1.1%).

“Snail-Mediated Diseases of Nam Theun 2 Project in Khammouane and Bolikhamxai Lao PDR, 15 April 1996 Draft” and “Freshwater Snails in the Nam Theun 2 Project Area of Khammouane and Bolikhamxai Provinces, Lao PDR, Revised April 1997”. Author: Chantima Lohachit, Mahidol University, Bangkok, Thailand.

These two studies (draft version of 1996 and revised version of 1997) demonstrated that 10 mollusk species of medical importance were identified and located. The snail intermediate host of *Schistosoma mekongi*, namely *Neotricula aperta* (gamma race), were found in the Xe Bangfai at Nakio and Mahaxai villages. Snail screening in field laboratories by the shedding method, and rigorous examination of trematode cercariae in a reference laboratory revealed that snails showed no natural infection. The snail intermediate host of *O. viverrini*, namely *Bithynia siamensis goniomphalos*, was found in 2 of the 13 sampling stations within the Project area. Laboratory investigations revealed no natural infection.

“Surveys for Malaria, Anopheles Mosquitoes and Aquatic Snails in Selected Villages of Nam Theun 2 Project Area, Khammouane Province, Lao PDR, 19 to 26 March 1997”. Author: John Storey, Public Health Consultant.

- Malaria: employing the rapid ParaSight™F diagnostic test in 5 villages located across the Mahaxai, Gnommalat and Nakai districts, a malaria prevalence of 8.6% was found (42 positive results out of 487 individual tested).
- Opisthorchis infection: the intermediate host snail of *O. viverrini* (*Bithynia* spp.) was present and identified at multiple sampling locations.
- Schistosomiasis: the intermediate host snail of *S. mekongi* (*N. aperta* gamma race) was found abundantly in one in site (Nam Gnom river, located in the village of Thatthot) at the under-surface of small stones.

“The Health Status of Resident Populations in the Nam Theun 2 Project Area, Khammouane Province, Lao PDR”. Author: Khamliene Pholsena and colleagues, Chiang Mai University, Chiang Mai, Thailand, April 1996 (draft) and 1997 (revision).

- A comprehensive study carried out between March and April 1996 among 1,455 people living in nine villages in the impoundment area, including physical examination, rapid clinical nutritional assessment, stool examinations for intestinal parasites and blood smear examinations for malaria parasites

“Mekong Malaria: Malaria, Multi-Drug Resistance and Economic Development in the Greater Mekong Subregion of Southeast Asia”. Published in the Southeast Asian Journal of Tropical Medicine and Public Health. Vol. 30, Suppl. 4, 1999.

- This document is a comprehensive overview of the epidemiology of malaria in the Mekong river basin (Lao PDR, Cambodia, Myanmar, Thailand, Viet Nam, and the Yunnan Province of the People’s Republic of China), as of the late 1990s utilizing geographical information systems (GIS). Key data on malaria rates, vector species and resistance profiles in Lao PDR are summarized in the overall malaria presentation in Section 5.6.

“Health Status of the People of the Lao PDR”. Author: Ministry of Health, January 2001.

- Country-wide health data published by region (i.e. North, Central and South) rather than on a provincial level. Consequently, these data have limited utility for the Project.

“Nakai Plateau Health Survey, 2001”. Author: Resettlement Management Unit (RMU).

- The Nakai plateau household survey was an extensive effort and covered 857 households (total population 5,101) from all 17 villages that are proposed for resettlement. As part of the overall

household survey, a wealth of health issues, including some medical testing and anthropometric data collection, was gathered. Our HIA team has made every effort possible to extract the most relevant data from the electronically available files. The key results are summarized and discussed in Section 5.6, alongside the ones obtained from the extensive household survey carried out in the Xe Bangfai area (see next paragraph).

“A Report of the Xe Bangfai Socio-Economic, Health and Fisheries Survey, 2001”. Author: Government of Lao PDR and Nam Theun 2 Electricity Consortium, December 2002.

- The Xe Bangfai household survey was an extensive effort and covered 1,680 households (total population 10,031) from 112 villages located over the entire Xe Bangfai area that is potentially impacted by the Project. As part of the overall survey, a specific health survey, including some medical testing and anthropometric data collection, was conducted. These data are summarized and discussed in detail in Section 5.6.

“HIV Surveillance Survey and Sexually Transmitted Infection Periodic Prevalence Survey, Lao PDR, 2001” and “Behavioral Surveillance Survey 2000/2001”. Author: National Committee for the Control of AIDS (NCCA).

- The most systematic and currently available published prevalence rate data covering a variety of different high-risk groups including long-haul truckers and service workers.

“Interim Report on the Intestinal Parasite Control among Primary School Children in Lao PDR, 2000-2002”. Author: Korea Association of Health Promotion, in collaboration with MOH (Lao PDR) and WHO.

- Comprehensive nation-wide survey carried out between May 2000 and June 2002 to investigate the epidemiology of intestinal parasitic infections among schoolchildren in Lao PDR. To our knowledge, these are the most recent data of intestinal parasites, covering some of the critical PIAs described in the NT2 HIA; hence, they are summarized and discussed in detail in Section 5.6.

“Pest Management Plan, Supplement Annex to the Social Development Plan December, 2003”.

- The pest management plan was a detailed survey of cultivation, fertilizer and pesticide use in the Project areas. Frequency of pesticide and fertilizer applications was surveyed in multiple villages throughout the major rice growing regions potentially affected by the Project. In addition, the specific commercially available pesticide products in Lao PDR were determined. A mitigation plan for pesticide and fertilizer use was proposed.

“Health Service Improvement Project. Draft Baseline Survey Report, January 2004”. Authors: MOH Project Coordination Unit.

- This report contains some of the most current provincial and district level health data for hospital staffing, malaria reporting, and immunization rates.

“Field Visit Data Collection for HIA of the NT2 Project”. Authors: HIA Team, February 2004.

- For the preparation of this report, our team surveyed numerous villages across the PIA and collected up-to-date data on the health care delivery system and the most critical diseases at the village, district and provincial level.

Annex 5-3: Health Equity Fund

Most Lao health institutions are depending more and more for their financing on the charging of user fees. Certain health institutions offer staff incentives which are financed by their revenue. This increases the problem of financial accessibility for the many poor people certainly in our target areas. Officially, poor people are exempted from paying fees. However, required drugs or medical supplies are often not available at the institutions and need to be purchased by patients from private pharmacies.

In reality each exempted patients has to be regarded as a financial loss to the institution and indirectly to the staff. As such health institutions are not encouraged to recognise patients as poor.

Moreover, most poor patients face important indirect costs such as transport and food, and the opportunity cost of their lost time. This represents a heavy financial burden on them.

A Health Equity Fund takes care of financing the health service related costs of poor persons needing health care. It is responsible for identifying poverty status and for reimbursing expenses. The support might cover direct costs such as examination or intervention fees or fees for drugs or medical consumables, but also indirect costs such as food, cooking utensils and reimbursement of transport costs.

In order to solve the conflict of interests, when health institutions have to identify and exempt poor people or when they have to decide how to use available funding for the poor, a health equity fund works through a third party, creating a so-called *purchaser-provider split*. Often such a party grants entitlement identity cards, plastified and showing the holder's photograph, in order to dissolve ambiguity upon arrival at a health service. These ID's are the object of an IEC campaign, ensuring that all concerned are aware and comply with their meaning, and endorsing the entitlement decision taken by the village leadership on who is considered "poor" within the village context. The medical expenditure bills are collected monthly and checked by the third party, after which the health service is paid back the amount credited. Indirect costs are settled during supervision visits at village level.

The programme will include all "poor" families in the Resettlement Area (some 75% of which have been found to belong to that category – cf. HSIP Baseline Survey Report/March 2004). Poor households covered by the Regional Health Plan will need to have a disease that the third party involved recognizes as related to the Project works or to the Dam's impact itself. The Programme must identify which organisation could play the role of third party as no Lao NGO's exist in Lao PDR. The LWU, LYU or INGO's could play a role in performing this function.

Annex 5-4: Health Staff Training Programmes

Training Programme (Construction phase)

Topic	Type/Level	No of participants	Duration	Frequency	Responsible organization
Community level					
Setting up and training of VHCs and VHVs members on their role and responsibility. Package of training on Maternal and Child Health (including nutrition, immunization, FP/BS, ANC, PNC, skilled assistance from a trained attendant during delivery, refer pregnant women with complications. Appropriate diagnostic and treatment protocols on respiratory/water/soil/ food borne diseases, BCC and HIS/WESR).	VHV	150	5 days	1 time/year	DHO/HC/ NTPC
Package of training to VHV on different PHC programs and technical subjects (diagnosis and treatment, sanitation and hygiene, maternal care and BCC campaigns and village drug kits management, BCC and HIS/WESR).	VHV	150	5 days	1 time/year	DHO/HC/ NTPC
Train private health care providers/pharmacies on prevention strategies, and appropriate diagnostic and treatment protocols for sexually transmitted infections.	Private providers	40-50	3 days	1 time/year	PHO/DHO/ NTPC
Train TBAs on safe delivery and maternal care.	TBA	150	5 days	1 time/year	PMCH/DHO/NTPC
Health Center level					
Package of training for health center staff on Maternal and Child Health (including nutrition, immunization, FP/BS, ANC, PNC, skilled assistance from a trained attendant during delivery, refer pregnant women with complications. Appropriate diagnostic and treatment protocols on respiratory/water/ soil/food borne diseases, BCC and HIS/WESR).	HC	12	5 days	1 time/year	DHO/HC/ NTPC
Train HC staff on prevention strategies, and appropriate diagnostic and treatment protocols for accidents, injuries, chemical exposures and poisoning, including respiratory/water/soil/vector/food borne diseases, STI and HIV/AIDS hazards of medical waste handling and the uses of appropriate personal protective equipment, BCC and HIS/WESR. If feasible laboratory diagnosis of malaria, STIs, etc.	HC	12	5 days	1 time/year	DHO/HC/ NTPC
Package of training to HC staff on different PHC programs and technical subjects (diagnosis and treatment, HC hygiene, HC nursing practices, maternal care, EPI, and BCC campaigns).	HC	12	5 days	1 time/year	DHO/HC/ NTPC
Train HC staff on management of HC and DRF management.	HC	12	5 days	1 time/year	DHO/HC/ NTPC
Practical training in the existing ICHC (1 month/course, 1 staff/ICHC)	HC	2	1 month	2 times	Savannakhet/ DHO
Workshop on how to identify psychosocial/drug abuse problems for HC staff.	HC	12	5 days	1 time/year	Psychologist from Vientiane

District level					
Package of training for DH/DHO staff on Maternal and Child Health (including nutrition, immunization, FP/BS, ANC, PNC, skilled assistance from a trained attendant during delivery, refer pregnant women with complications. Appropriate diagnostic and treatment protocols on respiratory/water/soil/food borne diseases, BCC and HIS/WESR).	DH DHO	12	5 dyas	1 time/year	PHO/NTPC
Train DH/DHO staff on prevention strategies, and appropriate diagnostic and treatment protocols for accidents, injuries, chemical exposures and poisoning, including respiratory/water/soil/vector/food borne diseases, STI and HIV/AIDS hazards of medical waste handling and the uses of appropriate personal protective equipment, BCC and HIS/WESR.	DH DHO	12	5 days	1 time/year	PHO/NTPC
Package of training to DH/DHO staff on different PHC programs and technical subjects (diagnosis and treatment, HC hygiene, HC nursing practices, maternal care, EPI, and BCC campaigns).	DH DHO	12	5 days	1 time/year	PHO/NTPC
Longterm training of DH staff on specific areas i.e. emergency medicine, obstetric emergency, laboratory, radiology/ultrasound (1-3 months/person/course)	DH DHO	10	1-3 months/year	3 years	Vientiane/Savannakhet
Train DH/DHO staff on general management and DRF management.	DH DHO	12	5 days	1 time/year	PHO/NTPC
Workshop on how to identify psychosocial/drug abuse problems for DH/DHO staff.	DH DHO	20	5 days	1 time/year	PHO/NTPC
Conduct study tour for committee members to existing ICHC (Champone or Longxane)	PHO DHO HC	9	4 days	1 time	PHO/NTPC
Study tour to Theun-Hinboun Power Company	PHO DHO HC	10	3 days	1 time	PHO/NTPC
Study visit to Phonesy HC, Bolikhamxai Province	PHO DHO HC	10	2 days	1 time	PHO/NTPC

Note : 1) For TBAs, VHVs and VHCs, several training centers will be operated according to a training schedule.

