Revenue and Expenditure Patterns of A Tertiary Hospital: Case Study of BIRDEM, Dhaka.

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HEP Working Paper # 01-98

CENTRE
FOR HEALTH AND
POPULATION RESEARCH

Print
Parallel Printers, Dhaka

ISBN 984-551-147-3

HEP WP # 01
ICDDR,B WP # 108

Publisher

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Acknowledgments

Health Economics Programme, Public Health Sciences Division, was created in December 1996 with financial support from Department for International Development (DFID), United Kingdom. We are grateful to Dr. Fasih Uddin Mahtab, Secretary General of Diabetic Association of Bangladesh, for providing the revenue and expenditure data of BIRDEM hospital for the analysis.

This research was supported by DFID, UK and the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). The ICDDR,B is supported by countries and agencies which share its concern for the health problems of developing countries. Current donors include: the aid agencies of the governments of Australia, Bangladesh, Belgium, Canada, Japan, the Netherlands, Norway, Saudi Arabia, Sweden, Switzerland, the United Kingdom and the United States; international organizations including Arab Gulf Fund, European Union, International Atomic Energy Centre, International Development Research Centre (IDRC), Save the Children-USA, the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), and the World Health Organization (WHO); private foundations including Aga Khan Foundation, Child Health Foundation (CHF), Ford Foundation, Population Council, Rockefeller Foundation, Thrasher Research Fund, and the George Mason Foundation; and private organizations including Helen Keller International, the Johns Hopkins University, Karolinska Institute, Logborough University, National Institutes of Health, New England Medical Centre, Northfield Laboratories Ltd., Procter & Gamble, RAND Corporation, Swiss Red Cross, the University of Alabama at Birmingham, University of Pennsylvania, UCB Osmotics Ltd., Wander A.G. and others.

Abstract

The purpose of this research is to illustrate the use of routinely collected revenue and expenditure data of hospitals to understand the time trend and seasonality of the variables. The time series can also be used to predict expected levels of revenue and expenditure in the future. Using BIRDEM hospital data, the analysis indicates that the hospital usually earn relatively higher revenue during November to March compared to other months of the year. The moving average (MA) of revenue appears to follow an exponentially increasing function. Total expenditure of the hospital also increased over the years but at a lower rate than the revenue narrowing the size of the deficit in recent years. Expenditure levels show month-to-month variations but there was no clearly identifiable high expenditure season. If the current trend of revenue and expenditure continue in the future, the hospital should be able to achieve break-even position by the first half of 1998. The major sources of revenue for the hospital were outpatient and diagnostic service charges while personnel costs and purchase of insulin accounted for two-thirds of total expenditure of the hospital in 1996. Capital expenditure increases the occupancy of hospital beds, revenue earned and expenditure. However, marginal revenue due to capital expenditure exceeds the marginal costs implying that the hospital will be able to improve its net revenue by increasing bed census and by adding new lines of activities.

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1. Introduction

Private hospitals in Bangladesh are expanding at a rapid pace. Within the last five years, at least 300 hospitals were added in the private sector (Khan, 1996). However, no systematic analysis has been carried out to understand the flow of financial resources and its implications on hospital revenue and profitability. Acute care hospital services, which often do not create any additional social benefits beyond patient-specific benefits, should not be subsidized in the long run. Therefore, both public and private hospitals must generate their own resources to provide care to the population. Moreover, the Government of Bangladesh has agreed to implement the provision of an essential health package during the next five years (1998-2003). The higher emphasis placed on primary level care and preventive-services are likely to reduce resource availability in the hospital sector (MOHFW, 1997).

This case study analyzes the major revenue earning sources and expenditure catgories of a tertiary hospital in Bangladesh. The comparative revenue and expenditure series based on the Management Information System (MIS) data will show the overall financial situation of a hospital. This study illustrates the possible use of simple MIS data for understanding the economic performance of hospitals and how to use the information to predict the level and duration of subsidy required for attaining the break-even point. The time series information can also be used to predict the expected revenue and expenditure situation.

2. Objective

The main objective of this study is to carryout a simple time series analysis of revenue and expenditure data collected by the Management Information System of a tertiary hospital in Dhaka. The analysis will examine the time trend of the revenue-expenditure categories. The time trend, if combined with the quality of services provided, can indicate relative efficiency or inefficiency of the hospital over the years if the inflation rates remain more or less constant. The trend can also be used to predict the expected levels of revenue and expenditure in the future.

The revenue-expenditure series of a large tertiary hospital are not representative of the hospital sector financial situation in general. Moreover, the hospital we have chosen, the BIRDEM hospital, is quite unique in the sense that one important component of its cost is diabetes related. The purpose of this research is to illustrate the possible use of regularly collected hospital data for understanding hospital's financial performance.

3. The BIRDEM Hospital

The Diabetic Association of Bangladesh (DAB) executes a comprehensive diabetic health programme through its central institute called the *Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders* (**BIRDEM**). The Association started an outpatient clinic in 1957 at Segun Bagicha, Dhaka, which gradually evolved into a large tertiary hospital. Over the years, the clinic has turned into a diabetes care and research complex which, after the demise of its founder Prof. M Ibrahim in 1989, has been renamed as the Ibrahim Memorial Diabetes Centre.

Now, the institute is housed in two buildings. One of these will be expanded to house a modern sophisticated cardiac centre. All the 539 beds are located in a 15-storied building. Almost all required departments for running a general hospital exists in BIRDEM. The indoor and outdoor facilities of BIRDEM provides care to both diabetic and non-diabetic patients (For details about the DAB and BIRDEM, Annual Report of Diabetic Association of Bangladesh, 1996-97).

The prevalence of diabetes is likely to increase rapidly in Bangladesh and it is estimated that more than 4 million suffer from diabetes. To cope with this threat the institute has emphasized to establish branch in different locations. Presently, it has 39 branches distributed all over Bangladesh. Despite the efforts of DAB, the hospital and the branches are currently taking care of only 10% of the estimated diabetic patients in the country (Annual Report, Diabetic Association of Bangladesh, 1996-97).

In 1982 BIRDEM was designated as the WHO Collaborating Centre for developing community oriented programme for diabetes prevention and control. It is the first of its kind outside Europe.

The DAB is a nonprofit voluntary socio-medical service organization. It treats 16 hundred diabetic patients in BIRDEM everyday. While the number covering the country for each day is 25 thousand patients. (The Daily Star, January 16, 1998).

The BIRDEM hospital's outdoor department provides care to 58316 patients in a month and during the last one year 19,428 patients were treated in the inpatient departments of the hospital. The hospital employs 862 physicians for patient care and research (Health Economics Unit, BIRDEM).

4. Methodology

The data for the analysis came from the MIS of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM). Three sets of time series data were provided. The first set consists of revenue earned by BIRDEM

hospital categorized into 23 revenue-earning items. The monthly information on revenue covered the period from July 1991 to June 1997. However, not all revenue categories are available for the whole period. For example, "blood bank" as a source of revenue was introduced in January 1994.

The second set of data is on monthly expenditure of the hospital by 21 expenditure categories. One category, capital expenditure, was excluded from the analysis of expenditure behavior. Capital expenditure basically represents increase in the 'stock' of capital and so, strictly speaking, it is not a flow of expenditure. Inclusion of capital expenditure will bias the overall trend observed. Moreover, capital expenditure affects future earning capacity and should be analyzed separately.

The method followed by the research is to correct the time series for month-to-month random and seasonal variability. Using the deseasonalized time series data, trend lines were estimated to derive the expected revenue and expenditure over the different months of the year. The seasonal pattern of the revenue and expenditure were also estimated assuming a multiplicative trend and seasonality components. A time series consists of three components: trend (t), seasonality (s) and irregular changes (i). The multiplicative model of time series (X_t) assumes that

$$X_t = t.s.i$$

Therefore, if one component is derived, the X_t can be divided by the component to obtain the series, which is independent of the component. For example, if we know the series 't', dividing X_t by t provides us a new series which includes the effects of 's' and 'i' only.

The trend lines were used for predicting the revenue and expenditure levels to identify the expected year and month when expenditure should become equal to the revenue earned for the hospital.

Quite large month-to-month fluctuations were observed in revenue and expenditure series for the period considered. To smooth-out this seasonal fluctuations, 12-month moving average (MA) for both revenue and expenditure were considered.

The 12-month MA series of revenue shows a positive exponential pattern. Since, the exponentially increasing trend can be best represented by a logarithmic model, we have predicted the monthly revenue for the next two years from January 1997 using the following model:

$$R = a+bt$$

Where, R = natural log(ln) of 12 month moving average of revenue
a = regression intercept
b = regression coefficient
t = time(1,2,3,.....) with January of 1992 as 1.

The steps followed are listed below:

Step1: Convert 12-month MA of revenue into natural logarithm

Step 2: Run a regression model with log of MA series as dependent and time 't' as independent variable.

