

CHAPTER 4

RESEARCH METHODOLOGY

4.1 Research Design

The design of this study as a cross-sectional and descriptive in type and was conducted in the children ward of Narayanganj district hospital interviewing parents and children below 5 years of age. Parents were interviewed about the cost incurred by patient and accompanying parents, and also experience about knowledge, attitude and perception of rural health facilities. The intention of this study was to identify the cost incurred by patient and parents during treatment period and determine the satisfaction of parents towards rural health system.

4.2 Selection of Study Area:

For the purpose of administration the Government of Bangladesh divided the whole country into 6 (six) Divisions and 64 (sixty four) Districts. Among the Districts of Bangladesh, Narayanganj is one of the less developed district in terms of literacy, income, earning source and so on. In terms of mortality and morbidity the situation of Narayanganj is not so satisfactory compared to other district. Narayanganj is the door way to the Dhaka city. Out of the problem of Narayanganj migration from other district to the city of Bangladesh is an important problem. Beside that Narayanganj district has got its own problem as well in terms of Diarrhoeal incidence and mortality, which are evident from different statistical report of Bangladesh. Considering the above mentioned reasons the study area was selected.

Profile of Study Area (Narayanganj District):

General Information (Geography): Narayanganj district has a total area of 759 square kilometers, it is located almost central part of the country and adjacent to the capital city.(See figure 3.3)

Population: The population is 1,824,494 ; out of which 80.36% in living in rural areas and 19.64% are living in urban areas. Total household is 334,460. The percentage of children under 5 years of age are 23% in rural areas and 21% in urban areas with an annual growth rate of population is approximately 2.36%.

Local Administration:

Number of Thana	5
Number of Union	49
Number of Villages	1505

Economic Situation : Major Occupation are agriculture and labor, average annual income Taka 7,000.00 (4375 Baht) per person in rural

areas and Taka 15,000.00 (9375 Baht) per person in urban areas.

Health Statistics: In 1993, Infant mortality rate (IMR) 113 per thousand Number of Diarrhoea case was 2145 per year (Unpublished report of Health information Unit, 1993).

4.3 Research Instrument

For the purpose of data collection structured questionnaires containing both closed and open ended questions was used. The questionnaire consisting of three parts, the first part contained general information to patient and accompanying parents, such as age, sex, occupation, education and average income per month to assess socio-economic demographic condition of parents, the second part of the questionnaire contained questions about cost incurred by patient and as well as parents during treatment period in the hospital, the third part of the questionnaire contained questions on the attitude, knowledge and perception about rural health care system, initially the questionnaire was constructed in English and then it was translated into Bangla.

4.4 Study population

The population under this study are the parents of children below 5 years of age, admitted into the district hospital with diarrhoeal diseases. It was supposed that children of this category had diarrhoea more than 3 days. It was expected that this group of population could provide the necessary information as the desire of the study.

1. Exclusion criteria:

- a) Children with Congenital Heart Disease, T.B .
- b) Children > 5 years old.
- c) Refer from local hospital.

2. Inclusion criteria:

- a) Children < 5 years old.
- b) Diarrhoea > 3 days old.

4.5 Sampling method:

Sample was purposively selected from the parents of all the children below 5 years of age having diarrhoea more than 3 days and admitted into the inpatient department of Narayanganj district hospital during the period of March 1 to March 23, 1995, and were interviewed by using structured individual questionnaire.

The sample consisted of 100 purposively selected urban (20) and rural (80) who were attend the Narayanganj District Hospital with their

diseased diarrhoeal children. A structured survey questionnaire was administered in face to face interview during the discharge period. The questions were retrospective, respondents were asked to recall events and experience about rural health care facilities. The problem of respondents was inability to recall accurately past events and minor illness was also an inherent weakness of the survey method. In order to minimize this source of error, respondents were asked about illness utilization which had occurred within six months prior to the interview.

4.6 Methods for Costing:

Costing is a big part of the modeling. There are methods responding to the question "How cost are measured" and methods responding to the question "How to calculate costs" (Keawsonthi et al 1986; 1988; 1989). The costs are basically calculated as the sum of all the inputs used. The cost of each input is simply calculated as the unit cost of that input multiplied by the number of units used. For financial costs, inputs are always valued at the price paid for them. With economic costs, inputs are valued in terms of their opportunity cost value, the value in money of time.

4.7 Measurement of Cost Incurred by Patient and Relatives.

Cost Models:

Models on the cost to be incurred between local and non-local patients and parent in District Hospitals are formulated from the framework.

