CHAPTER 4

ECONOMIC LOSS CONCEPT

Economic loss results from Schistosomiasis morbidity has been demonstrated by economic costs, current productivity loss and future productivity loss. Economic costs borne by households in endemic area represents the resources which has been diverted towards Schistosomiasis instead of being channelled to other best alternative uses which could yield more returns. Thus, these economic costs which encompasses both direct and indirect costs, reflects one of the economic losses to the community. However, this loss would have been averted if the government initiated a control programme.

Another source of economic loss caused by Schistosomiasis morbidity is current productivity loss as depicted by changing health status of household members in endemic area. Deterioration of health status of household members as revealed by labour productivity index leads to a decline in individual labour productivity. The summation of individual productivity loss justifies household productivity loss.

When all household productivity loss are summed together we get total productivity loss for the whole community living in the endemic area. Likewise, this productivity loss would have been averted if there was a control programme.

On the other hand, economic loss to the society as a result of poor school performance of children is manifested in two ways: (i) Investment made on education (ii) Lost future productivity.

4.1 EDUCATION INVESTMENT LOSS

Households and the government both do spend substantial resources on education which is considered as a long term investment. The investment in education is not made for its on sake, instead for expected higher future returns from the children who are future productive labour force, thus when these children are subjected to poor school performance due to Schistosomiasis infection , it implies loss to the community, which sacrificed its current consumption on anticipation of the investment to pay higher returns in future through increased labour productivity due to knowledge acquired from education.

4.2 NET PRESENT VALUE (NPV) APPROACH

As pointed earlier, investment in education is a long term one, which requires huge initial capital on anticipation of earning more in future through an increase in labour productivity. Thus, in a situation where there is no Schistosomiasis morbidity, investment in education is a viable project depicted by NPV being greater than zero. However, with the presence of Schistosomiasis, school children's performance is being affected as a result investment costs became higher than benefits eventually pushes down the NPV to be less than zero (negative), implying such an investment is not worthwhile.

$$NPV = \sum_{i=1}^{n} \frac{Bi - Ci}{(1 + r)^{i}}$$

$$= \frac{B1-c1}{(1+r)^{1}} + \frac{B2-C2}{(1+r)^{2}} + \frac{B3-C3}{(1+r)^{3}} + \cdots\cdots + \frac{Bi-Ci}{(1+r)^{n}}$$

Bn = Benefits in year i
Cn = Costs in year i
r = Discount rate
n = Number of years
i = The year being discounted.

NPV > 0 If there is no Schistosomiasis (control programme prevails) hence, investment in education is feasible.

NPV < 0 With the presence of Schistosomiasis, hence investment in education is not feasible.

4.3 LOST FUTURE PRODUCTIVITY

Dunlop and Diatchenko (1964) pointed that, among the factors which influences labour productivity are: (i) The skill or qualification of the worker (ii) The intensity of his effort in the process of labour, or the intensity of work. (iii) The innate ability of the worker, that is his physical and mental energy.

From these arguments it is clear that, the community is deprived of skilled or qualified future workers as the children who are the future labour force, they are hampered to perform well on their studies due to the presence of Schistosomiasis, hence they become in future semi skilled if not unskilled at all. Also, Schistosomiasis affects their physical and mental energy as a result they become less productive in future.

4.4 COST CLASSIFICATION (PATIENT PERSPECTIVE)

DIRECT COSTS	INDIRECT COSTS
1. Drugs	1. Travel cost
2. Lab tests	2. Extra food costs incurred when seeking treatment.
3. Consultation fees	3. Output loss during the time of seeking treatment.
	4. Reduced labour productivity due to infection.

4.5 COST IDENTIFICATION AND MEASUREMENT

(1) DIRECT COST

This is out of pocket payments made by households when seeking medical services to treat Schistosomiasis.

DRUGS:

Drug cost incurred by households to treat schistosomiasis. It is calculated as number of praziquantel doses consumed by a household member multiplied by price of a single dose.

LAB TEST:

This is the cost borne by households as a result of diagnostic tests performed to detect Schistosomiasis. It is calculated as total number of laboratory tests performed to a member multiplied by price paid for a single test.

PHYSICIAN FEES:

This is the payment made each time, household members consults physician. Thus, it is calculated as total number of consultations made in a year multiplied by price paid for one consultation.

(2) INDIRECT COST

These are costs borne by households but not directly related to treatment.

These costs are identified and estimated as follows:

FOOD:

This includes any extra food purchased(apart from normal household food consumption) when seeking treatment valued at market price.

TRAVEL COST:

This involves transport cost incurred by patients as well as accompanied member(s) of the household per trip per year. This cost is obtained through household interview as well as by observation whereby interviewer come across local transport. It is calculated as total number of trips made per year for all members, multiplied by fare paid for one trip.

OUTPUT LOSS DURING THE TIME OF SEEKING TREATMENT.

This is the opportunity cost of time spent seeking treatment at the health facility instead of taking part in productive activities. This is important because all schistosomiasis cases are diagnosed and treated at district hospital. This is imputed by multiplying the number of hours lost in a day by the shadow price of labour in the endemic area. This method of assigning market value of production lost as a result of morbidity, has been also adopted by Kamolratanakul, P and others (1993).

