

# **PART II**

## **HEALTH PLANNING AND MANAGEMENT SYSTEMS**

## **CHAPTER 13**

# **LONG TERM VISIONS AND STRATEGIES OF THE HEALTH SECTOR IN LAO PDR**

### **13.1 REVIEW OF THE EVOLUTION OF HEALTH POLICIES OF LAO PDR**

This chapter reviews the evolution of health policies in Laos.

#### **(1) From 1975 to 1992**

After the founding of the Lao People's Democratic Republic in 1975, government health policy was geared towards full healthcare coverage, with special attention paid to vulnerable groups such as mothers and children, and ethnic minorities in remote areas.

Laos has long subscribed to the concepts and approaches of primary health care (PHC). The country participated in the Alma Alta Conference on PHC in 1978 and also held several national conferences on PHC.

Working within a socialist framework, a health centre network based on the distribution of farming co-operatives was created and expanded up until about 1982. The system started to break down, however, during the transition period from a centrally planned to a more market-orientated economy.

#### **(2) From 1992 to the Present**

As the impact of the New Economic Mechanism (NEM) began to become apparent, special measures became necessary in the health sector as in others. Major institutional changes were introduced by the Fifth Party Congress's decision in 1992<sup>1</sup> as follows:

- 1) Revolving Funds and other cost recovery schemes should be introduced;
- 2) Private hospitals and clinics, and private pharmacies should be authorised.

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<sup>1</sup> The 1992 Party Policy Statement on Health (Decree No.599/MOH)

### **(3) Overall Health Policy**

The Overall Health Sector Policy was set out in major policy documents issued by the Lao People's Revolutionary Party (LPRP) in 1992<sup>2</sup> and by the MOH in 1993<sup>3</sup>. The main objectives laid down are as follows:

- 1) Poor health seriously hinders the human and economic development of the nation. The Lao government undertakes to strive for its improvement, based on the strong belief that it would increase the nation's ability to defend itself and its prosperity.
- 2) Health care should be available to all ethnic groups. Health is regarded as a special right of workers. Laos subscribes to the aims and methods of "Health for All by the Year 2000."
- 3) Preventive care is the top priority. At the same time, emphasis is placed upon curative and rehabilitative services.
- 4) Investment in public health should be made not only by the government but also by communities. It promotes the concept that each community should play a leading role in achieving self-reliance with external support. It also calls for each and every villager to make a financial contribution to PHC projects and actively participate in their implementation.
- 5) In recognising the importance of traditional medicine, it calls for the integration of modern and traditional medicines. While governmental decentralisation is in progress, it recognises the need to identify new mechanisms for vertical and horizontal coordination. While setting the improvement of PHC as the top priority, it also emphasises the need to improve management capacity at district level.
- 6) Emphasis is placed on creating a cadre of skilled personnel to plan and implement service delivery. It recognises the need to provide better incentives including improved salaries for health staff.
- 7) In declaring the prevention of infectious diseases as a high priority, it aims at improving water supply and sanitation and promoting hygiene education, such as the "three types of cleanliness". It also recognises the need to improve health education with special attention to the health of mothers, children and the elderly. It also sees behavioural changes as necessary for the improvement of health.

The contents of this Health Sector Policy are largely confirmed in the Health Strategy to 2020.

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<sup>2</sup> The 1992 Party Policy Statement on Health (Decree No.599/MOH)

<sup>3</sup> MOH: *Health Strategies form Now to the Year 2000*, the 1993 Health Policy Statement by the Ministry of Health, 1993

## **13.2 FROM STRATEGIC VISIONS TO ACTION PLANS**

### **(1) The Need for a Greater Allocation of Resources to the Social Services Sector**

Round Table Meetings (RTM) have been held every three years since 1983. At these the donor community has consistently pointed out that both external development assistance and domestic spending has been concentrated on the productive and infrastructure sectors while the social services sectors, such as health and education have been under-funded.

The Government's Report to the 5<sup>th</sup> RTM in 1994 demonstrated the government's own concern on this front. Nevertheless, it explained that the productive and infrastructure sectors remained a high priority given current financial constraints.

At the 6<sup>th</sup> RTM in 1997, following the resolution of the Party Congress, the Lao government declared the nation's goal to be to liberate the country from the status of least developed country (LDC). Under this overarching goal, a comprehensive development package including economic development, poverty alleviation and improvement of social services became necessary. In the same document, for that purpose, the Lao government clearly stated its goal of increasing spending for the social service sector to at least 20 percent of the total public budget, as well as to 20 percent of total foreign aid and loans.

### **(2) Strategic Vision Documents**

Unlike the previous round table meetings, the 7<sup>th</sup> RTM in 2000 was seen as part of a series of policy dialogue, especially as it related to sectoral policies. Strategic vision documents were prepared in the sectors of agriculture, rural development, health, education, road and forest resource management. The strategic vision documents were used as materials for discussion in the process of policy dialogue.

Based on these strategic vision documents, long-term sectoral action plans are to be developed.

## **13.3 HEALTH STRATEGY TO 2020**

### **(1) Structural Problems for Health Development in Lao PDR**

In MOH's Health Strategy to 2020, the following structural problems for health development are identified:

1. Limited Access to Health Services
2. Inadequate Quality of Care
3. Low Utilisation of Health Facilities
4. Weak Management Capability

## 5. Insufficient Financing in the Health Sector

### **(2) Health Vision to the Year 2020**

The Health Strategy to 2020 follows the decision by the Sixth Party Congress to “free the country from the status of least developed country by the year 2020 and ensure that all Lao people have access to healthcare services.”

The Health Strategy to 2020 clearly sets the general goal of health development to the year 2020 as follows:

“To free the healthcare services in Lao PDR from the state of underdevelopment and to ensure full healthcare service coverage, justice and equity in order to increase the quality of life of all Lao ethnic groups.”

### **(3) Four Basic Concepts for Health Development Strategies to the Year 2020**

The Health Development Strategies to 2020 have emphasised the following four basic concepts, which will be used to guide future health development efforts:

1. Equity of Healthcare Service
2. Early Integration of Healthcare Services
3. Demand-Based Healthcare Services
4. Self-Reliant Healthcare Services

### **(4) Six Major Directions for Health Development to the Year 2020**

The Health Strategy to 2020 stresses six directions for health development:

1. To strengthen the capability of health staff in terms of attitudes, ethics and technical skills in order to ensure high quality services;
2. To improve community-based health promotion and disease prevention;
3. To improve and expand hospital services at all levels and in remote areas;
4. To promote the utilisation of traditional medicine by integrating modern and traditional care;
5. To promote scientific and research activities for health development;
6. To ensure effective health management, including administration, financial and health insurance systems.

These directions should be followed in accordance with the four basic concepts outlined in the previous section.

## **(5) Ten Key Areas of Health Development in the Next Five Years**

1. To expand the network of health care services to cover rural areas, especially remote and mountainous areas, by promoting Primary Health Care projects;
2. To make efforts to control of infectious diseases, including diarrhoeal diseases, malaria, dengue haemorrhagic fever, acute respiratory infection, HIV/AIDS, STD and tuberculosis;
3. To upgrade two central hospitals and five regional hospitals, to improve health care services at provincial and district hospitals, and to upgrade the quality of central and regional laboratories and of provincial laboratories in selected provinces;
4. To develop a community-, family- and individual-based health care system;
5. To improve the quality of health personnel at all levels by continuing human resource development, paying attention to the needs of training not only for technical aspects, but also for managerial and administrative aspects;
6. To upgrade and rehabilitate existing hospitals to perform five main functions: preventive services, curative services, health personnel training, research & development and provision of assistance to communities;
7. To improve and revise fee systems in hospitals, combining health insurance schemes;
8. To support the utilisation of traditional medicine, to promote the production of affordable essential drugs, and to improve the quality of drug production for export;
9. To increase health research activities; and
10. To establish health management systems, to improve health information system, and to develop standardised planning and financial system, for the effective management of foreign aid projects and for increasing the mobilization of resources from abroad.

This list includes all the important components of health sector development, although the objectives are very ambitious.

## **(6) Six Priority Programmes**

The MOH has identified the following six priority programmes:

1. Health Prevention and Promotion Strategies
2. Curative and Rehabilitation Strategies
3. Consumer Protection Strategies
4. Human Resources Development for Health Strategies

5. Health Operational Research and Health Legislation
6. Health Administration Strategies

Some of these programmes or strategies correspond to those laid down in MOH's five-year plans for departments, centres or institutes.

### 13.4 VARIOUS TARGETS OF HEALTH DEVELOPMENT

Existing health policy documents contain various targets for health development:

Policies, Strategies and Plans	Key Targets of Health Development
National Population and Development Policy of the Lao PDR	IMR: 20/1,000 by the year 2020 (104 in 1995) U5MR: 30/1,000 by the year 2020 (170 in 1995) MMR: 130/100,000 live births by the year 2020 (656 in 1993) Note: Health Strategy 2020 of MOH sets the targets for 2020 using these numbers.
Targets for 2000 (from UN System Support to the National Socio-Economic Development Plan 1996-2000)	IMR: 50 per 1000 live births by the year 2000 (125 in 1994) MMR: 326/100,000 by the year 2000 (656 in 1994)
1993 Policy Statement by the MOH, "Health Strategies from Now to the Year 2000"	IMR: 80 per 1,000 live births by the year 2000 MMR: 350 per 100,000 live births by the year 2000 Life Expectancy: 53-55 years by the year 2000
National Goals on Reducing Mortality by the Year 2000 in UNICEF's 1996 Situation Analysis	IMR: 85 per 1,000 live births by the year 2000 U5MR: 105 per 1,000 live births by the year 2000 MMR: 490 per 100,000 live births by the year 2000
Government Document for the 1997 Sixth Round Table Meeting	IMR: 70 per 1,000 live births by the year 2000 U5MR: 100 per 1,000 live births by the year 2000 MMR: 300-400 per 100,000 by the year 2000

## **CHAPTER 14**

# **HEALTH PLANNING AND MANAGEMENT SYSTEMS**

### **14.1 INTRODUCTION**

Laos is a landlocked and mountainous country with a low population density. The majority of people live in small, scattered villages. These demographic and geographical features, as well as low GDP per capita, combine to make it more difficult for Laos to achieve full or even decent healthcare coverage than for many other developing countries.

Many of the problems facing the health services in Laos stem ultimately from the increased pressure put on budgetary and other resources which have accompanied the transition from a centrally planned to a market economy.

