CHAPTER 5

LABOUR PRODUCTIVITY MEASUREMENT

5.1 PRODUCTIVITY CONCEPTS:

Productivity is the power to produce economic goods and services. Economists sometimes compare the current output of an economy, industry, factory, worker or machine with the theoretical possible output i.e. the output that would be produced under certain assumptions of change in the determinants of output.

In most discussions of productivity, however, the comparison is not of current output with theoretically possible output, but of current output with current input of resources. Of the several senses of "power to produce" then it is to the comparison of output with input - particularly ,the ratio of the one to the other - that the term, productivity is ordinally attached. The ratio of output to input in a particular time or place is further compared with corresponding ratio of another time or place.

The comparison is usually put in a relative form - output per worker, to yield an index of labour productivity. Further, productivity may be the relation between output and the input of one factor, all other input factors being kept constant as in an experiment under controlled conditions; or it may be relation between output and the input of one factor, with changes occurring in all other factors. Still further, productivity may be the relation between total output and input of a period, or it may be the relation between the increment in output associated with the addition of one unit of a given factor of production; that is, it may be average or marginal, Dunlop and Diatchenko (1964).

5.1.1 LABOUR PRODUCTIVITY CONCEPT:

Labour productivity is the sum of use values produced(products or material services)per worker employed in material production. It is always calculated with reference to some unit of time(hour, day, month or year). It comprises of the whole result of labour within a unit of time determined jointly by factors dependent on and independent of the worker. Thus, it also depends upon the degree of intensity of his work.

Labour productivity, is contingent , first of all, on the productive power of labour, that is the ability of labour to produce use values which can be considered normal at a given state of technique and organization. Labour's productive power is influenced by objective factors independent of individual workers, and particularly by :(1) The degree of mechanization and automation of labour (2)The level of organization of work, and especially of cooperation and specialization. (3)Natural resources used in production - the fertility of soil, the richness of deposits, and so forth.

Labour productivity depends not only on the productive power of labour determined by objective factors, but also on how these factors develop or how they are in fact used. It is also contingent on subjective factors relating to the worker himself. Thus, the subjective factors influencing labour productivity are:(1)The skill or qualification of the worker(2)The intensity of his effort in the process of labour, or the intensity of work. (3)The innate ability of the worker, that is his physical and mental energy, Dunlop and Diatchenko (1964).

5.1.2 Household production function:

It is determined by individual output, whereby the summation of individual household member's output gives household output. However, individual output depends on their labour productivity. For the purpose of this study, labour productivity of individual household members, depends on the following variables; Age(A) and Health status (H).

Dunlop and Diatchenko, (1964) argued that " productivity may be the relation between output and the input of one factor, all other input factors being kept constant as in an experiment under controlled conditions; or it may be relation between output and the input of one factor, with changes occurring in all other factors".

For this case, household labour productivity is being analyzed in relation to age,health status (variable inputs) while full capacity working hours of members per day are kept constant. The rationale for age and health status variables to be varying factors is that, over time some household members will be infected by Schistosomiasis, hence their capacity to work may decline and eventually, completely absent from work due to illness. This describes changes in their health

status. For the case of age, it is considered that household members in the age ranges between 15 - 60 have higher labour productivity compared to other age groups.

5.1.3 ASSUMPTIONS:

(i) By interviewing each household member, it is expected that these members will reveal their true amount of work they are able to pursue in situations when they are healthy, infected or have developed morbidity.

(ii) Household members in the same age group have the same productivity, but differs among other age groups.

(iii) The proportion of days household members will be either healthy, infected or had morbidity is uniformly distributed in each period of interview which entails an interim of six months.

(iv) There is no substitution or complementarity among household members in the husehold production function.

5.2 CONVERSION OF HOUSEHOLD PRODUCTIVITY INTO MONETARY VALUE.

Household members productivity are obtained through questionnaire in different units of measurement. In order to have a common unit of measurement, all output units are converted into monetary terms by using current market price of each product. However, in case of non market products such as the value of a household mother to perform domestic works, imputation method is applied. This means, we impute the value of work done by a household mother, by assigning value equal to the payment made for household attendants in the endemic area. In this way, all different outputs of household members are expressed in monetary terms by using local currency (Tanzanian shilling).

The following equation presents computational procedure:

$$\alpha_{ik}^{j}(A,H) = \sum_{d=1}^{D} (M_{ikd}^{j} \times P_d)$$

whereby:

α_{ik}^{j} = Productivity value of household member i from household K in period j, given his age and health status.

M_{ikd}^{j} = Productivity units of household member i of household K, from various products in period j.

P_d = Price of one unit of product d, which can be bags of rice, cotton bales, fish catch baskets, etc. The price is measured in Tanzanian currency (Tshs).