Training Programme (Operation phase)

Topic	Type/Level	No of participants	Duration	Frequency	Responsible organization
Community level					
Setting up and training of VHCs and VHVs members on their role and responsibility. Package of training on Maternal and Child Health (including nutrition, immunization, FP/BS, ANC, PNC, skilled assistance from a trained attendant during delivery, refer pregnant women with complications. Appropriate diagnostic and treatment protocols on respiratory/water/soil/food borne diseases, BCC and HIS/WESR).	VHV	210	5 days	1 time/year	DHO/HC/NTPC

Package of training to VHV on different PHC programs and technical subjects (diagnosis and treatment, sanitation and hygiene, maternal care and BCC campaigns and village drug kits management, BCC and HIS/WESR).	VHV	210	5 days	1 time/year	DHO/HC/NTPC
Train private health care providers/pharmacies on prevention strategies, and appropriate diagnostic and treatment protocols for sexually transmitted infections.	Private providers	60	3 days	1 time/year	PHO/DHO/NTPC
Train TBAs on safe delivery and maternal care.	TBA	34	2 days	1 time/year	DHO/NTPC
Health Center level					
Package of training for health center staff on Maternal and Child Health (including nutrition, immunization, FP/BS, ANC, PNC, skilled assistance from a trained attendant during delivery, refer pregnant women with complications. Appropriate diagnostic and treatment protocols on respiratory/water/soil/food borne diseases, BCC and HIS/WESR).	HC	24	5 days	1 time/year	DHO/HC/NTPC
Train HC staff on prevention strategies, and appropriate diagnostic and treatment protocols for accidents, injuries, chemical exposures and poisoning, including respiratory/water/soil/vector/food borne diseases, STI and HIV/AIDS hazards of medical waste handling and the uses of appropriate personal protective equipment, BCC and HIS/WESR. If feasible laboratory diagnosis of malaria, STIs, etc.	HC	24	5 days	1 time/year	DHO/HC/NTPC
Package of training to HC staff on different PHC programs and technical subjects (diagnosis and treatment, HC hygiene, HC nursing practices, maternal care, EPI, and BCC campaigns).	HC	24	5 days	1 time/year	DHO/HC/NTPC
Train HC staff on management of HC and DRF management.	HC	12	2-3 days	1 time/year	DHO/HC/NTPC
District level					
Package of training for DH/DHO staff on Maternal and Child Health (including nutrition, immunization, FP/BS, ANC, PNC, skilled assistance from a trained attendant during delivery, refer pregnant women with complications. Appropriate diagnostic and treatment protocols on respiratory/water/soil/food borne diseases, BCC and HIS/WESR).	DH DHO	10	5 days	1 time/year	PHO/NTPC
Train DH/DHO staff on prevention strategies, and appropriate diagnostic and treatment protocols for accidents, injuries, chemical exposures and poisoning, including respiratory/water/soil/vector/food borne diseases, STI and HIV/AIDS hazards of medical waste handling and the uses of appropriate personal protective equipment, BCC and HIS/WESR.	DH DHO	10	5 days	1 time/year	PHO/NTPC
Package of training to DH/DHO staff on different PHC programs and technical subjects (diagnosis and treatment, HC hygiene, HC nursing practices, maternal care, EPI, and BCC campaigns).	DH DHO	10	5 days	1 time/year	PHO/NTPC
Train DH/DHO staff on general management and DRF management.	DH DHO	12	2 days	1 time/year	PHO/NTPC

Annex 5-5: Nakai Indigenous Medicine Changes

(Extract from "Identification of Traditional Health Practices and Medicines: Phase 1)

(NTPC Consultancy Report)

Health-seeking on the Plateau

People in Ban Nakai Tai say that 3 to 4 out of 5 now prefer biomedical drugs to traditional herbal remedy. This has become feasible since the NT2 Project provided them with a 26-item Drug Revolving Fund (DRF) back in 2000. The preference seems to have spread to all, whether poor or rich, mother or father, young or old. Only elders still prefer consulting first the spirits with the help of a Moh Yao. Younger people rather borrow money for pills than go pick herbs for treatment. Ban Nong Boua villagers confirm this attitude. But even though having a DRF, they continue to use medicinal plants. In Ban Done severity of presenting symptoms (high fever, abdominal pains, seizures) decides whether to start with herbs or drugs. Conveniently, the District Hospital is a mere 40 minutes ride away (at 5000 kp/p). Nong Boua lies at just 30 minutes away. And prevention goods like impregnated bed nets are now bought from the District Health Office for 8500kip, against 30.000 when sold in the market.

Makong women in Nong Boua exemplified the most modern attitude to cure. A feverish toddler is given paracetamol on day one, gets a blood check on day two and might return sleep at the hospital as of day three. This usually means getting an intravenous drip, known to be quickly effective. Before, in the old village, caretakers started with herbs until someone returned two hours later with pills. Both sorts were then given jointly, without fear of conflict between them. In fact, health-seeking behaviour generally relies on trial and error until cure or death. Initially, symptoms are given up to 48 hours to abate, before a new remedy or health provider is sought. In roadside villages, this often means just changing the antibiotic. In remote ones natural, biomedical and spiritual means alternate or combine in increasingly rapid succession to ward off imminent death.

A shared view exists on what herbs and drugs have going for or against them. Herbs are free and always somewhere at hand. They show fewer side effects than medicines. Remarkably, people find that "*when herbs heal, they do it well and the disease doesn't return*". But preparing an herbal concoction may take up to 48 hours (if e.g. 7 ingredients are all found at distant spots) and isn't often pleasant to swallow. In addition, few people know enough about formulas and locations to collect a reasonably potent remedy. Not all villages have their herbalist. Since the last one died in the previous Nong Boua, no successor has – yet? - arrived.

In e.g. Ban Done biomedicine was introduced in 2000 and the drug fund has kept revolving thanks to rules strictly applied by the health worker. Drugs work fast, work most of the time, are easy to purchase, easily swallowed and include contraceptives. Diagnosis seems more reliable. But they are not free, must be bought from afar, often give side effects, and steadily lose quality. If used wrongly, they're outright dangerous. Yet on the whole people trust biomedicine more (a disease may "*return*" following poor drug regime compliance – and anything, including herbs, will cure a viral 3d fever). Herbal cure takes longer to surface, and only does so half of the time.

A way of preserving tradition officially endorsed by the Ministry of Health is to include industrial as well as natural formulations in revolving drug kits. Conversely, training herbalists to administer a DRF seems quite acceptable. Such a person could decide faster when to change remedies, and one needn't locate a second person to avail of both functions. If of course s/he were absent, one again would wish for decoupled skills! Certainly a Traditional Birth Attendant, possibly even a Moh Mohn might usefully add drug therapy to their trade. The main criterion for these responsibilities was felt to be literacy and intelligence, not age or experience. Having the educated work with the experienced was called optimal.

Modernizing the Plateau

No struggle was noted in finding Tai Lao names for common herbs. The Ban Done herbalist doesn't know Makong names for the plants he uses. Though over 60yr he doesn't speak the language himself. Also e.g., it has been a while since Nong Boua residents replaced burial with cremation. "*True, we are Brou (also known as Makong a.k.a. Alem a.k.a. Kha)*", says the health worker, "*but we willingly trade our tradition and customs for those of the Lao*".

This process of dilution seems at work in the domain of medicinal knowledge too. Each herbal doctor vanishing without a successor (“*Pou nom khi khaan bien, khi khaan khalam*” – young people don’t bother with study or discipline) leaves a compendium of medicinal wisdom to lay persons, who patchily apply what little they remember. “*Ancient Moh Yah knew what time of the day, the week or the moon to take what part of a plant. We here just go and take what we need and know enough about.*” In Nong Boua elders could still cite therapeutic indications, but younger people mostly knew but the names of common medicinal plants.

As ancient practice phases out, modern ways phase in. The young (15-45y) and educated are first to take pills (“*Women somewhat later, they’re not as often ill!*”). Once introduced the contagion spreads throughout the household. *Ya luang* (great medicine) works well and fast, and is promoted by the Ministry. Though Nong Boua’s leader thinks an intelligent Moh Yao might make a good health worker, he doubts a spirit conversely would think of possessing a health worker to call her into divining. (“*Science and tradition don’t mix well!*”). Thus the trend becomes irreversible.

Nakai Tai’s leader (knows he must) fight superstition and runs his village’s DRF. He feels that once the current Moh Yao are gone, no new recruits will step forward, “*Or just maybe, if a teenager acts crazy enough and remembers it shows possession. But by then no one might take phi seriously anymore!*” But the elders protest: “*A diviner is nice to you, not like those in the hospital! Everyone is now cured using drugs but before, everybody got just as well just using plants!*” Or against the notion that spirits fear needles: “*The phi is there even after a drip starts running: he’ll leave only once he’s properly been fed.*” Possibly nevertheless, herbal abortion teas will grow further in popularity, despite their religious prohibition as sinful (*habh*), most likely in anomic cities. No honourable Moh Yah could bring himself to prescribe them.

Whether *phi* flee the needle, or drips drown the pathogen, “*even just pills can cure you, you don’t even need a needle!*” Black magic, still practiced some 30 years ago, has likewise lost appeal, “*otherwise we’d all be dead by now!* (says a Tai Bo man in Nong Boua). The current generation has electricity and thus spots far less, or actually no more *phi*. “*Before, whether you tied your baby’s wrist or not, they still all died anyway!*” (as a Makong woman said: *I had 11 children, still 6 now*”).

In the western technological panoply it isn’t just intravenous drips or impregnated nets that sap the might of spirits. As Moh Bouapha told us: “*We used to worship so many phi – the phi nam boh (fountain, ruler of the stream), the phi phon puak (termite hill, ruler of the fields), the phi dong (great tree, rulers of the forest) – but what happened to their power? Sources are channelled, termite hills bulldozed and in minutes the greatest trees get chain sawed. No one prays. Nothing ever happens.*”

Conclusion

A preliminary survey draws preliminary conclusions. Phase 2 data may dis/confirm these. What follows is tentative and does not state hard facts or verified situations.

Domestic healing practice is either spiritual or medical. At times, spiritual taboos overlap with biomedical advice e.g. against taking infants out in the fields or near decaying corpses. The indigenous frame could in fact be borrowed to spread health education messages. Even not taking a corpse back to its village makes good sense in case of cholera, where sweat and vomit carry pathogens. Blocking *phi* by marking foreheads or tying strings is not harmful except by unduly reassuring the inexperienced. ‘Tying wrists’ builds on the concept of *khwan*, a core cultural construct not just in Lao that is certain to survive the Plateau’s immersion.

Yu fai may gradually weaken under modernization but seems worthwhile preserving if not promoting. Notably district hospitals might consider adapting procedures to accommodate a physically, socially and culturally beneficial ritual. Less commendable are some of the tied-in food taboos, or the practice of feeding newborns chewed rice. Other fire-related practices like *ya horm* do not appear to play a major role. Certainly tourist sauna stations aren’t yet on people’s minds. Massage techniques seem too unskilled at present to combine at such a station.

The preliminary impression is that traditional medicinal remedies fade out under the use of convenient and effective biomedicines. This must be greeted certainly, but some natural formulations hold cure for diseases biomedicine cannot handle. Most aware of this potential is Vientiane’s Traditional Medicine

Research Centre (TMRC). It has growing experience with studying (side) effects of traditional substances. It organises workshops to show newly confirmed formulas or ingredients, and making the Moh Ya's art more reliable. Similarly, Moh Tamnye receive central support for spreading hygienic newborn care. This often means training young literate people to be Traditional Birth Attendants. A good case can nevertheless be made for having youngsters train alongside (illiterate but) more experienced Moh Tamnye (Ban Nong Boua has such an optimal midwife duo).

The Moh Khwan and Moh Sout will help carry the *khwan* meme far into the future. The social support and harmony it seeks fosters individual and collective well-being. A Moh Mohn's power to heal is nowhere ranked very high, and will likely diminish further under biomedical pressure. Diviners will surely go on giving sense to the "why" or "why me" questions modern medicine only answers by naming coincidence and risk. Where Moh Yao don't oppose or delay biomedical compliance, negative impact may be limited.

It would appear a strong trend exists for traditional knowledge, attitudes and beliefs to retreat into the elderly or less educated strata of village life. This uphill battle with science likely will leave the Moh Ya, Tamnye and Khwan standing. While the latter are thriving, the need is for promoting medicinal remedies that bear the test of cure.. Phase 2 will identify ingredients if any, unique to the Plateau in order to transplant them in herbaria, plant gardens and appropriate habitats above 538 EL. Lao or colonial era treatises may suggest promising research topics for the TMRC. In this connection the University of Chicago's International Biodiversity Group should be funded to further examine how to promote valuable healing practices indigenous to the Plateau. How animal ecology will evolve after the flood no one can say. Excepting some unknown insects and bacteria, unimportant to indigenous medicine, it seems unlikely medicinal species exist that would disappear because of the floods. Using these animals as ingredients does not contribute to their survival either.

Western technology conspires with official ideology to weaken "countryside superstition". Certainly the young and educated don't really fight back. Neither do strong self-identity nor clear gender roles seem priorities to the villagers encountered. Only long-term participant observation might qualify this claim. Cultural assimilation may move at this fast pace not least because the concerned actively embrace majority culture and eventually, it would appear, identity. But should valuable indigenous healing power disappear alongside it?

Annex 5-6: Core Package of Services
Core Package of Services (HSIP)

A. Village Level

Service/Activity	Contents
Health Education, IEC, Communication for behavioral change	Personal hygiene, Sanitation, Prevention of communicable diseases including sensitization on STIs/HIV and EPI, Nutrition, Safe Motherhood promotion.
Communicable Disease Control	Early detection of cases and referral. Treatment of uncomplicated cases using drug kit. Support for IBN distribution and re-dipping. Support for gradual devolution to villages of DOTS implementation. Support for EPI campaigns.
Nutrition	Support to Vitamin A distribution to children and women. Support to Iron/Folic Acid distribution to pregnant and lactating women. Nutrition Education including breast-feeding promotion. De-worming drug distribution.
Safe Motherhood and Birth spacing	Advise on Antenatal and Post-natal health. Assistance to uncomplicated deliveries for safer home deliveries. Appropriate use of TBA kits. Early detection of complicated pregnancy and referral. Contraceptive distribution including condoms.
Basic Curative care	Appropriate use of drug kits (treatment of uncomplicated cases of fever, pain, diarrhea, coughing, small wounds, skin infections, intestinal worms).

