CHAPTER 7

Conclusions and Limitations

7.1 Conclusions

This study has justified the potential benefits of establishing a regional economic-health-disease information for health and economic development planning. One specific example has been presented in the form of a study of malaria, in which two analytic tools have been applied. One is the malaria morbidity model, in which malaria is an interdependent variable with the causation of socioeconomic, health and environmental variables. Another is a framework for assessing the economic efficiency and equity in health resources distribution. A summary is presented in Table 7.1.

Results reported here, though preliminary, permit us to draw the following conclusions:

(i) The empirical result of fitting Thai data to the framework has shown that malaria incidence seems to be more closely related to specific malaria control activities rather than to the general health services, especially in the malaria epidemic provinces. This result provides support for the continuation and intensification of antimalaria activities, such as blood examination and possibly DDT spraying, since it seems possible to reduce malaria morbidity rate to some extent by using preventive measures.

(ii) Education level is also an important determinant of malaria incidence from the result of our analysis. Increased education level seems to be very effective for disease control, it would be a long term condition for eradication of disease. For malaria control programs, specific health education activities should serve as a vital part. Special attention should be given to the development and application of communication media/material using local dialects and ways should be sought for giving health education to illiterate groups, which lead to modified their risk behavior and more effective prevent malaria.

(iii) The results show that forest areas seem to be high risk factors for malaria transmission. The malaria control measures and other related activities should be more focused on these areas. Further studies at local level should be encouraged to define risk groups in more detail in order to implement more effective malaria prevent/control measures.

Table 7.1 List of variables, definition, sources and results in relation to malaria control

Factors	Definition	Correlation with Malaria incidence?	Data Source
Dependent Variable:			
API91	annual parasite incidence		[1]
API92	rate, 1991, 1992		[1]
Independent variables:			
Anti-malaria Activities			
1. ABER91	annual blood examination	Yes	[2]
2. ABER92	rate in 1991 and 1992	Yes	[2]
General Health Facilities			
3. DOCT	population/physician	No	[3]
4. NURS	population/nurse	Yes	[3]
5. HBED	population/hospital bed	No	[3]
6. NEXP	health budget/capita	No	[4]
Socio-economic Factors			
7. PDEN	population/area	No	[3]
8. FSIZ	average family size	Yes	[5]
9. FARM	farmer/population	No	[5]
10. EDUC	schooling years	Yes	[5]
11. AVIN	household income/capita	No	[5]
12. GPP	gross provincial product	No	[3]
Environmental Condition Factors			
13. FRST	forest area/total area	Yes	[6]
14. RAIN	average rainfall	No	[6]
15. TEMP	average temperature	No	[6]
16. CAR	population/passenger car	Yes	[3]
17. TELE	population/telephone	No	[3]

Sources:
[1] Malaria Report, 1994, Thailand
[2] Epidemiological Report, 1991,1992, Thailand
[3] Thailand in Figure, 1995-1996
[4] National Health Report, 1992, Thailand
[5] Socio-economic Household Survey (calculate from household database)
[6] Statistics Year Book, 1993, Thailand

(iv) The geographic distribution of malaria (Figure 1) shows that high malaria transmission provinces are located in