REDUCED LABOUR PRODUCTIVITY:

This is an indirect cost arises from incapacity of household members to work at their full capacity, as they are feeling unwell due to schistosomiasis infection. It is a difference of productivity between the time a household member is free from infection and when is infected. This productivity loss (units per day) is quantified in monetary term so as to obtain the value of the reduced productivity. Labour productivity index table provides an estimation of this.

DECLINE IN SCHOOL PERFORMANCE:

This is an indirect cost accrue to households in terms of lost education investment as well as lost future productivity of school children. Future productivity is discounted at present value to reflect

the lost investment, as the children in future will be working as semi skilled or unskilled workers.

4.6 COST EQUATIONS

4.6.1 DIRECT COST EQUATION:

Let i represent household members 1,2...n

Let n represent total number of household members in a particular household.

Let k represent households 1,2,....K

Let Dg_k represent drug cost for a dose of praziquantel, incurred by household members of household k.

Let Lt_k represent laboratory test charge for one laboratory test performed to household members of household k.

Let Cf_k represent consultation fee paid for one consultation sought by household members of household k.

Let Np_{ik} represent number of praziquantel doses consumed by household member i of household k.

Let Nt_{ik} represent number of laboratory tests performed to household member i of household k.

Let Nc_{ik} represent number of consultation visits made by household member i of household k

Let TDC_k represent total direct cost of household k

(1) Total drug cost for household k is:

$$TDg_k = Dg_k \sum_{i=1}^{n} Np_{ik} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 1$$

(2) Total laboratory test cost for household k is:

$$TLt_k = Lt_k \sum_{i=1}^{n} Nt_{ik} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 2$$

(3) Total cost of consultation fees for household k is:

$$Tcf_k = Cf_k \sum_{i=1}^{n} Nc_{ik} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 3$$

(4) Total direct cost for all households is:

$$TDC = \sum_{k=1}^{K} TDg_k + TLt_k + TCf_k \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad 4$$

4.6.2 INDIRECT COST EQUATION:

Let Fd_k represent food cost per trip incurred by household members of household k

Let Tr_k represent travel cost per trip as incurred by household members of household k

Let Hl_{ik} represent number of hours lost when seeking treatment for household member i of household k

Let Pr_k represent local pay rate per hour, for hours lost by household members of household k

Let Pl_{ik} represent units lost due to reduced labour productivity for household member i of household k.

Let Mp_k represent market price of one unit lost due to reduced productivity for household members of household k.

Let NT_{ik} represent number of trips made seeking treatment for household member i of household k.

Let Np_{ik} represents number of persons in one trip, who escorted household member i from household k to seek treatment at district hospital. (i.e. patient plus accompanied members).

(5) Total extra food cost for household k is:

$$TFd_k = Fd_k \sum_{i=1}^{n} (NT_{ik} Np_{ik}) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad 5$$

(6) Total travel cost for household k is:

$$TTr_k = Tr_k \sum_{i=1}^{n} (NT_{ik} Np_{ik}) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad 6$$

(7) The value of output loss during the time of seeking treatment for household k is:

$$VOL_k = Pr_k \sum_{i=1}^{n} (Hl_{ik}\ NT_{ik}\ Np_{ik}) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad 7$$

(8) The value of the units lost due to reduced productivity for household k is:

$$VRP_k = Mp_k \sum_{i=1}^{n} (Pl_{ik}) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 8$$

(9) Total indirect cost for all households is:

$$TIC = \sum_{k=1}^{K} (TFd_k + TTr_k + VOL_k + VRP_k) \quad \ldots\ldots\ldots\ldots\ldots \quad 9$$

(10) Economic cost equation for all households is:

$$TC = \sum_{k=1}^{K} (TDC_k + TIC_k) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 10$$

4.6.3 INTERPRETATION OF THE COST EQUATIONS

From these cost equations, it is noticed that due to the common feature of reinfection, for all treated Schistosomiasis cases then, the total cost of treating the disease is bigger. This is true because, treatment of current infection is the only coping mechanism available for these people living in endemic area at the moment, as there is no control measures for the disease.

However, equation 10 presents all the costs associated with schistosomiasis morbidity in an endemic area including the opportunity cost of time spent seeking treatment, opportunity cost of reduced productivity due to current infection and opportunity cost of complete absent from work when they have developed morbidity symptoms. Thus, this equation estimates total cost borne by households in the Schistosomiasis endemic area whereby there is no control programme.

How bigger is equation 10 depends on the variables such as value of output lost when seeking treatment(VOL_k), value of output units lost due to reduced productivity as a result of infection(VRP_k), number of persons accompanied with sick person to health facility

(Np_k), travel fare per person(Tr_k), laboratory test charge (TLt_k), and price of a single dose of praziquantel(an effective drug for Schistosomiasis treatment) indicated as Dg_k. If these cost components produced big figures they will make equation 10 more bigger and vice versa.

Thus, this equation tells health planners the magnitude of resources households in endemic area are spending so as to cope with the disease.