Step 3: Using this estimated regression coefficients, predict the Y values for the next 24 months from January 1997 by substituting new numbers for t in the equation.

Step 4: Take exponential value of these predicted log values to get the monthly revenue for January 1997 to December 1999.

On the other hand, 12-month MA of expenses over the period shows an S-shaped pattern. To fit the S-shaped curve we have considered the logit transformation of expenditure. The steps followed are presented below:

Step 1: A simple regression was estimated to see the pattern of monthly expenditure, considering time as independent variable and 12 month moving average of expenditure as dependent variable. Note that, linear model will overestimate the predicted values of E for future months.

$$E = c + dt$$

where, E = 12 month moving average of monthly total expenditure
c = regression intercept
d = regression co-efficient
t = time (1,2,3,.....) with January of 1993 as 1.

Step 2: Using the above linear model, monthly expenditure for the 72th month (after 24 months from January 1997) was predicted by putting t=72 in the previous equation. Since the MA series is actually S-shaped, the linear model will overestimate expenditures for future months. Therefore, the predictions from the linear model can be used to define the upper-limit values. Using this relatively high value of E, we calculated the proportion (P_i) for each month dividing the 12-month MA by the estimated 72^{th} month expenditure.

Step 3: Using the estimated P_i values the following values were calculated for each of the observations: $[\ln\{P_i/(1-P_i)\}]$.

Step 4: A simple regression was fitted considering these calculated log-odds as dependent variable and time as independent variable. Using this model we predicted the possible log-odds for the next 24 months (i.e., up to December 1999).

Step 5: The log-odds were converted back into monthly total expenditure (i.e. E in step 1).

The third set of data obtained from the BIRDEM hospital is the bed utilization information of the hospital. Bed occupancy data for the hospital are available for the period January 1994 to June 1997. In the analysis, attempts have been made to examine the impact of changing bed occupancy on revenue of the hospital for the period January 1994 to June 1997.

To examine the capital expenditure and revenue relationship, the methodology followed is to estimate a regression equation with revenue as dependent variable. Capital expenditure should increase quantity and quality of services provided and introduce new lines of hospital activities. However, a lag is expected between capital expenditure and its subsequent impact on revenue. The statistical models should allow for the lag to exist. Empirical method followed was to allow lag to vary from one month to four months to identify the best empirical model.

5. Hospital Revenue

The BIRDEM hospital reports its revenue earning under 23 heads. The items are: hospital seat rent, hospital other recipient, service charge collected in dermatology department, radiology, ophthalmology, cardiology, dental, ultrasonogram, physiotherapy, surgical charges, General laboratory (G. Lab.), C.T.scan., microbiology, immunology, Endocrine and Metabolism (E&M), endoscopy, Endoscopic Retrograde Cholangio-Pancreatography (ERCP) and gynae, charges of Operation Theatre (O.T.), laperoscopy, sales of insulin, medicine & others, blood bank and others. One clarification might be useful here that BIRDEM charges a fixed consultation fee for specialist physician irrespective of department or specialty. In BIRDEM's list, these charges are listed as service charges.

The BIRDEM hospital also receives governmental subsidy on a regular basis. The annual report of Diabetic Association of Bangladesh (DAB) 1996-97, listed the yearly total of governmental grants from 1991 to 1997. Since our calculations are based on monthly data, we have converted the total yearly grant into per month subsidy, assuming that the grant is distributed equally over the 12 months of a year. The monthly subsidy becomes Tk. 2.1 million for 1991-92, Tk. 2.8 million for 1992-93, Tk. 4.0 million for 1993-94, Tk.5.0 million for 1994-95, Tk. 6.3 million for 1995-96 and Tk. 6.3 million for 1996-97. Clearly, the BIRDEM hospital has experienced an increasing trend in the grant money received from the government of Bangladesh over the last few years though it remained identical in recent years.

I) Total Revenue

We have considered two major sources of revenue for BIRDEM. These are revenue earned by BIRDEM activities and governmental grant. Total revenue of BIRDEM from all sources in Table 1.

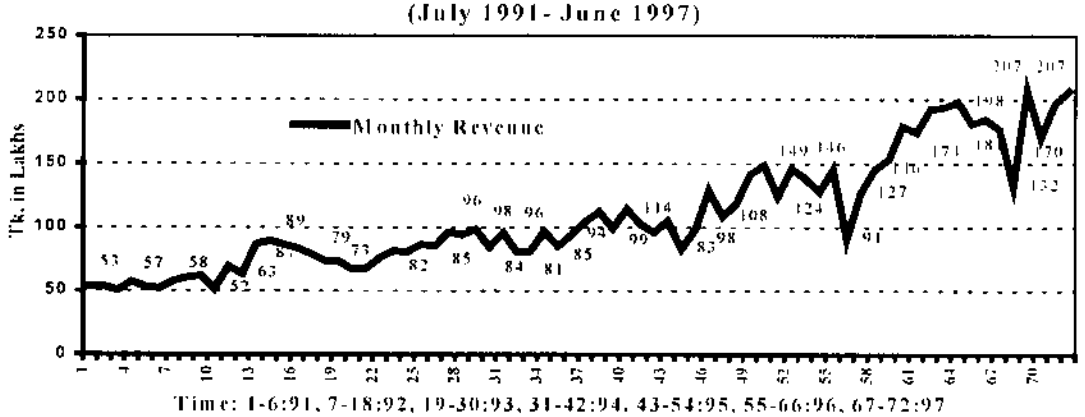
Note from the table that total revenue of the hospital during the six years under considerations increased by more than 200 percent. In 1996-97, the revenue

Table 1:Revenue Receipt of BIRDEM Hospital, Dhaka, 1991-97 (in million Tk.)

Year	Revenue earned	Govt. Subsidy	Total revenue	Revenue earned as % of total revenue	Govt. Subsidy as % of total revenue
1991-92	68.2	25.3	93.6	72.9	27.1
1992-93	94.4	34.1	128.5	73.4	26.6
1993-94	107.8	47.7	155.5	69.3	30.7
1994-95	127.0	60.1	187.1	67.9	32.1
1995-96	166.7	75.1	241.8	69.0	31.0
1996-97	221.1	75.0	296.1	74.7	25.3

earned by the hospital increased to Tk.221.1 million from only Tk.68.2 million in 1991-92. Note that in 1996-97, revenue earned from own sources reached about 75% of total hospital revenue. Given the trend in the revenue generated from own sources, it is likely that BIRDEM will be able to reduce its dependency on GOB funds further in the future.

Figure 1: Monthly Revenue earned by BIRDEM (July 1991- June 1997)



Monthly total revenue from all sources, excepting the GOB grant is shown in Figure 1. The figure shows that over the period July '91 to June '97, the lowest revenue earned by the hospital was Tk.5.0 million in September '91 and the highest revenue was 20.7 million in March and June '97. It should be mentioned here that the numbers are not corrected for the rate of inflation. The prediction may become biased if unusual change in prices affect the trend. There are substantial irregular fluctuations of total monthly revenue over the period. However, the figure indicates that the variability has become higher with longer amplitudes in recent months. The fluctuations are especially pronounced since January 1996. Two major deviations are clear from the diagram. One happened in Jan '96, when the revenue declined by 37.2% compared to the previous month and became 9.1 million in Feb '96 from 14.5 million in Jan '96. The variations in monthly observations remained high for next 10 months. In the second phase, the monthly total revenue experienced a big jump in January 1997. Only within a month the observation declined by 25%, from 17.6 million in January '97 to13.2 million in February '97. Interestingly monthly revenue rose significantly in the next month i.e., in March from the previous month. In March it reached the apex of the monthly revenue observations reaching 20.7 million taka.

II) Seasonal Variation of Revenue

The revenue earned by the hospital shows quite large fluctuations over the months. Although, the revenue earnings show an upward trend in general the amplitude of the fluctuations also changed implying that seasonal pattern of revenue earnings may have changed over the years as well. However, we can still approximate the seasonal pattern of revenue earning by carefully examining the month-to-month variations. By assuming a multiplicative form of time-series components, we have estimated the seasonality index for each month after factoring out the effect of trend and irregular variations. The method followed is summarized below.