Health sector problems result also from the ineffective and inefficient use of resources, not only from domestic sources but also from increasing levels of foreign aid. This reflects deficiencies in health planning, decision-making and management. In this chapter, the main planning and management systems of the health sector are reviewed.

### **14.2 FIVE-YEAR AND ANNUAL PLANNING**

At the ministry level, there are principally two systems of planning: a five-year plan and an annual plan. Firstly, each department, centre or institute of the MOH proposes its own draft five-year plan and annual plan to the Department of Planning and Finance at the MOH. The MOH establishes its five-year and annual plans based on these proposals, after due consultation and co-ordination within the Ministry.

The five-year plan of the MOH sets future direction, defines objectives and clarifies major components and activities. It is often the case that sources of funding are not identified at the stage of formulating the five-year plan, which is usually developed without paying much attention to budgetary implications. Consequently, it tends to be a relatively ambitious plan. In contrast, the annual plan is often a more practical plan for activities with feasible budget estimates.

However, the next five-year plan for the period of 2001-2005 was more practical and specific under the guidance of the Minister of Health.



The five-year plan is reviewed at the Annual National Health Conference, which is held by MOH every January. This system of annual review was introduced partly because of the lack of health information systems in Laos. As it is difficult to make accurate predictions over a 5-year period, revisions need to be made every year based on the previous year's experience.

### **14.3 THE NEEDS FOR A STRATEGIC “OVERALL STRATEGY” FOR HEALTH DEVELOPMENT**

The Health Strategy up to the Year 2020 serves as the principal guide to formulating the five-year plan. Until a draft version of the Health Strategy to 2020 was produced, there had been no long-term strategy or plan of this kind. It is now under revision to respond to the latest party decision on health sector development.

The next five-year plan is expected to accord closely with the Health Strategy to 2020.

Nevertheless, as discussed below, the Health Strategy to 2020 does not present an overall strategy sufficiently clear to guide key efforts for health development from long-term perspectives. As a result, the five-year and annual plans are still likely to be too ambitious without clear strategic views.

#### **(1) Grand Design of the National Health Care System: Important Part of Strategy**

In Laos, there is neither an articulated grand design nor a clear consensus as to the structure and functions of the future national health care system

The many standards and protocols currently under consideration include the following:

- Technical standards of services, equipment and personnel at different health facilities (health centre, district hospital, provincial hospital and regional hospital);
- Standards of maternal and child health care at different levels (community, health centre, district hospital, provincial hospital and regional hospital);
- Health management information system; and
- Job descriptions of different health workers.

How to set these standards and protocols itself constitutes an important part of the overall strategy for health development in Laos. For instance, to define the types of curative and laboratory services that are to be offered at provincial hospitals would determine what levels of human resources and equipment are required. More importantly, these specifications would determine the costs that would need to be borne.

In view of this, the grand design of the whole health care system is an essential part of the strategy of health development.

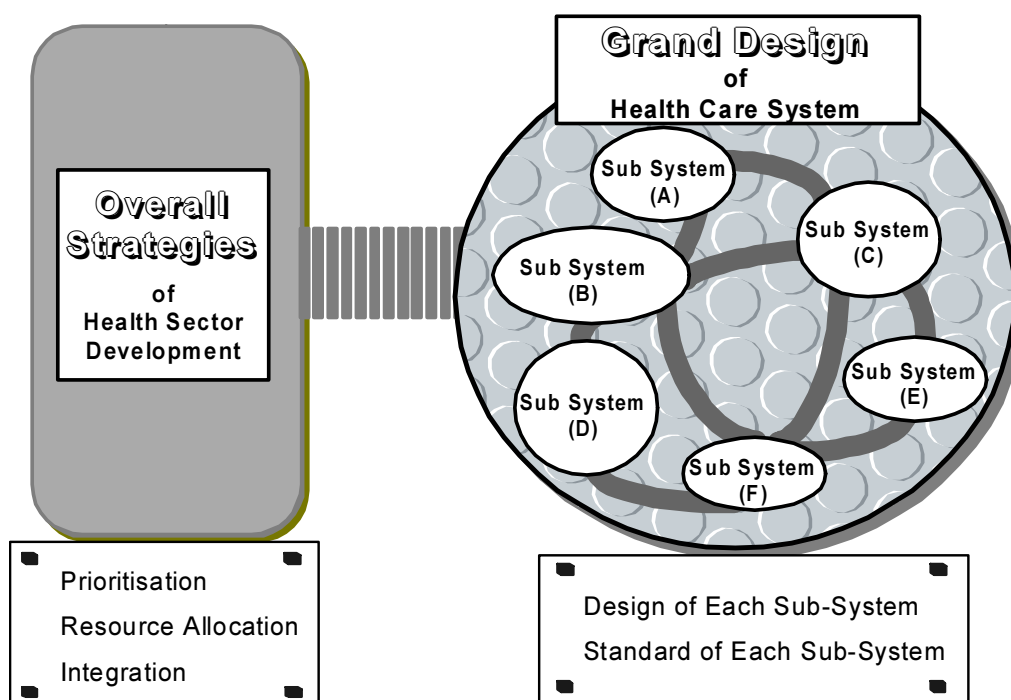
## (2) Strategic Perspectives for “Overall Strategy”

In addition to the question of how to constitute the health care system as a whole, there are various strategic issues in setting an overall strategy for health development which need to be addressed, including:

- Should the health sector be developed in small stages or should fundamental reform be attempted from the outset?
- Which sub-sector should be given high priority?
- What integration between sub-sectors should take place?
- Which population groups should be targeted?
- Which geographical areas should be targeted?
- How can the profile of the health sector on the government agenda be raised and how can its share of the national budget be increased? .

The Health Strategy to 2020 does not clearly address strategic issues such as these.

**Figure 14.1 Grand Design of the Health Care System and Strategies for Health Care Development**



### **(3) The Need for a Strategic “Overall Strategy”**

Two factors mentioned above - the lack of a grand design or master plan for the healthcare system and the lack of clear strategic perspectives - hinder the MOH from formulating a practical plan for strategic actions.

For example, as there are no standards for service improvement, facility improvement, and human resource development, mid- and long-term plans cannot be made in any of these areas. Nor can reliable budget estimates be made for these areas. Therefore, there is not enough information available for formulating substantive strategies.

The refinement and articulation of a long-term overall health strategy in a strategic manner is required for formulating effective long-term health planning, which can then be used to guide strategic actions for necessary changes and development.

#### **14.4 BEGINNING OF A SECTOR-WIDE APPROACH**

In the Lao health sector, a sector-wide approach is to be initiated.

Until the formulation of the Health Strategy to 2020, the MOH did not openly present its own views about long-term health development. Partly because of this, the MOH tended to be passive in planning and implementing some health projects. As a result, the directions those projects took were often dictated by the priorities and preferences of international donor agencies and NGOs. Although co-ordination mechanisms had been set up between the MOH and donor groups for certain programmes (e.g. EPI), little effort had been made for co-ordination across the entire health sector. However, in the process of the Round Table Meetings with the donor community, the MOH developed the Health Strategy 2020 as the material for a Sectoral Round Table Meeting in May 2000. This provided the MOH with the basis for an open discussion both within the MOH and with donor agencies and NGOs.

Furthermore, the MOH is expected to play a crucial role in poverty reduction by proposing and implementing concrete measures. It is generally thought that MOH's initiatives like this will create the enabling environment for a sector-wide approach involving key stakeholders in the Lao health sector.

#### **14.5 DIFFICULTIES DERIVED FROM ON-GOING DECENTRALISATION**

In line with government decentralisation, the management of health services has become more complicated, resulting in increased difficulties in vertical coordination between the MOH and provincial/district health offices.

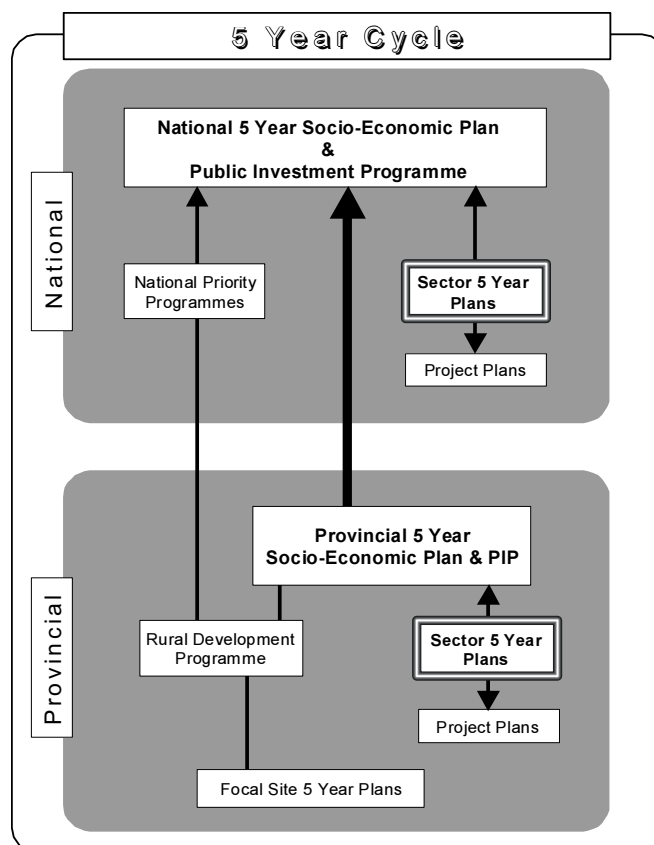
Between the MOH and provincial health offices, there is a system in place to maintain consistency in general policies and technical guidelines. Provincial five-year and annual plans

are co-ordinated with MOH's planning cycle. Although the MOH is given an opportunity to review and make comments on provincial budget plans, and annual reports and plans, final decisions are left to planning departments and Provincial Governors' Offices.

The MOH spends one third of the national health budget, while the rest is spent at provincial level. Clearly then the MOH has neither the power nor the means to exercise great influence on the actual activities of provincial health offices even if strategic action plans are adopted at the national level. Moreover, given the present budget system and financial capacity of the MOH, budgets required for any extraordinary plan or strategy rarely come from the MOH. Even if the MOH were to set a variety of standards of sub-systems, its influence would remain marginal.

