CHAPTER 2

Literature Review

The literature review comprises two parts. Part 1 is related to the justification of potential benefits eventuating from establishing a regional information network. Part 2 is concerned with determining socioeconomic factors associated with malaria transmission, and evaluation of the allocative efficiency and equity in health resources allocation.

Part 1. General output of economic-health information network

A number of papers are reviewed in relation to the benefits of health information networks. This topic is discussed in these papers from different points of view, and the evidence and examples in each country are presented to show how economic and health information are beneficial to priority setting, policy development, monitoring and control of disease, and guidance in resources allocation.

Scott et al(1992) presented a report about the importance of public health surveillance for setting health policies and managing prevention and disease control programs. To understand better the real, practical potential for public health surveillance, he reviewed the history and development of health surveillance with a variety of examples using data which assist effective actions in public health, such as priority setting, policy development, and program implementation and evaluation. This paper clearly demonstrated the important role surveillance has played in public health activities.

Chen(1992) introduced the main public health surveillance activity in China, which includes the component of surveillance systems and the functions of these systems. She also reviewed the history and development process of establishing the disease surveillance system and the disease information network. The benefits of having such systems for health planning and disease control are illustrated by evidence of how surveillance information have been used to implement and evaluate public health programs. These examples include:

- monitoring morbidity from infectious disease during heavy flooding in 1991 with resultant effective prevention of epidemics;
- forecasting the epidemiologic transition: analyses were used to develop recommendations for program planning to the Ministry of Public Health;
- prediction and control of meningitis based on the cumulative database;
- strategy setting for vaccination for polio eradication.

Chunharas(1992) described the structure of the public health surveillance system in Thailand, and how the system is utilized to support sound decision-making at the different levels of government. Examples are given to illustrate the benefits of using health data for decision making in Thailand, such as:
- policy guidelines from surveillance data with one specific outcome: withdrawal of typhoid vaccine;
- reorganizing the Ministry of Public Health to make it more dynamic to cope with changing health problems;
- help setting priorities for health problems to guide allocation of resources;
- age-specific prevalence surveys and introduction of screening programs for diabetes mellitus and hypertension;
- policy making for management and allocation of human resources;
- using health-status data to identify provinces with efficient management;
- use of population-specific disease data to plan variation in intervention;
- monitoring use of analgesics after caffeine was removed from the standard formulation for aspirin.
The author concluded that using surveillance data for public health decision making is crucial to the problem solving process. The surveillance concept of conventional outbreak control needs to be expanded if the present concern is based on "health" rather than just on disease. Risk factors, lifestyle choices, use of service and accessibility of health care are all issues that surveillance information can help us address.

Shepard(1992) discussed the current and future economic burden of health problems in both industrialized and developing countries. Improving allocation of resources for health services would be beneficial for all countries in which health surveillance makes great contributions. The paper outlines an approach for using economics to analyze resource allocation in health. The approach, the World Bank's Health Sector Priorities Review, currently incorporates a group of 32 studies coordinated by Jamieson and Mosley. Most of the 32 studies are organized around specific health programs. The results of these studies are very useful for health policy planning and promoting more efficient allocation of resources and management of finances.

An article from the Institute of National Information Infrastructure(Internet, 1996) presents economic and health benefits obtained from the national information infrastructure (NII) in United States. From a health care perspective, the NII can help solve America's health care crisis, and guide health care reform that will ensure that Americans will not lose their health care coverage and also control skyrocketing health care costs. As it mentioned, challenges are faced to tackle with the health problems, such as health expenditure escalation -- under current policies it will hit 19 percent of total GDP by the year 2000, and 25 cents out of every dollar on the hospital bill goes

to administrative costs and does not buy any patient care. These problems will not be solved without comprehensive health care reform. Better use of information technology and development of health care applications for NII can make an important contribution to reform. Experts estimate that telecommunications applications could reduce health care costs by $36 to $100 billion each year while improving quality and increasing access.

Laporte(1994) described the importance and benefits of global public health information infrastructure, and introduced the technology and features of public health information networks. This paper illustrated possible applications of networking for public health, for example global disease telemonitoring, environmental monitoring, on-line vital statistics, E-mail searches, public health gopher, distance education and so on.

These papers reflect a some of the advantages of health surveillance systems. The benefits can be viewed from several aspects, it can increase the capacity:

First, to assess and to monitor trends in the health status of the population;

Second, to assess and to identify risk factors, i.e. to monitor exposure of the population to factors that may adversely affect health;

Third, to assess and to monitor equity of access to health services;

Fourth, to detect emerging health problems and to respond to them in a timely and appropriate fashion.

Fifth, to evaluate the impact of public health policies and public health programs;

Sixth, to convey information more effectively to policymakers, to managers of public health programs, and to the public.