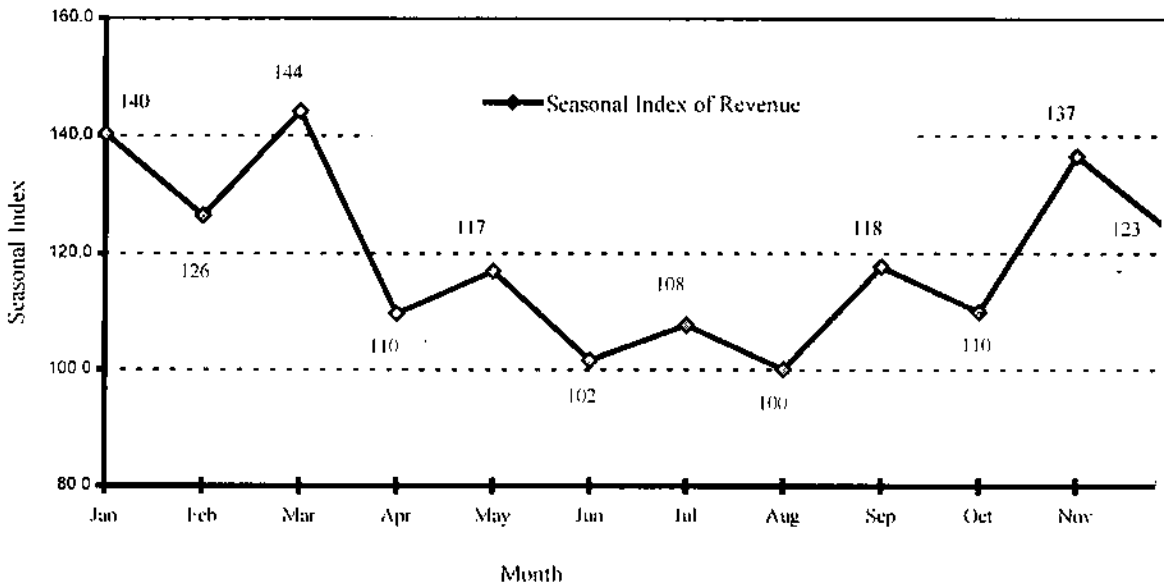
If X_t represents the time series, the components are related to X in the following manner

$$X_t = t_t.s_t.i_t$$

A twelve-month moving average of X_t provides us the value of t_t, the trend. Dividing X_t by t_t gives us a series, which represents the multiplication of the seasonality and irregularity components i.e., $s_t.i_t$. Averaging out of $s_t.i_t$ for each month over seven years provides the approximate values of s_t.

Figure 2 shows the seasonal variability of revenue earnings for BIRDEM. The graph shows that BIRDEM earns lowest revenue in August while it is highest in March. The second highest revenue-earning month in general, was January. Note that November to March is usually high revenue earning months in a year.

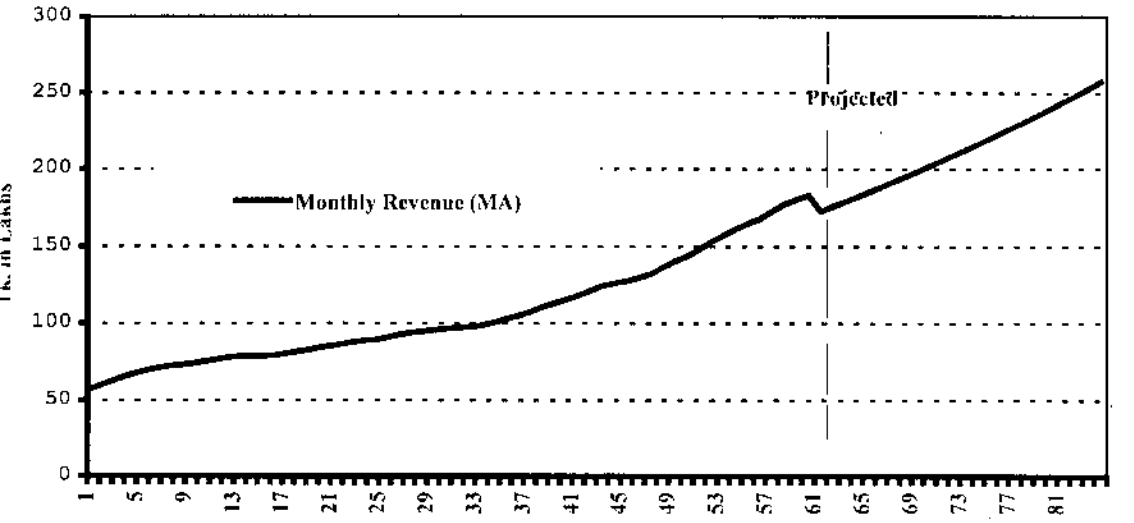
Figure 2: Seasonal Index of Monthly Revenue of BIRDEM (July 1991-June 1997)



III) Moving Average (MA) of Revenue

The 12 months moving average (Figure 3) of revenue shows an increasing trend over the period 1991-1997. Figure 3 shows that the MA of revenue approximates an exponentially increasing function. Although, revenue earning cannot continue an exponential rate of growth in the long run, we have assumed that the growth path will remain exponential for the next two years. For empirical estimation of the pattern, we have considered logarithmic transformation of revenue earned in a month as dependent variable. The regression line was estimated using the model mentioned in the methodology section.

Figure 3: Moving Average(MA) of Monthly Revenue of BIRDEM (January 1992-December 1998)



IV) Predicted Revenue

The actual revenue levels show significant ups and downs due to irregular, seasonal and trend components. Therefore, the analysis should examine the time-series by taking the irregular and seasonal effects out so that we can focus on the long-term trend observable. In doing so, the time-series was converted into a 12-month moving average series. The 12-month MA process ensured that all seasonal effects are taken out. This process also takes out the irregular variations. The 12 MA series is shown in Figure 3.

Using the estimated regression function, we have predicted the monthly revenue values for the period January 1997 to December 1999. A discrete jump in revenue is observable between last observed value and the initial predicted value implying that the increases in revenue in recent months can not be fully explained by past trend (Figure 3). The reason for this more than expected jump in revenue during the last two years could be due to policy changes, changes in user-fees, etc.

V) Composition of Revenue

Although the hospital reports 23 categories of revenue sources, some of these items are quite similar if we use activity-based classification. Moreover, a number of

items are so small in monetary values that categorizing these into larger groups will be useful for analytical purposes. All the 23 revenue sources are grouped into five broad categories. The broad categories with their constituent parts are listed below.

Group-A:	service charges (s/c) -dermatology, radiology, ophthalmology, cardiology, dental, USG, physiology, G-lab, CT, micro, immunology, Endocrine and Metabolism (E&M), endoscopy, Endoscopic Retrograde Cholangio-Pancreatography (ERCP)
Group-B:	surgical charge-general, surgical charge-gyne, O.T.-Laperoscopy
Group-C:	hospital seat rent
Group-D:	hospital other recipient, others, sales-medicine, blood bank
Group-E:	sales of insulin

To understand the composition of revenues based on 12-month moving average and its changes over the years, we have estimated the relative distribution of total revenue in January for all the years, 1992 to 1996 (Figure 4 & Table 2).

Figure 4:Percentage distribution of Revenue by Revenue Categories ('92-'96)

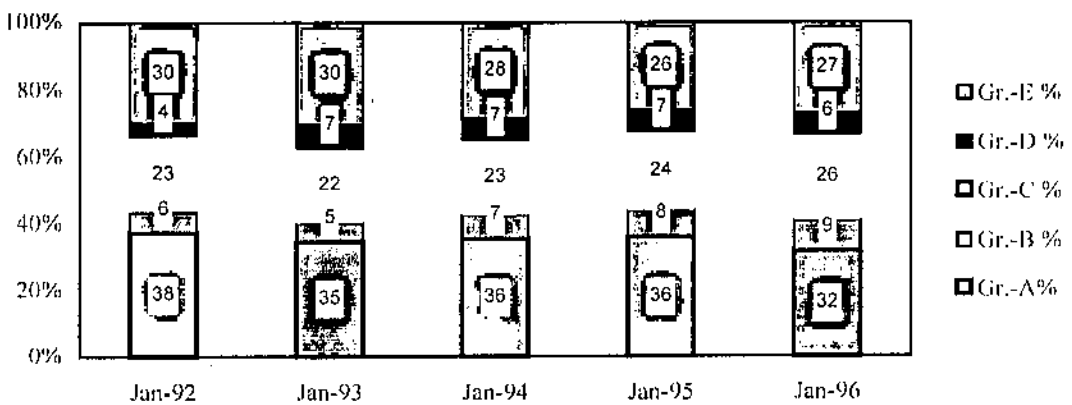


Figure 4 indicates that in terms of share of total revenue during these six years was earned, the major contributors were group-A, C and E. Most important source of revenue during these six years was Group-A which consists of mainly the service charges from different sources. In percentage terms, it varied from about 32% to 38%. Relative importance of this group declined over the years. Sales of insulin (Group-E) shows relative decline as percent of total revenue (30% to 27%) over the period as well. However, even in 1996, it remained the second highest source of revenue. This is due to BIRDEM's specialization in diabetes care. Another important feature is that Group-C, which consists of hospital seat rent, has been increasing in importance as a contributor to

total revenue (23% to 26%). The current expansion of BIRDEM may have increased the revenue earning from hospital seat rent. Group-B and D were showing a slight increasing trend.