The activities of each department, centre and institute often include many joint activities (e.g. surveys, research, pilot projects, training) with provincial and district health offices. Many of these projects rely on donor assistance. Through these activities, the MOH could influence provincial and district health activities. However, the MOH does not always have the means to engage in such joint activities with every province and every district, either directly or through donor-supported projects

**Figure 14.2 The Weak Relationship between the National Sectoral Five-Year Plan and Provincial Sectoral Five-Year Plans**



## **14.6 HEALTH DEVELOPMENT PLANNING AT THE PROVINCIAL AND DISTRICT LEVELS**

Horizontal co-ordination within the health sector in a province is very difficult without clear goals of healthcare system development. Owing to budgetary constraints, most health activities at the provincial and district levels are currently dependent on vertical programmes implemented by donor agencies or small-scale NGO projects. In consequence, while each provincial and district health office has a plan of action corresponding to its budget, the plan is often not based on any clear vision of how the provincial and district healthcare systems should operate in the future. Nor does the planning process include a logical framework by which planners would explain how annually planned activities could lead to the improvement of the healthcare services and the health status of the area.

In most provinces, several donors and NGOs have been operating, though in many of them they are active only in some districts. There are also cases in which projects take different approaches to health intervention in the same sub-sector in different districts of one province, making horizontal co-ordination more difficult.

The lack of co-ordination has long been seen as a serious issue. Another major difficulty is the absence of a suitable enabling environment for such co-ordination at a provincial level. Although in the southern provinces (Attapeu, Salavane, Sekong and Champasak), co-ordination activities between NGOs and related government agencies were conducted for four years, they did not prove to be sustainable. Each donor agency and NGO has its own aims and interests. Moreover, in Laos, there is little co-ordination within the government, or even between departments within the same government organisation.

The present policy of decentralisation aims at developing strategies and budget plans at district level. Even under this policy, however, the province will continue to be a meaningful unit in the healthcare management system. It is essential for each province to develop its own long-term health development plan with clear goals for healthcare system development. Without such provincial planning, it will not be possible to guide annual activities at the district level. At the same time, it would be desirable for such a provincial plan to be developed with the participation and collaboration of all major stakeholders.

## CHAPTER 15

# HEALTH MANAGEMENT INFORMATION SYSTEM (HMIS)

### 15.1 INTRODUCTION

A health management information system may cover health events (activities, output and outcome) as well as other management input such as health human resources, finance, and logistics. In Lao PDR, the building blocks of a HMIS are in place albeit not yet linked. For Progress Report 1, this chapter focuses on the health information system (HIS). Its specific objectives are three:

1. to describe the HIS, its strengths, areas for improvement, opportunities and threats;
2. to review the proposed HIS model; and

The discussion that follows was based primarily on a review of existing documents written by consultants of international organizations, interviews of key informants, and the consultation meeting chaired by the Minister of Health Dr. Ponemek Dalaloy on August 30, 2001.

### 15.2 THE PRESENT HEALTH INFORMATION SYSTEM

At present, there are at least eight major information systems within the MOH: Routine system (HIS of the Health Statistics Division includes a surveillance component); Sentinel surveillance (National Surveillance System of Notifiable Diseases of the Department of Hygiene and Disease Prevention, Laboratory and Epidemiological Centre); and surveillance of 6 vertical control programmes, namely, ARI, CDD, EPI, leprosy, tuberculosis, and malaria.

In 1993, an evaluation<sup>1</sup> of eight surveillance systems using a scale measurement revealed the following key findings (Table 15.1):

- Most of the systems received a (+1) rating only.
- The composite score was highest for the information systems for EPI and TB followed by that for Malaria. The sentinel surveillance got the lowest rating. Among all the systems, it was the only one that received a zero rating for one of the

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<sup>1</sup> Sutter R: *Review of Sentinel and AFP Surveillance*. Report on WHO mission from 18 November – 11 December 1993. (The scale measurement was not fully described.)

evaluation attributes. The surveillance component of the MOH routine system was at par with those for ARI, CDD and leprosy.

- The strongest attribute of most systems is simplicity, both in structure and ease of operation. Except for the sentinel and TB surveillance, all were rated (+2). On the other hand, the weakest attribute is timeliness, which reflects the speed or delay between steps. In this regard, the EPI system is an exception.
- Although the EPI and Malaria systems received the best rating overall, they share a weakness in their ability to detect outbreaks or detect cases of a disease or health condition.

**Table 15.1 Evaluation of Surveillance Systems, 1993**

Attributes	Routine	Sentinel	EPI	ARI	CDD	Leprosy	TB	Malaria	Total
Simplicity	+2	+1	+2	+2	+2	+2	+1	+2	+14
Flexibility	+1	+/- (0)	+2	+1	+1	+1	+2	+2	+10
Acceptability	+1	+1	+2	+1	+1	+1	+2	+2	+11
Sensitivity	+2	+1	+1	+1	+1	+1	+2	+1	+10
Representativeness	+1	+1	+2	+1	+1	+1	+2	+1	+10
Timeliness	+1	+1	+2	+1	+1	+1	+1	+1	+9
Usefulness	+1	+1	+1	+2	+2	+2	+2	+2	+13
Composite	+9	+6	+12	+9	+9	+9	+12	+11	

Source: Sutter R: *Review of Sentinel and AFP Surveillance*. Report on WHO mission from 18 November – 11 December 1993.

What is the state of the current health information system? What are its strengths and areas for improvement?

### 15.2.1 Strengths

Political will to enhance the current system – this is the foremost strength. The MOH leadership affixed its imprimatur of support when the Minister himself chaired the August 30 meeting to consult central officials and donors. He emphasized the need for an accurate and scientific data that will guide policy-makers, planners, managers, and implementers. “Strengthening of HMIS”<sup>2</sup> is the declared policy of the MOH to deal with the recognized problem of “weak HMIS and insufficient integration on data collection exercises”.

Another strength is the experiences of all the eight systems as well as those of civil society and international donors. In Phase 3, further analysis will be conducted to identify the lessons and describe best practices in HMIS.

<sup>2</sup> MOH, 2000, *Health Strategy 2020*.

## 15.2.2 Areas for Improvement

**Table 15.2 Areas for Improving HMIS Core and Support Sub-systems**

CORE SUBSYSTEM	
Data Collection	<ul style="list-style-type: none"> <li>✓ Type of data - no agreement on minimum sets of indicators for management. The types of data collected are often donor-driven. As a result of lack of coordination, some data (e.g. dengue and other morbidity statistics) are collected by more than one unit whereas others are missed (STD &amp; prevalence of malnutrition are not collected routinely at national level; population by age group is not available).</li> <li>✓ Definitions and formulas for some concepts (e.g. women of child-bearing age) and summary statistics (number of births for the month) may be variable or unclear.</li> <li>✓ Volume of data collected is too much</li> <li>✓ Utility or relevance - limited for some</li> <li>✓ Source of data to determine the number of births, deaths and population size – not uniform</li> <li>✓ Forms – incompletely filled up and delayed submission</li> <li>✓ Accuracy and reliability of data – remains problematic considering the lack of laboratory facilities and trained medical personnel at health centres and sometimes at district hospitals</li> </ul>
Consolidation, processing & analysis	<ul style="list-style-type: none"> <li>✓ Central – no office that takes charge of data collection for basic indicators while projects, programmes and other units do not submit some data to the Statistics Unit.</li> <li>✓ Periphery – varies across provinces particularly for vertical programmes. Some districts submit directly to provincial statistics unit while others to officials of programmes</li> </ul>
Information dissemination, feedback & use	<ul style="list-style-type: none"> <li>✓ Generally, there is no dissemination or feedback system. There is no official MOH annual health statistics report. Often, data are printed in response to request or as the need arises. Inconsistencies have been reported in the reports even if they come from the same office.</li> <li>✓ Information is hardly used especially at lower levels. Its limited utility for program management may be partly attributed to the perceived inadequacy in data quality.</li> </ul>
SUPPORT SUBSYSTEM	
HRD	<ul style="list-style-type: none"> <li>✓ Training – very few for all levels</li> <li>✓ Monitoring of district and health centres – limited by funds</li> </ul>
Logistics	<ul style="list-style-type: none"> <li>✓ Forms – insufficient at periphery (health centres &amp; districts) and for programmes with limited fund</li> <li>✓ Computers – available in all Provincial Statistics Units that were visited. A few districts use computers while all health centres fill up forms manually.</li> <li>✓ Public utilities are use to submit filled up forms or reports from health centres or districts levels. Through this system, some forms are lost.</li> </ul>

Through interviews of officials of MOH, NGOs and funding agencies, review of records, forms, statistical reports and related documents, and an assessment workshop, Dr. Ophelia Mendoza<sup>3</sup> discovered that the purpose of the current information system is often not clear to data providers and users. They collect data mainly to submit reports. There was very little intra-MOH and intra-sectoral coordination in terms of type of data, forms and data sources. Data users have limited knowledge of the type of data available in other offices. The rest of the findings are summarized in Table 15.2.

<sup>3</sup> Mendoza O: *Reproductive Health Information System*. Report on WHO missions from 22 February – 22 March 1999 and from 27 September – 29 November 1999. (The scope of work was widened from reproductive health only to the whole health information system.)



### 15.2.3 Opportunities and Threats

The comprehensive health sector reform is an opportunity to improve the current HIS. Aside from its international commitment particularly to the WHO for its Country Health Information Profiles and the UNDP for its HDR, there is a pressing need to provide the MOH with relevant, accurate and timely information for health planning, implementation and evaluation. The Health Strategy up to Year 2020 set targets for key indicators at the national level. To specify targets for all levels of the organization, to monitor the progress and to evaluate the degree to which the targets are being achieved, setting up and maintaining a functional HMIS becomes inevitable.

Another opportunity is the commitment of support from HMIS stakeholders.<sup>4</sup> During consultation meetings/workshops in Bolikhamxay and Luangprabang, officials and staff from health centres, hospitals, district health offices and provincial health offices, the participants expressed the need to streamline and simplify the HMIS. MOH directors and managers as well as representatives of international agencies and NGOs expressed their support.

The threat to the development of HMIS may come from within. Repeating the vicious cycle of low data quality and poor utilization may reinforce the resistance to the reform process.

## 15.3 THE HEALTH INFORMATION SYSTEM MODEL

The proposed HIS Model was presented in a consultation meeting last August 30, 2001. The MOH emphasized that the model is still at a developmental stage. Its purpose and intended users are clearly stated – to assist health officials, health staff and even village committees make rational decisions for “many health and health-related actions such as client care, planning, administration and monitoring, and review of activities”.<sup>5</sup> Its primary difference with the current system is its unified system as it integrates the health information records and procedures vertically among all management levels and horizontally among the different programme activities.