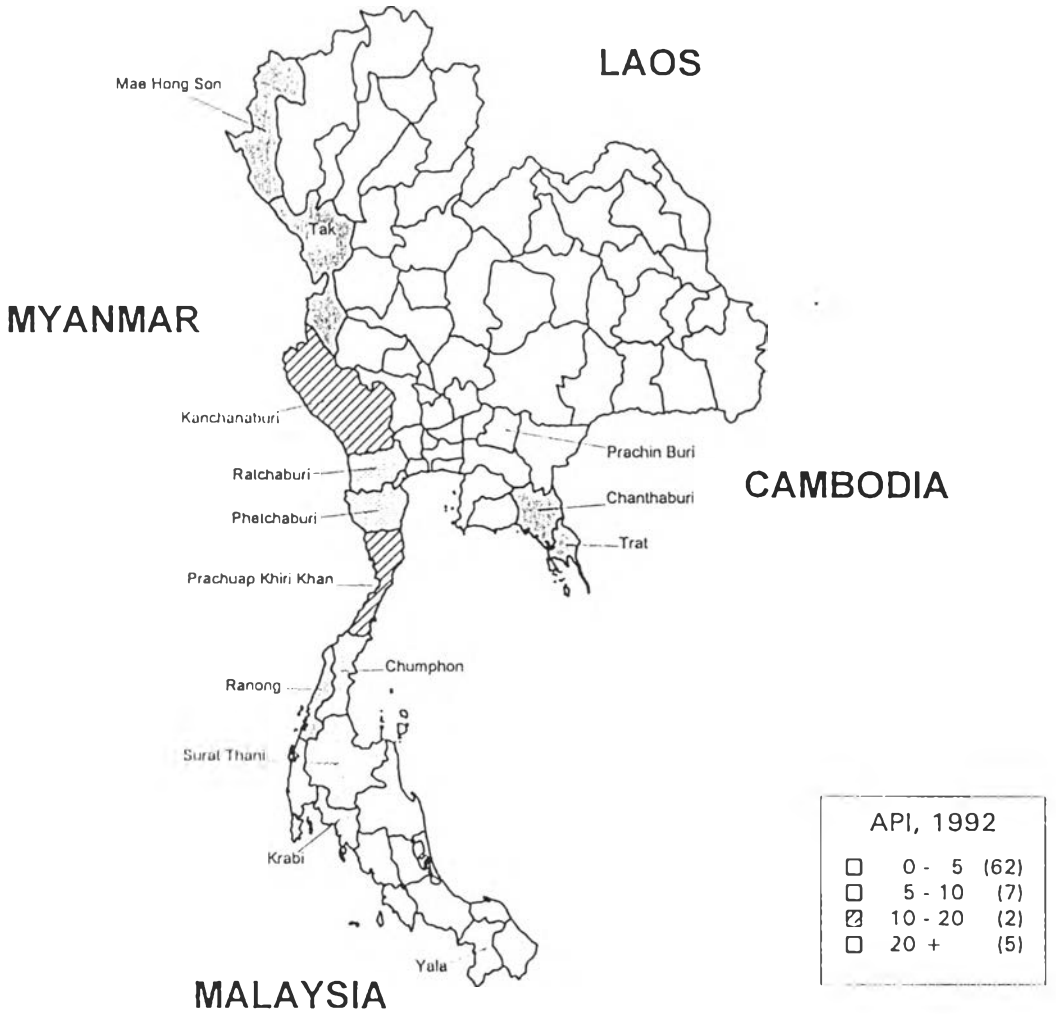

Figure 1 Annual Parasite Incidence (API)
(per 1,000 Population), 1992

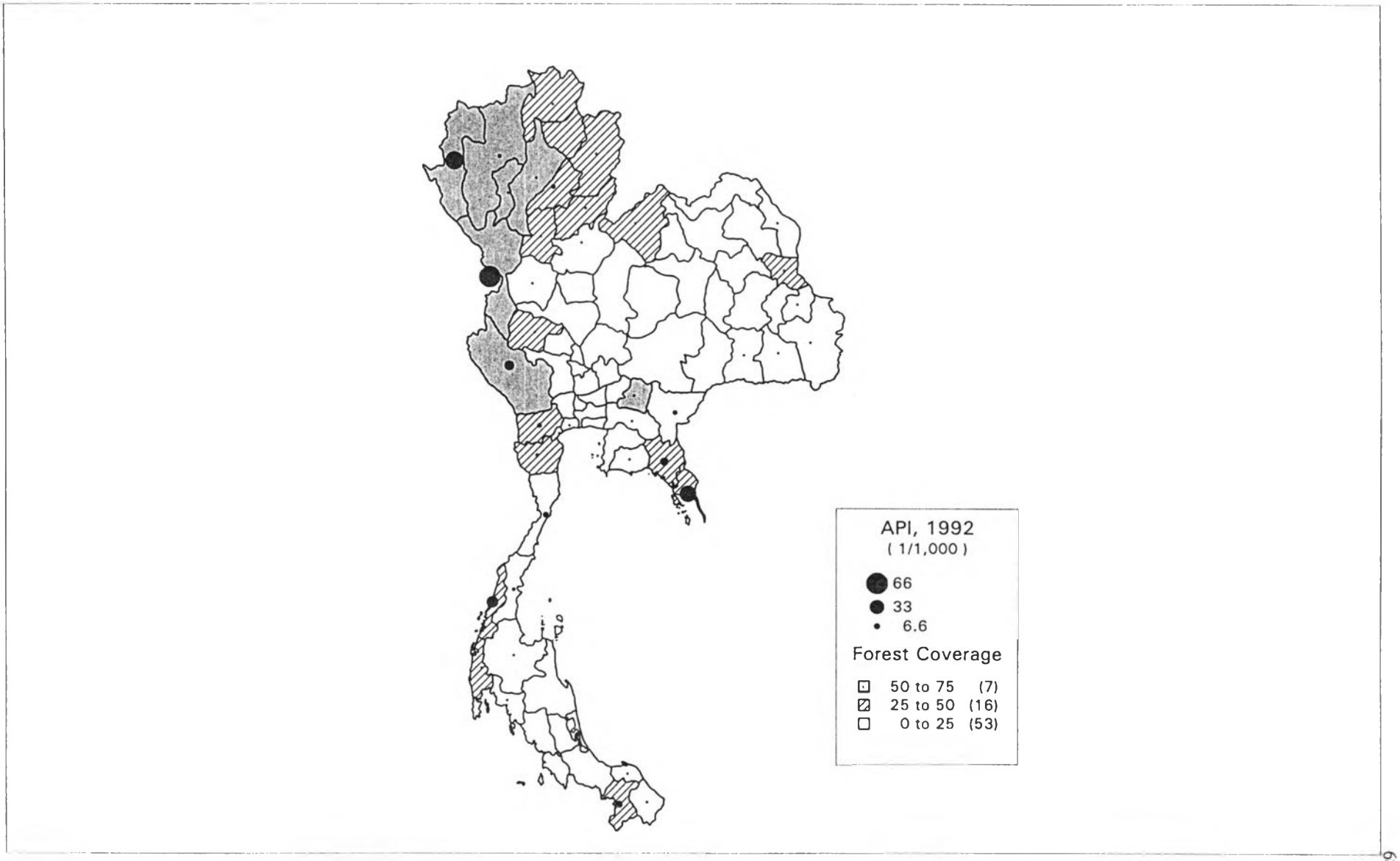

Figure 2 Relationship between Forest Coverage and API, 1992 by Province, Thailand

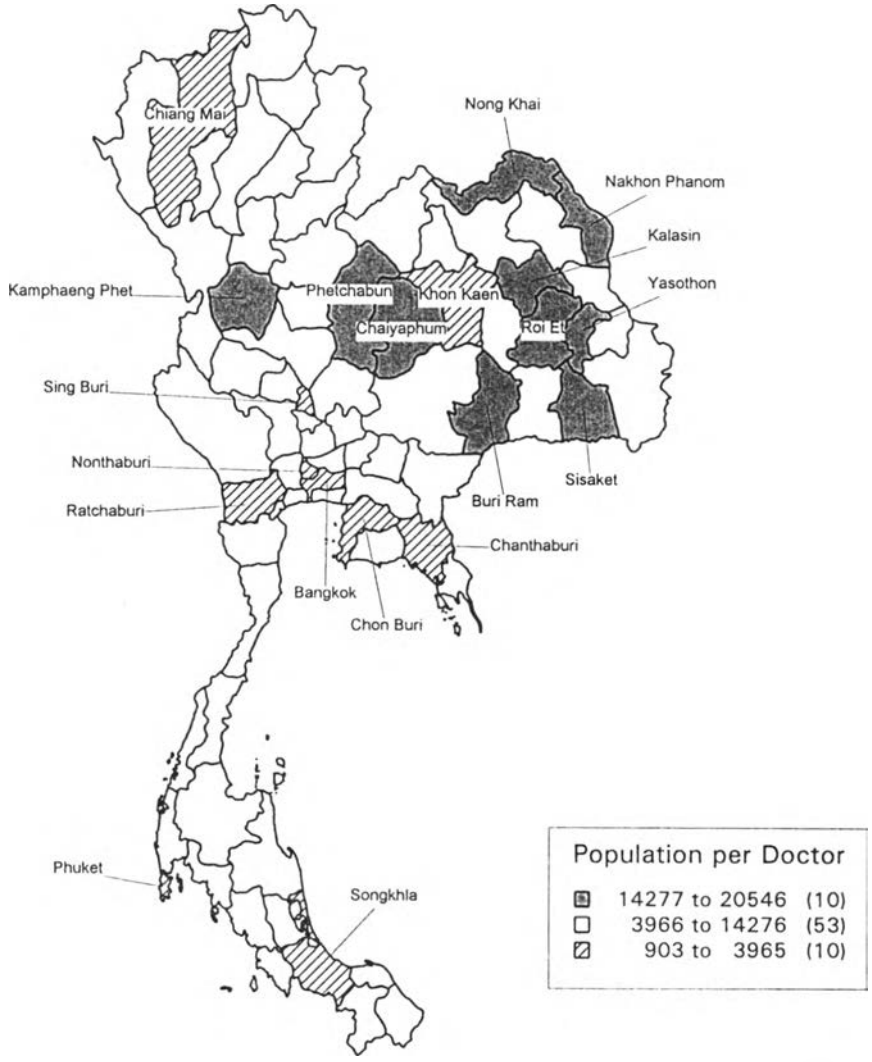

Figure 3 Population Per Doctor, 1992, Thailand

the border areas (Thai-Maynmar, Thai-Laos, Thai-Cambodia). It is important to implement joint studies on the malaria problem in border areas. For this purpose cooperation and coordination between these countries are necessary. Establishing an information network is urgent and important to provide a common data set as a basis for joint planning of strategy in these areas, frequent updating, preferably on-line.