Total household productivity, of household k is defined by the following model:

$$\alpha_k^j\ (A, H,) = \sum_{i=1}^{n} \alpha_{ik}^j\ (A, H) \quad \ldots\ldots 1.$$

whereby:

α_k^j (A, H) = Total productivity value of household k, in period j given the ages and health status of its members.

A = Age

H = health status of household members.

5.3 ESTIMATION OF HOUSEHOLD MEMBER PRODUCTIVITY

It is given by the following model:

$$\bar{\alpha}^j\ (A, H) = \frac{\sum_{k=1}^{K} \sum_{i=1}^{n} \alpha_{ik}^j (A, H,)}{T} \quad \ldots\ldots 2.$$

whereby:

$\bar{\alpha}^j$ (A, H) = Productivity value(average) of household members at each age group and health status in period j.

α_{ik}^j(A, H) = Productivity value of household member i, from household k in period j given his age and health status.

n = household member 1,2,3,...n.
A = Age group of a household member.
H = Health status of a household member.
T = Total number of household members in particular age group considering all 384 households in the sample size.

5.4 DEFINITION OF THE DISEASE IMPACT ON HOUSEHOLD LABOUR PRODUCTIVITY.

In order to define the impact of the disease on household productivity, from equation (1), let H be broadly defined as:

H_y = healthy

H_i = infected

H_m = morbidity

5.4.1 HEALTHY MEMBERS:

These members are not affected with the disease, hence their productivity remains the same, assuming other factors are held constant.

5.4.2 INFECTED MEMBERS:

These members have incapacity to perform economic activities, but they can manage to work, although below their capacity.

5.4.3 MEMBERS WITH MORBIDITY:

These are seriously sick, thus they are completely absent from work.

Another variable in the model is the definition of AGE. It is broadly defined into five age groups namely:

00 - 06 years
07 - 10 years
11 - 14 years
15 - 59 years
> 60 years

5.5 LABOUR PRODUCTIVITY INDEX:

This reveals household members' capacity of work per day in three situations namely Healthy, infected and morbidity. When both age groups and health status of members are considered on determining the household productivity, the following table summarizes how Productivity index table will be presented.

Table 5.1 Designed Productivity Index Table in Period j

AGE GROUP	HEALTHY	INFECTED	MORBIDITY
00 - 06			
07 - 09			
10 - 14			
15 - 59			
> 60			

5.6 DEVELOPMENT OF LABOUR PRODUCTIVITY INDEX

The major assumption in the development of labour productivity index is that, household questionnaire will be able to provide sufficient information which reveals output value per household member under the changing health status. In this way each household will provide its total output value by summing up individual output values considering both their age group and health status.

The following table summarizes the data obtained through questionnaire hence, presenting single household output value for each age group. Figures are in thousands of Tanzanian shillings.

Table 5.2 Hypothetical Household Data (In '000' Tshs)

HOUSEHOLD NO.	AGE GROUP	HEALTH STATUS	HEALTH STATUS	HEALTH STATUS
		HEALTHY	INFECTED	MORBIDITY
1	00 - 06	0	0	0
	07 - 10	5	2	0.3
	11 - 14	46	24	6
	15 - 60	50	25	4
	> 60	10	4	0.9
2	00 - 06	0	0	0
	07 - 10	4	1	0.5

	11 - 14	25	10	3
	15 - 60	50	21	7
	> 60	35	16	4
3	00 - 06	0	0	0
	07 - 10	4	1	0.5
	11 - 14	37	20	5
	15 - 60	50	34	6
	> 60	30	12	0.2
4	00 - 06	0	0	0
	07 - 10	5	1	1
	11 - 14	40	20	2
	15 - 60	50	26	4
	> 60	25	12	2
5	00 - 06	0	0	0
	07 - 10	7	5	0.1
	11 - 14	37	16	2
	15 - 60	50	19	3
	> 60	25	21	0.6

Thus, in order to estimate individual household member output value under different health status taking into account all households in an endemic area, average output value is calculated for each age category and in respective of health status. It is a summation of all output values in that age group divide by number of household members in that age group for the entire sample.

Each health status situation, (healthy, infected and morbidity) will produce five output values for household member due to the fact that, they are five age groups. Therefore, average (mean) output value per

household member considering all households in an endemic area is calculated by applying the estimation model as presented in equation 2.

The output values per household member obtained under the three health status faced by households in each age group, signifies the productivity values as revealed by household members. If all these values are filled in the table with respect to age group and health status, we get the following productivity index table.

Table 5.3 Computed Productivity Index Table

(Figures in '000' Tshs)

AGE GROUP	HEALTHY	INFECTED	MORBIDITY
00 - 06	0	0	0
07 - 10	5	2	0.48
11 - 14	37	18	3.6
15 - 60	50	25	4.8
> 60	25	13	1.54
TOTAL PRODUC. PER DAY	117	58	10.42