Table 2: Change in Revenue by Revenue Groups

	Group-A	Group-B	Group-C	Group-D	Group-E	Total
Jan '92	22.93	3.23	13.15	2.16	16.77	58.24
Jan'96	47.67	12.28	35.15	8.56	36.64	140.30
Change(+/-)	24.74	9.05	21.99	6.40	19.87	82.06
Change(%)	30.15	11.03	26.80	7.80	24.22	100
Jan '93	29.38	4.14	17.04	5.23	16.77	72.56
Jan '95	40.84	8.07	24.75	6.82	36.64	117.12
Change(+/-)	11.46	3.93	7.71	1.59	19.87	44.57
Change(%)	25.72	8.81	17.30	3.58	44.59	100

Table 2 represents the percentage change in revenue in different group for two time periods, Jan 1992-Jan 1996 and Jan 1993-Jan 1995. In first period, group-A was the major contributor (30.15%) of the total variation. Subsequent major contributors are group-C (26.8%) and group-E (24.22%). In case of second time period considered, group-E emerged as the major contributor (44.59%). The next influential contributor is group-A (25.72%). Group-C and B are in the following position.

6. Hospital Expenditure

The BIRDEM hospital collects its expenditure data under 21 heads. The items are: pay and allowance, repairs and maintenance, food and others, printing and stationeries, other administrative expenditure, postage and telecommunication, WASA charge, medicine purchase, vehicle maintenance, education, training and research, medical gas, electricity, gas charges, chemical, film, glassware etc., linen and apparel, capital expenditure, insulin purchase, gratuity fund, development fund, branch affiliation expenditure, journal subscription expenditure (Annex 2).

I) Total Expenditure

Table 3 shows the yearly total amount of expenditure and the percentage change in subsequent years, excluding capital expenditure. During this five-year period, total

expenditure of the hospital doubled. The highest increase in yearly expenditure happened in between 1994-95 and 1995-96.

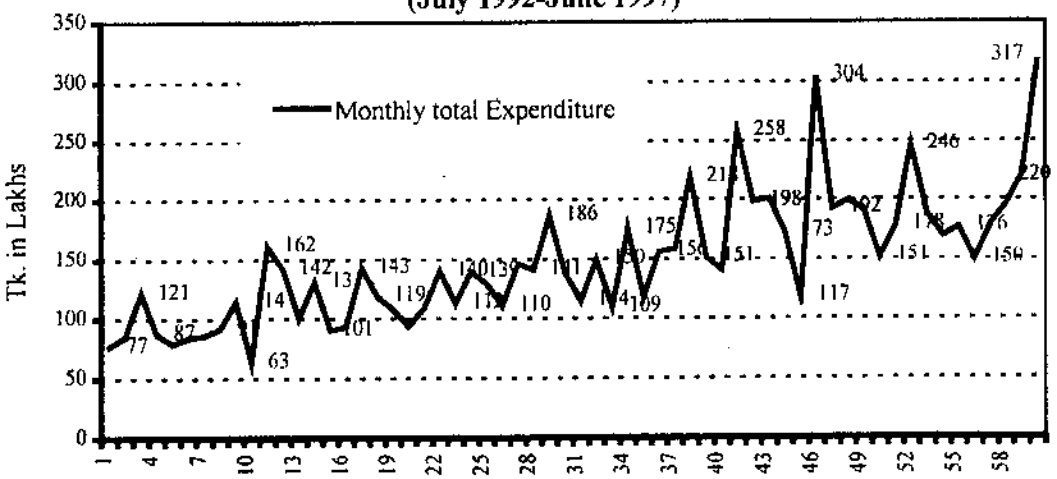
Table 3:Total Expenditure of BIRDEM Hospital, Dhaka, 1992-97

Year	Expenditure (in million Tk.)	% change in Exp. in subsequent years
1992-93	119.1	
1993-94	137.7	15.6
1994-95	167.2	21.4
1995-96	231.0	38.2
1996-97	235.7	2.1

Figure 5 shows the monthly total expenditure for all items for the period from July 1992 to June 1997 excluding capital expenditure.

The lowest expenditure was 6.3 million in April 93 and the highest was 31.7 million in June 97. The second highest monthly total expenditure was 30.4 million in April 96. The biggest jump occurred between in March 96 (11.7 million) and April 96 (30.4 million). Second highest positive change in terms of monthly total expenditure was 11.8 million from October 95 (14.0 million) to November 95 (25.8 million). On the other hand, the highest decline in monthly total expenditure occurred in between April 1996 and May

Figure 5: Monthly Expenditure of BIRDEM (July 1992-June 1997)



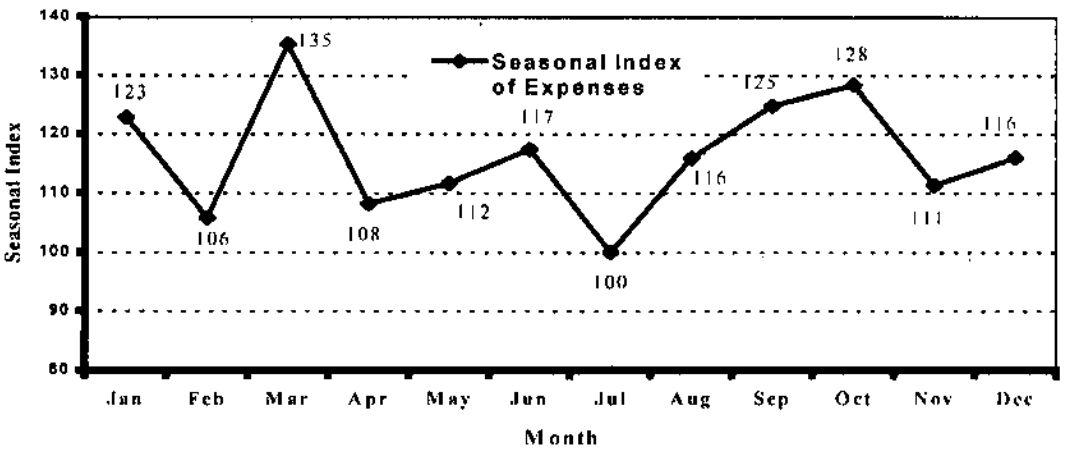
96, a decline by about 11.2 million taka. Monthly total expenditure experienced a sharp decline over a 5 months period from April 1996 to August 1996. During this time, it declined by 15.3 million, as it became 15.1 from 30.4 million.

II) Seasonal Variation of Expenditure

Just like the revenue series, seasonal variations also exist for the expenditure series of BIRDEM. Again, we have used the Multiplicative Method for calculating seasonal index of expenditure.

We have calculated the index number for different months to see the expenditure pattern. Figure 6 plots the seasonal indices. It is interesting to note that

Figure 6: Seasonal Index of Expenditure of BIRDEM (July 1992-June 1997)

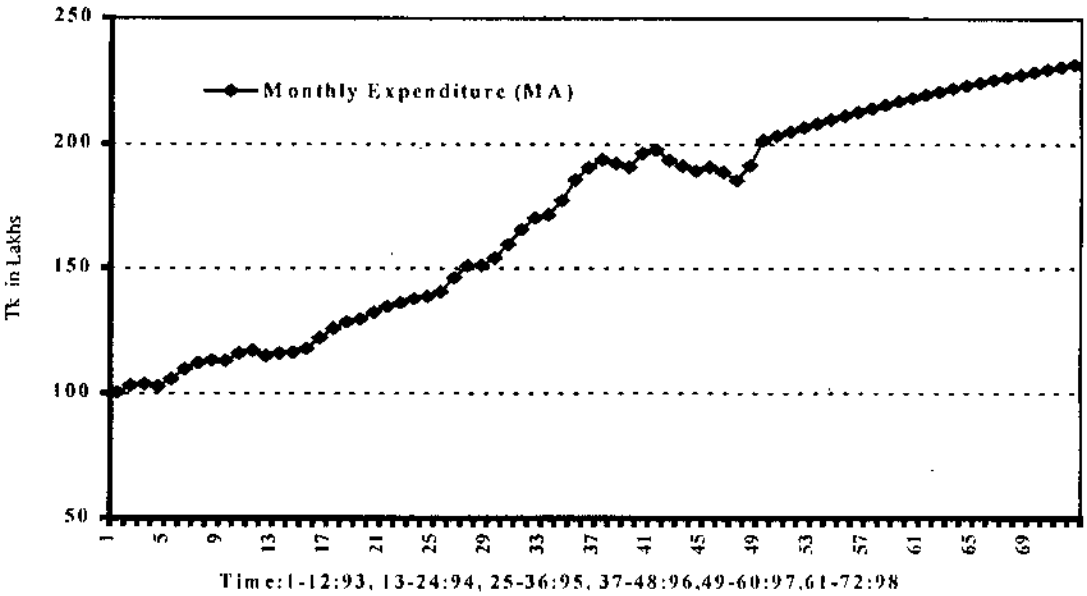


like revenue, March is the highest spending month and July is lowest spending month. Expenditure series shows lower seasonal variability than revenue.