These six general benefits summarize what we have learned from these papers. It is useful for us to foresee the benefits which could be obtained from establishing the regional information network. However, no references were found for interfacing health, disease and economic data for health policy and economic development planning. The discussion of benefits from this perspective in the following Chapter will show the needs of economic consideration in health surveillance systems.

Part 2. Analysis of economic-health-disease data for health policy planning, with specific reference to malaria.

The literature review in this part has concerned the study of determination and quantification of the relationships between socioeconomic factors and malaria transmission, and defining the outcome measures for improving health resources allocation.

Godelman(1995) conducted a study to deal with models of health planning at district level. It describes and analyzes experience with a version of the "Health Resources Allocation Model" and its application in courses, especially evaluating its potential for teaching and training in health planning. The health resources allocation model is designed to illustrate factors that have to be taken into consideration in the planning of health systems, and to stimulate discussion of different possibilities. Knowledge from the disciplines of epidemiology, anthropology, medical geography and health economics is interrelated with the concepts and techniques of information science. Data about key factors from geographical, demographic, epidemiologic and economic sources, and health providers are collected and used to formulate this model, and to generate the health outcome of selecting different health planning and resource allocation options, which can help planners making rational decisions to achieve their objectives and goals.

Banguero(1984) studied the impacts of socioeconomic factor changes on malaria transmission. This study reassessed the determinants of the malaria problem in order to identify social and economic factors that might be playing an important role by themselves or in association with epidemiologic or health determinants of the disease. The paper presented a methodology which is being applied to the analysis of social, economic and health determinants of malaria incidence in Colombia. The model is developed based on a home economic framework. Economic variables include education and housing conditions, health factors include nutrition and health services.

Kwadwo(1994) studied socioeconomic factors in malaria control in Ghana. He found that knowledge of people's perception of malaria and of the socioeconomic implications of the disease is considerable value when control programs are being planned and implemented. Many socioeconomic factors are considered to have substantial effect on malaria transmission. These factors include sanitation conditions, agricultural development, irrigation, the availability of drugs and pesticides, knowledge of and attitudes to the disease, migration and outdoor activities. Some of these correlations are observed in this country, for example, malaria is linked to poverty in a vicious cycle, the factors perceived as causing malaria include malnourishment, mosquitoes, excessive heat, excessive drinking, fatigue, dirty surroundings, unsafe water, bad air, and poor personal hygiene. It is widely understood that malaria has a major adverse impact on the ability of adults to work and of children to attend school.

Mills(1995) conducted a study to try to find out the relationship among malaria incidence, socioeconomic development and malaria control interventions. Through analyzing demographic changes, geographical distribution of population, changes in land cultivation and crop production, economic changes, malaria

control expenditure and malaria incidence in Nepal, correlations of these factors were found and recommendations based on the finding are made for help in policy planning, as well as to select appropriate malaria control programs for specific target populations.

Pornchaiwiseskul(1993) conducted an economic analysis of communicable disease control. His study was centered on explaining the effects of disease control on health risk and economic output. The optimal conditions of allocative efficiency and equity of malaria control distribution among health districts and between preventive and surveillance measures are analyzed. These optimal conditions can be used to evaluate how well the malaria control resources have been allocated over time, and to pinpoint the provinces in which resources allocated inefficient and inequity. Thus it can be used as a feedback mechanism by planners for modifying the plans.

The morbidity model he developed is based on the notion presented as:

$$\log C_T - \log C_{T-1} = \eta_T - \rho_T$$

Where

C_T = the morbidity rate at year T

η_T = the transmission rate

ρ_T = the patient recovery rate

In the empirical morbidity model, three leading causes of morbidity and mortality from diseases(malaria, acute diarrhea and tuberculosis) were considered. The independent variables, including lagged dependent variables and other socio-economic factors, are considered to determine either the transmission rate or the patient recovery rate or both. The estimations are based on ten years annual time series data for selected provinces.

Sen(1972) discussed a number of measures of inequality. The advantage and weakness of these measures are discussed. Some of measures are:

(1) The *range* is defined as the gap between highest and lowest income level as a ratio of mean income.

$$E = (\text{Max } y_i - \text{Min } y_i) / \mu$$

The weakness of this measure is that it ignores the distribution in between extremes.

(2) The *relative mean deviation* looks at the entire distribution and not merely at the extreme values. It compares the income level of each with the mean income, and looks at the sum of the differences as a proportion of total income:

$$M = \Sigma^{\mu}_{i=1} |\mu - y_i| / n\mu$$

The weakness of this measure is that it is not sensitive to transfer from a poor person to a rich person as long as both lie on the same side of mean income, e.g. if $1 is transferred from the richest to the second richest person or to the poorest, all

will get the same value of M. So it fails to catch the commonly accepted ideas on inequality.

(3) In order to solve the above problems, the use of *Gini Coefficient* measurement was suggested. A detailed explanation of this measure will be presented in Chapter 5.