

CHAPTER 5

Conclusions and Recommendations



5.1 Conclusions

The study is a descriptive research that explains the cost of rabies control in year 2000. Furthermore, the researcher tries to simulate a model of the intensified-dog control program for 3 years. We will know how much budget has to have so as to attain the program objective. Research methodology is based on WHO observations and recommendations guided in the WHO Technical Report Series 1992 and also several studies previously done by many research teams. Secondary data were obtained from many related organizations. Some were acquired via telephone interviews and some were indirectly synthesized by available data.

Main activities were grouped into 4 activities; 1) postexposure treatment, 2) dog vaccination, 3) laboratory diagnosis in animals and 4) other program (i.e. dog population management, health education, related campaigns). Then, the simulated models were divided into 2 situations; 1) under the current practice and 2) under the intensified dog control program (dog vaccination coverage 80%). Costs of both situations would be calculated and compared the difference that was an incremental cost of the intensified program. In parallel with the benefit of the program were a number of deaths averted. The researcher cited previous study done by Bogel K (1990) as method to assume the number of deaths. Its assumption was during the first year of the intensified program a death rate equal to 20% of the initial rate and the incidence was expected to reach zero during the second year. The researcher also applied *human capital approach* to calculate income foregone of premature deaths and compared the difference that was an incremental benefit or, however, income saved from death averted in the intensified program.

The intensified program was expected to implement for 3 years in order to attain rabies-free from Thailand. The reasons were considered that rabies control program in Thailand had been progressively done well for many years. Evidences were a reduction of death continuously and an increase of dog vaccination coverage close to WHO recommendation. Several literature reviews the researcher had searched also showed the possibility to reach the target within 3 years; nevertheless well-cooperative work will be needed.

Empirical results showed that cost of rabies control and prevention, both public and private sectors, was 1,188,446,635 baht in year 2000. It was divided into human PET 808,178,253 baht and dog rabies control 380,268,382 baht. Average cost of PET was 480.08 baht per visit and dog vaccination was 46.54 baht per dog. Laboratory diagnosis in animals was on average 2,897.72 baht per sample.

Calculation of incremental cost of the intensified program for 3 years showed approximately 99,321,106 baht. This amount would be spent on dog vaccination to cover at least 80%. Incremental benefit was calculated from the difference of income foregone between two programs. It was 202,674,911 baht. Benefit to cost ratio was 2.04.

Conclusion of the model was found that it was beneficial to our country to implement the intensified program; particularly Thailand is an endemic area.

5.2 Recommendations

1) Give more budgets on controlling of rabies in animals

The findings told us that total cost of rabies control in year 2000 was 1,188,446,635 baht and was drawn to human PET 112.5% higher than dog control programs. It implied less attention was drawn to animal rabies control. The study models showed that costs of PET in 2001, 2002 and 2003 were 832,362,704 baht, 890,293,958 baht and 950,377,410 baht respectively compared to year 2000 was 808,178,253 baht. Increasing rate was 3%-6.7% per year. In contrast to cost of dog rabies control was slightly changed (392,256,378 baht, 357,171,836 baht and 378,813,080 baht respectively). The outcome was a reduction in deaths but still had every year and expected to have hidden cases in which diagnosis was not clear. For our country, dog is still the major cause of spreading, differently from western countries that wild animals are the case.

Report data revealed the increasing trend in PEV very rapidly. That meant the government had to spend a huge budget on human PEV when compared to another program. It is true that all contracted persons would inevitably die when expressing the symptom. But we should realize that rabies is a preventable disease in the sense of controlling of spreading source, especially in dog. Therefore, human vaccination might be indispensable but that doesn't mean it can eradicate such disease definitely.

From WHO recommendations, if 80% of dog population in particular area were vaccinated, it would produce 'herd immunity' and be able to eradicate the disease. When comparing cost of rabies control in year 2000, dog vaccination was virtually 10 times cheaper than human vaccination (46.54 baht per a dog vaccinated to 480.08 baht per visit per man). Furthermore, the former was done 1 time a year while the latter would be 5 visits to be complete (postexposure treatment). Consider the cost that was increased in the intensified program, 99,321,106 baht, is not too much for the government when regarding the benefit gained.

Therefore, the researcher recommends that budget should be given more on controlling of rabies in dogs. It is better to execute the cause of problem than to correct the problem.

2) Control of dog population

This is one of influencing factors to attain vaccination coverage successfully. Analyzed data showed that dog population was not increase much compared to the past. Nowadays dog to human is around 1 to 10.3 that caused the intensified program be beneficial to implement ($B/C = 2.04$). If dog population had increased more or the ratio below 1 to 9 (i.e. 1 to 8, 1 to 7), the intensified program would have been less beneficial to do ($B/C < 1$). Cost of the program will be increased very much (see table 4.57).

Therefore, dog population management, either reproduction control or removal, should be done so as to restrain cost of the program. In addition, before the implementation of the intensified program, dog population survey should be executed. This will have an effect on program planning and financing. If possible, the

registration of dog population may be required, like many countries done. It will support our work to succeed effectively.