III) Moving Average (MA) of Expenditure

The 12 months moving average of expenditure (Figure 7) also shows an increasing trend over the period of time. However, the trend is not exponentially increasing. A free hand drawing of the MA series will generate a S-shaped function. So, in the predictive model, we have applied logit transformation of the original data, as mentioned in the methodology section above.

Figure 7: Moving Average (MA) Monthly Expenditure (MA) of BIRDEM (January 1993-December 1998)



IV) Predicted Expenditure

The actual data for expenditure shows significant variations due to irregular, seasonal and trend components. It will be reasonable to examine the time-series by taking out the irregular and seasonal effects so that we will be able to focus on the long-term trend observable. For this purpose, the time-series was converted into a 12-month moving average series. The 12-month MA process ensured that all seasonal effects are taken out. The 12 period MA also takes out the irregular variations. The MA series is reproduced in Figure 7.

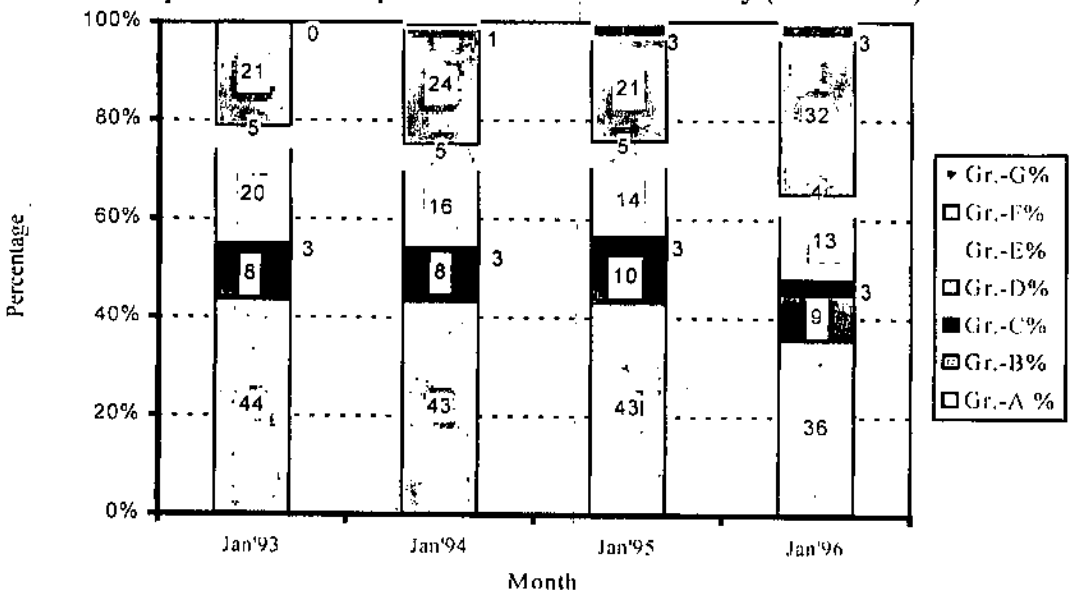
V) Composition of Expenditure

BIRDEM has 21 expense items. We have categorized them according to their activity areas into six groups. The categories are:

Group -A: pay and allowance, gratuity fund, other administrative expenditure
Group-B: repairs and maintenance, postage and telecommunication, WASA charge, vehicle maintenance, medical gas, electricity, gas charges, depreciation

Group-C:	printing and stationery, education training and research, journal subscription expense
Group-D:	medical purchase, chemical, film, glassware
Group-E:	food and others, linen
Group-F:	insulin purchase
Group-G:	branch affiliation expenditure

Figure 8: Percentage Distribution of Expenditure by Expenditure Groups for the month of January (1993-1996)



In order to understand the relative change in the composition of expenditure based on 12-month moving average, group-wise percentage distribution of expenses for the month of January 1993 to 1996 were taken. From Figure 8, we see that group-A was the most important cost component accounting for almost 45% of total expenditure. Therefore, personnel and administrative cost is about half of the total expenditure level of the hospital. As BIRDEM has a large administrative set-up and since hospital is usually human resource intensive unit, it is reasonable to find that administrative and personnel cost dominate the expenditure pattern. Group-F showed an increasing percentage over the period. It increased from 21% (Jan'93) to 32% (Jan'96) over a period of three years. Hence, we see that food and other cost related to in-patient, linen and apparel and depreciation cost has remained unchanged over time. Group-C, which consists of printing and stationery, education, training and research, is more or less consistent over the time. One interesting aspect is that medical purchase, chemical, X-ray film, glassware that are in

group-D has shown a slight increasing trend in the stipulated time period. The expenses on blood bank which is in group-G was introduced from Jan'94 and it is also increasing.

Table 4: Change in Expenditure by Expenditure Groups

	Gr.-A	Gr.-B	Gr.-C	Gr.-D	Gr.-E	Gr.-F	Gr.-G	Total
Jan '93	43.58	5.57	2.89	19.5	7.14	20.92	0	99.61
Jan '96	83.3	13.68	6.21	32.49	14.25	39.22	4.08	193.22
Change(+/-)	39.72	8.11	3.32	12.99	7.11	18.29	4.08	93.62
Change (%)	42.43	8.67	3.54	13.87	7.6	19.54	4.36	100
Jan '94	51.61	6.62	3.12	19.39	9.02	24.4	1.19	115.36
Jan '96	83.3	13.68	6.21	32.49	14.25	39.22	4.08	193.22
Change (+/-)	31.69	7.06	3.08	13.1	5.22	14.81	2.89	77.87
Change (%)	40.7	9.06	3.96	16.83	6.71	19.02	3.71	100

Table 4 also shows the percentage change in expenses by groups. We have considered Jan'93-Jan'96 and Jan'94-Jan'96 for the comparison. Here, we also observed that a major change of the total expense has occurred in group-A, group-F and group-D. Group-A and F shows almost same change and group-D shows a slight increasing effect.

7. Comparison of Revenue and Expenditure

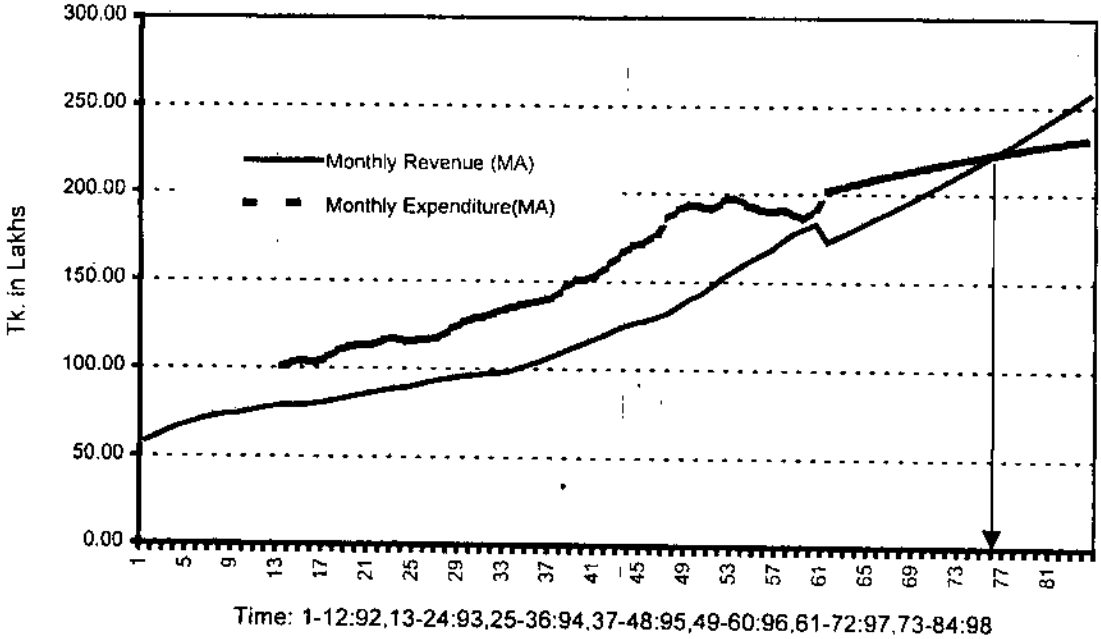
I) Moving Average

In Figure 8, the 12-month moving average for both revenue and expenditure are presented simultaneously. Both the expenditure and revenue series increased, over the months till March 1996. However, the rate of increase was steeper for expense than for revenue. After March of 1996, expenditure shows a declining tendency though revenue continued its increasing trend.