As an initial step towards integration, the Minister of Health proposed four criteria in selection of data. First the data must be indispensable for decision-makers. It should be appropriate to the real situation. Its collection and use must be sustainable. Lastly, but equally important, the data collected should be accurate for it to be useful.

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<sup>4</sup> Mendoza L: *Health Information System Development*. Report on WHO mission conducted from 15 August – 16 October 2000.

<sup>5</sup> MOH Planning and Finance Department, Statistics Division: *Health Information System Model: Records and Procedures from the Village up to the Province*. Draft as of May 2001.

The Minister of Health presented a matrix defining the types of data that will be collected from villages and all types of health facilities (Table 15.3). At the village level, only three types of data will be collected and these are about births and deaths, PHC activities and population. Aside from the three types of data from villages, health centres shall be responsible for data on diseases. Health offices from the district to central levels shall be tasked with additional type of data, namely, hospital activities, health system and financial data.

**Table 15.3 Data Collection System**

LEVEL	Type of Data						
	Births & Deaths	PHC Activities	Population	Diseases	Hospital Activities	Health Systems	Financial
Village	+	+	+				
Health Centre	(+)	(+)	(+)	(+)			
District	(++)	(++)	(++)	(++)	(++)	(++)	(++)
Provincial	+++	+++	+++	+++	+++	+++	+++
Central	++++	++++	++++	++++	++++	++++	++++

Source: Dalaloy, P: *Closing remarks during the presentation of HIS Model*. August 30, 2001.

Note: The + refers to the volume of data collected. The () refers to the facility where most of the data analysis and processing shall be done.

The consultation meeting was participated by representatives from various departments and centres of the MOH, NSC and donor agencies such as EU Malaria, GTZ, JICA, JICA Study Team, UNFPA, UNICEF, and WHO. Below are the highlights of comments and suggestions from the participants.

1. There was agreement on the importance and necessity of having a unified HIS,
  - use of HIS for routine data and surveillance and other surveys for non-routine data,
  - need to come up with the minimum level of information that have to be collected from each level, and
  - continue the participatory process in developing the HIS by involving interested health partners as well as those who will be providing the data such as those from the village, health centre and district levels.
2. Regarding the forms,
  - The third and fourth forms that will be filled up at the village level might be complicated;
  - Some terms (e.g. types of latrine) have to be defined otherwise technicians will have to be the ones to collect the data;
  - Some data items have to be added such as the date on the OPD form and hepatitis B vaccine and two doses of tetanus toxoid given to expectant mothers;

- Some items may have to be deleted like the patient's signature in admission form and the director's signature in death certificate; and
  - Consistency in definition has to be observed as in the cut-off age for the number of persons with acute flaccid paralysis is greater than 15 years in the hospital form when in fact it is less than or equal to 15 years in the other forms.
3. Challenges in involving village chiefs are as follows:
    - Term of office – every two years there is a change;
    - Literacy – some are not;
    - Compliance – some will not submit if there forms are not provided but some, even if forms are available, still they will not submit; and
    - Budget should include expenses for training and supervision.
  4. There is a need to continue coordination with other agencies in order to avoid duplication. Population data, for example, may have to be discussed with the NSC. The Social Security Organization is developing a computerized HIS for hospital admissions, transfers and discharges.
  5. Questions were raised as well for clarification purposes.
    - Regarding information flow, who will analyse the data? Who will do the feedback?
    - Will the data provider be supported with logistics?
    - How to record emergency cases?
    - Who will keep patient records?

Regarding the involvement of communities in HIS, the experience in Bolikhamxay province demonstrated the potential of VHV as data providers. The MOH, supported by the GTZ, was able to collect data on demography, reproductive health, bed nets, toilets, and water sources from 70% of the 180,000 provincial residents<sup>6</sup>. It was the VHV who collected the data from the households, compiled and summarized them. After the forms were checked for completeness and validity, the officials of the sub-district collected the completed forms from each VHV. For data processing, officials of the statistical section of the district health office used the computer and Epi-Info version 6.

The proposed HIS model addresses some of the areas for improving the current HIS. It proposes a national minimum data set<sup>7</sup> (NMDS) that will reduce the data elements and forms, and increase their relevance. It unifies flow of data and information. Through the feedback system, it encourages data providers to be data users, too. By involving village health

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<sup>6</sup> MOH and GTZ: *Results of the Annual Family Survey 2001 of the Bolikhamxay Province (Lao PDR-German Family Health Project)*. Vientiane, April 2001.

<sup>7</sup> WHO: *Guidelines for the Development of Health Management Information Systems*. Manila, 1993.

committees in data collection, it expands the potential users of health data. By shifting from submission of reports to collection during supervision, it allows the supervisor an opportunity to directly ascertain data quality as well discuss the results.

## CHAPTER 16

# GEOGRAPHIC INFORMATION SYSTEM (GIS) FOR HEALTH PLANNING AND MANAGEMENT

### 16.1 PRESENT STATUS OF GIS IN LAO PDR

#### 16.1.1 Summary of Agencies Utilizing GIS

GIS activities are being carried out in few government agencies with limited support of central funds but mainly within development projects supported by international organizations, grants or loans. Most of these activities serve the purpose of the project funded, but continuation is not guaranteed unless initiatives from respective agencies and funds are not provided. Table 16.1 shows the main users of GIS in Lao PDR.

**Table 16.1      GIS Users in Lao PDR**

Name of Agency	Main Purpose
Geography Department Under Prim-Ministers Office	National mapping agency. Responsible for producing national map products and currently number of digital data preparations is taking place
STENO	This is serving as a data distributor for other users. Also, they have an environmental center within the organization that create digital data for environmental issues
National Agricultural and Forestry Research Institute	Main area of interest is producing land use maps of whole country that is suitable for agricultural planning
Forest department	Digital forest cover data
Department of Geology & Mining	Digital information on mineral resources and sensitive areas
Department of Education	School mapping, planning and management, country wide
Ministry of Transportation and Communication	Database for accessibility evaluation of eight provinces including education, health, water and market
Ministry of Labor & Welfare	Landmine (UXO) project
Ministry of Health	Discussed later
Mekong River Commission	Database for Mekong River Basin
Laos National University	Education & research

### **16.1.2 Digital data availability**

Digital data of various levels are being in circulation, but the exact source and the accuracy is difficult to find out. It is said that generation of country boundary and administrative boundaries are the responsibility of Geography Department, but it was found that they have been using data produced by other sources. Even though the quality is not controlled, various information are available, as digital form, but user need to investigate and take care of the quality of data. Following are the digital data available for Lao PDR.

1. National, Provincial and District boundaries as vector polygons (Discrepancies of province and district boundaries observed. Some new districts are not included)
2. Village location as point data. Presently available data contains 11,939 villages.
3. Infrastructure, Major roads, cart roads and footpaths as line data (1993)
4. Land cover polygon data (1997)
5. Forest cover and forest area related polygon data (1997)
6. School location point data (2000)
7. Health facilities as point data (1997)
8. Topography, based on 1:100,000
9. Topography, based on 1:200,000

The above are for national coverage. There are other data available covering small areas that are generated for special purposes through various projects, and quite difficult to access them as data sharing is difficult.

### **16.1.3 Evaluation of Available Data Quality**

It is questionable whether quality of spatial data are maintained and which organization is responsible for producing and monitoring them. As per today, there is no central agency managing these data sources. Reasons for this could be due to lack of technical know-how or human resources. There are discrepancies in provincial and district boundaries. Also, some new districts are not integrated in the present administrative data layers. Though there are about 12,000 villages are listed, more than 800 villages are without spatial locations. Also, some villages not currently exist or move to different places. These are not reflected in the present village dataset. Mapping of major roads are not completed. Information on footpaths are digitized from 1985 maps. Some of them are converted to better roads but some are not available now questioning the accuracy of the dataset. Accuracy of location of facilities such as health facilities and schools depends on the locations of villages as these are not surveyed but linked to villages within the vicinity. In summary, most of the current digital data are derived from 1:100,000 or 1:200,000 maps providing location accuracy of digital data around 300 meters or more given the map scale and digitizing method involves.

## **16.2 CURRENT GIS ACTIVITIES OF MOH AND RELATED CENTERS**

### **16.2.1 EPI**

EPI GIS unit is in operation for few years and received staff training from WHO and some other local agencies. Direct information transfer from district level is available for this center on 16 different sicknesses including diarrhea, malaria, etc. These information are aggregated into district level at this center, and it provides statistics and aggregation of each of these categories to higher authorities

EPI started to store information in EPI-Info since 1994, software package that support special analysis function of EPI data. Arcview is used in GIS data manipulation, but this is not actively used other than for presentation. One doctor is conversant with the software and providing on-job training for more junior staff. Linkage between two packages is not used resulting duplication of data input. At present GIS is not being used for analysis but mainly as a mapping tool.

### **16.2.2 Center for Malaria Parasitology & Entomology (CMPE)**

Malaria center GIS facility is supported with two PC computers, 1 A4 printer and 2 ArcView software packages. Also, Health Mapper of WHO is used to develop presentation materials. One staff member has received one week training at AIT, one week training at Mahidol University and some training from WHO Lao and has basic knowledge to link malaria data with spatial data to create maps. Mapping facilities are not used due to cost of maintenance of the color printer. Further, maps are not recognized as planning tools.

Center aggregates information on malaria for each district and these data are linked with spatial data. District offices collect data from health centers to report to province and then to central. This information channel runs vertically from CMPE to district level. Aggregated reports are submitted to MOH once in six months and annual reports. GIS is used to present distribution in maps of incidents to higher administration, but not directed to grass-root level of the information channel.

### **16.2.3 Primary Health Care (PHC)**

PHC uses GIS to evaluate primary health care planning considering the distribution of facilities, health workers with respect to a health zone or catchment area. PHC cooperates with Ministry of Education, Rural Development Project and Ministry of Communications, Transport, Post and Construction in sharing information that are directly or indirectly play a role in public health.

There is six staff involved on GIS activities of PHC coming from different sectors such as Planning and Budgeting of MOH and Cabinet. PHC uses Arcview PC based software to

manage data and analyze them. This year, PHC has started developing GIS for Phongsaly and Luangnamtha provinces.

#### **16.2.4 National Center for Environment Health and Water Supply**

Center started to consider GIS as a potential tool in managing and evaluating its information from year 2000. Collected data and store in Microsoft Access. Specific software for GIS is not in use and GIS analysis is not being carried out so far, but looking forward to use its potentials.