B. Health Centers

Service/Activity	Contents
Health Education, IEC, Communication for behavioral change	Personal hygiene, Sanitation, Prevention of communicable diseases including sensitization on STIs/HIV and EPI promotion, Nutrition, Safe Motherhood.
Communicable Disease Control	Early detection of cases (including microscopy for TB and Malaria) treatment of uncomplicated cases and referral of complicated cases. IBN distribution and re-dipping. Devolution of DOTS implementation to HCs and Villages. Delivery of EPI with fix and portable cold chain. Diagnostic and treatment of STIs.
Nutrition	Breastfeeding promotion. Vitamin A distribution to children 6-71 month old and mothers within one month after delivery. Iron/Folic Acid distribution to pregnant and lactating women. Nutrition Education including Iodized Salt promotion. De-worming.
Safe Motherhood and Birth spacing	Provision, education and services related to FP, including condoms, IUD's, etc. Counseling on Antenatal and Post-natal health. Provide Antenatal care including treatment of Iron Deficiency Anemia and Malaria. Early detection of complicated pregnancy and referral. Safe delivery of normal pregnancies. Neonatal resuscitation. Health Centers Type A: safe delivery of normal pregnancies, manual removal of placenta, medication before referral of complicated pregnancies and deliveries. Emergency treatment for miscarriage, premature delivery and other obstetric emergencies. Health Centers Type B: safe delivery of normal pregnancies, medication before referral of complicated pregnancies and deliveries.
Basic Curative Care	Appropriate use of HC drugs (treatment of uncomplicated cases of fever, of uncomplicated malaria, iron deficiency anemia, pain, diarrhea, coughing, small wounds, skin infections, intestinal worms). Minor surgery and referral.
VHVs, TBAs, VHPs: Training, Supervision and Support.	See previous table on VHV, TBA and VHP tasks.

C. District Hospitals (Inpatient and Outpatient Services).

Service/Activity	Contents
Health Education, IEC, Communication for behavioral change	Prevention of communicable diseases including sensitization on STIs/HIV and EPI promotion, Nutrition, Safe Motherhood, Birth spacing.
Communicable Disease Control	Early detection of cases (including microscopy for TB and Malaria). Treatment of cases and referral of severe complicated cases. DOTS implementation and devolution to HCs and Villages. Diagnostic and treatment of STIs. Blood testing for HIV and other diseases. Immunization and logistic support to HCs and VHPs for immunization, organization of ITN campaigns, Sanitation, IEC.
Nutrition	Nutrition Education including breast -feeding. De-worming. Nutritional rehabilitation of severely malnourished children. Treatment of severe iron deficiency anemia.
Safe Motherhood and Birth spacing	Contraceptive distribution including condoms. Insertion of IUDs. STIs detection and case management. Antenatal and Post-natal care of selected complicated pregnancies and post-partum complications. District Hospitals Type A: Manual removal of placenta. Emergency treatment of incomplete abortion. Assistance to complicated deliveries ⁶ including C Sections and other basic obstetrics procedures, blood transfusion, antibiotic treatment. District Hospitals Type B: Basic non-surgical obstetric care and referral.
Curative Care	Minor surgery and emergency case management and referral. Diagnostic and treatment of internal medicine, pediatrics, infectious diseases patients including complicated and cerebral Malaria, Dengue, ARI, Diarrhea, DOTS (TB).
Training, Supervision & Support to HCs	See previous table on HC services.

D. Inter-District Hospitals (Inpatient and Outpatient Services).

Service/Activity	Contents
Health Education/IEC & Communication for behavioral change	Prevention of communicable diseases including sensitization on STIs/HIV and EPI promotion, Nutrition, Safe Motherhood, Birth spacing, Infectious disease outbreaks and case management.
Communicable Disease Control	Early detection of cases (including microscopy for TB and Malaria). Treatment of cases of severe complicated cases including cerebral malaria, severe dengue fever, typhoid, tetanus, meningitis. DOTS implementation and devolution to HCs and Villages. Diagnostic and treatment of STIs. Blood testing for HIV and other diseases. Immunizations: technical and logistic support to HCs and DHs.
Nutrition	Nutrition Education including breast -feeding. De-worming. Nutritional rehabilitation of severely malnourished children. Treatment of severe iron deficiency anemia.
Safe Motherhood and Birth spacing	Contraceptive distribution including condoms. Insertion of IUDs. Female and male sterilization. STIs detection and case management. Antenatal and Post-natal care of complicated pregnancies and post-partum complications. Emergency obstetrics: Manual removal of placenta. Emergency treatment of incomplete abortion and ectopic pregnancy, including curettage.

⁶ In DHs type A with staff adequately equipped and trained in basic obstetrics

	Assistance to complicated deliveries including C-sections and other basic obstetrical procedures, blood transfusion, antibiotic treatment.
Curative Care	Emergency surgery and emergency case management and referral. Includes: intestinal occlusion, stomach perforation, peritonitis, hernia, appendicitis, stone bladder, amputation, fracture reduction and immobilization. Diagnostic and treatment of internal medicine, pediatrics, infectious diseases patients including complicated and cerebral Malaria, Dengue, ARI, Diarrhea, DOTS (TB). Laboratory diagnostic services: blood cells counting, hemoglobin, malaria parasite identification, azotemia, glycemia, liver function tests, stool tests, urine examination.
Train., Supervision & Support	See previous tables on DH and HC services.

Annex 5-7: Example of an Official Consultation Meeting

**Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity**

**Ministry of Health
Department of Hygiene
and Prevention**

No /DOHP

**Minute of the NT2 HIA Consultation meeting
Public Health Action Plan proposal
in Khammuane province
15-17/06/04**

The meeting was held:

- On Tuesday 15/06/04, at Nakai and Mahaxai districts
- On Wednesday 16/06/04, at Gnommalath district
- On Thursday 17/06/04, at Khammuane province

Number of participants are attached (see list attached)

I Objectives of the consultation:

- To inform provincial, district, local authorities and concerned communities on HIA and public health action plan to mitigate the adverse impacts to the health of the local people of NT2 during the construction, reservoir filling and during the operation phase.
- To collect comments from Khammuane province, Nakai, Mahaxai and Gnommalath districts on Public Health Action Plan and report to the Ministry of Health.

II The following recommendations for the project to be considered:

1. From the Khammuane Provincial Governor:

- The creation of awareness and knowledge of local people on health prevention and health promotion is very important and should be considered as primary tasks in parallel with other preparation works. Prevention activities should start from now such as what need to done in terms of prevention when we build the new market? Latrines, water supply etc...We have to prepare our plan right now.
- Request NT2 Project to contribute for the improvement of Khamkeut, Nakai and Gnommalath district hospitals in order to ensure adequate health care service for the increased number of workers, and population. We should start the works from now, in the year 2004-2005, because it is a very urgent matter.
- Organize Health Education campaign to the local people from now. The establishment of awareness among communities regarding prevention of disease, health education to all people, especially local people who have limited knowledge on prevention.
- Setting up of provincial health team to work with the Ministry and with the NT2.

2. Recommendations from Nakai, Gnommalatand Mahaxai districts.

- Establishment of outbreak response team is very urgent. The team should have competence surveillance system on communicable diseases
- To improve health infrastructure:
 - Increase the number of health care services in order to insure adequate service to the increase number of people.
 - To improve the existing facilities and/or construct new district hospitals for the disease burden that will emerge from the NT2 works.

- Train of staffs and supply adequate medical equipment, provision of necessary drugs to district hospital/health center.

- Provision of ambulance

- District hospital should be able to provide health care service in an acceptable manner for emergency or before refer patients to provincial hospital.

- Access to clean water is very important during the construction of the dam, provision of public piped water to the district municipality in order to response to the development of the district in the future. The district should have good sytem of waste management and treatment of water.
- Capacity building for district health as well as health centres staff and village health volunteer to improve the quality of services.
- Provision of communication equipment to facilitate communication between health center and district.
- Construction of paved road with traffic signal
- Install public telephone to facilitate to the communication with health network
- Provision of health equipment: echography, small operation room.
- Protection of medicinal plants and combine tradtional medicine with conventional medicine.
- For the follower's camps and restaurants, there is a need to provide clean water and construction of latrines. These works should be prepared and started from now.
- In order to protect against malaria and dengue fever we have to provide impregnated bednets and larvicide.
- Organize campaign of health education for the prevention of HIV/AIDS/STI among risk groups.
- Health check up for workers and their followers.

3. Recommendations from Provincial Health Service.

- Suggest Nt2 to contact and work with Khammuane Provincial Service for any activities related to health, particularly in the resettlement area, some construction of jars for collecting water may be useful for daily use, but it can be harm or any outbreak of dengue fever, if the concerned community do not get information on how to prevent dengue.
- Request Nt2 to inform the province as well as plan to be cooperated and implemented with the provinces. The plan should be agreed upon with the Ministry, the provincial health service and the NT2.
- The povince will organize the team for working with the Ministry and NT2.

Vientiane, 18 June 2004

Deputy Director General
Head of Technical Team

Reporter

Dr Sengdara Vongsouvan

Annex 5-8: Summary of Key Baseline Health Data (Census 2000) on Khammouane Province