II) Prediction

One of the objectives of the analysis is to examine the expected future deficit levels if the current trend of revenue and expenditure continues in the near future. Figure 8 compares the predicted revenue and expenditure for few years beyond June 1997. Note for the figure that BIRDEM should be able to reach their break-even point after fifteen months from the initial prediction i.e., at around March 1998, the hospital's revenue from own sources should be same as its expenditure. After that break-even point, revenue is likely to exceed the expenditure level

Figure 9:Comparison between Revenue and Expenditure of BIRDEM (January 1992-December 1998)



III) Effect of occupancy on Revenue & Expenditure

Since BIRDEM has been going through an expansion phase, occupancy has an important role both in revenue generation and expenditure. Increase in the number of beds is a consequence of hospital expansion. A regression model was run to understand the relationship between revenue and occupancy. The coefficients imply that occupancy has a positive significant effect on revenue i.e., for one unit change of occupancy, revenue is expected to increase by 0.0179. Similarly, occupancy also shows a positive effect on expenditure, i.e., one unit change of occupancy will increase expenditure by 0.0139. Note that the effect of increased occupancy on revenue is higher than on costs implying increasing profitability of adding new beds.

IV) Capital Expenditure & Revenue/Occupancy

The impact of capital expenditure is related to the expansion of hospital activities and therefore, it should be related to revenue/occupancy level. Since capital expenditure cannot affect the operations immediately, there should be a time lag. We have assumed that the impact of capital expenditure on revenue will be felt after four months from the capital expenditure period. The simple linear regression model indicates that for one lakh

increase in capital expenditure monthly total revenue increased by Tk 0.25 lakh and occupancy increased by 10.6 days. In both the regression models, capital expenditure was statistically significant.

8. Concluding Observation

This research examines the revenue and expenditure pattern of the BIRDEM hospital. The main objective of the research is to illustrate the use of simple time series data for policy analysis and to understand the financial situation of a hospital. The paper illustrates how to use time series data when other relevant time series variables are not directly available. For example, in this paper, the time series of revenue and expenditure per month were used without correcting the series for medical care price indices. In fact, the trend line estimation not only shows the long-term trend in real growth but also the rate of inflation. The trend lines were also used to predict the future levels of revenue and expenditures if current real growth rate and inflation remain similar in the future.

As mentioned above, this analysis was carried out for illustrating the use of regularly collected hospital financial data. The actual revenue and expenditure series reported here can not be used directly to approximate the series for general acute care hospitals. The BIRDEM hospital is specializes in diabetic and a significant part of the hospital revenue and expenditure is due to diabetic related activities. However, since the hospital now offers all in-patient hospital services, a number of cost and revenue components may be useful to indicate the expected costs and revenue of other general care tertiary hospitals.

The analysis of BIRDEM data reveals that both the revenue and the expenditure of the hospital increased at a relatively rapid rate over the seven years. Although the prices of medical care services are not known, the rate of inflation in the country during the period remained about 6.4 percent (World Bank 1997). The fact that the revenue of the hospital increased at an annual rate of 40% over 1991-92 to 1996-97 implies that the real rate of growth of revenue was quite high. It should be noted here that the BIRDEM hospital received significant financial help from the Government of Bangladesh over this period. In 1996-97, the governmental subsidy was about a quarter of total revenue of the hospital. The expenditure of the hospital, excluding the capital expenses, also increased at an annual rate of 19%. Over the period, the moving average of capital expenditure increased from 9.2 million to 108.5 million taka, implying an annual growth rate of 61.7 percent. Therefore, the BIRDEM hospital was going through an expansion phase since 1991.

The hospital also shows seasonal variability of revenue earning. In general, the hospital earns relatively higher revenue during November to March. The average monthly revenue in these five months was about 23 percent higher than the other months of the year. The underlying reasons for this seasonality pattern is not fully understood and will

be analyzed later. Expenditure series of the hospital do not show any strong seasonal pattern. There exists some peak points in the seasonal indices (March and October) but the changes are not systematic and may not be statistically significant.

The revenue series of the hospital shows a clear increasing trend. The equation of the trend line was used to predict the expected future revenue if the current trend continues. The expenditure series also shows an increasing trend but at a much lower rate than the revenue. Moreover, the revenue tends to increase at an exponentially increasing rate but the rate of growth of expenditure tends to decline over the years. The trend pattern observed implies that the gap between the revenue and the expenditure will gradually reduce over the years. Given the estimated trend lines, the model predicts that starting from the current deficit situation, the deficit will decline over the months and revenue should exactly equal the costs by March of 1998.

In terms of the sources of revenue, the most important source for BIRDEM hospital was the out-patient service charges, which generated more than a third of all revenue in 1996. Hospital seat rent generates another one quarter of all revenue. The hospital also earned 27% of total revenue through the sale of insulin. On the other hand, personnel costs (salary and benefits) is the most important expenditure category followed by insulin purchase. Salary and benefits account for about 40% of total expenditure. It is interesting to note that medicine, chemical, film and other medical supply purchases accounts for less than 15% of total costs. Maintenance, repair and utilities costs another 10%.

The study also examined the relationship between revenue and hospital occupancy as well as revenue and capital expenses. Increased occupancy increases the profitability of the hospital. The effect of additional occupancy on revenue was found to be higher than the impact on costs. Increased capital expenditure also increase the revenue and occupancy of the hospital. One additional million spent on capital acquisition increased the revenue of the hospital by about 0.025 million taka after a lag of four months. The additional capital also tends to increase the occupancy rate per month by 10.6 days, again with a lag of about four months. Therefore, the capital expenditure of the hospital during the last six years has helped to improve its revenue as well as occupancy rate.

This study is the first attempt by the Health Economics Programme of ICDDR,B to understand the costs and revenue of a tertiary hospital in Bangladesh. Detail analysis of each of the costs and revenue components can be carried out to better understand the nature of the series. In the future, the programme will carry out specific health economic research studies in collaboration with the Health Economics Unit of BIRDEM (BHEU). A study on costing operation theatre services has been initiated. A study on long term costs of diabetes has also been initiated. Therefore, in all these studies, the current study will provide the necessary macro background information.

Additional studies can also be carried out using the macro financial data. For example, the predictive model can be improved further by incorporating the changes in the price levels and the effects of capital expenditure and occupancy rates on revenue and costs. One can also examine the effect of diabetes care on BIRDEM hospital costs and revenue.

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ANNEX-1

Sources of BIRDEM's Revenue Earned

Particulars & Sub-Heads
Hospital Seat Rent
Hospital Other Recipients
Admission Fees
Rolla Test
Dressing Charge
Surgery-General
Surgery-Gynae
Surgery-Laproscopy
Others
Service charge
Service Charge-Radiology
Service charge- Opthalmology
Service charge- Cardiology
Service charge-Dental
Service charge-Ultrasonography
Service charge-Physiotherapy
Service charge- General Lab.
Service charge-C.T. Scan
Service charge-Microbiology
Service charge- Immunology
Service charge- Endocrine & Metabolism (E&M)
Service charge- Endoscopy
Service charge- Endoscopic Retrograde
Cholangio-Pancreatography (ERCP)
Service charge- Skin
Service charge- Blood Bank
Medicine and Other Sales
Medicine and Strips
R. Solution
Guide Book
Urine Test Book
Insulin
Other Revenue
Subscription and Fees
Interest Revenue
Others

ANNEX-2

BIRDEM'S Expenditure Category

Particulars & Sub-Heads	
Pay and Allowance	*Electricity, WASA, Gas and Taxes*
Basic Pay	Electric Charges
House Rent Allowance	Gas Charges
Medical Allowance	WASA Charges
Conveyance Allowance	Property Tax
Rest and Recreation Allowance	*Medicine and Other*
Festival Allowance	Medicine
CPF Contribution	U.T. and Guide Book
Dress Allowance/Expenses	*Vehicle Maintenance*
Group Insurance Premium (staff)	Repairing Charges
Employees Revenue Tax	Fuel and Oil
Leave Salary Contribution	Insurance Premium
Gratuity	*Education and Research Expenses*
Overtime Allowance	BIRDEM Academy Expenses
Special Allowance	Training Expenses
Repairs and Maintenance	Research Expenses
Building Maintenance	Book and Journal Cost
Equipment Maintenance	Foreign Travel Expenses
Food and Other	Photography Expenses
Food supply-Hospital	*Chemical, Film and Glassware*
Other Supply-Hospital	Chemicals and Re-agents
Printing and Stationery	X-Ray, C.T. scan and Photo. Film
Other Administrative	Glassware and Consumables
Advertisement	Insulin Purchase
Entertainment	Linen and Apparel
Legal Expenses	Depreciation Fund
Bank Charges	Branch Affiliation Fund
Conveyance and Travelling	Journal Subscription Expenditure
Audit Fees	*Capital Expenses*
Publication Expenses	Motor Vehical
Consultancy Fees	Furniture and Fixture
Charity and Assistance to Poor	Land and Building Development
Miscellaneous Expenses	PABX system
Postage and Telephone	Hospital Bed Lift
Postage	Equipment- Hospital
Telephone	Equipment- Eye Dept
	Equipment - Laboratory
	Equipment - Electric and Others
	Equipment- Computer Network
	Equipment - Laundry Dept.
	Equipment -X-Ray Dept.
	Equipment - Others.