(v) From this study, we found that it is not enough just using one year's data to explore the relationship between disease and economic status, as our study failed to find the correlation between disease and economic factors. If we look at their correlations at a macro level, time series data are needed to explore how the disease pattern changes along with the economic changes over time, because there may be a lagged effect between disease and economic factors.

We also notice that the availability of disease and economic data are different in terms of level and time series. Disease data are collected more frequently(e.g. weekly, monthly) and at local level, because it needs quick responses at the different levels. Economic changes are relatively slower, the household surveys are conducted every two years. In order to make these data consistent, so they can be utilized by different levels (district, province, region), methods of interfacing these data are necessary to develop.

(vi) The results of determining the Gini Coefficient of equity in health facilities distribution shows the degree of inequality is small for health budget, nurses and hospital beds, but larger for physicians. Health personnel and hospital beds are more concentrated in the rich or urbanized provinces, e.g. Bangkok, Chanthaburi, Nonthaburi, Songkhla, Chiang Mai(Figure 3). The health resources are most equally distributed in the Southern region, and most unequally in the Central region. The equity conditions of health resources distribution can be given, which can be fed back to policymakers in order to update plans to improve equity in health care.

(vii) A framework of efficiency in resource allocation is presented in this study. A computer program has developed based on the framework to calculate the optimal condition of resource distribution among health districts. It provides one method to measure the efficient level of resources allocation, which is useful for decision-making.

7.2 Limitations of the study

This pilot study attempt to explore the relationship between malaria morbidity with socio-economic parameters, and to apply health economic theory to assess the efficiency and

equity in health resources allocation. There are some limitations we faced in conducting this study.

First, some of the important data are not accessible at this moment. Since we conducted the study on malaria by analysis at national level, it is more useful to employ the data of specific malaria control measures and health care services, e.g. malaria clinics, personnel, vector control activities, malaria control expenditures. But these data are only available at the micro-level(by malaria sectors), it needs to convert these data into the provincial level. At this limited time, we have to use some general health care data instead of specific ones. Clearly in order to optimize the information network's operations, data collection methods need to be standardized, to eliminate the requirement for laborious data transformation.

Second, in this study, we select annual blood examination rate(ABER) as the proxy of malaria control measures. Actually, ABER is not a good indicator, since this rate, in practice, is used to evaluate the work of local health personnel, the higher the examination rates indicate the more work they have done. Therefore, some inapprepriate blood testing is reported, which makes the rate apparent to be higher than the actual level and cannot represent the real situation of malaria control measures.

Third, data on socio-economic, health, and environmental factors are coming from different sources. Although we used the data from the same year(1992), and interfaced these data to form the combined database for analysis, however, they may be not consistent, because these data are collected from different sample populations, and the time periods of conducting these surveys are different. So it may generate some bias in our analysis.

Fourth, as the limitation of my knowledge about the malaria epidemiology and the background of the provinces of Thailand, the discussions and conclusions may be not appropriate and not practical. Limited time is another constraint for me to go further with deep analysis.

A key element overall is clearly the need to develop appropriate methods for interfacing the data bases as they are, in order to improve the value of cross-correlation, as mentioned above. It is thus useful to examine briefly ways in which this critical task might be approached. An example of interfacing economic-health-disease database is given in Appendix B.

7.3 A Final Note

With the demands on resources to improve health status of the population, and with the limited resources available, particularly in the health area, choices must be made. Findings such as those reported here should enter the decision-making process as information (but not the only information) relevant to the question of how much resources are to be allocated among competing areas and programs. When the government, for example, considers the desirability of launching an antidisease campaign in some areas, it has to make the choice in alternative programs, whether involving disease, education, roads or other development uses.

Quantitative findings from this study can be useful of decision-making process, though very limited. The study about malaria, however, is only one form of output of an information system. We hope that the approach employed in this study is useful as a prototype for the studies of other diseases. Yet study of economics of disease control is still in its infancy. It is possible to do rigorous quantitative work in this area. But as this study has shown, the energies and talents of economists need to be combined with those of medical personnel and a larger social perspective to understand how man adjusts to disease.