Non-local (Rural) people in this study is defined, those who are living at a radius of more than 5 kilometers away from the central place of the District headquarter.

Definition of variables and abbreviation:

BC _j	= Bed cost of individual 'j'
BC _T	= Total bed cost
BC _A	= Average bed cost
DC _j	= Drug cost of individual 'j'
DC _T	= Total drug cost
DC _A	= Average drug cost
LC _j	= Laboratory cost of individual 'j'
LC _T	= Total laboratory cost
LC _A	= Average laboratory cost
FC _j	= Food cost of individual 'j'
FC _T	= Total food cost
FC _A	= Average food cost
TC _j	= Travel cost of individual 'j' in Kilometer
TC _T	= Total travel cost
TC _A	= Average travel cost

WL_j = Wage lost of individual 'j'
 WL_T = Total wage loss
 WL_A = Average wage lost
 DY_j = Daily income of individual 'j'
 LS_j = Length of stay of individual 'j'

Total Cost (TC) = Total provider cost + Total consumer cost

This study has only calculated the total and average cost of the consumer. The total consumer cost including (patient and parents) are as follows:

$$TC_c = BC + DC + LC + FC + TC + WL$$

where, TC_c = Total consumer cost

BC = Bed cost
 DC = Drug cost
 LC = Laboratory cost
 FC = Food cost
 TC = Transport cost
 WL = Wage lost

Average consumer cost (AC_c)= Total consumer cost divided by total number of patient treated at the District hospital.

$\text{Average cost consumer} = \frac{TC_c}{TQ}$
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TC_c = Total cost of all consumer(the sum of the total cost of each consumer)

TQ = Total number of patient treated

Method of calculation of cost:

Individual bed cost (BC_j): Individual bed cost was calculated by using revenue per bed multiplied by the length of stay in the hospital.

$$BC_j = (BR * LS_j) \dots\dots\dots(1)$$

where, BC_j = Individual bed cost
 LS_j = Individual length of stay
 BR = Revenue per bed

Total bed cost was calculated by summing up all individual bed cost.

$$BC = \sum_{j=1}^N (BC_j)$$

Average bed cost is equal to total bed cost divided by the number of samples.

$$BC_k = BC / N$$

Individual drug cost 'j'(DC_j): Individual drug cost was calculated by the item of the drugs multiplied by unit of the drugs multiplied by the market price.

$$DC_j = \sum_{i=1}^k (PD_i * U_{ij}) \dots\dots\dots(2)$$

Where, i = Item of the drug 'i'

U_{ij} = Unit of the drug 'i' consumed by individual 'j'

PD_i = Unit cost of drug 'i'

k = The number of types of drug

Total drug cost was calculated by summing all individual drug cost.

$$DC_c = \sum_{j=1}^N (DC_j)$$

where, DC_j = Drug cost of of individual

Average drug cost is equal to total drug cost divided by the number of samples.

$$DC_k = DC_c / N$$

where, N = Total number of patients

Individual laboratory cost 'j'(LC_j): The total Laboratory cost for an individual 'j' was calculated by multiplying the unit cost for each laboratory test by the number of test of each investigation.

$$LC_j = \sum_{i=1}^L (PL_i * U_{ij}) \dots\dots\dots(3)$$

Where,

L = The number of types of laboratory test

i = Item of investigation 'i'

U_{ij} = Unit of investigation 'i' consumed by individual 'j'

PL_i = Unit cost of invesgation 'i'

Total laboratory cost was calculated by summing up all individual laboratory cost.

$$LC_t = \sum_{j=1}^N (LC_j)$$

Average laboratory cost is equal to total cost incurred by the patients by the number of patients.

$$LC_a = LC_t / N$$

Individual food cost 'j' (FC_j) = Food cost of the patient + Food cost of the attendants.

Total food cost was calculated by summing up all individual food cost.

$$FC_t = \sum_{j=1}^N (FC_j) \dots\dots\dots(4)$$

Average food cost is equal to total food cost divided by the total number of patients.

$$FC_a = FC_t / N$$

Individual travel cost 'j' TC_j = The actual total expenditure on travel to the hospital was obtained for each patient and an average was calculated and expressed as cost on travel per patient during their stay at hospital.