ANNEX-3

Diabetic Association of Bangladesh

Comparative Income Statement for the Period July 1991-June 1997 (Figures in Lakh Tk.)

ANNEX-3

YEAR	91	91	91	91	91	91	92	92	92	92	92	92	92	92	92	92	92	92
Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hosp. Seat Rent	11.96	11.85	11.35	12.53	10.94	11.95	12.66	12.95	14.67	12.26	16.58	15.84	17.56	16.14	16.89	16.14	17.84	17.29
Hosp. Other Recipients	0.64	0.76	0.62	0.66	0.64	0.61	0.77	0.71	0.67	0.65	0.79	0.71	1.02	0.98	1.01	0.86	0.94	0.86
Service Charge-Skin	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0.16	0.16	0.12	0.13	0.11
Surgical Charges	2.2	1.98	2.17	2.8	2.69	1.83	2.4	3.41	3.24	1.83	2.89	2.57	3.81	2.95	3.14	2.45	3.19	3.46
S/Charges-Radiology	1.53	1.4	1.26	1.4	1.44	1.12	1.24	1.3	1.61	1.02	1.73	1.41	2.18	2.16	2.2	2.12	1.83	1.67
S/Charges-Opthalmology	1.62	1.61	1.14	1.92	2.11	1.75	1.88	2.44	2.73	2.3	3.79	2.82	3.28	3.06	2.22	2.62	3.27	3.23
S/Charges-Cardiology	1.4	1.25	1	1.21	1.22	0.99	1.4	1.42	1.27	1.09	1.22	0.89	1.45	1.55	1.73	1.5	1.46	1.56
S/Charges-Dental	0.15	0.13	0.16	0.24	0.23	0.25	0.45	0.33	0.37	0.2	0.2	0.22	0.28	0.26	0.25	0.19	0.22	0.31
S/Charges-Ultrasono	1.02	0.9	0.61	0.7	0.64	0.58	0.64	0.64	0.69	0.49	0.35	0.9	1.32	1.37	1.37	1.3	1.27	1.13
S/Charges-Physioth.	0.15	0.19	0.14	0.2	0.23	0.16	0.23	0.16	0.2	0.18	0.16	0.12	0.17	0.22	0.28	0.21	0.19	0.16
S/Charges-C. Lab.	4.37	3.99	3.34	4.17	3.68	4.28	5.83	5.32	4.91	4.68	6.73	5.16	7.93	8.16	8.65	7.4	6.81	5.98
S/Charges-C.T.Scan	5.82	5.91	5.5	6.38	6.65	7.51	6.69	6.97	7.95	6.48	8.67	8.92	10.9	12.16	10.74	10.45	6	7.3
S/Charges-Microbiology	0.64	0.68	0.61	0.74	0.69	0.65	0.79	0.61	0.78	0.52	1.02	1.11	1.29	1.31	1.29	1.08	1.08	1.09
S/Charges-Immunology	1.47	1.49	1.15	1.3	1.42	1.04	1.15	1.17	1.23	1.25	1.55	1.24	1.54	1.55	1.35	1.29	1.12	1.1
S/Charges-E&M	1.76	1.29	1.38	1.42	1.52	1.11	1.28	1.3	1.22	1.32	2.31	1.98	3.17	3.97	3.31	3.16	3.03	2.11
S/Charges-Endoscopy	0.84	0.82	0.78	0.8	0.71	0.7	0.56	0.75	0.65	0.49	0.78	0.63	1.05	1.01	0.81	0.67	0.75	0.85
S/Charges-ERCP	0.37	0.61	0.43	0.84	0.61	0.67	0.78	0.45	0.86	0.32	0.75	1.02	1.18	1.18	0.87	1.02	0.76	0.62
S/Charges-Cyane	0.27	0.44	0.52	0.69	0.86	0.52	0.43	1.01	0.66	0.9	0.49	0.89	0.56	0.68	0.69	0.34	0.34	0.63
O.T. Lapeerscopy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-	-	2.3	0.24	2.88	3.16	2.68	0.57
Sales-Insulin	16.46	16.2	15.94	17.39	16.35	14.62	17.2	18.25	17.11	14.72	17.12	16.83	24.49	26.93	25.07	23.33	24.57	22.27
Sales-Medicine a Others	1.33	2.05	2.17	1.47	1.32	1.15	1.7	1.28	1.17	0.81	1.3	0.68	1.15	1.21	1.41	1.27	1.32	1.15
Blood Bank	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: I-I No Information

Diabetic Association of Bangladesh

Comparative Income Statement for the Period July 1991-June 1997 (Figures in Lakh Tk.)

ANNEX-3

YEAR	93	93	93	93	93	93	93	93	93	93	93	93	94	94	94	94	94	94
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Hosp. Seat Rent	16.93	16.77	14.14	16.45	18.25	16.95	17.59	17.67	20.32	20.56	21.34	19.48	19.19	18.92	18.68	21.28	19.25	20.44
Hosp. Other Recipients	0.81	0.81	1.09	0.81	1.05	0.88	1.24	1.22	1.37	1.33	1.12	1.19	1.28	1.22	1.09	1.38	1.33	1.48
Service Charge-Skin	0.1	0.08	0.08	0.11	0.11	0.1	0.12	0.14	0.15	0.13	0.13	0.12	0.11	0.1	0.11	0.18	0.15	0.23
Surgical Charges	3.99	4.04	3.17	2.76	4.85	4.11	4.28	3.21	3.65	3.18	3.74	4.26	3.25	4.02	3.33	3.83	3.02	3.25
S/Charges-Radiology	1.81	1.8	1.61	2.19	1.84	1.83	2.3	2.18	2.32	2.08	2.25	1.78	1.9	2.02	1.88	2.56	2.11	2.36
S/Charges-Opthalmology	2.85	2.81	2.34	3.42	3.92	3.12	3.47	5.03	4.96	5.18	4.5	4.07	4.23	3.81	3.37	4.74	4.36	5.16
S/Charges-Cardiology	1.83	1.55	1.34	1.91	1.47	1.63	1.85	1.76	1.92	1.76	1.69	1.48	1.89	1.69	1.44	1.76	2.14	2.47
S/Charges-Dental	0.34	0.27	0.33	0.44	0.48	0.5	0.43	0.41	0.45	0.31	0.32	0.25	0.27	0.32	0.27	0.4	0.28	0.45
S/Charges-Ultrasono	1.19	1.06	1.16	1.51	1.51	1.42	1.72	1.54	1.7	1.48	1.23	1.37	1.67	1.56	1.5	1.95	1.74	1.87
S/Charges-Physioth.	0.2	0.2	0.18	0.28	0.19	0.28	0.26	0.21	0.24	0.33	0.73	0.7	0.76	0.91	0.59	0.93	0.66	0.71
S/Charges-G.Lab.	5.67	5.16	4.46	7.43	7.18	7.91	9.56	9.46	10.25	9.92	10.18	8.32	8.65	8.48	7.94	11.12	10.33	10.87
S/Charges-C.T.Scan	5.36	5.38	5.22	7.31	4.45	2.96	4.84	5.04	6.79	6.06	6.33	4.64	5.37	4.66	4.52	6.19	4.32	4.98
S/Charges-Microbiology	1.05	1	0.92	1.02	1.19	1.02	1.19	1.16	1.37	1.28	1.19	1.17	1.01	1.02	1.64	1.31	1.22	1.45
S/Charges-Immunology	1.21	0.86	1.03	1.26	1.3	1.46	1.51	1.55	1.75	1.79	1.64	1.26	1.34	1.4	1.54	2.26	2.29	2.55
S/Charges-E&N	2.95	2.98	1.73	2.83	2.89	2.86	3.12	2.62	2.94	2.86	2.61	2.16	2.44	1.79	2.02	2.63	2.27	3.22
S/Charges-Endoscopy	0.52	0.54	0.35	0.22	0.73	0.7	0.76	0.68	1.2	0.75	1.36	0.61	0.66	0.91	0.93	1.03	1	1.09
S/Charges-ERCP	0.42	0.48	0.39	0.15	0.81	0.7	0.71	0.56	1.49	1.68	2.14	0.71	1.12	0.77	1.54	1.97	1.62	1.73
S/Charges-Cyane	0.49	0.49	0.45	0.86	0.84	0.33	0.3	0.66	0.92	0.72	0.72	0.51	0.69	0.59	0.31	0.68	0.28	0.73
O.T.Lapoerscopy	0	0	0	0	0	0	2	1.2	1	2.9	1	0.8	1.2	1.6	1.2	2.6	2.8	3.35
Others	1.29	0.26	8	2.45	3.14	11.26	1.36	2.41	3.44	3.69	4.15	1.9	11.58	0.56	2.76	2.27	1.05	4.17
Sales-insulin	22.34	19.86	19.05	21.19	24.08	20.21	28.29	24.98	26.93	24.82	27.9	25.87	25.73	23.14	23.92	24.5	22.23	20.59
Sales-Medicine & Others	0.94	0.45	0.55	1.5	1.25	1.22	1.65	1.55	1.09	1.06	2.11	1.52	1.26	1	1.09	1.04	0.86	0.9
Blood Bank	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: (-) No information