District-	Data Source	Thakhek		Mahaxay		Nongbok		Hinboon		Nhommalat		Boulapha		Nakai		Xebangfay		Xaybouathong		TOTAL	
		Number	Rate or %	Number	Rate or %	Number	Rate or %	Number	Rate or %	Number	Rate or %	Number	Rate or %	Number	Rate or %						
SUMMARY OF KEY BASELINE DATA																					
Total Population	5	81,562	25.1%	28,059	8.6%	44,258	13.6%	60,960	18.7%	25,897	8.0%	22,854	7.0%	18,622	5.7%	24,372	7.5%	18,678	5.7%	325,262	81%
Male	5	40,350	49.5%	13,881	49.5%	21,895	49.5%	30,158	49.5%	12,812	49.5%	11,306	49.5%	9,213	49.5%	12,057	49.5%	9,240	49.5%	160,914	49.5%
Female	5	41,212	50.5%	14,178	50.5%	22,363	50.5%	30,802	50.5%	13,085	50.5%	11,548	50.5%	9,409	50.5%	12,315	50.5%	9,438	50.5%	164,348	50.5%
Women of Child Bearing Age (WCBA)	6	18,759	23.0%	6,454	23.0%	10,179	23.0%	14,021	23.0%	5,956	23.0%	5,256	23.0%	4,283	23.0%	5,606	23.0%	4,296	23.0%	74,810	23.0%
Married women as a % of WCBA	6	13,207	70.4%	4,543	70.4%	7,166	70.4%	9,871	70.4%	4,193	70.4%	3,701	70.4%	3,015	70.4%	3,946	70.4%	3,024	70.4%	52,666	70.4%
No. of WCBA likely to become pregnant in given year	6	3,009	16.0%	1,035	16.0%	1,633	16.0%	2,249	16.0%	955	16.0%	843	16.0%	687	16.0%	899	16.0%	689	16.0%	12,000	16.0%
Crude Birth Rate (CBR)	6	3,010	36.9	1,035	36.9	1,633	36.9	2,249	36.9	956	36.9	843	36.9	687	36.9	899	36.9	689	36.9	12,002	36.9
Children 0 - 11 months as a % of population	6	3,010	3.7%	1,035	3.7%	1,633	3.7%	2,249	3.7%	956	3.7%	843	3.7%	687	3.7%	899	3.7%	689	3.7%	12,002	3.7%
Children 12 - 23 months as a % of population	6	2,936	3.6%	1,010	3.6%	1,593	3.6%	2,195	3.6%	932	3.6%	823	3.6%	670	3.6%	877	3.6%	672	3.6%	11,709	3.6%
Children <5 years old as a % of population	6	12,805	15.7%	4,405	15.7%	6,949	15.7%	9,571	15.7%	4,066	15.7%	3,588	15.7%	2,924	15.7%	3,826	15.7%	2,932	15.7%	51,066	15.7%
Village Details																					
Number of Villages	5	141		89		72		166		71		82		67		50		68		806	
Number of Villages with Poverty Rating	5	0	0.0%	69	77.5%	20	27.8%	13	7.8%	57	80.3%	78	95.1%	49	73.1%	2	4.0%	61	89.7%	349	43.3%
Number of Households in total population, and ave. per/HH	5	15,280	5.3	5,256	5.3	8,291	5.3	11,420	5.3	4,851	5.3	4,281	5.3	3,489	5.3	4,566	5.3	3,499	5.3	60,933	5.3
Number of IBN villages and % of total villages	1	108	76.6%	89	100.0%	72	100.0%	166	100.0%	71	100.0%	87	106.1%	65	97.0%	50	100.0%	66	97.1%	774	96.0%
Population "at risk" of Malaria, and % of total population	1	77,276	94.7%	25,882	92.2%	43,361	98.0%	57,551	94.4%	24,634	95.1%	19,461	85.2%	18,612	99.9%	23,463	96.3%	17,029	91.2%	307,269	94.5%
No. of Villages >3 hours from a Health Facility	1	8	5.7%	31	34.8%	0	0.0%	22	13.3%	58	81.7%	52	63.4%	48	71.6%	0	0.0%	52	76.5%	271	33.6%
No. of villages with Village Drug Kit (with 4 essential drugs)	1	15		33		29		34		42		11								164	
No. Population with WES, and % of Total Pop.	1	56,225	68.9%	12,950	46.2%	28,738	64.9%	39,411	64.7%	3,945	15.2%	4,646	20.3%	7,737	41.5%	15,630	64.1%	18,027	96.5%	187,309	57.6%
Health Facilities and Services																					
Number of Beds at Provincial Hospital and BOR	3	150	27.5																	150	27.5
Number of Consultations at Outpatients	3	1																		1	
Number of inpatient days	3	15,058																			
Number of Beds at District Hospital and BOR	1			15	9.3	15	10.9	15	11.4	15	12.7	15	11.3	15	9.2	15	15.1	15	5.5	120	18.7
Number of Consultations at Outpatients	1	926		751		810		727		739		738		702		1,116		97		6,606	
Number of inpatient days	1	475		510		595		623		694		618		504		824		300		5,143	
No of functioning Health Centre's (Suksala's)	1	13		6		10		17		5		4		5		7		4		71	
Number of General Consultations	1	0		309		748		302		998		516		833		355		190		4,251	
No. population in catchment area, and as % of total pop.	1	81,562	100.0%	28,059	100.0%	44,258	100.0%	60,960	100.0%	25,897	100.0%	22,854	100.0%	18,622	100.0%	24,372	100.0%	18,678	100.0%	325,262	100.0%
Womens Health																					
No. of pregnant women attending ANC cons. at Hospital	1	1,757		203		667		399		281		123		82		438		136		4,086	
No. of pregnant women attending ANC cons. at HC	1	0		0		0		0		0		0		0		0		0		0	
No. and % of pregnant women having at least 2TT	1	181	6.0%	50	4.8%	123	7.5%	78	3.5%	126	13.2%	90	10.7%	60	8.7%	24	2.7%	63	9.1%	795	6.6%
No. and % of women practicing modern FP methods	1	407	3.1%	155	3.4%	312	4.4%	56	0.6%	131	3.1%	164	4.4%	238	7.9%	354	9.0%	342	11.3%	2,159	4.1%
No. of deliveries at Provincial Hospital attended by trained HS	1	741																		741	
No. of deliveries at District Hospital attended by trained HS	1			45		40		25		46		38		30		28		17		269	
No. of deliveries at a Health Centre attended by trained HS	1	0		0		0		0		0		0		0		0		0		0	
No. of deliveries at home attended by Trained Health Staff	1	176		31		270		115		61		26		30		156		4		869	
Childrens Health																					
No. and % of children <1 immunised with DPT3	1	1,606	53.4%	809	78.1%	827	50.6%	1,011	44.9%	761	79.6%	780	92.5%	497	72.3%	731	81.3%	685	99.4%	7,707	64.2%
No. and % of children 12-23 m. immunised with MSV	1	390	13.3%	271	26.8%	408	25.6%	751	34.2%	511	54.8%	443	53.8%	390	58.2%	147	16.8%	226	33.6%	3,537	30.2%
No. and % of children 12-23 m. fully immunised	1	293	10.0%	194	19.2%	702	44.1%	688	31.4%	263	28.2%	444	54.0%	125	18.6%	41	4.7%	73	10.9%	2,823	24.1%
No. and % of children <5yrs who died from ARI	1	0	0.0%	7	0.2%	0	0.0%	0	0.0%	2	0.0%	0	0.0%	2	0.1%	10	0.3%	6	0.2%	27	0.1%
No. of cases of Diarrhoea in children <5yrs	1	603		55		616		120		91		76		298		300		109		2,268	
No. and % of children <5yrs who died from Diarrhoea	1	0	0.0%	0	0.0%	2	0.0%	0	0.0%	0	0.0%	0	0.0%	18	0.6%	0	0.0%	0	0.0%	20	0.0%

Malaria																					
No. of Malaria cases, as % of "Population at risk"	1	661	0.9%	773	3.0%	228	0.5%	922	1.6%	835	3.4%	398	2.0%	525	2.8%	750	3.2%	810	4.8%	5,902	1.9%
No of Positive slides, and SPR (%)	1, 3	3	2.0%	54	0.1	31	0.6%	22	2.2%	16	1.3%	59	15.8%	3		114		196		498	2.3%
No. of bednets (old and new) and Ave. persons per bednet	1	14,200	3.0	5,794	4.5	9,410	4.6	0	#DIV/0!	7,378	3.3	8,590	2.3	5,243		4,075		3,445		58,135	4.7
No. nets impregnated in last 12 m/th's, and % pop. protected.	1	14,200	54.4%	5,794	100.0%	9,410	100%	0	100%	7,378	100%	8,590	100%	5,243	100%	4,075	100%	3,445	100%	58,135	89%
No. malaria deaths as % of cases	1	0	0.0%	0	0.0%	0	0.0%	1	0.1%	0	0.0%	2	0.5%	0	0.0%	0	0.0%	3	0.4%	6	0.1%
Other Diseases																					
No. of Pulmonary TB cases diagnosed	1, 3	6		10		35		17		11		18		2		19		14		132	
Health Staff																					
Provincial Health Office	3	102																			102
Provincial Hospital	3	198																			198
District Health Office	1	18		17		21		20		22		16		13		24		14		165	
District Hospital	1			29		29		14		14		22		12		13		16		149	
Health Centre's (Suksala's)	1	41		7		20		36		6		11		11		14		7		153	
Total Health Staff	1	59		53		70		70		42		49		36		51		37		767	
Trained health staff/1000 population		0.7		1.5		1.6		1.1		1.6		2.1		1.9		2.1		2.0		2.3	
Trained VHV's	1	220		91		72		87		71		93		100		105		66		905	
Trained TBA's	1	64		11		72		36		71		30		70		10		66		430	
DATA SOURCES																					
District Health Office	1																				
District Planning & Finance Section	2																				
Provincial Health Office	3																				
Provincial Planning & Finance Department	4																				
National Statistics Centre	5																				
Maternal Child Health Centre	6																				
Centre for Malariology, Parasitology and Entomology	7																				
National TB Program	8																				
National HIV/AIDS Program	9																				
HSIP Project Coordination Unit, MOH	10																				
Department of Personnel, MOH	11																				
Department of food and Drugs, MOH	12																				
Proxy Data	P																				

Annex 5-9: Summary of Key Baseline Health Data (Census 2000) on Bolikhamxay Province

SUMMARY OF KEY BASELINE DATA	District- Data Source	Pakxane		Thaphabath		Pakkading		Bolikham		Khamkeuth		Viengthong		TOTAL	
		Number	Rate or %	Number	Rate or %	Number	Rate or %	Number	Rate or %	Number	Rate or %	Number	Rate or %	Number	Rate or %
Total Population	5	41,156	19.1%	25,071	11.6%	38,525	17.9%	29,400	13.6%	62,156	28.8%	19,365	9.0%	215,673	100%
Male	5	20,675	50.2%	12,594	50.2%	19,353	50.2%	14,769	50.2%	31,224	50.2%	9,728	50.2%	108,343	50.2%
Female	5	20,481	49.8%	12,477	49.8%	19,172	49.8%	14,631	49.8%	30,932	49.8%	9,637	49.8%	107,330	49.8%
Women of Child Bearing Age (WCBA)	6	9,466	23.0%	5,766	23.0%	8,861	23.0%	6,762	23.0%	14,296	23.0%	4,454	23.0%	49,605	
Married women as a % of WCBA	6	6,664	70.4%	4,059	70.4%	6,238	70.4%	4,760	70.4%	10,064	70.4%	3,136	70.4%	34,922	
No. of WCBA likely to become pregnant in given year	6	1,518	16.0%	925	16.0%	1,421	16.0%	1,085	16.0%	2,293	16.0%	714	16.0%	7,957	
Crude Birth Rate (CBR)	6	1,519	36.9	925	36.9	1,422	36.9	1,085	36.9	2,294	36.9	715	36.9	7,958	
Children 0 - 11 months as a % of population	6	1,519	3.7%	925	3.7%	1,422	3.7%	1,085	3.7%	2,294	3.7%	715	3.7%	7,958	
Children 12 - 23 months as a % of population	6	1,482	3.6%	903	3.6%	1,387	3.6%	1,058	3.6%	2,238	3.6%	697	3.6%	7,764	
Children <5 years old as a % of population	6	6,461	15.7%	3,936	15.7%	6,048	15.7%	4,616	15.7%	9,758	15.7%	3,040	15.7%	33,861	
Village Details															
Number of Villages	5	59		34		51		44		126		41		355	
Number of Villages with Poverty Rating	5	10	16.9%	2	5.9%	42	82.4%	33	75.0%	64	50.8%	37	90.2%	188	53.0%
Number of Households in total population, and ave. per/HH	5	6,989	5.9	4,257	5.9	6,542	5.9	4,992	5.9	10,555	5.9	3,288	5.9	36,623	5.9
Number of IBN villages and % of total villages	1	55	93.2%	34	100.0%	0	0.0%	24	54.5%	73	57.9%	34	82.9%	220	62.0%
Population "at risk" of Malaria, and % of total population	1	23,395	56.8%	20,126	80.3%	0	0.0%	12,702	43.2%	33,916	54.6%	15,475	79.9%	105,614	49.0%
No. of Villages >3 hours from a Health Facility	1	0	0.0%	0	0.0%	0	0.0%	12	27.3%	31	24.6%	12	29.3%	55	15.5%
No. of villages with Village Drug Kit (with 4 essential drugs)	1	52		32		53		36		72		40		285	
No. Population with WES, and % of Total Pop.	1	26,533	64.5%	13,042	52.0%	23,590	61.2%	15,581	53.0%	23,517	37.8%	2,655	13.7%	104,918	48.6%
Health Facilities and Services															
Number of Beds at Provincial Hospital and BOR	3	70	73.5											70	73.5
Number of Consultations at Outpatients	3	10,741												10,741	
Number of inpatient days	3	18,760													
Number of Beds at District Hospital and BOR	1			10	75.3	10	76.3	10	65.2	70	14.6	10	18.0	110	47.3
Number of Consultations at Outpatients	1	0		4,579		2,462		395		2,138		855		10,429	
Number of inpatient days	1	0		2,748		2,782		2,378		3,738		655		12,301	
No of functioning Health Centre's (Suksala's)	1	5		5		5		5		9		4		33	
Number of General Consultations	1&P	1,646		1,002		1,541		1,176		2,486		775		8,626	
No. population in catchment area, and as % of total pop.	1	41,156	100.0%	25,071	100.0%	38,525	100.0%	29,400	100.0%	62,156	100.0%	19,365	100.0%	215,673	100.0%
Womens Health															
No. of pregnant women attending ANC cons. at Hospital	1	817		337		319		320		723		170		2,686	
No. of pregnant women attending ANC cons. at HC	1	0		0		0		0		0		0		0	
No. and % of pregnant women having at least 2TT.	1	91	6.0%	138	14.9%	96	6.8%	115	10.6%	550	24.0%	72	10.1%	1,062	13.3%
No. of women practicing modern FP methods	1	18,574		8,626		23,159		11,054		13,078		7,786		82,277	
No. of deliveries at Provincial Hospital attended by trained HS	1	462												462	
No. of deliveries at District Hospital attended by trained HS	1			120		199		77		252		23		671	
No. of deliveries at a Health Centre attended by trained HS	1	0		0		0		0		0		0		0	
No. of deliveries at home attended by Trained Health Staff	1	39		46		86		9		127		35		342	
Childrens Health															
No. and % of children <1 immunised with DPT3	1	684	45.0%	309	33.4%	682	48.0%	452	41.7%	1,543	67.3%	188	26.3%	3,858	48.5%
No. and % of children 12-23 m. immunised with MSV	1	116	7.8%	141	15.6%	202	14.6%	348	32.9%	1,934	86.4%	344	49.3%	3,085	39.7%
No. and % of children 12-23 m. fully immunised	1	63	4.3%	101	11.2%	145	10.5%	239	22.6%	1,081	48.3%	365	52.4%	1,994	25.7%
No. and % of children <5yrs who died from ARI	1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
No. of cases of Diarrhoea in children <5yrs	1	139		146		333		172		517		247		1,554	
No. and % of children <5yrs who died from Diarrhoea	1	0	0.0%	0	0.0%	1	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%