Total travel cost was calculated by summing all individual travel cost.

$$TC_t = \sum_{j=1}^N (TC_j) \dots\dots\dots(5)$$

Average travel cost;

$$TC_a = TC_t / N \quad (\text{Total number of patient})$$

Individual Wage lost (WL_j): For individual wage lost was calculated by taking daily average income X Length of stay in the hospital.

$$WL_j = DY_j * LS_j \dots\dots\dots(6)$$

$$\text{Total wage lost } WL_t = \sum_{j=1}^N (WL_j)$$

Average wage lost is equal to total wage lost divided by the total number of attendants.

$$WL_A = Wl, / N$$

Wage loss for those who has no job is assumed to be same.

(All cost data are attached on Appendix 2.)

4.8 Method for measurement of satisfaction:

The variables selected for analyzing the satisfaction of the respondents about rural health care facilities, and scoring procedures used in this paper were as follows:

For yes = 1
for no = 0

The response to each of the questions were coded in a two point scale (0-1). The variables used to evaluate the quantity of care includes laboratory facilities Q1, quality of drugs Q2, availability of personal Q3, availability of drugs Q4, waiting time to see a doctor Q5, relation between doctors and patients Q6, diagnosis and treatment Q7 (see questionnaire in appendix, part III).

About services the variables includes nursing services S1, quality of the foods and service of the foods S2 and other auxiliary services S3 (please refer questionnaire in appendix 2, part III).

About accessibility the variables includes distance A1, travelling time to the health complex A2, waiting time to get a doctor A3.

Satisfaction index:

An overall satisfaction score was computed by summing the mean ratings for those variables among the 11 questions that related to each of the following variables 1. quality of care, 2. accessibility of routine care, 3. service facilities. The same variables was used to measures the satisfaction about Health center, Health complex and District hospital. In this study satisfaction score was computed from Health center, Health complex and the District hospital separately. In health center six questions (question nos. 23.1-23.6, appendix 1, part III) are related to those selected variable to measure overall satisfaction. The individual satisfaction index was calculated by using the following formula:

For yes = 1
for No = 0
No response = NA (No value and not included for calculating satisfaction)

$$I_j = \frac{\sum_{i=1}^6 S_i}{TA}$$

Where I_j = Index health center.

i = Number of criteria 1-6

S_i = Satisfaction index.

TA = Total (Positive or Negative) patient answer.

In Health center only 43 number of respondents satisfied about the Health care facilities in Health center (N= 43). Over all group satisfaction index of Health center was:

$$I_{ic} = \frac{\sum_{j=1}^N I_j}{N}$$

Where,

n = Number of individual

j = Individual

N = Total number of patients who answer

Over all satisfaction of Thana health complex and District hospital was calculated by using the same formula. The grading of satisfaction came from the index, the mean value of index centered around 0.5, so, the grading of score was as follows,

<0.4 = low level of satisfaction.

0.4 to 0.6 medium level of satisfaction.

>0.6 = high level of satisfaction.

Analysis was done to find out the percentage and mean of satisfaction both in Health center, Health complex, and District hospital. Finally cross tabulation was used to see a relationship between satisfaction level with occupation and education of respondents.

4.9 Sample Size Determination:

The size of the sample for this study determined by adopting the standard formula which is as follows:

$$n = \frac{Z^2 \times (p \times q)}{d^2}$$

Where, n = Estimated sample size.

Z = Degree of confidence (at 95% confidence level).

p = User rate of rural population

q = 1-p

d = Acceptable error.

Here,

P = 0.5

q = 0.5

Z = 2

d = 0.1

Therefore,

$$n = \frac{Z^2 \times (0.5) \times (0.5)}{(0.1)^2}$$

$$= 100$$

So the determined sample size is approximately 100. Although the estimated sample size was 100, but it was supposed to be too small, it was decided to 120. But while collecting data it was not possible to collect 120, some of questionnaire were incomplete. So finally 100 questionnaires were analyzed.

4.10 Method of Data Collection:

A questionnaire were prepared both in English and Bangla. Interviewers were selected from the brothers working in the same hospital who had good knowledge both in English and Bangla. The interviewers were given an orientation on how to interview and how to fill up the questionnaire. Pretesting of the questionnaire was done and accordingly some changes were made afterwards before starting data collection to ascertain it,s content validity.

4.11 Statistical Analysis

After the completion of data collection editing and coding were done following the coding instructions. Appropriate statistical tests were used to find the relationship. Chi- square statistical test were used to determine the association between satisfaction and different variables included in the study.

1. Chi-square test:

Chi-square test offers an alternate method of testing the significance of difference between two proportions. It's another advantage is that, it can also be used when more than two groups are to be compared. Use of the Chi-square distribution is to test the null hypothesis that two criteria of classification, when applied to the same set of entities, are independent.