Vertical link to district level Nam Saat workers provide information to the center following an information form provided for them. Center is planning to conduct training on data collection and information relay to central level at district and provincial level to efficient and smooth information sharing

### **16.3 PROSPECTS AND CONSTRAINTS OF GIS IN LAO PDR HEALTH SECTOR**

#### **16.3.1 Potential of GIS in Health Planning and Management**

Geographical Information System provides excellent means to acquire, store, manage and above all geographically integrate large amount of information from multi-disciplinary information sources. Further, it is an excellent tool for visualizing and analyzing health related data to find out trends, inter-dependencies, inter-relationship of diseases among each other as well as factors such as accessibility to facilities, availability of health care, relationship of poverty and education, etc. GIS is highly recognized as a potential tool for developing surveillance activities. Also, public health resources, specific diseases and other health events can be mapped in relation to their surrounding environment and existing health and social infrastructures. Such information when mapped together creates a powerful tool for monitoring and management of epidemics and identifying appropriate primary health care activities for a given locality.

Advantages of GIS are many when compared to conventional methods used in health planning and management. Some of the advantages and tools can be enumerated as bellow;

##### Overlay:

GIS facilitates overlay of different kinds of information such as health, census, environment and socio-economic. This helps in identifying interrelationships and trends in a particular disease and can be used in planning and decision making through multi-criteria modeling.

##### Query:

GIS allows making queries in spatial domain that is not supported in other databases. These queries can be made to find out a suitable location for a new facility serving given number of villages with defined access time or distance.



Buffer:

Buffer analysis can be carried out to define the area to be considered to control activities of a disease, or impact zones of vector breeding sites, where control activity needs to be strengthened, etc.

Network:

This is a suitable analysis procedure for locating efficient routes for facility distribution, locating health facilities, or identifying the best route in serving in an emergency.

Statistics:

GIS provides statistical analysis similar to most of other database systems, but its direct linkage to geographical location provides additional meaning and better interpretation to statistical interference.

GIS is becoming an indispensable tool in the health sector around the world and some of its public health applications are given below:

1. Identify geographical distribution of diseases
2. Analyze spatial and temporal trends
3. Identify immunization gaps
4. Maps of population at risk
5. Forecast epidemics
6. Monitor utilization of health centers
7. Identify and map health center serviceable areas
8. Plans for target intervention
9. Define strategies for primary health care education

### **16.3.2 Relationship of HMIS and GIS**

In order to support countries to develop efficient primary health care system, WHO is emphasizing the need of a health information system that enable monitoring of health services. A health information system provides information for the management of health program and services. In particular it is essential for monitoring the health situation, the performance of promotive, preventive and curative health services and activities and the utilization of health resources. A HIS is made up of mechanism and procedures for acquiring and analyzing data for providing information needed by:

1. All level of health planners for planning, programming, budgeting, monitoring, assessment and coordination of health programs and services;
2. Health care personnel, health research workers and educators in support of their respective activities;
3. Socioeconomic planners and general public outside health sector for inter-sectoral information linkage; and

#### 4. National policy makers for evidence based policy formulation<sup>1</sup> .

The same WHO report identified the information obtainable through HIS could be categorized into epidemiological surveillance, service records from all levels, program monitoring and evaluation, administration and resource management information, and births and death registrations. In summary, HIS is a information system that covers information on every aspect of a health care system of a country and it is said that well developed HIS is vital for delivery of effective health care services and care for a entire population based on primary health care approach.

Having identified the main functions and goals of a HIS, it is important to further discuss the role and the functionality of a GIS within a health care system. Definition of GIS in public health can be expressed in three approaches; map centered approach, database approach and spatial analysis approach<sup>2</sup>. The key features, which differentiate GIS from other information systems, are the general focus on spatial entities and relationship, together with specific attention to spatial analytical and modeling operations.

In a simple form, HIS could function as a GIS if the information are georeferenced. But in reality this is not efficient and easy task as some of the information within a HIS need not to be georeferenced (service records and reporting forms), and some may not carry any weight even they are georeferenced. On the other hand, HIS will not facilitate intersectoral integration that would be vital in making socioeconomic planning and national and local level policy making. This leaves GIS as an independent tool that could provide potential applications for health care planning and management but in the context of health information aspect, GIS could considered as an extended part of a HIS. In summary, it can be said that GIS complement a well developed HIS and it could further enhance the capability in health care planning and monitoring introducing spatial variability component to information and facilitating the integration of external factors.

#### **16.3.3 GIS as an Integrated Planning Tool**

Integrated planning provides an interdisciplinary approach to the management of health related facilities and resources by ensuring the comprehensive consideration of the full range of natural resources, public interest and requirements, socio-economic condition within a given geographic area. These multisectoral resources and their use are reflected in the information, concern and interests that government and non-government participants bring to the planning process. These interdisciplinary approaches require the cooperation of management agencies with different functional responsibilities and the production of plans that require joint implementation strategies. Given the needs of the health sector of Lao PDR, health related planning need to consider national, regional and local level education strategies, development plans, migration, availability of resources for agricultural activities, natural disasters etc. to

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<sup>1</sup> WHO, 2000, Health information systems development and strengthening, WHO Report, 2000, WHO/EIP/OSD/00.6

<sup>2</sup> Croner Maguire, 1991: Geographic Information System; Management Perspective, Journal of Public Health Management Practice 1991.

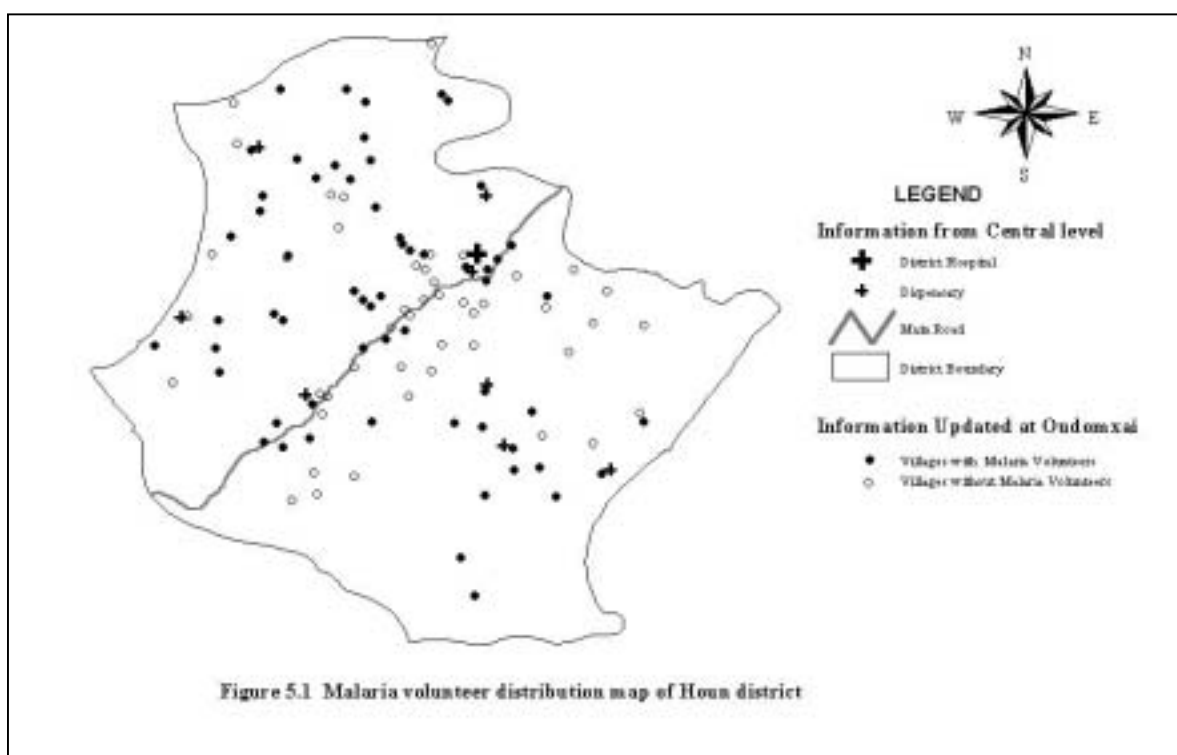
make a plan viable and effective.

### 16.3.4 Relevance of Integrated Planning for Laos Health Sector

In this section, the relevance or the need of integrated planning approach is discussed with the experience of Oudomxay Workshop carried out under this project, and discussion carried out with Rural Development officers at various administrative levels.

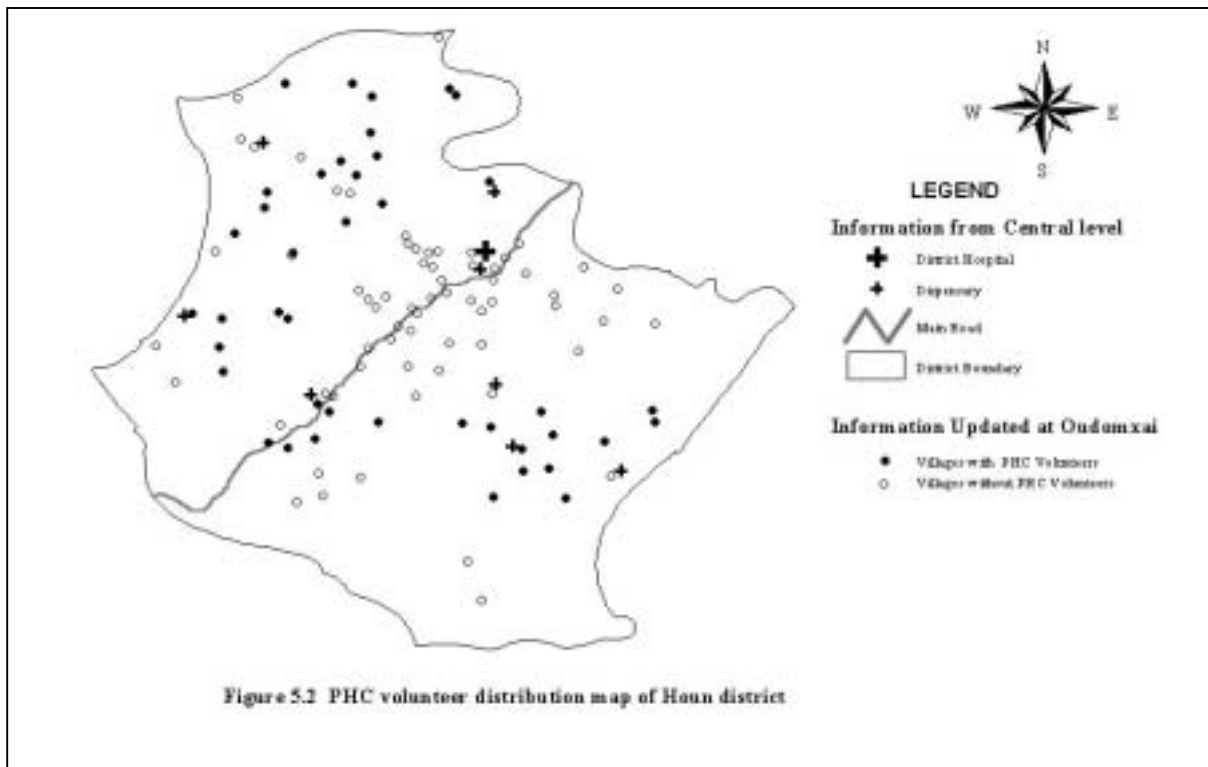
Some of the maps developed during the workshop is shown in Figures 20.1, 20.2 and 20.3. These maps represent VHV for malaria control, VHV for PHC and TBA distribution at the time of the workshop. Other information given in the maps are collected at central level, but need to update for health center/dispensary location during the workshop. These three health care activities are managed vertically with direct communication with the central level. Centers or departments that responsible for malaria and PHC may not aware of the volunteers in each others program, and they may not take into account during planning activities. Integration of information of placement of volunteers may help to render their service timely and cost effectively. If we integrate these information together as shown in Figure 16.4, it would provide all the agencies the strength of volunteers and possibility of educating and exchanging volunteers for more than one activity.