Malaria																
No. of Malaria cases, as % of "Population at risk"	1	37	0.2%	69	0.3%	336	#DIV/0!	219	1.7%	758	2.2%	276	1.8%	1,695	1.6%	
No of Positive slides, and SPR (%)	1, 3	13	1.6%	0	0.0	6	5.0%	12	1.1%	39	3.0%	72	7.6%	142	2.2%	
No. of bednets (old and new) and Ave. persons per bednet	1	6,748	3.0	2,377	3.0	0	#DIV/0!	1,456	3.0	2,295	5.9	993	7.4	13,869	3.8	
No. nets impregnated in last 12 m/th's, and % pop. protected.	1	6,748	86.5%	2,377	35.4%	0	#DIV/0!	1,456	34%	2,295	40%	993	#DIV/0!	13,869	50%	
No. malaria deaths as % of cases	1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.4%	1	0.1%	
Other Diseases																
No. of Pulmonary TB cases diagnosed	1, 3	0		8		5		0		7		2		22		
Health Staff																
Provincial Health Office	3	53												53		
Provincial Hospital	3	95												95		
District Health Office	1	15		17		17		20		7		14		90		
District Hospital	1			11		11		15		0		16		53		
Health Centre's (Suksala's)	1	15		13		12		16		42		4		102		
Total Health Staff	1	30		41		40		51		49		34		393		
Trained health staff/1000 population		0.7		1.6		1.0		1.7		0.8		1.8		1.8		
Trained VHV's	1	95		68		82		82		169		44		540		
Trained TBA's	1	46		68		73		67		36		24		314		
DATA SOURCES																
District Health Office	1															
District Planning & Finance Section	2															
Provincial Health Office	3															
Provincial Planning & Finance Department	4															
National Statistics Centre	5															
Maternal Child Health Centre	6															
Centre for Malariology, Parasitology and Entomology	7															
National TB Program	8															
National HIV/AIDS Program	9															
HSIP Project Coordination Unit, MOH	10															
Department of Personnel, MOH	11															
Department of food and Drugs, MOH	12															
Proxy Data	P	Health Centre consultation was based on a PROXY of 4% of Population														

Annex 5-10: Summary of Key Baseline Health Data (Census 2000) on Savannakhet Province

District:-	Data Source	Khanthabouly		Xaybuly		TOTAL	
		Number	Rate or %	Number	Rate or %	Number	Rate or %
SUMMARY OF KEY BASELINE DATA							
Total Population	5	104,008	13.3%	50,229	6.4%	782,617	41%
Male	5	51,536	49.6%	24,888	49.6%	387,787	49.6%
Female	5	52,472	50.5%	25,341	50.5%	394,830	50.5%
Women of Child Bearing Age (WCBA)	6	23,922	23.0%	11,553	23.0%	180,002	
Married women as a % of WCBA	6	16,841	70.4%	8,133	70.4%	126,721	
No. of WCBA likely to become pregnant in given year	6	3,837	16.0%	1,853	16.0%	28,872	
Crude Birth Rate (CBR)	6	3,838	36.9	1,853	36.9	28,879	
Children 0 - 11 months as a % of population	6	3,838	3.7%	1,853	3.7%	28,879	
Children 12 - 23 months as a % of population	6	3,744	3.6%	1,808	3.6%	28,174	
Children <5 years old as a % of population	6	16,329	15.7%	7,886	15.7%	122,871	
Village Details							
Number of Villages	5	94		89		1,546	
Number of Villages with Poverty Rating	5	0	0.0%	2	2.2%	519	33.6%
Number of Households in total population, and ave. per/HH	5	16,739	6.2	8,084	6.2	125,955	6.2
Number of IBN villages and % of total villages	1	16	17.0%	31	34.8%	867	56.1%
Population "at risk" of Malaria, and % of total population	1	6,903	6.6%	19,399	38.6%	352,785	45.1%
No. of Villages >3 hours from a Health Facility	1	0	0.0%	40	44.9%	356	23.0%
No. of villages with Village Drug Kit (with 4 essential drugs)	1	3				317	
No. Population with WES, and % of Total Pop.	1	99,675	95.8%	36,709	73.1%	617,184	78.9%
Health Facilities and Services							
Number of Beds at Provincial Hospital and BOR	3	160	77.4			160	77.4
Number of Consultations at Outpatients	3	35,735				35,735	
Number of inpatient days	3	45,190					
Number of Beds at District Hospital and BOR	1			10	61.8	235	63.1
Number of Consultations at Outpatients	1	0		5,643		58,283	
Number of inpatient days	1	0		2,254		45,785	
No of functioning Health Centre's (Suksala's)	1	13		10		97	
Number of General Consultations	1	7,122		13069		90,384	
No. population in catchment area, and as % of total pop.	1	104,008	100.0%	50,229	100.0%	782,617	100.0%
Womens Health							
No. of pregnant women attending ANC cons. at Hosptal	1	165		413		7,934	
No. of pregnant women attending ANC cons. at HC	1	0		0		0	
No. and % of pregnant women having at least 2TT.	1	805	21.0%	274	14.8%	5,420	18.8%
No. and % of women practicing modern FP methods	1	3,482	20.7%	1875	23.1%	32,729	25.8%
No. of deliveries at Provincial Hospital attended by trained HS	1	1,652				1,652	
No. of deliveries at District Hospital attended by trained HS	1			75		1,438	
No. of deliveries at a Health Centre attended by trained HS	1	0		0		0	
No. of deliveries at home attended by Trained Health Staff	1	425		1356		7,162	
Childrens Health							
No. and % of children <1 immunised with DPT3	1	1,474	38.4%	1102	59.5%	16,478	57.1%
No. and % of children 12-23 m. immunised with MSV	1	171	4.6%	716	39.6%	10,920	38.8%
No. and % of children 12-23 m. fully immunised	1	153	4.1%	917	50.7%	8,568	30.4%
No. and % of children <5yrs who died from ARI	1	4	0.0%	0	0.0%	25	0.0%
No. of cases of Diarrhoea in children <5yrs	1	94		257		2,912	
No. and % of children <5yrs who died from Diarrhoea	1	0	0.0%	0	0.0%	0	0.0%
Malaria							
No. of Malaria cases, as % of "Population at risk"	1	94	1.4%	59	0.3%	4,086	1.2%
No of Positive slides, and SPR (%)	1, 3	94	29.3%	59		4,086	8.4%
No. of bednets (old and new) and Ave. persons per bednet	1	1,929	2.5	4,125		110,521	2.5
No. nets impregnated in last 12 m/th's, and % pop. protected.	1	1,929	69.9%	4,125		110,521	73%
No. malaria deaths as % of cases	1	0	0.0%	0	0.0%	20	0.5%
Other Diseases							
No. Pulmonary TB cases diagnosed.	1, 3	124		16		350	

Health Staff						
Provincial Health Office	3	180				180
Provincial Hospital	3	307				307
District Health Office	1	19		11		228
District Hospital	1			22		312
Health Centre's (Suksala's)	1	26		15		174
Total Health Staff	1	45		48		1,201
Trained health staff/1000 population		0.4		1.0		1.5
Trained VHV's	1	123		107		1,723
Trained TBA's	1	57		74		845
DATA SOURCES						
District Health Office	1					
District Planning & Finance Section	2					
Provincial Health Office	3					
Provincial Planning & Finance Department	4					
National Statistics Centre	5					
Maternal Child Health Centre	6					
Centre for Malariology, Parasitology and Entomology	7					
National TB Program	8					
National HIV/AIDS Program	9					
HSIP Project Coordination Unit, MOH	10					
Department of Personnel, MOH	11					
Department of food and Drugs, MOH	12					
Proxy Data	P					

Annex 5-11: Health Program Management Unit

NTPC should create a Health Program Management Unit (HPMU). The HPMU will coordinate, support, supervise and report on the implementation of the NTPC Public Health Action Plan activities.

The major responsibilities of the HPMU are following:

Program Management Structure

The project management structure consists of the Provincial Health Director and the Project Manager (=International Public Health Expert). It will be based in Thakhek, preferably in the PHO. Both the Provincial Health Director and the Project Manager are responsible for the good functioning of the HPMU.

The Provincial Health Management Team (PHMT) meeting is the forum to negotiate and organize the linkage between the Project and the government structure. It is where project management happens between the Provincial Health Director and the Project Manager within the limitations of the PHAP, approved by the Health Project Steering Committee (HPSC). The Project Manager (=Public Health Expert) will become a member of the Provincial Health Management Team. The Social and Resettlement Office and the Resettlement Management Unit will also be part of this Committee.

Any major change to the PHAP has to get prior approval from the PHMT before submitting it to the Health Project Steering Committee. Official minutes will be written by the Provincial Health Office under direct supervision of the Project Director and will be signed by all the members of the PHMT.

Mandate of the Health Program Management Unit (HPMU):

1. Organization, coordination and supervision of the implementation of Public Health Action Plan activities; (Civil works, procurement, training, referral system, support the health districts with the implementation of the service delivery, surveillance and monitoring);
2. Collection and analysis of the health data on project activities, achievements, problems, and impacts. Support the implementation of different health surveys. Forward data and reports to the S&M Taskforce. This with the scientific support of the IFMT/STI;
3. Oversee the different components of the Resettlement and the Regional Health Plan and assure that their implementation is in line with the PHAP and the HPSC agreements;
4. Organize and supervise the implementation of trainings as proposed by the PHAP and the training need assessment;
5. Give public health advice to the PHO and DHO direction and implementing staff;
6. Attend the Provincial Health Management Team meetings;
7. Assist the District Health Office of the project area to prepare their annual District Health Plan and Budget;
8. Prepare a yearly plan and budget for project activities based on the PHAP and consistent with the development of the project;
9. To present the yearly plan and budget for approval, first by the PHMT and finally by the HPSC;
10. Administrative and financial management of the project according to the official procedures, this includes procurement of goods and services;
11. Assume responsibilities of the project accounts (cash and bank) for transactions in line with the PHAP, the NTPC financial procedures, the Health Project Steering Committee (HPSC) agreements, and the MOU;
12. Control project finances of the implementing partners (DHO, NGOs, training institutions, etc.);
13. Coordination of different implementing agencies: MOH departments, NGOs, training institutions, national organizations;
14. Evaluate the quality of the services delivered by the different implementing agencies;

15. Adaptation of project planning in line with the project's development, propose required changes to the PHAP to the HPSC;
16. Agenda setting for the Health Project Steering Committee meeting;
17. Inform the HPSC Chairperson about the need for an extraordinary HPSC meeting;
18. Preparation of the written invitations to attend the Health Project Steering Committee meeting, together with the dissemination of preparatory documents for these meetings to members within the given timescale;
19. Attend the HPSC meetings;
20. Secretariat of Health Project Steering Committee meetings.
21. On request by NTPC assist the Environmental Management Unit in verifying whether the HCC implements and respects the requirements of the Owner as well as his own approved plan regarding the Project Staff Health Program and possibly other health related environmental issues.

The Health Project Management Unit (HPMU) should at least include:

- one International Public Health Expert
- one Medical Doctor, Lao Technical Assistant
- one Secretary with accounting skills
- one Translator/Office Assistant
- one Driver

The International Public Health Expert should have experience in the field of Public Health (District Health Management, Health System Reform, Health Training, Primary Health Care) and with Project Management (planning, budgeting, reporting, evaluation, procurement, management of resources) (see TOR).

The NTPC office will support the HPMU with specific administrative tasks (accounting, procurement, custom clearance, legal, auditing, inspection of civil works, etc.).

Ideally the HPMU office should be located within the Khammouane Provincial Health Office.

Annex 5-12: TOR and Qualifications Required of Health Program Management Unit Personnel
Project Team Leader

Appointed:	by NTPC (approved by MOH)
Location:	Based part time in Thakhek, part time in Vientiane, conducting field visits in all of the NT2 project districts
Reporting to:	Manager of the NTPC
Timing of required services:	Full time 48 months

Specific Functions:

1. Organization, coordination and supervision of the implementation of Public Health Action Plan activities; (civil works, procurement, training, referral system, support the health districts with the implementation of the service delivery, surveillance and monitoring)
2. Supervise the collection and analysis of the health data on project activities, achievements, problems, and impacts. Support the implementation of different health surveys. Forward data and reports to the S&M Taskforce. This with the scientific support of the IFMT/STI;
3. Oversee the different components of the Resettlement and the Regional Health Plan and assure that their implementation is in line with the PHAP and the HPSC agreements;
4. Give public health advice to the PHO and DHO direction and implementing staff;
5. Coordination of different implementing agencies: MOH departments, NGOs, training institutions, national organizations;
6. Evaluate the quality of the services delivered by the different implementing agencies;
7. Organize and supervise the implementation of trainings as proposed by the PHAP and the training need assessment;
8. Administrative and financial management of the project according to the official procedures, this includes procurement of goods and services;
9. Assume responsibilities of the project accounts (cash and bank) for transactions in line with the PHAP, the NTPC financial procedures, the Health Project Steering Committee (HPSC) agreement, and the MOU;
10. Liaise with the Director of the Provincial Health Office of Khammouane and the Director of the Social Department of NTPC for project related decisions:
 - a. Procurement of goods or services surpassing a certain amount;
 - b. Minor changes to the planned activities of the PHAP not requiring HPSC approval;
11. Control project finances of the implementing partners (DHO, NGOs, training institutions, etc.);
12. Attend the Provincial Health Management Team meetings;
13. Assist the District Health Office of the project area to prepare their annual District Health Plan and Budget;
14. Prepare a yearly plan and budget for project activities based on the PHAP and consistent with the development of the project;
15. To present the yearly plan and budget for approval, first by the PHMT and finally by the HPSC;
16. Agenda setting for the Health Project Steering Committee Meeting;
17. Inform the HPSC Chairperson about the need for an extraordinary HPSC meeting;
18. Preparation of the written invitations to attend the Health Project Steering Committee meeting, together with the dissemination of preparatory documents for these meetings to members within the given timescale;
19. Attend the HPSC meetings;

20. Secretariat of Health Project Steering Committee meetings;
21. Report and brief the Director of the Social Development Plan of the NTPC on achievements and problems on a regular base (monthly);
22. Liaise with different departments of the MOH at central level regarding project issues related to their specific departments;
23. Organize, manage and supervise the HPMU office and its staff.