The classification according to two criteria of a set of entities like people can be shown by a table in which the "r" rows represents the various levels of one criterion of classification and the "c" columns represents the various levels of other criterion. Such a table generally called contingency (2 x 2) table. In the view of testing the null hypothesis that in the population the two criteria of classification are independent.

If the computed value of Chi-square is equal to or larger than the tabulated value of Chi-square for at a level of significance, the null hypothesis is rejected. Thus, the two criteria are not independent. The Chi square can be calculated as follows

$$\text{Chi-square} = \sum_i \sum_j \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where, i = Row i
j = Column j

O_{ij} = Observed frequency of a cell in row i and column j

E_{ij} = Expected frequency of a cell in row i and column j

Example; Chi-square test is done to see the satisfaction between rural and urban people in relation to convenient location.

Observed value comes from the study and the expected value of 'i' was calculated by:

$$E_{ij} = \frac{\text{Total of row } i \times \text{Total of column } j}{\text{Grand Total}}$$

Data available to the researcher are the satisfaction level made on one sample each from rural and urban patient. 7 rural patient are satisfied about convenient location out of 80 sample, at the same time 20 urban people are satisfied out of 20 sample from that point. (Data comes from table 6.4, variable 1).

	Satisfied		Non-satisfied		Total
	Obs.	Exp.	Obs.	Exp.	
Rural	7	21.6	73	58.4	80
Urban	20	5.4	00	14.6	20
Total	27		73		100

The sample are considered to represent the population at large.

Hypothesis:

H_0 : There is no difference between the satisfaction level of rural and urban people in relation to convenient location.

H_1 : There is difference between satisfaction level of rural and urban people in relation to convenient location.

Expected value of cell 1 can be calculated by multiplying two marginal value divided by number grand total.

Therefore,

$$\begin{aligned} X^2 &= \frac{(7 - 21.6)^2}{21.6} + \frac{(73 - 58.4)^2}{58.4} + \frac{(20 - 5.4)^2}{5.4} + \frac{(0 - 14.6)^2}{14.6} \\ &= 9.87 + 3.65 + 39.47 + 14.6 \\ &= 67.59 \end{aligned}$$

The quantity will be small if the observed and expected frequencies are close together, and will be large if the difference is large. The computed value of Chi-square is compared with the tabulated value of Chi-square with $(R-1)(C-1)$ degree of freedom. In this example, R and C are equal to 2. The degree of freedom is $1 \times 1 = 1$. Null hypothesis is reject if computed chi-square value is greater than or equal to the tabulated Chi-square for the alpha value 0.05.

In this examples, the calculated Chi-square (67.59) is significantly larger than the tabulated Chi-square (3.84) at 1 degree of freedom for alpha 0.05. Therefore, the null hypothesis is rejected and accept the alternative hypothesis. So, there is statistical difference of satisfaction of rural and urban respondents.

Similarly, this test will be applied to test the null hypothesis that there is statistical difference between satisfaction of group of respondents as classified by other conditions such as occupation, education and income. This will be discussed in chapter 6

2. t- Test:

t- Test was done to see the difference of cost between urban and rural people.

Hypothesis: Analysis of Cost between Rural and Urban

If,

u_1 = Cost of urban people

u_2 = Cost of rural people

Null hypothesis: There is no difference between the costs incurred by the rural patients and urban patients.

$$H^0: u_1 = u_2 = 0$$

Alternative hypothesis: There is a difference between the rural patients and urban patients.

$$H^1: u_1 \neq u_2$$

Assumptions: The sampling distribution of the means approximately close to the normal distribution.

Formula: $t = \frac{\bar{X}_1 - \bar{X}_2}{\text{Sq. rt} \left[\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2} \right]}$ (Freund, 1970)

Where, \bar{X}_1 = Mean of urban cost.

\bar{X}_2 = Mean of rural cost.

S_1^2 = Standard deviation of urban cost.

S_2^2 = Standard deviation of rural cost.

N_1 = Number of urban sample.

N_2 = Number of rural sample.;

Therefore,

$$t = \frac{1451.50 - 2025.29}{\sqrt{\frac{(401.85)^2}{20} + \frac{(860.00)^2}{20}}}$$

$t = 3.39$

The computed value (3.39) exceeded the tabulated value (1.68) at df 38 and significance level at 0.05. Therefore we cannot accept null hypothesis. Thus reject H_0 : and H_a was accepted. There was statistically significant difference between the cost incurred by the rural patient and urban patient.