**Figure 16.1 Malaria Volunteer Distribution Map of Houn District**



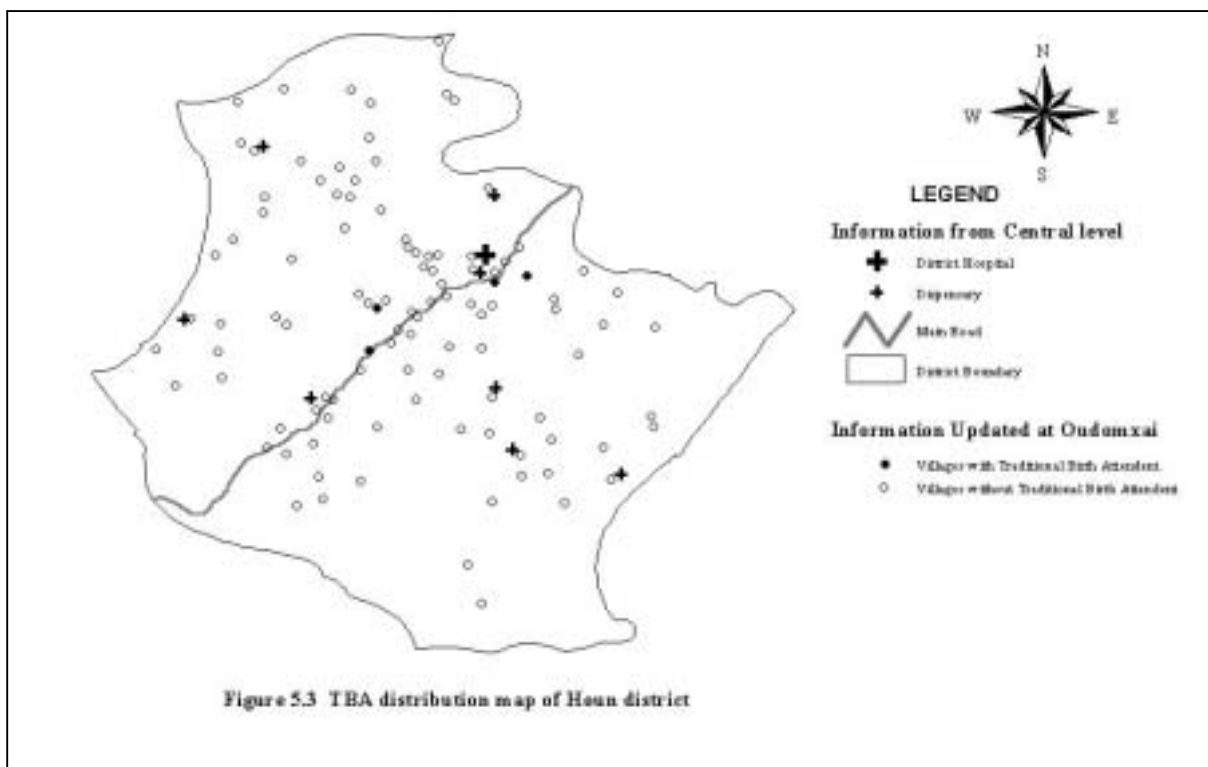
Source: Map prepared in the GIS workshop in Oudomxay

**Figure 16.2 PHC Volunteer Distribution Map of Houn District**



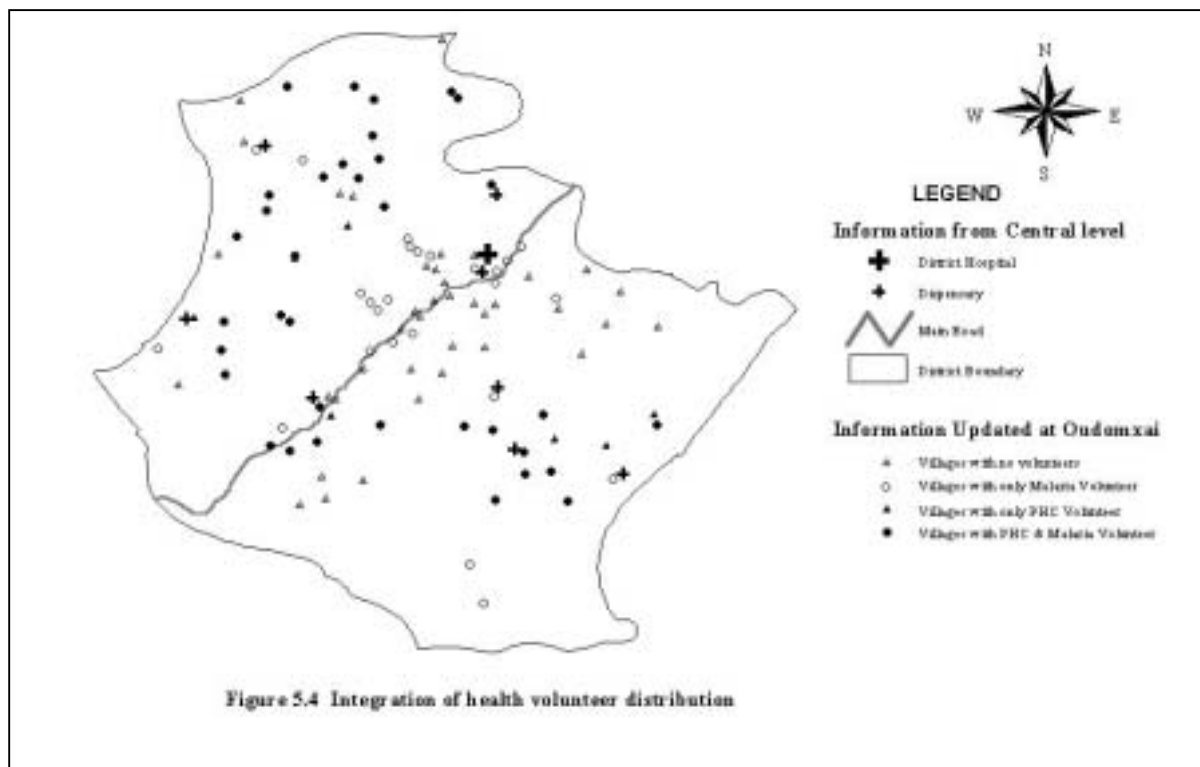
Source: Map prepared in the GIS workshop in Oudomxay

**Figure 16.3 TBA Distribution Map of Houn District**



Source: Map prepared in the GIS workshop in Oudomxay

**Figure 16.4 Integration of Health Volunteer Distribution**



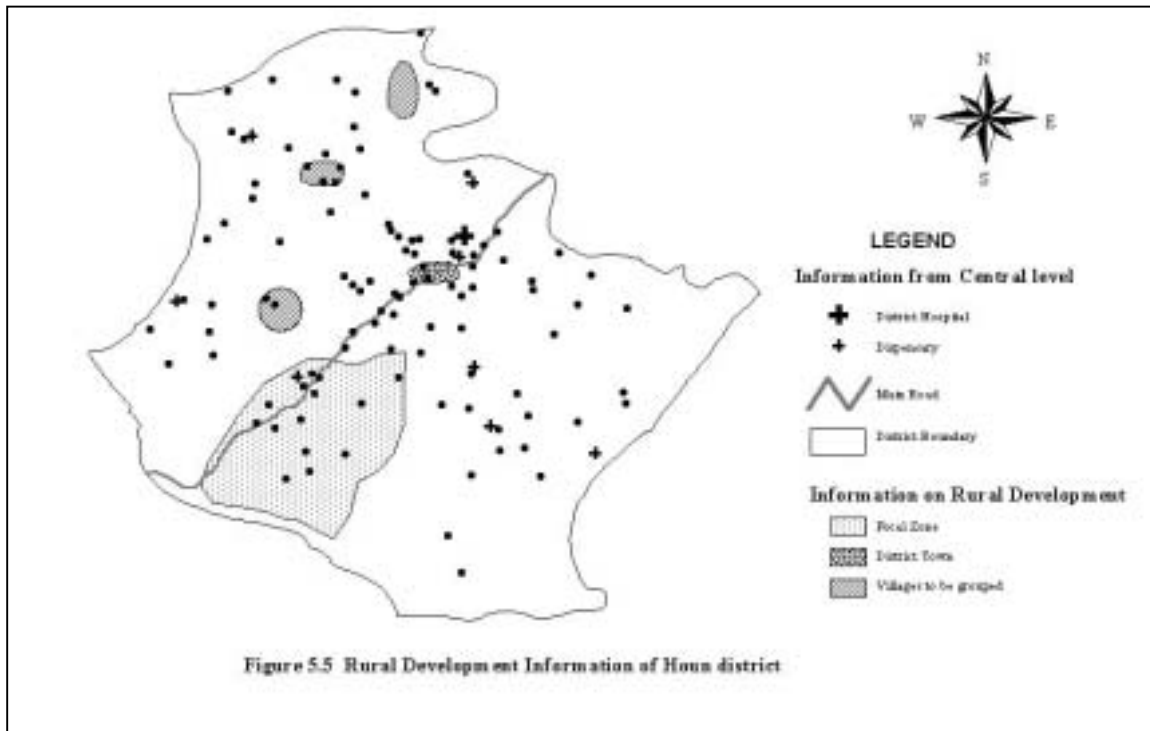
Source: Map prepared in the GIS workshop in Oudomxay

Figure 16.5 was reproduced from UNDP publication<sup>3</sup>. This shows the development activities planned, completed in the Houn district. According to the Rural Planning department, they are promoting village integration, re-settlements to provide better access to the people in health, education, and economical opportunities. The present policy of their planning is to bring the people for the services and not to take services to people who are scattered in areas with poor transportation. This planning approach can not be ignored when planning in the health sector as health is one of the primary service that the government of emphasizing to achieve with the Health Strategy to 2020.