Qualifications Required:

- Medical Officer with more than 10 years experience in Public Health, more specifically in the field of Operational Health Districts, Primary Health Care, epidemiology, referral systems, financing systems and health personnel training. Preferably with a Master's in Public Health;
- Previous experience with project and personnel management;
- Experience with contracting is preferred;
- Experience in South East Asia is preferred;
- Fluency in English, good working knowledge of French;
- Knowledge of Lao culture is an advantage;
- Good computer skills (Word, Excel, PowerPoint, MS Project, Email)

Good personality, communication skills and ability to work with national and international personnel

Technical Assistant/ Health Operations Officer

Appointed:	by NTPC (approved by MOH)
Location:	Based in Gnommalath, with frequent visits in all of the NT2 project districts and to Vientiane
Reporting to:	Manager of the Social and Resettlement Division, NTPC, through the Project Team Leader
Timing of required services:	Full time, 48 months

Specific Functions:

1. Coordinate the collection and analysis of the health data on project activities, achievements, problems, and impacts with MOH, Province and District Health Offices. Support the implementation of different health surveys. Forward data and reports to the S&M Taskforce. This with the scientific support of the IFMT/STI;
2. Give public health advice to the PHO and DHO staff;
3. Organize and supervise the implementation of trainings of all levels of health staff in the Project area. as proposed by the PHAP and the training need assessment;
4. Liaise with the Heads of District Health Offices in Khammouane Province and the Manager of Social and Resettlement Division of NTPC for project related decisions:
 1. Procurement of goods or services surpassing a certain amount;
 2. Minor changes to the planned activities of the PHAP not requiring HPSC approval;
5. Attend the Provincial Health Management Unit meetings as well as other relevant meetings;
6. Assist the District Health Office of the project area to prepare their annual District Health Plan and Budget;
7. Prepare a yearly plan and budget for project activities within the districts based on the PHAP and consistent with the development of the project;
8. Agenda setting for the Health Project Steering Committee meeting;
9. Inform the HPSC Chairperson about the need for an extraordinary HPSC meeting;
10. Attend the HPSC meetings;
11. Report and brief the Manager of the Social and Resettlement Division of the NTPC on achievements

and problems on a regular basis (monthly).

Qualifications Required:

- Medical Officer with more than 5 years in experience in Public Health, more specifically in the field of Operational of Health Districts, Primary Health Care, health surveys, epidemiology, referral systems);
- Previous experience with project management;
- Experience in working with the government health system;
- Fluency in English;
- Good computer skills (Word, Excel, PowerPoint, MS Project, Email);
- Good personality, communication skills and ability to work with national and international personnel.

Project Accountant / Secretary

Category: HIRED BY NTPC

Responsibilities: responsible for Project Office accounting & secretariat

Timing of required services: Full time 48 months

Specific Functions:

- Project office accounting;
- Check PHO and DHO accounting, including monitor the cash advances and certify the liquidation reports;
- Secretariat function for the Project Manager;
- Answering letters in English and Lao;
- Writing reports in Lao and English, including translation;
- Serve as a Lao-English interpreter

Qualifications:

- Degree in office management, business administration and/or accounting;
- Familiarity with medical terminology is an advantage;
- Fluency in oral and written Lao, English, good working knowledge of French will be an advantage;
- Able to make simultaneous translation
- Computer literate Excel, Word; PowerPoint, email; excellent Lao typing skills
- Good personality, communication skills and ability to work in team with national and international staff;
- Willingness to live in a province.

Annex 5-13: Proposed Content for the MOU

Memorandum of Understanding

The responsibilities, authorities, rights and contributions of the different partners and the procedures for the implementation of the PHAP should be clearly specified and established.

The Memorandum of Understanding (MOU) commits all the agreements and engagements to paper.

MOU Partners: the MOH, the NTPC, the Provincial Health Office of Khammouane

Content of the MOU should cover at least the following issues:

- Approval of the PHAP and the institutional framework for its implementation (the creation of the Health Project Steering Committee, Health Project Management Unit, Surveillance and Monitoring Taskforce, exchange of health data for monitoring purposes, etc.);
- Specify the mandate of the HPMU;
- Staffing of the Public Health Institutions in the Project area;
- The procedures for financing the operational costs of the implementing public health institutions. (reporting, and accounting responsibilities);
- Transparency of the DHO and DH financial systems (sources, taxes, revenue and expenses);
- Whether taxes should be paid or are to be exonerated on civil works, equipment, vehicles, consumables, salaries and incentives;
- Procurement procedures of the NTPC (different procedures depending on the expected amount of the purchase or contract);
- Any restrictions on the use and maintenance of project funded vehicles (private use??), equipment;
- Handing over procedures and dates of equipment and infrastructures;
- Activity reporting obligations (what, by who, to whom, frequency);
- Whether the HPMU can use office space of the PHO building;
- Visas for personnel of NGO or other implementing organisations
- Final evaluation procedures

Annex 5-14: References

- American Thoracic Society. (2000), Diagnostic Standards and Classification of Tuberculosis in Adults and Children., *Am J Respir Crit Care Med*, **161**, 1376-95.
- Appiah-Opoku, S. (2001), Environmental impact assessment in developing countries: the case of Ghana, *Environ Impact Assess Rev*, **21**, 59-71.
- Awakul, P. and Ogunlana, S. P. (2002), The effect of attitudinal differences on interface conflict on large construction projects: the case of the Pak Mun Dam project, *Environ Impact Assess Rev*, **22**, 311-35.
- Birley, M. H., Gomes, M. and Davy, A. (1997), *Health aspects of environmental assessment. Update 18 to the environmental impact assessment resource book.*, World Bank, Washington DC.
- Brismar, A. (2004), Attention to impact pathways in EISs of large dam projects, *Environ Impact Assess Rev*, **24**, 59-87.
- Charlwood, J., Paru, R. and Dagoro, H. (1984), Raised platforms reduce mosquito bites, *Trans Roy Soc Trop Med Hyg*, **78**, 141-2.
- de Silva, N. R., Brooker, S., Hotez, P. J., Montresor, A., Engels, D. and Savioli, L. (2003), Soil-transmitted helminth infections: updating the global picture, *Trends Parasitol*, **19**, 547-51.
- Desjarlais, R., Eisenberg, L., Good, B. and Leinman, A. (1995), *Dislocation in World Mental Health: Problems and priorities in low-income countries* Oxford University Press, New York, pp. 136-54.
- Doumenge, J. P., Mott, K. E., Cheung, C., Villenave, D., Chapuis, O., Perrin, M. F. and Reaud-Thomas, G. (1987), *Atlas of the global distribution of schistosomiasis*, Geneva.
- Ezzati, M., Lopez, A. D., Rodgers, A., Vander Hoorn, S., Murray, C. J. L. and Group, t. C. R. A. C. (2002), Selected major risk factors and global and regional burden of disease, *Lancet*, **360**, 1347-60.
- Ezzati, M., Utzinger, J., Cairncross, S., Cohen, A. J. and Singer, B. H. (2004), Environmental exposure indicators in the developing world: review, conceptual framework, and examples. *J Epidemiol Community Health*, (submitted for publication).
- Gamage-Mendis, A., Carter, R., Mendis, C., De Zoysa, A., Herath, P. and Mendis, K. (1991), Clustering of malaria infections within an endemic population: risk of malaria associated with the type of housing construction, *Am. J. Trop. Med. Hyg.*, **45**, 77-85.
- Ghebreyesus, T., Haile, M., Witten, K., Getachew, A., Yohannes, M., Lindsay, S. and Byass, P. (2000), Household risk factors for malaria among children in the Ethiopian highlands, *Trans. R. Soc. Trop. Med. Hyg.*, **94**, 17-21.
- Gunawardena, D., Wickremasinghe, A., Muthuwatta, L., Weerasingha, S., Rajakaruna, J., Senenayaka, T., Kotta, P., Attanayake, N., Carter, R. and Mendis, K. (1998), Malaria risk factors in an endemic region of Sri Lanka and the impact and cost implications of risk-factor based interventions, *American Journal of tropical Medicine and Hygiene*, **58**, 533-42.
- Hadis, M., Lulu, M., Makonnen, Y. and Asfaw, T. (1997), Host choice by indoor-resting *Anopheles arabiensis* in Ethiopia, *Trans Roy Soc Trop Med Hyg*, **91**, 376-8.
- Hunter, J. M., Rey, L., Chu, K. Y., Adekolu-John, E. O. and Mott, K. E. (1993), *Parasitic diseases in water resources development: the need for intersectoral negotiation*, World Health Organization, Geneva.
- Institut de la Francophonie pour la Medecine Tropicale, WHO and Japan International Cooperation Agency (JICA). (2003), *Diagnosis and Treatment in District Hospitals*, Ministry of Health, Lao P.D.R., Vientiane, Lao P.D.R.
- Japan International Cooperation Agency (JICA) and Ministry Of Health. (2002), *Study on the improvement of health and medical services in the Lao People's Democratic Republic: Lao Health Master Planning: Final Report*.
- Japan International Cooperation Agency (JICA) and Ministry of Health. (2003), *The case study of rural water supply and sanitation improvement in North-West Region in the Lao Peoples's Democratic Republic: Summary report*, The 3rd World Water Forum, Kyoto, Japan.
- Jobin, W. (2003), Health and equity impacts of a large oil project in Africa, *Bull World Health Organ*, **81**, 420-6.

- Kemm, J. (2003), Perspectives on health impact assessment, *Bull World Health Organ*, **81**, 387.
- Kobayashi, J., Phompida, S., Toma, T., Looareensuwan, S., Toma, H. and Miyagi, I. (2004), The effectiveness of impregnated bed net in malaria control in Laos, *Acta Trop*, **89**, 299-308.
- Kobayashi, J., Somboon, P., Keomanila, H., Inthavongsa, S., Nambanya, S., Inthakone, S., Sato, Y. and Miyagi, I. (2000), Malaria prevalence and a brief entomological survey in a village surrounded by rice fields in Khammouan province, Lao PDR, *Trop Med Int Health*, **5**, 17-21.
- Kolstrup, N. (1980), *Studies on the transmission and control of Wuchereria bancrofti in North east Tanzania*, Univ of London, London.
- Krieger, G. R., Magnus, M. and Hassig, S. E. (2004), HIV/AIDS prevention programs: methodology and insights from the dynamic modeling literature., *Clin Occupat Environ Med*, (in press).
- Krieger, N., Northridge, M., Gruskin, S., Quinn, M., Kriebel, D., Davey Smith, G., Bassett, M., Rehkopf, D. H., Miller, C. and group, t. H. p. a. p. c. (2003), Assessing health impact assessment: multidisciplinary and international perspectives, *J Epidemiol Community Health*, **57**, 659-62.
- Lengeler, C. (2000), Insecticide-treated bednets and curtains for preventing malaria, *Cochrane Database Systematic Reviews*, **CD000363**.
- Lindsay, S. W., Jawara, M., Paine, K., Pinder, M., Walraven, G. E. L. and Emerson, P. M. (2003), Changes in house design reduce exposure to malaria mosquitoes, *Trop Med Int Health*, **8**, 512-17.
- Lindsay, S. W. and Snow, R. W. (1988), The trouble with eaves; house entry by vectors of malaria, *Trans R Soc Trop Med Hyg*, **82**, 645-6.
- Listorti, J. A. and Doumani, F. M. (2001), *Environmental health: bridging the gaps*, World Bank Discussion Paper No. 422, World Bank, Washington, D.C.
- Lock, K. (2000), Health impact assessment, *BMJ*, **320**, 1395-8.
- Lumsden, D. (1993), *Dams, Displacement and mindful distress*, International Mental and Behavioral Health Project, Center for the Study of Culture and Medicine, Harvard Medical School, Boston.
- Mayxay, M., Newton, P. M., Khanthavong, M., Tiengkham, P., Phetsouvanh, R., Phompida, S., Brockman, A. and White, N. J. (2003), Chloroquine versus sulfadoxine-pyrimethamine for treatment of *Plasmodium falciparum* malaria in Savannakhet province, Lao People's Democratic Republic: an assessment of national antimalarial recommendations., *Clin Infect Dis*, **37**, 1021-28.
- Mercier, J.-R. (2003), Health impact assessment in international development assistance: the World Bank experience, *Bull World Health Organ*, **81**, 461-2.
- Ministry Of Health. (2001), *Report of national health survey: health status of the people in Lao P.D.R.*, Ministry of Health, Vientiane.
- Ministry of Health (2004), *Health service improvement project: draft baseline survey report*, PCU, Vientiane.
- Morgan, R. K. (2003), Health impact assessment: the wider context, *Bull World Health Organ*, **81**, 390.
- Parry, J. and Stevens, A. (2001), Prospective health impact assessment: pitfalls, problems, and possible ways forward, *BMJ*, **323**, 1177-82.
- Phimphachanh, C., Philavong, B., Sayabounthavong, K., Bennett, T., Phothong, A. and Gallway, J. (2000), HIV/AIDS/STD technical assessment on Lao People's Democratic Republic August 10-23, 1999 In *Ind Lao-Vietnam Symposium on Health Research to Promote the Quality of Preventive and Curative Medicine. Abstracts & Reports* (Eds, MOH and WHO) Ministry of Health, National Committee for the Control of AIDS Bureau, Vientiane 10-11 January 2000, pp. 57-62.
- Pholsena, K., Hongvangthong, B., Vanisaveth, V. and Promkutkao, C. (1997), *The health status of resident populations in the Nam Theun 2 project area, Khammounae province, Lao PDR*, Institute of Malariology, Parasitology and Entomology, Vientiane.
- Pillai, D. R., Labbé, A.-C., Vanisaveth, V., Hongvangthong, B., Pomphida, S., Inkathone, S., Zhong, K. and Kain, K. C. (2001), *Plasmodium falciparum* malaria in Laos: chloroquine treatment outcome and predictive value of molecular markers., *J Infect Dis*, **183**, 789-95.

