CHAPTER V

DISCUSSION AND CONCLUSION

This chapter discusses the findings of the study and points out the strengths and weaknesses of the methods applied. The next section concludes the study and also derives policy implications of the results obtained. Suggestions for further research are given in the final section.

5.1 Discussions on the results

This is the first study comparing cost-effectiveness of early case detection for VL under two separately run programs in Nepal. A number of assumptions were inevitable while doing costing exercise for want of accurate data, and this is perhaps one of the most important limitations of the study. Nevertheless, the results of this study have raised some important questions and identified gaps for future researches. This will be discussed in later sections.

The concept of costing capital outlays in this study followed the fundamental economic theory- capital costs represent an investment in an asset which is used over time and most of them, such as equipment and buildings, depreciate with time, except land, which maintains its value. There are two components of capital costs- the opportunity cost of funds tied up in capital assets and depreciation over time of the asset itself. Although various methods were available to calculate these costs, calculation of 'equivalent annual costs' was preferred in this study as 'this would give both types of the costs' (Drummond, 1997). For this reason, the estimates given in chapter IV should reflect the economic costs of the capital outlays, not financial ones. Moreover, the difficulty in costing capital

outlays due to non availability of records led to estimate the purchasing price in round figure, and in case it could not be done, a replacement value was estimated. These estimates, of course, incorporated many assumptions, as discussed in methodology and while presenting the results. Moreover, the allocation criteria developed to apportion total annual costs to the VL case detection program was also not free from the assumptions. Sometimes, for want of accurate data, a crude assumption such as bed occupancy had to be used to allocate the capital costs of generator, which could have allocated differently in other situations. Calculation of material costs also required several estimates. Importantly, as no data for laboratory supplies was available, the costs of one test (bone marrow, for example) was estimated first identifying the inputs and their quantity and then multiplying the quantity by their respective market price, assuming that this would give the economic cost of ordering one test. Thus, although several efforts were made to have these assumptions as realistic as they could be, the results presented in chapter IV need to be used cautiously.

Costing outreach detection program was based on average daily costs of inputs, which although not as precise as micro-costing, was a realistic approach. The actual expenditure of the program was found to be higher, as the unit price paid for the inputs were much higher than the existing market rates. The market was assumed to be functioning, and this led to adjust the prices in order to reflect true opportunity costs of the resources deployed. Another reason for adjustment was that leaving the prices unadjusted would introduce substantial biases in the study. Both unadjusted and adjusted costing are given in earlier sections of this chapter so that readers are free to make their own value judgements.

The adjusted labor costs might rise some interesting questions. From the providers' point of view, does it allow for the sustenance of the program, as the provider has to pull up some additional resources in order to pay at market rates? Moreover, paying at government rate itself might disregard the real wage rate prevalent in that area and workers might not be willing to work for the government provider. Thus, this two way

possibility related to sustainability of the outreach program needs to be considered while making any decision. Secondly, is the outreach program still be a better alternative if the labor costs were not adjusted? The figures from the analysis indicate that it is not. In such a case, existing health facility based program serves better.

The results indicate that capital costs of health facility based case detection program accounts for more than half of the total costs. Further analysis of capital costs showed that the annual costs related to buildings only accounted for 92 per cent. The building cost might have been overestimated by as high as 10 percent discount rate. A sensitivity analysis done by differing discount rates showed that the valuation of annual costs were sensitive to the choice of discounting rate used to reflect the opportunity cost of the capital. The health facility based program was more capital intensive.

The discrepancy in the share of staffing costs in the total costs of health facility based detection program (9.5 per cent) and outreach detection program (18.6 per cent) reflects importance of staff involvement in outreach services. This is further attributed to zero capital investment in case of outreach services, most of them are recurrent costs going to case detection alone. Moreover, the cases detected by the health facility based program might have some drug-resistant cases and defaulters, which might have increased the costs of the program. It was considered to be zero in outreach detection program, assuming that outreach program results in more earlier case detections. Notably, cost of hospitalization as estimated in outreach program may not reflect the true economic costs, as the minimum charge taken by the hospital for a case has been used to estimate costs if the detected cases were to be treated by the program. The cost of one inpatient day was not available and it was not possible to calculate the patient day costs in this study. This cost component might underestimate the total costs of outreach program, in case it is also run by the government that runs the hospital (the same provider).

The estimation of patient's cost in both the programs made several assumptions. There were 18 newly detected cases for which no data on treatment costs was available. It was

assumed to be the minimum costs incurred by the patients in terms of indirect costs (30 days of treatment time) and all direct costs such as drug and hospitalization charges, except travel cost and meals cost, were assumed to be provided by the program itself. This assumption might not be true, especially in case of days of absence from work. Moreover, as the results revealed, the variations between the costs incurred by these cases are substantial, and the number of cases interviewed might not be enough to generalise the results. However, variations in the costs can largely be attributed to the severity of the disease, accuracy of the diagnosis made, patients' compliance, drug resistance and attitude towards seeking health care. Variations can, therefore, always be expected in such cases.