Integration of health and rural planning in geographical point of view is depicted in Figure 16.6. This shows the location of villages, health facilities with respect to development plans. As development plans are given priority for development, re-settlement, health care service should be considered to develop in these zones to fulfill the government comprehensive approach. This figure shows future village integration and provides the health planners to identify volunteer distribution in the target villages that could help planners to decide future use of them and activity areas. This is very rough idea of the potential of integrated planning, and much more could be identified and visualized through GIS if integrated with other health and non-health related information.

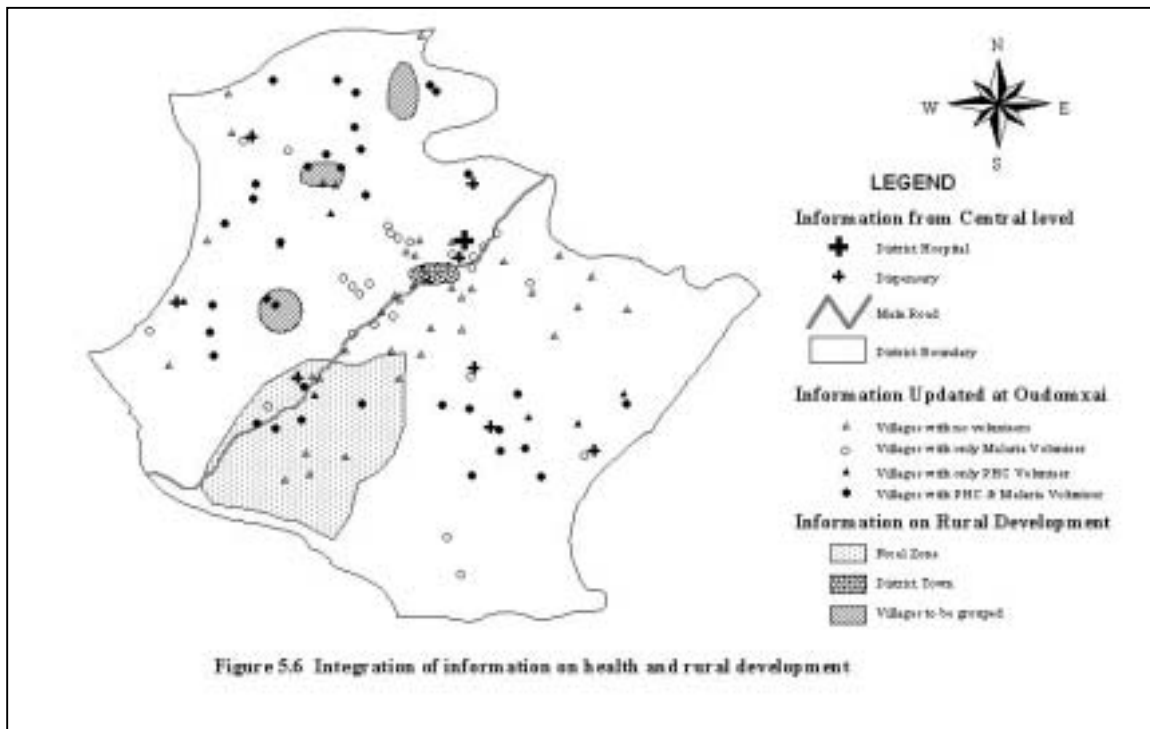
<sup>3</sup> UNDP, 1997: Resettlement and Social Characteristics of New Villages, Edited by Yves Goudineau. Vientiane

**Figure 16.5 Rural Development Information of Houn District**



Source: Reproduced from Resettlement and Social Characteristics of New Villages, Edited by Yves Goudineau. Vientiane, UNDP, 1997

**Figure 16.6 Integration of Information on Health and Rural Development**



Source: Map prepared in the GIS workshop in Oudomxay

### **16.3.5 Factors Determining a Successful GIS**

Potential of an appropriate GIS system was explained in previous sections, and it is required to look into the system itself to understand the factors that need to be considered and monitor for the successful use of such a system. Some of the key element for a successful GIS is enumerated below;

#### **(1) Efficient Information System**

This is the backbone for any information system and true for a unfailling and efficient GIS system. Well-established HMIS could link through appropriate data structure giving access to all the health related information to GIS system. Further, relevant intersectoral information should be integrated to the GIS to explore its full capability, and this should be taken up as a data sharing system with other relevant agencies.

#### **(2) Accurate Spatial Information**

The difference between GIS and other information system is the linkage with spatial entities. Therefore, without spatial linkage of information, a GIS system can not exist. These information need to obtain from updated maps or new surveys, but the level of detail and accuracy required for the considered system should be identified before collecting. In Lao PDR health sector context, most of these data are available, and need to update for changes. It is not advisable to invest on spatial data creation at MOH, specially for administrative data as different agencies are responsible for such activities and it may difficult to maintain the data conformity if every agency start to develop there own administrative spatial information. It may be necessary to create very limited data such as new health facilities and share these with other agencies.

#### **(3) Suitable Software and Hardware**

GIS system cannot serve the purpose without dedicated software package for intended use. As GIS can serve as a database, mapping, analyzing, modeling system, it is necessary to identify the role of the intended system, data acquisition method, presentation of analysis before deciding a system that could save large amount of money and time. A system that uses HMIS information, and able to utilize spatial data from source agencies could consider investing on low-end GIS packages to reduce cost and human resource development time. Present day software packages in these capabilities are well suitable to run on desktop computers. Packages with all GIS capabilities including database creation, spatial data editing, modeling, storing etc. could be very costly and need to invest for maintenance and human resource development.

#### **(4) Avoid Information Duplication**

There should be one information network within health sector and should be nested together with relevant units or sectors including GIS. In other words, it is not necessary to have a separate data generation process for the intended GIS, and GIS should link to HMIS.

#### **(5) Data Conformity**

It is important to control the data quality and format within the health sector to avoid delays and difficulties in sharing information and results among each other. As it is not expected that staff of MOH is supposed to have high literacy in computer and data structures, this could be achieved through investing on software that uses same data structure. Further, flow of information through HMIS would be the best option to ease technical difficulties in each of the GIS user.

#### **(6) Two-Way Communication**

Information gathered from root level are fed into a central level information system (HMIS), and the root level health workers should be benefited through their effort. In this sense, it is important to provide map based information develop through GIS system to health workers in the root system also. This will help to motivate them to continuously contribute to information sharing system, as they will understand that their input benefit them also. This was well heard from the participants during the GIS workshop conducted at Oudomxay.

#### **(7) Research and Training**

No system can work with dedicated and trained staff, and this is another important task for a successful GIS. Training should be conducted in a systematic manner rather than providing training to use particular software. Staff working in a GIS system should understand GIS data structure, coordinate systems, data creation methods, statistical analysis etc. to avoid miss-interpretation and erroneous results. Further, knowledgeable staff is a wealth to investigate potentials and application techniques of health related data to find out new trends, underlying facts, new interpretation keys etc. that could be not observable from naked information.

### **16.4 ESTABLISHING AN APPROPRIATE GIS FOR LAO PDR HEALTH SERVICES**

#### **16.4.1 Organizational Structure**

Establishing GIS activities in Lao PDR health sector is not new as some form of activities are being carried out in some units in MOH described in a previous section. What are lacking at present are organized data communication, practical usage of GIS potential, and form of continuous data update and human resource development. Furthermore, most of GIS activities are launched as a part of an on-going project discontinuing most of these activities with the

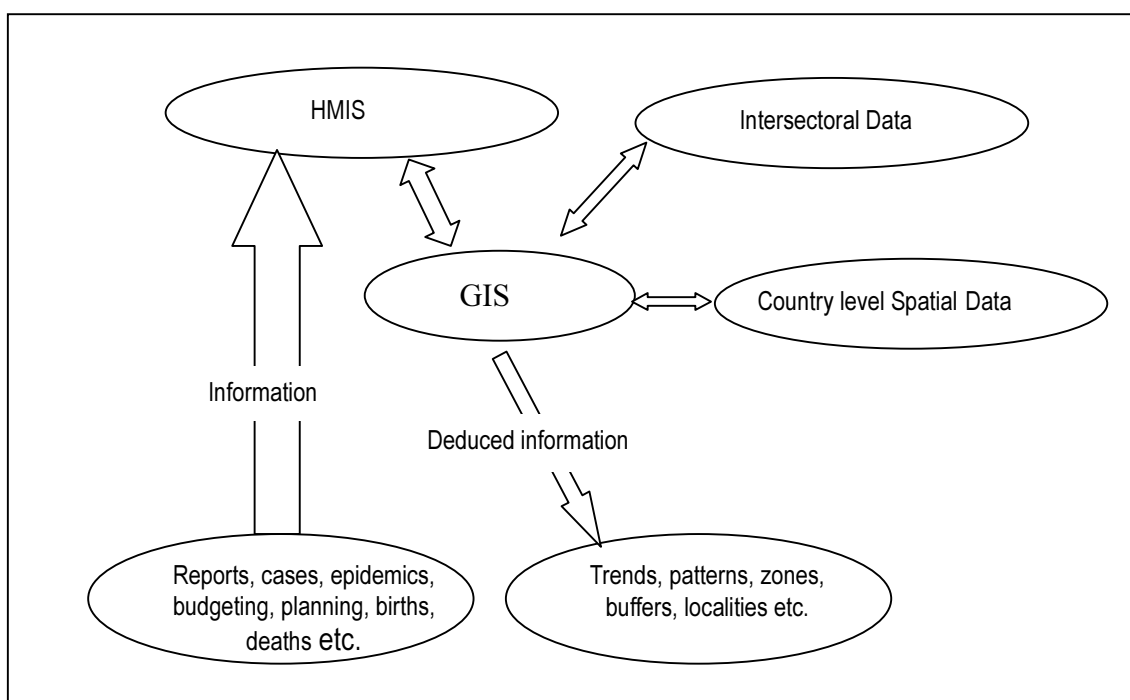


termination of such projects. In some instances, the potential of GIS is over emphasized creating institutional complexity among users and non-users. These problems occur when there is lack of understanding about GIS itself, and trying to bring about solutions with poorly developed GIS systems without supporting information, technical know-how and institutional recognition.