This measure will have indirect benefit, however. It will force the owners to be seriously responsible for their pets. Stray dog could be effectively under control including reduction of environmental pollution from dog waste. The by-product is fruitful to tourism economy.

3) Reduce the burden of expenditure on dog vaccination by public sector

Result of study found that public sector had borne some responsibility of vaccinating owned dogs. In year 2000, owned dogs were only 24.5% of total dog population received vaccines from private clinics. The fact that 80% of dog population was owned dogs. It implied some owned dogs received free vaccines from public sectors. Actually, this burden should be bearing by the dog's owners. They should pay some for their pets when receiving any public-provided services. In the long run, law enforcement should be in effect so as to force the owners being more responsible for their pets.

4) Increase animal samples for laboratory diagnosis

Review of study found that lab diagnosis in animals was decreasing every year, even though there are over 40 potential laboratories in Thailand. Average cost of lab was 2,897.72 baht per sample and will be increase every year because of less number of samples submitted and more administrative cost. This problem is not only the ineffective of lab utilization but also the reliability of surveillance data. Especially, the latter were counted on sample numbers. It would affect the policy planning to control rabies. Owing to an endemic area like Thailand, surveillance system is very important. It's also able to help physicians to decide their treatment properly. Nowadays, many labs were close because of very few samples being received and not cost-benefit to operate.

The researcher recommends that government should advocate persuasion measures on submitting more animal samples, for example, remuneration for sender or comfortability to access. If necessary, the active surveillance should be redone. As was mentioned, it would help strengthening the surveillance system to be more effective and reliable. All labs would be utilized fruitfully compared to the present. We have to recognize the fact that surveillance would be the justification whether rabies still existed or not.

5) Strengthening the role of LGA to deal with rabies control

Empirical results showed that LGA could provide vaccines to dog around 771,428 dogs or 18% of total vaccinated dogs. Its operating cost was 35 baht per dog. Process of their work is usually accompanied by DLD district office (officially abolished in 2002) and health center. LGA will allocate the budget annually to purchase rabies vaccines and contraceptive hormone for dogs and let volunteers trained by DLD execute remaining work.

Approximately 8,000 units of LGA (municipals, sub district authorities) all

over country are operating now, their duties are mainly responsible for people in the areas and they know community need well. If rabies control had been undertaken by LGA, it was possible to attain 80% of vaccination coverage. Another factor, unit cost of activity is not rather different from which to be done by DLD (38.30 baht). By these reasons, the government should strengthen LGA to play more roles in rabies control with an assistance of government organization.

6) Continuing health education

Success in rabies control is partly derived from continuing health education. It can be observed from increasing a number of postexposure vaccination every year. That means exposed persons are more aware of the disease increasingly.

But in near future, when dog vaccination activity can attain its target, rabies will be absolutely eradicated from dogs. Therefore, postexposure vaccination should be decrease or stable. Health education will play as a channel for disseminating not only true knowledge but also true understanding of rabies. People should be realized the success in dog rabies control and properly provided a self-care guide for an uncertain exposure.

7) Further studies of cost of rabies control on societal perspective

In economic evaluation, cost analysis could be divided into 2 parts:

- (1) Direct cost: consists of cost incurred by provider, for example, medical cost and cost incurred by purchaser, for example, transportation cost, time cost.
- (2) Indirect cost: consists of cost incurred indirectly by the activity, for example, income lost due to absent from work either illness or death, cost incurred by relative who looked after a patient.

It should be explored more particularly on cost of purchaser view both the patient and relative and also the benefit that would have occurred in tourism economy. This will affect the policy planning and managing on health strategies.

5.3 Limitation of the study

1) The study is an empirical research of cost that might not reflect the real cost virtually incurred in the society. By the fact that there are other expenses, particularly on the patient view, for example, transportation cost, time cost including cost incurred by relative. And also the researcher didn't encompass the cost of outbreak control of rabies. Furthermore, there also has an effect of program that spilt over to society, known as externality in economics. These can be quantified by applying technique of willingness-to-pay, for example, a willingness-to-pay by tourists if rabies free from Thailand or a willingness-to-pay by people if community free of rabies. By these reasons, true cost-benefit might be higher than the result of this study.

2) Because of limitation of available data, the researcher need to compute some

total cost by using operating cost, for example, cost of PEV at public hospital, cost of treatment for rabies and immunoglobulin side effect by using DRG. Especially, data of LGA have not been evaluated as a whole yet. There are only some areas to be available.

3) Currently, working structure of many government organizations has been reformed. So cost of activities might be changed to some extent because of using data in year 2000 to be analyzed.

4) At the time of study, there are no data of per Capita GPP in year 2001-2003, disseminated by NESDB. Then, the researcher applied per Capita GDP to compute an income foregone of rabies deaths. It might seem to have a higher income foregone.