The results also show that patients of visceral leishmaniasis is bearing a substantial burden due to disease, mainly in terms of indirect costs due to absence from work. Especially among patients with incomes below the poverty line, the economic consequences of VL can be devastating. These consequences seemed more depressing in health facility based program than outreach program, as most of the cases detected by this program who were living under absolute poverty (daily earning less than USD 1) was found to be incurring costs more than 5 thousand rupees than the same group of cases detected by outreach program (Table 4.9). This result should, however, be interpreted in light of the assumptions made to estimate indirect costs (absence from work) of treatment (30 days for 18 newly detected cases out of 28 interviewed cases in outreach program), as indirect costs formed a large component in the total burden of disease.

Estimation of effectiveness also assumed that not all cases will survive after the treatment of the cases, as seen in the epidemiological reports (MOH, 1998). However, the most important aspect was the estimation of the probability of survival. The case fatality rate was considered to be a good proxy for the compliment of survival rate, which could however pose difficulty in estimation, as it is not deterministic in nature. A sensitivity analysis carried out at the end of chapter IV should allow the readers to interpret this result effectively. Another drawback of the effectiveness measure was its ignorance of

many confounding factors other than VL that would lead the case to death in worst scenario and to early recovery in the best scenario. The primary effectiveness measure (cases detected) was supposed to have certain value in itself because if a case is detected, it was assumed that the health system would treat it and stop the transmission of the disease. Finally, while translating effectiveness into monetary value, some assumptions were made which might not be realistic, yet the estimate could provide burning agenda for discussion. It is important to see that health facility based program could save more per capita value of potential life years than the outreach program. This could largely be attributed to the more younger population group in the former program and also more median earnings. This might perhaps be a serious limitation of the formula used to calculate value of potential life years saved.

Moreover, the outreach program used k39 dipstick test for the VL case detection in the field. The limitations of serology should be acknowledged, as no serological test is completely specific for visceral leishmaniasis. The results of the use of k39 dipstick presented here show lots of assurance, since the test was found to be both sensitive and specific in the areas where this economic evaluation was carried out. However, care must be taken to interpret the results as the gold standard used to validate the test was DAT, which is less specific in general. Despite that, the results obtained here are quite comparable with studies done elsewhere (Sundar et al,1998; sensitivity 100%, specificity 98%). However, not many evidence of the effectiveness of k39 dipstick for diagnosis of leishmaniasis have been reported.

It is important to note that the k39 dipstick was found to be very practical and easy to use in the field settings, in addition to being effective in detecting VL cases. Moreover, the affordability of the test (it is available at USD 1.12 per test) may also imply its greater use in future by the health system in detecting the VL cases rather than doing confirmatory tests such as bone marrow aspirates, which is both costlier (more than USD 4.0 per test) and more invasive (gives more stressful sessions to patients). The economic costs of having k39 dipstick for VL case detection in terms of manpower is also much

less than that of having conventional bone marrow aspirates, as the former can be done by any health worker with little training in the community itself while the latter requires a skilled technician and a laboratory. Another test, DAT, is slightly more expensive than the dipstick (USD 1.50 per test) and requires laboratory facility. While its ease and practicability, coupled with effectiveness and lower costs, might place k39 dipstick as an more attractive option for VL case detection over conventional tests, decision makers need to seek more evidence of its reproducibility in all rural areas.

Discussions on marginal analysis

Since the two programs being evaluated are likely to be complimentary in nature, as they can not substitute each other, a relevant question here could be " can we add outreach program to the existing health facility based detection program to improve earlier case detection?" The study results provide enough evidence of this possibility. As seen in earlier discussions, if outreach program is implemented, it would reduce the patient's burden of disease substantially. However, one should be aware of the additional costs that would be required if a decision to integrate outreach detection to the health facility is to be taken.

It is, therefore important to calculate marginal rather than average costs of the programs The marginal costs is the costs incurred or saved from providing one unit of more or one unit less of a program whereas average cost represents the total costs of program divided by total units produced upto the point at which the calculation is made. There is no *a priori* reason to assume that both costs will be the same unless total costs rise at a constant rate as the program is expanded (Donaldson and Shackley, 1997). There are several methods of doing marginal analysis. While evaluating two or more programs, if the analyst is more concerned in knowing how much extra costs are required to expand each of the programs, calculation of marginal costs at certain level of output for each program would be appropriate. If he is more interested in making a decision about which of the alternative programs should be chosen based on the additional costs or savings per additional effectiveness (as in CEAs), economists prefer to do what is known as

'incremental' analysis. Therefore, the way a marginal analysis is done depends on the primary question on which it is based.