The present status of GIS at MOH is not well organized and in almost all the cases the activities are conducted at individual units. Further, information or technology sharing is not visible among these users leading to information duplication, poor institutional recognition leading to administrative difficulties affecting the possible use of GIS for the benefit of health care planning and management. This situation is not suitable to identify the potential of GIS and future advancement of its usage. To reconsider the present status, it may necessary to look at the GIS concept in two different aspects; technical and institutional.

In technical point of view, GIS should relate with HMIS and further linked to other sectors in strengthening the information content. Also, all the units that could utilize GIS should have the access to information freely, should have a freedom to communicate with each other. Graphical representation of technical structure of a suitable GIS for MOH is depicted below.

**Figure 16.7 Technical Structure of a Suitable GIS for MOH**

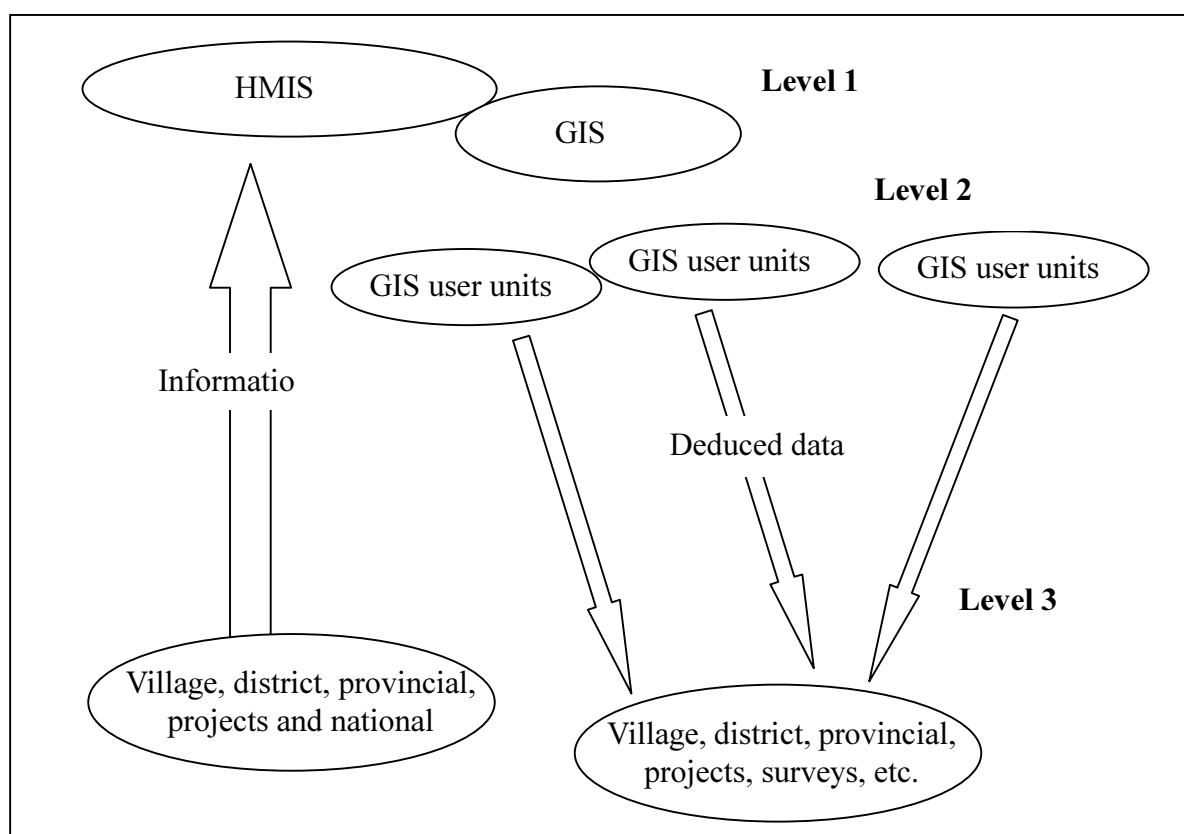


The central part is the information flow from all health related areas. Relevant data for spatial modeling and analysis is obtained from HMIS. Intersectoral data can be added directly to integrating multi-disciplinary data. Major spatial data are coming from authorized source agencies can be used for GIS activities of MOH, but need to have some form of spatial data

creation facility that are not developed from other sources. Deduced information is sent back to relevant units of MOH for utilizing in health care planning and management.

Having defined the technical formation of GIS and related technical aspects within MOH and linkage with outside agencies, it is necessary to consider the appropriate institutional structure for efficient and economical GIS activities in fulfilling health related activities. The following diagram shows the proposed institutional framework for GIS facilities at MOH.

**Figure 16.8 Institutional Framework for GIS Facilities at MOH**



This recognizes three levels of organizational units for GIS. The level 1 is where there is a capability to generate some form of spatial data within MOH and this unit is responsible to have frequent communication in developing appropriate information channel and information structure of HMIS that should readily integrate in a GIS. This should be at the central level, and should have the authority to manage nationwide information structure. Level 2 is at the central level or project basis with their own GIS data analysis capabilities. Spatial data generation is not their mandate and should use spatial data available from Level 1. In the context of analysis, mapping, research, and policymaking, they should have the freedom to conduct their own GIS works, but deduced information should be relayed to Level 1 for national level planning and management. The level 3 is the information provider and the receiver including central level to village level. Deduced information and maps should be provided to policy makers in central

government and all other relevant agencies in the line down to village level. The information provided to each user should be designed to suit their respective requirements and level of understanding.

CMPE, EPI, PHC units are recognized in Level 2, and Level 1 unit should be with the unit responsible for HMIS. There should not have administrative differences between Level 1 and Level 2 apart from their obligation. Information at Level 1 should freely available for Level 2, and if necessary to Level 3. One of the important tasks of Level 1 is to maintain standard of spatial data, acquire necessary external sources of information, harmonize data flow with HMIS, and utilize deduced information for national level budgeting and policy making. Also, it is necessary to provide these to lower level administrative agencies for regional or local planning and management purposes.

#### **16.4.2 Computer Tools and Human Resources**

Even at present some of the units recognized GIS as a potential tool utilize GIS for some limited works and it is necessary to streamline the data structure and software packages used. Arcview is mainly used in these centers, and most of the national data are generated around this software standard. Therefore, it is cost effective to continue GIS activities with Arcview or ESRI software structure. Initial plan for software and hardware could be considered as follows;

1. Level 1 PC based arcview, color plotter (at least A2), small digitizer, CD-R/W.
2. Level 2 PC based arcview, color printer (A4), CD-R/W
3. Level 3 Software and hardware are not necessary at the initial stage

Development human resource capabilities in conducting GIS analysis in all these 3 levels are important for practical usage of GIS. At least two permanent staff should be available at Level 1, and Level 2 should be supported with at least one staff conversant with GIS and Arcview software. At least 2 months initial training on GIS and the usage of software is required for starting with some of the GIS operation and time to time exposure to advanced techniques and continuous utilization would help to develop human resources at these centers in the usage of GIS. Most importantly, planners, managers of health care facilities, researchers in various health disciplines should interact with these units to investigate potential use of GIS in health sector, and it will be unrealistic to leave the GIS work for technicians to develop new ideas and application areas. GIS is only a tool that makes some ideas workable, presentable, and applicable for health planning and management more efficient way with the interaction of enthusiastic health planners and managers.

#### **16.4.3 Spatial and Attribute Data Acquisition**

As there are number of spatial data available in Lao PDR, it is not required to develop spatial information from the scratch. Also, country level administrative boundary and common features should not develop within MOH as it could create inconsistency with data sources from

authorized agencies for country level map data. At present the major constraint is village location data as these are relocating to new areas and need continuous update. This can easily be done with the help of other relevant agencies or working directly with lower level health personnel. Ministry of education that maintain and update school map would be a good source to share the current village database.

The challenge is linking information with spatial entities. At present there is no recognized numbering systems for province, district and village spatial data. This should have to verify with the authorized agency for spatial data management (Department of Geography). This is vital for linking any sort of information with spatial entities. It is necessary to consider the best way to maintain this numbering system within the HMIS as input information to GIS needs to be based on HMIS. At present different units use their own database systems such as Access, EpiInfo etc. for data management and in some cases same information is input twice; one for database system and again for GIS system. This redundancy should be overcome by establishing better HMIS where everyone and each unit could share information for their own purpose at one reliable place. If a system around the HMIS is developed, it is not required to have extra burden for GIS data collection, except for spatial data.

#### **16.4.4 Strengthening Information Exchange**

Development of a technology depends on its recognition and acceptance by a large community. In the case of GIS or HMIS, it is utmost important to develop two-way communication; bottom to top and top to bottom. This two-way communication would help to recognize the importance of information content that is provided by lower level as higher authority could feed back them with deduced facts or figures based on their wealth of information and how to utilize them in daily health care activities. This could be achieved through exchanging monthly, quarterly or annual surveillance reports, planning based on GIS, and providing annual updated maps on health facilities, health volunteer distribution maps, maps of catchment areas, future development zones and expected trends in epidemics. Their eagerness to look into above information in spatial domain was observed during the Oudomxay workshop and it was repeatedly requested to provide them with updated maps depicting health facilities, villages etc for provincial and district level planning. Participants of Oudomxay workshop were very much happy in updating current maps and preparing and evaluating their own strategies on the maps provided for them and this could easily be done as the initial step in Level 3 GIS approach. Further, having their faith and initiatives in map preparation and updating would help the continuity of GIS activities at higher level and advancement of such activities in time to come. Therefore, consideration should be given to feed back the local authorities and health workers with derived information and relevant maps in order to keep the continuity of information flow through participation of all personnel in health sector.