CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

This chapter concludes the research study and then briefly reviews the limitations associated with the use of the tools developed for analysis of demand function for malaria services and their application.  Finally, we give some recommendations for future study.

7.1  Conclusion

In this study a priori theoretical considerations shows that at the same district, demand for malaria clinics treatment services, Q, in malaria sector clinics is a function of the district's incidence rate of malaria, R, per capita government expenditure, G, on malaria control activities in the district, the district's average household income, I, of the population, mean travel distances, X, to the sector malaria clinics by the vulnerable population and the annual blood slide examinations, S, in the malaria clinics.  Thus, in symbols, for a sector malaria clinic,

$$Q = f(X,R,G,I,S) \tag{7.1}$$

We propose to use quantitative method, multiple regression technique to find the solution while the data are pooled cross-section time series of 10 sector malaria clinics at Tak Province in the average of 3 years (1991-1993).

After careful considerations of the alternative schemes by which cross-section and time-series data might be pooled, an error-components pooling technique and weighted ordinary least square technique are selected as the best options to meet the objective of the research study.  However, after comparing the efficiencies of the two techniques, the former is finally chosen as the most suitable for use

in this study.

In order to handle the decline in the purchasing power of the Baht over the year which is the usual problem associated with the use of nominal currency figures, as we have in our variables for average household income, I, and per capita government expenditure, G, we use logarithms of the two variables instead of their nominal values.

An initial test run using the regression equation (5.1) (to investigate the strength of the correlations of the output variable Q and the five independent variables, the linearity of the regression function and the presence of multicollinearity using Micro TSP programme and the pooled data) shows that the use of lagged log G variable is more appropriate compared with the variable log G itself if the problem of multicollinearity is to be avoided. This is found to be reasonable as it shows that the previous year's government expenditure on malaria control activities, if judiciously utilized, has significant effect on malaria cases detected at the malaria clinics in the subsequent year. This is an important information for budget allocation in planning.

Furthermore, the incidence rate of malaria, R, is found to be highly correlated with the household income variable, log I, thus giving rise to a problem of multicollinearity in the function and therefore it is removed from the subsequent analyses of the study, based on the strength of its correlation with the output variable Q, compared with that of log I. This means that the marginal effect of the incidence rate of malaria on demand for malaria clinics services is equal to that of household income level and justified on the bases of underlying theory explained in the preceding chapter. Incidence rate of malaria is higher in the lower income groups than in the higher income groups and therefore the latter demand less of the malaria clinics services than the former as shown from both models developed in this study.

Two error components models, one to estimate demand function for treatment services and the other to extrapolate the annual attendances in the malaria clinics (the total blood slides examined)-

which in fact represents the total annual demand for services at the clinics- are developed . The results indicate that attendance rate and therefore incidence of malaria cases in the malaria clinics increases when the lagged household income and per government expenditure for malaria control activities fall and, fall when the lagged household income and the lagged government expenditure per capita increase. Whilst the poor seem to suffer from malaria most and are the ones that demand most for the malaria clinics services , long distances and the judicious utilizations of government expenditure reduce demand for the services. Any future policy by the Malaria Division aimed to influence the incidence rate of malaria and the demand for the services in the district should take these factors into consideration in order to achieve a better result. The understanding of the quantitative measurements of the factors influencing demand for malaria services in order to form an estimate as to how largely each factor influences the whole result is very important for policy formulation and planning and this the study achieves.

Furthermore, the methodology developed in this study can be applicable in other provinces in Thailand and other endemic countries in the world when faced with similar situation encountered in the study.

7.2  The Limitation of the Study

The limitations of the study can be briefly summarized as follows:

1. This study has investigated only malaria clinics in the Tak Province which has a peculiar malaria problem as a result of frequent border crossing to and from Myanmar, a highly endemic country, because of family ties and may not be applicable in the other provinces with different malaria situation.

2. It may not be appropriate to apply the models outside the range of the observations that have been used to estimate the models' parameters and to verify the aptness of the models' assumptions.

3. Whenever the models are utilized to make future inferences, the validity of the inference requires that future causal conditions be the same as during the period covered by the observed data.

When causal conditions have changed, the fitted models may no longer be appropriate.  It requires then that  new data be collected and the model fitted again.

7.3  Recommendations for future study

1. A comparable study that covers more than one province is recommended so as to verify the effects of the factors examined and to generalize the results.

2. As there is a frequent policy changes in regards to malaria control activities in the endemic zones, care should be taken in the selection of the study units and in the data collection.  Malaria clinics with stable data should be considered.

3. It will be more appropriate to measure mean travel distances for each year instead of a single constant one for the time period chosen for the study as done in this study.  One reason is that new malaria clinics are constantly being  put up in the endemic zones every

now and then depending on the prevailing circumstances and as the result of the study has shown, a decrease in mean travel distance increases demand (all things being equal).

4. It will be more appropriate to collect pooled data spanning the same time period for all the cross-section units selected. This is because conditions may differ in the situation where there are different time periods for different cross-section units. The different conditions may distort results of the study.

5. It should be noticed that the error-components model technique used in this study is applicable in a pooled data. With only a cross-sectional data and of similar situation, the weighted least squares regression model developed in the study will be appropriate for consideration.