The current question is, however, somewhat different from the two examples given above. The question here is- 'how much extra cost is required if outreach program is integrated with health facility based program?'. The programs were evaluated separately, and therefore, no data on the combined costs are available. However, assuming that there would be some shared costs if these two programs are combined, the total costs of the combined program would be less than the sum of the costs of each program. In this case, the incremental cost of integrating outreach detection to health facility will be less than the average cost of outreach program. Thus, the combined program should incur USD 124 (average cost of outreach program) or less per additional case detected. From providers' perspective, it is a better alternative as the average cost of health facility based program (USD 191 per case detected) is more than this amount. As discussed earlier, patients' perspective strongly suggest that these two programs need to be integrated. Thus, it seems relevant that outreach program be added to health facility based detection.

5.2 Conclusion

Efficiency of any program requires examining if the program's cost is worth its effectiveness. Based on the findings of this research, it can be concluded that given all assumptions made to estimate costs and effectiveness in this study be realistic, outreach case detection program seems more efficient than the health facility based program, and it seems relevant to initiate the outreach case detection program in the areas where visceral leishmaniasis is endemic. Since these two programs are not *substitute* of each other, outreach program can compliment the health facility based detection to detect more cases and also to reduce the time lag between infection and seeking health care. Outreach program ensures less patients costs than the health facility based detection, and thus may solve the problem of equity in service delivery. It may, therefore, be worthwhile to invest on outreach program.

Since there is no data available in order to compare the average cost of VL case detection and treatment, it is still unknown if outreach case detection program can even be more cost-effective. Comparing the results with a different but relevant study (Boelaert, 1999), both of these programs are more cost effective than the one in which a case is detected by parasitological test and treated (C/E= USD 448 per death averted). However, it is important to note the differences between the detection methods used by these programs.

5.3 Policy Implications

Outreach case detection for visceral leishmaniasis may be a preferred option to control the disease in Nepal. Under the current system of health care delivery, the health facility (hospital) based case detection program can not be replaced by the outreach program, as these two programs are not *substitute* of each other, but it might be possible to integrate it with the existing one. This is important because this may reduce the patients' burden of disease substantially, especially for most of the cases whose economic conditions are extremely poor and who can not afford seeking health care at the hospital, as shown by the results.

As the results show, in the existing health facility based detection program, those with the least earnings are spending more money than they could afford to treat the disease. This implies that the system is not equitable and it needs to rearrange its resources in a more efficient manner so that patients burden of disease could be minimized. Integrating outreach program to the existing one might be a better alternative to solve the equity problem.

The results also suggest that VL cases are not reporting to health facility due to both direct and indirect costs associated with treatment, as being extremely poor, they can not afford it. Thus, it is important to reduce time lag between infection and diagnosis of the disease, or else there might be growing incidence of the disease. Growing incidence of

VL could simply mean greater risk of transmission of the disease in the community, which in turn may mean the increased costs to the society.

The high opportunity costs in terms of days of absence from work and informal support associated with health facility based detection program, as reveled by the study, might have some implications to the diagnostic accuracy of the system. Thus, the program needs to improve its effectiveness in diagnosis and also try to contain opportunity costs of the patients. As an alternative to the conventional diagnostic tests, the program may start some other tests for rapid detection of visceral leishmaniasis such as k39 dipstick, which is less costly and could be more accurate.

5.4 Suggestions for Further Research

The following areas are considered to seek further research:

1. This study suffered to a large extent by the lack of accurate data needed to do the cost analysis of the programs. A research to explore the data requirement and storage techniques for such an economic evaluation of major public health problems, including VL, in Nepal is an immediate need, considering that economic evaluation can contribute tremendously in the disease control activities.
2. As there was no data available to compare the results of this study, and it is still unknown if the outreach program is really an efficient measure for VL control in Nepal, comparing with other alternatives such as spraying. Thus, similar economic evaluation needs to be carried out for all possible alternative interventions to control VL.
3. The effectiveness measure studied in this research took into account the primary outcome (cases detected), and with some assumptions, quantity of life years saved. However, it is desirable that both quantity and quality of life years saved by an intervention be estimated. It would, therefore, be useful if effectiveness measures

such as Disability Adjusted Life Years (DALYs) could be calculated for alternative interventions in order to help the decision-makers take the best choice.

5.5 Limitations of the study

The study was not carried out from the societal perspective, and therefore, did not include the costs of false positives and false negatives arisen from the diagnostic tests. Moreover, the number of screened population was not available, instead population at risk was used to compare the effectiveness of the program. Also, incremental analysis was not carried out, as costs of combined program (outreach plus health facility based detection) was needed for that purpose, which this study was not able to collect.