- Rim, H. J., Chai, J. Y., Min, D. Y., Cho, S. Y., Eom, K. S., Hong, S. J., Sohn, W. M., Yong, T. S., Deodato, G., Standgaard, H., Phommasack, B., Yun, C. H. and Hoang, E. H. (2003), Prevalence of intestinal parasite infections on a national scale among primary schoolchildren in Laos, *Parasitol Res*, **91**, 267-72.
- Scott-Samuel, A. (1998), Health impact assessment--theory into practice, *J Epidemiol Community Health*, **52**, 704-5.
- Scott-Samuel, A., Birley, M. and Ardern, K. (2001), *The Merseyside guidelines for health impact assessment*, International Health Impact Assessment Consortium, Liverpool.
- Singhasivanon, P. (1999), Mekong malaria: malaria, multi-drug resistance and economic development in the greater Mekong subregion of Southeast Asia, *Southeast Asian J Trop Med Public Health*, **30**, 1-101.
- Soukaloun, D., Kounnavong, S., Pengdy, B., Boupaha, B., Durondej, S., Olness, K., Newton, P. N. and White, N. J. (2003), Dietary and socio-economic factors associated with beriberi in breastfed Lao infants, *Ann Trop Paediatr*, **23**, 181-6.
- Subramanian, S., Manoharan, A., Sahu, S., Jambulingam, P., Govardhini, P., Mohapatra, S. and Das, P. (1991), Living conditions and occurrence of malaria in a rural community, *Indian J Malariol*, **28**, 29-37.
- Thompson, R., Begtrup, K., Cuamba, N., Dgedge, M., Mendis, C., Gamage-Medis, A., Enosse, S., Barreto, J., Sinden, R. and Hogg, B. (1997), The Matola Malaria Project: a temporal and spatial study of malaria transmission and disease in a suburban area of Maputo, Mozambique, *Am J Trop Med Hyg*, **57**, 550-9.
- Trape, J.-F., Lefebvre-Zante, E., Legros, F., Ndiaye, G., Bouganali, H., Druilhe, P. and Salem, G. (1992), Vector density gradients and the epidemiology of urban malaria in Dakar, Senegal, *Am J Trop Med Hyg*, **47**, 181-9.
- Trung, H. D., Van Bortel, W., Sochantha, T., Keokenchanh, K., Quang, N. T., Cong, L. D. and Coosemans, M. (2004), Malaria transmission and major malaria vectors in different geographical areas of Southeast Asia, *Trop Med Int Health*, **9**, 230-37.
- United Nations. (2002), *World urbanization prospects: the 2001 revision*, United Nations, New York.
- Urbani, C., Sinoun, M., Socheat, D., Pholsena, K., Strandgaard, H., Odermatt, P. and Hatz, C. (2002), Epidemiology and control of mekongi schistosomiasis, *Acta Trop*, **82**, 157-68.
- Utzinger, J., Tozan, Y., Doumani, F. and Singer, B. H. (2002), The economic payoffs of integrated malaria control in the Zambian copperbelt between 1930 and 1950, *Trop Med Int Health*, **7**, 657-77.
- Utzinger, J., Wyss, K., Moto, D. D., N'Diekhon, Y., Tanner, M. and Singer, B. H. (2004), Assessing health impacts of the Chad-Cameroon petroleum development and pipeline project: challenges and a way forward, *Environ Impact Assess Rev*, (in press).
- WHO. (2000), *Human health and dams*, WHO/SDE/WSH/00.01, World Health Organization, Geneva.
- WHO. (2001), *Health impact assessment: harmonization, mainstreaming and capacity building*, WHO/SDE/WSH/01.07, World Health Organization, Geneva.
- WHO. (2002), *The global plan to stop tuberculosis*, WHO, Geneva.
- WHO. (2003a), *Draft third edition of the WHO guidelines for drinking water quality*, World Health Organization, Geneva.
- WHO. (2003b), *The world health report 2003: shaping the future*, World Health Organization, Geneva.
- World Commission On Dams. (2000), *Dams and development: a new framework for decision-making. The report of the World Commission on Dams*, Earthscan Publications, London.

Annex 5-15: Entitlements – Resettlement and Regional Health Programs

(i) Resettlement Health Program - Entitlements Table

[Note: unless otherwise stated, entitlements are for duration of Resettlement Implementation Period (about COD + 5 years)]

Type of Loss	Entitled Person	Compensation and/or rehabilitation measures
1. Health infrastructure and services		
(The entitlements to use of health facilities and access to health services as specified in item 1 below relate to the facility and service entitlements as detailed under item 2 below.)		
1.1 Health Facilities	All Resettlers	<ul style="list-style-type: none"> • Access to Nakai District Hospital and two (newly built) Integrated Community Health Centers (“ICHCs”), which have: <ul style="list-style-type: none"> ○ Adequate medical and non-medical equipment; ○ Water supply and sanitary facility; ○ Appropriate numbers and levels of Ministry of Health (“MOH”) staff; and which are: <ul style="list-style-type: none"> ○ Structurally maintained for the first five years by the Company, after which MOH will maintain them as any other facility in the country; ○ Under the support and supervision of the NT2 Projects Project Implementation Unit (“PIU”).
1.2 Health Services	All Resettlers	<ul style="list-style-type: none"> • Health Checks to all Resettlers at the start of resettling in newly built villages. • Hospital/ICHCs providing all routine health services normally provided through government health services, including all preventive services under the national preventive programs, of a high standard. • Provision of curative services (including antiretrovirals (“ARV”) as follows: <ul style="list-style-type: none"> (i) free of charge for the first three years (yrs 1 to 3); (ii) 50 % subsidized cost for next three years (yrs 4 to 6); (iii) Villagers to then (yr 6 +) pay service charges as any where else in the country (except for poor families identified by Village Resettlement Committees, who shall continue to be eligible for free medical services). • Free of charge referral services for medical emergencies as/when required for the resettlement period. • Ambulance service for transfer of medical emergencies from ICHC to District Hospital (“DH”) and/or Provincial Hospital (“PH”). • School health education and other preventive programs. • Health education and awareness programs.
2. Impacts in nine Environmental Health Areas		
2.1 Impacts resulting in respiratory disease, including TB	Nakai Resettlement villages and Oudomsouk ⁷	<ul style="list-style-type: none"> • Participation in all components of the global health programs for Resettlers. • <u>Promotion and Prevention:</u> Participation in: <ul style="list-style-type: none"> ○ Health education/awareness on prevention and management of Acute Respiratory Infections (“ARI”) and Tuberculosis (“TB”); ○ National Expanded Program of Immunization (“EPI”). • New housing to be constructed to have separate, ventilated kitchen areas. • <u>Diagnosis and Detection:</u> <ul style="list-style-type: none"> ○ Improved TB laboratory services at Nakai DH; ○ Conduct contact tracing of all patients diagnosed with active TB; ○ Sputum collection at ICHC level without required hospitalization. • <u>Treatment:</u> <ul style="list-style-type: none"> ○ Treatment of ARIs in ICHC and DH, in accordance to clause 1.2 of this table.
2.2 Impacts in vector-related disease	Nakai Resettlement villages and Oudomsouk	<ul style="list-style-type: none"> • Participation in all components of Malaria Control program. • <u>Promotion and Prevention:</u> Participation in Regular education programs regarding: <ul style="list-style-type: none"> ○ Prevention and treatment of Dengue, incl. elimination of Dengue larvae breeding grounds; ○ Prevention and treatment of Malaria for the resettlement period; ○ Provision of Impregnated Bed Nets (“IBN”); ○ Health education and awareness campaigns regarding the prevention of leptospirosis if required; ○ Waste management plans and service in each Village. • <u>Diagnosis and Detection:</u> <ul style="list-style-type: none"> ○ Malaria Testing at Health Centre (“HC”) and DH level (antigen test and/or microscopy).

⁷ The parties intend to include all Oudomsouk residents in the updated survey to be carried out prior to COD, in order to identify those people who shall be eligible, along with the descendants for “Oudomsouk” entitlements in this table. The purpose of such survey is to identify the households living in the area pre-Project.

Type of Loss	Entitled Person	Compensation and/or rehabilitation measures
		<ul style="list-style-type: none"> • <u>Treatment:</u> <ul style="list-style-type: none"> ○ Adequate malaria treatment at HC and DH level; ○ Management of Dengue Fever, Dengue Hemorrhagic Fever, Dengue Shock Syndrome and other disease with fever as presenting problem at HC and DH level; ○ Transfer of serious patients to Province Hospital if required.
2.3 Impacts in sexually transmitted and blood borne infections	Nakai Resettlement villages and Oudomsouk	<ul style="list-style-type: none"> • Participation in existing global program. • <u>Promotion and Prevention:</u> <ul style="list-style-type: none"> ○ Participation in health education and awareness programs regarding Sexually Transmitted Infections (“STIs”) and HIV/AIDS and prevention strategies; ○ Participation in school-based HIV/AIDS and sex education program; ○ Provision of health services which implement the national guidelines/policy for the control of blood-borne pathogens (proper disposal of sharps, autoclave equipment, in house medical waste collection, destruction and storage); ○ <u>Condoms and education regarding use and disposal.</u> • <u>Treatment:</u> <ul style="list-style-type: none"> ○ Provision of treatment for STIs through the HCs and the DH (subject to clause 1.2), assuming generic ARV are available in the Lao PDR; ○ Voluntary counseling and testing for Resettlers and treatment when required for seropositive patients.
2.4 Impacts in soil and water borne diseases as well as food, nutrition and micronutrients related issues	Nakai Resettlement villages and Oudomsouk	<ul style="list-style-type: none"> • Participation in <u>Promotion and Prevention</u> program for Resettlers: <ul style="list-style-type: none"> ○ Education and awareness on drinking water systems, treatment of water and family latrines based on the MOH water and environmental sanitation program; ○ Education and awareness programs regarding fecal/oral transmission of diseases, and transmission of helminthic diseases; ○ Domestic water sources and sanitation to all households of the resettlement villages, complying with national standards; ○ Local markets with the following: 1) latrines, 2) waste receptacles and waste removal system and 3) domestic water. • <u>Provision of Treatment</u> - subject to clause 1.2: <ul style="list-style-type: none"> ○ Worm treatment for children 2-6 (for whole resettlement period); ○ Worm treatment twice a year to primary school children (during whole resettlement period); ○ Participation in health education and awareness on correct child weaning and child feeding practices adapted to changed types of food; ○ Vitamins (vitamin A, Folic Acid, Fe) for children and pregnant women. • <u>Diagnosis and Detection:</u> <ul style="list-style-type: none"> ○ DH Laboratory capable of diagnosing food, water, and soil borne infections. • <u>Provision of Treatment:</u> <ul style="list-style-type: none"> ○ Appropriate treatment of food, water and soil borne diseases at HCs and DHs; ○ Appropriate treatment of malnutrition and micronutrient deficiencies at HCs and DH; ○ Supplementary feeding for malnourished children.
2.5 Impacts in accidents / injuries, chemical exposures and poisoning	Nakai Resettlement villages and Oudomsouk	<ul style="list-style-type: none"> • Participation in appropriate education and <u>promotion on prevention:</u> <ul style="list-style-type: none"> ○ Education programs regarding road safety; ○ Education programs for electrical safety in the house; ○ Education programs on correct management of pesticides and fertilizers. • <u>Provision of Treatment:</u> <ul style="list-style-type: none"> ○ First aid treatment for mechanical and chemical traumas and poisoning at the HCs and DH (for whole Resettlement period); ○ Provision of referral system for patients requiring transfer; ○ Emergency transfer of seriously ill/injured patients to Provincial Hospital.
2.6 Psychosocial disorders	Nakai Resettlement villages and Oudomsouk	<ul style="list-style-type: none"> • Participation in <u>Promotion and Prevention:</u> <ul style="list-style-type: none"> ○ Education and awareness on psychosocial problems for villages; ○ (in coordination with Community Development “(CD)” programs) Respect to existing indigenous and ethnic institutions, culture and practices in all aspects of resettlement; ○ (in coordination with CD programs) Timely, adequate and regular information about the Project (to prevent uncertainties and stress); ○ Information Education and Communication in schools on substance abuses; ○ Support to the District Committee for Drug Control. • <u>Provision of Treatment:</u> <ul style="list-style-type: none"> ○ Sensitization of psychosocial problems at village level by Village Health Volunteers (“VHVs”) and HC; ○ Training / sensitization and management , to the extent possible, at DH level and referral to Provincial Hospital.
2.7 Cultural Health Practices	Nakai Resettlement villages and	<ul style="list-style-type: none"> • Preservation of those Cultural Health Practices not detrimental to the health of users in resettled villages. • Preservation of any medicinal plans that are likely to be lost during the formation of the

Type of Loss	Entitled Person	Compensation and/or rehabilitation measures
	Oudomsouk	lake and appropriate relocation. <ul style="list-style-type: none"> • Cultural sensitivity to Resettlers in ICHC and district hospital. • Education and awareness consistent with ethno-medical frames of representing disease, cure and prevention.

(ii) Regional Health Program - Entitlements Table

[Note : this program is to be implemented until the End of the Resettlement Implementation Period (approximately COD +5years)]

Type of impact activity	Entitled Person	Compensation and rehabilitation measures
1. Health Infrastructure		
1.1 Health Facilities	Any person residing in the area covered by the health facilities of Gnommalat, Nakai, Khamkheut and Mahaxai	<ul style="list-style-type: none"> • Availability of improved health infrastructure at Provincial, District and Village group level (ICHCs) for better health service provision. <p>[Note: NT2 Project will make improvements to be made through Assistance with medical equipment for District hospitals and Provincial hospitals and non-medical equipment for District and Provincial health offices.]</p>
1.2 Health Services	Any person residing in the area covered by the health facilities of § 1.1	<ul style="list-style-type: none"> • Availability of improved health services in Health Facilities. Improvements to be made through provision of: <ul style="list-style-type: none"> ○ Curative service, under the same rules and regulations as anywhere else in the country; ○ All preventive services, under the national preventive programs operating in the country; ○ Training and transference of appropriate technology among health workers and practitioners, and supervision of the health centre staff; ○ Strengthened referral services in district hospitals, so that serious patients are evacuated to provincial hospitals well stabilized and without undue delay; ○ Strengthened services in Villages and Health Centers.
1.3 Health Services (in communities)	Communities in the Downstream Areas (XBF, XBF Hinterland, Nam Phit Hinterland, Nam Kathang and Nam Theun)	<ul style="list-style-type: none"> • Availability of improved health services at the community level. Improvements to be made through provision of: <ul style="list-style-type: none"> ○ School health education and other preventive programs in the schools; ○ Health education and awareness programs delivered to the communities.
2. Impacts in nine environmental health areas		
2.1. Provision of treatments	All Project Affected People requiring medical treatment	<ul style="list-style-type: none"> • Availability of essential drugs (in a manner consistent with then current MOH policies and institutional arrangements for health at all levels).
2.2. Respiratory diseases	- camp-followers - villages near the workcamps - roadside communities (Rd 12 & 8B)	<ul style="list-style-type: none"> • Participation in <u>Health Promotion and Prevention Program</u>: <ul style="list-style-type: none"> ○ Education and awareness on prevention and management of ARI and TB; ○ Implementation of the national EPI program through outreach; ○ BCG (TB immunization) cover under EPI program. • Availability of <u>Diagnosis and Detection</u>: <ul style="list-style-type: none"> ○ Improvement of the TB laboratory diagnostic capabilities in a collaborative approach with the 3 Districts; ○ Conduct of contact tracing of all patients diagnosed with active TB through visits to the patient's village to interview and examine family members and close relatives. • Availability of <u>Treatment</u>: <ul style="list-style-type: none"> ○ Availability of treatment of ARIs through the HCs and the DH; ○ Availability of DOTS (program of TB treatment) at DH level.
2.3 Accidents, injuries, chemical exposures	All residents in the districts of Nakai, Gnommalat and Mahaxai	<ul style="list-style-type: none"> • Participation in <u>Promotion and Prevention</u> programs: <ul style="list-style-type: none"> ○ Education programs regarding road safety; ○ Education programs for electrical safety in the home in collaboration with the Ministry of Transport, Post and Communications (“MTPC”);

Type of impact activity	Entitled Person	Compensation and rehabilitation measures
and poisoning	In Khamkheut District: the camp-followers, the villages near to the workcamps and the transportation corridor	<ul style="list-style-type: none"> ○ Education programs on correct management of pesticides and fertilizers. ● Availability of <u>Treatment</u>: <ul style="list-style-type: none"> ○ Availability of first aid for mechanical and chemical traumas and poisoning at the HCs and DH; ○ At Gnommalat DH provision 24 hours a day of: <ul style="list-style-type: none"> ▪ Emergency Care Unit (2-4 beds); ▪ Link with Provincial Blood Bank for a small stock of blood for emergency transfusion service; ▪ X-ray and ultrasound services; ▪ Emergency services for minor surgery and for stabilizing patients before transfer.
2.4 Vector- and pest-borne diseases	Camp-followers, Villages near to the workcamps Communities in the Downstream Areas	<ul style="list-style-type: none"> ● Participation in strengthened existing MOH's Malaria global program. ● Participation in <u>Health Education and Promotion</u> for preventable diseases and availability of elimination programs: <ul style="list-style-type: none"> ○ Education programs regarding the prevention and treatment of Dengue; ○ Vector control programs against adult and larval stages of mosquitoes in malaria and dengue outbreaks; ○ Campaigns supporting the elimination of Dengue larvae breeding grounds; ○ Education campaigns regarding the prevention and treatment of Malaria, more specifically on the use of Long-Lasting Impregnated Bed Nets (“LLIBN”); ○ Information Education and Communication (“IEC”) campaigns regarding the prevention of vector borne diseases. ● Availability of <u>Diagnosis and Detection</u>: <ul style="list-style-type: none"> ○ Facilities for Malaria Testing at HC and DH level (antigen test and/or microscopy). ● Availability of <u>Adequate Treatment</u>: <ul style="list-style-type: none"> ○ Availability of adequate malaria treatment at HC and DH level (considering parasite resistance); ○ Availability of adequate management for Dengue Fever, Dengue Hemorrhagic Fever, Dengue Shock Syndrome and other diseases with fever as presenting argument at HC and DH level (including transfer to PH if required).
2.5 Sexually transmitted and blood-borne infections	All residents in the districts of Nakai, Gnommalat and Mahaxai In Khamkheut District: the camp-followers, the villages near to the workcamps and the transportation corridor	<ul style="list-style-type: none"> ● Participation in strengthened existing MOH's STI global program. ● Participation in <u>Health Education and Promotion</u> programs in prevention of STIs and HIV/Aids in the communities, including: <ul style="list-style-type: none"> ○ Information Education and Communication programs regarding STI and HIV/AIDS and prevention strategies; ○ School-based HIV/AIDS and sex education program; ○ National guidelines/policy for the control of blood-borne pathogens (proper disposal of sharps, autoclave equipment, in house medical waste collection, destruction and storage); ○ Provision of condoms and education regarding use and disposal, targeting high risk groups (free of charge and/or through social marketing); ○ Strengthened District STI services for Education and Awareness on STI including HIV counseling service. ● Availability of <u>Diagnosis and Detection</u>: <ul style="list-style-type: none"> ○ Provision of improved diagnostic facilities for STIs in district hospitals and mechanism for arranging HIV testing for patients in the Provincial hospital; ○ Provision of STI services for Service Women. ● Availability of <u>Treatment</u>: <ul style="list-style-type: none"> ○ Availability of treatment for STIs through the DHs; ○ Strengthening of private pharmacies to provide improved STI services.
2.6 Impacts in soil and water borne diseases	All affected residents in the districts of Nakai, Gnommalat and	<ul style="list-style-type: none"> ● Participation to and benefit from <u>Promotion and Prevention programs</u>: <ul style="list-style-type: none"> ○ Health education and awareness on drinking water systems, treatment of water and family latrines based on the MOH water and environmental sanitation program;

Type of impact activity	Entitled Person	Compensation and rehabilitation measures
	<p>Mahaxai</p> <p>In Khamkheut District: the camp-follower camps, the villages near to the workcamps and the transportation corridor</p>	<ul style="list-style-type: none"> ○ Health education and awareness programs regarding fecal/oral transmission of diseases, and transmission of helminthes and other parasitic diseases; ○ Public education programs on food sanitation awareness to public, including local restaurants and eating places; ○ Implementation of the primary school worm infestation treatment program to Project Impact Area/Target Group (“PIA/TG”) villages in Nakai, Gnommalat and Mahaxai. ● Benefit from improved food quality through Monitoring, Reporting and follow up of food borne diseases: <ul style="list-style-type: none"> ○ Monitoring any excess of food borne diseases and follow up to the source; ○ Regular inspections enforcing compliance with national hygiene regulations for restaurants/food vendors/abattoirs in the District Centers; ○ Regular inspections enforcing compliance with national hygiene regulations of Project facilities and those providing to camp-followers and workforce; ● Availability of Treatment and outbreak response plan: <ul style="list-style-type: none"> ○ Treatment of food, water and soil borne diseases at HCs and DHs; ○ Development of a food or water borne illness outbreak response plan and investigation procedures.
<p>2.7 Impacts in food, nutrition and micronutrients related issues</p>	<p>PAPS in the districts of Nakai, Gnommalat and Mahaxai</p> <p>In Khamkheut, Xebangfai, Nongbok and Xaybuli Districts (only for monitoring and Surveillance activities)</p>	<ul style="list-style-type: none"> ● Availability of a strengthened MOH’s National Maternal & Child Health program. ● Participation in Promotion and Prevention programs: <ul style="list-style-type: none"> ○ Health education and awareness on child weaning and child feeding practices (including the provision of IEC materials); ○ Strengthening of antenatal care for pregnant women; ○ Strengthening of national EPI program for pregnant women and children; ○ Encourage assisted births by a trained health worker and post natal care; ○ Growth monitoring programs for under fives; ○ Collaboration with local villagers to develop and promote alternate sources of sustainable protein to replace potential losses of fish as a staple in the local diet. ● Availability of Treatment and supplementary feeding programs: <ul style="list-style-type: none"> ○ Availability of appropriate education on malnutrition and micronutrient deficiencies in villages, HCs and DH. ● Provision of supplementary feeding programs using locally available food for antenatal mothers and preschool malnourished children.
<p>2.8 Psychosocial disorders</p>	<p>In the districts of Nakai, Gnommalat and Mahaxai all activities will be supported</p>	<ul style="list-style-type: none"> ● Participation in Health Education and Awareness program for preventable psychosocial disorders: <ul style="list-style-type: none"> ○ Information, education and communication in schools on substance abuses; ○ Information, education and communication on psychosocial problems for villages; ○ Prevention of uncertainties and stress through adequate information on the future through regular communication and consultation. ● Recognition of condition and availability of Treatment: <ul style="list-style-type: none"> ○ Recognition of psychosocial problems at village level by HC; ○ Recognition of psychosocial problems and limited treatment capacities at DH level and referral if required. ● Availability of adequate diagnostic and treatment capacity of referred cases for psychosocial problems at the Provincial Hospital, Thakhek.
<p>2.9 Cultural Health Practices</p>	<p>All villages in the Project Areas</p>	<ul style="list-style-type: none"> ● Promotion of cultural sensitivity and appropriate respect for minorities and traditional rituals among health centers and hospital staff. ● Provision of education and awareness programs congruent with ethno-medical frames of representing disease, cure and prevention. ● Ad hoc monitoring of the Traditional Health Practices and the availability of ingredients of traditional medicines in collaboration with the National Traditional Medical Research Center.

Annex 5-16: PHAP Budget Summary

	main component	sub-components	Resettlement Health Prog: \$	Regional Health Prog: \$	Total: \$	%
1	Upgrading Public Health Infrastructure (37.5%)	Public Health Infrastructure	63,500	294,000	357,500	12.0
		Infrastructure (IHCs, staff house)	H (80,000\$)		H (80,000\$)	
		Water supply and sanitation (Project Lands/Camp Followers Plan)	M (130,500\$)	M (130,500\$)	M (261,000\$)	
		Water supply and sanitation (Resettlement Infrastructure Development Plan)	H (518,500\$)		H (518,500\$)	
		Medical and other Equipment	226,250	324,902	551,152	18.4
		Medical Equipment for ICHC	H (18,000\$)		H (18,000\$)	
		Vehicles (Ambulances, utility cars and motorbikes)	80,640	133,780	214,420	7.2
2	Public Health Programs - including awareness programmes (26.5%)	Supplies - Drugs, kits, forms and manuals.	175,096	229,716	404,812	13.5
		Awareness Programmes.	48,903	340,000	388,903	13.0
3	Strengthening Human Resources in Public Health (23.8%)	Supervision and Monitoring (Per diems and allowances)	54,324	162,653	216,977	7.3
		Human Resource Development (Training)	65,399	232,986	298,385	10.0
		Meetings	48,037	146,215	194,252	6.5
4	Public Health Monitoring and Surveillance (7.4%)		158,381	63,000	221,381	7.4
5	Equity Fund for the Poor (4.8%)		46,026	96,363	142,389	4.8
	Total		966,555	2,023,615	2,990,170	100.0