Diabetic Association of Bangladesh

Comparative Income Statement for the Period July 1994-June 1997 (Figures in Lakh Tk)

ANNEX-3

YEAR	94	94	94	94	94	94	95	95	95	95	95	95	95	95	95	95	95	95
Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hosp.Seat Rent	25.28	27.23	23.79	27.86	23.31	23.08	23.01	20.4	22.95	26.92	23.72	26.05	32	35.85	31.45	38.35	35.33	33.25
Hosp. Other Recipients	1.55	1.49	1.39	1.88	1.27	1.36	1.36	1.43	1.67	1.77	1.57	1.69	1.84	1.88	1.61	2.05	2.02	1.43
Service Charge-Skin	0.2	0.21	0.2	0.25	0.18	0.15	0.11	0.1	0.18	0.26	0.24	0.54	0.33	0.33	0.26	0.26	0.27	0.22
Surgical Charges	3.88	4.52	4.38	4.65	5.01	2.37	2.56	2.38	3.48	5.2	4	3.99	4.45	5.21	4.77	5.91	6.06	5.04
S/Charges-Radiology	2.62	2.66	2.34	2.97	2.41	1.82	1.93	1.76	1.65	2.51	1.82	2.31	2.53	2.41	2.18	2.53	2.28	2.25
S/Charges-Opthalmology	5.02	4.88	4.49	6.16	5.97	6.5	6.74	3.69	5.85	6.73	5.37	4.88	7.55	7.74	5.1	5.96	6.68	5.79
S/Charges-Cardiology	2.74	2.78	2.14	2.69	2.47	2.12	2.41	1.79	2.02	2.63	2.27	2.62	2.64	2.6	2.01	2.01	1.95	1.89
S/Charges-Dental	0.5	0.6	0.54	0.59	0.4	0.28	0.47	0.35	0.38	0.52	0.36	0.47	0.6	0.48	0.31	0.43	0.44	0.5
S/Charges-Ultrasono	1.8	1.92	1.82	2.21	1.79	1.6	1.57	1.51	1.39	1.87	1.68	1.73	1.92	1.81	1.38	1.46	1.57	1.49
S/Charges-Physioth.	1.01	0.78	0.62	1.12	1.15	1.03	0.91	1.02	0.39	0.97	0.9	0.75	0.88	0.53	0.36	0.22	0.41	0.37
S/Charges-C.Lab.	12.95	13.45	12.1	14.88	10.68	8.84	8.86	7.18	9.53	11.61	11.16	12.36	15.75	17.84	15.68	17.74	16.91	15.28
S/Charges-C.T.Scan	5.51	6.12	5.76	0.62	3.81	5.14	10.28	5.45	5.92	7.79	5.18	7.75	9.99	7.14	5.78	7.02	5.37	5.83
S/Charges-Microbiology	1.83	1.74	1.64	2.06	1.76	1.83	1.51	1.28	1.39	1.83	1.41	1.76	1.99	1.91	1.46	1.6	1.45	1.29
S/Charges-Immunology	3.19	3.18	2.52	3.15	2.69	1.95	2.47	2.17	3.4	4.72	4.77	5.69	5.69	5.95	4.59	5.28	4.91	4
S/Charges-E&M	3.18	3.4	2.79	3.31	2.53	2.39	2.66	1.77	2.14	3.68	3.27	4.08	3.76	3.68	3.65	4.23	3.81	3.38
S/Charges-Endoscopy	1.28	1.5	0.94	1.2	0.83	0.83	0.73	0.77	0.93	1.03	0.77	0.64	0.94	1.04	1.08	0.94	0.83	0.65
S/Charges-ERCP	1.01	1.8	2.01	1.61	2.82	0.92	0.6	0.43	0.51	0.87	1.04	0.77	0.6	0.5	0.24	0.8	0.59	0.44
S/Charges-Cysno	0.96	1.1	0.88	1.38	1.12	0.87	1.02	1.11	1.72	3.02	2.03	2.33	2.91	2.92	3.22	3.25	2.75	2.7
O.T.Laparoscopy	2.5	3.45	1.6	3	1.6	3.3	3.8	2.2	1.94	2.48	2.4	2.8	3.57	3.99	2.6	2.33	1.68	3.62
Others	1.65	1.94	0.97	3.26	1.36	4.41	4.23	1.9	3.42	7.36	4.8	3.64	5.89	2.99	2.63	4.21	3.35	4.38
Sales-Insulin	24.47	25.76	24.83	27.45	29.04	23.95	25.44	22.96	24.57	31.95	27.76	29.79	34.01	39.52	31.06	37.27	37.18	31.71
Sales-Medicine & Others	0.98	1.66	1.11	1.46	1.14	0.72	1.36	0.81	1.05	1.51	0.99	1.07	1.41	1.34	1.25	0.87	1.23	1.1
Blood Bank	0.35	0.16	0.15	0.37	0.67	0.41	0.72	0.43	0.73	1.4	0.8	1	1.14	1.32	1.47	1.42	1.13	1.14

Note: I-I No information

Diabetic Association of Bangladesh

Comparative Income Statement for the Period July 1991-June 1997 (Figures in Lakh Tk.)

ANNEX-3

YEAR	96	96	96	96	96	96	96	96	96	96	96	96	97	97	97	97	97	97
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Hosp. Seat Rent	35.02	23.6	31.51	32.72	35.64	48.74	48.59	50.86	55.26	55.73	55.42	55.72	51.52	37.33	58.36	47.12	56.03	59.2
Hosp. Other Recipients	1.63	1.03	1.74	2.08	1.97	2.33	2.03	2.12	2.4	2.35	2.29	2.12	2.05	1.84	2.71	2.09	2.16	2.24
Service Charge-Skin	0.26	0.15	0.25	0.33	0.31	0.4	0.32	0.46	0.48	0.51	0.37	0.28	0.3	0.19	0.31	0.25	0.29	0.3
Surgical Charges	8.3	4.62	5.95	7.7	6.92	10.59	7.38	8.2	7.17	7.93	8	8.08	7.21	3.78	4.62	5.71	6.71	6.93
S/Charges-Radiology	2.29	1.52	2.44	2.83	2.99	3.15	2.81	3.33	3.46	3.71	2.98	2.79	2.8	2.06	3.54	2.8	3.32	3.73
S/Charges-Opthalmology	4.77	4.3	5.81	4.86	5.07	5.11	6.06	6.13	9.8	7.99	8.69	10.59	8.13	3.69	10.22	9.25	10.54	10.67
S/Charges-Cardiology	1.73	0.89	1.7	1.89	3.17	2.79	2.78	3.28	3.28	3.39	2.97	2.77	2.66	1.98	3.23	2.79	2.93	3.29
S/Charges-Dental	0.5	0.3	0.55	0.63	0.71	0.88	0.75	1.03	1.13	1.2	1.03	0.62	0.53	0.38	0.89	0.73	0.76	1.04
S/Charges-Ultrasone	1.75	0.99	1.74	1.81	1.98	2.37	2.43	2.91	2.87	3.03	2.72	2.68	2.49	1.82	2.79	2.5	2.65	2.98
S/Charges-Physioth.	0.51	0.34	0.69	0.85	0.79	0.93	1.12	1.7	1.31	1.24	1.01	1.11	1.19	0.85	1.89	1.18	0.92	1.02
S/Charges-C.Lab.	14.74	8.66	14.24	18.26	18.87	20.42	20.41	22.25	25.86	26.07	22.19	21.48	19.48	15.7	23.59	20.43	23.86	23.77
S/Charges-C.T.Scan	7.04	3.33	4.73	6.19	6.58	5.92	6.71	7.61	8.17	8.88	7.61	7.85	6.82	6.42	7.53	6.95	8.42	7.35
S/Charges-Microbiology	1.44	0.8	1.35	1.95	2.16	2.4	2.34	2.69	3.07	3.04	2.63	2.31	2.28	1.55	3.09	2.21	2.43	2.79
S/Charges-Immunology	3.66	2.06	3.99	5.09	5.61	6.06	5.97	6.43	6.77	6.75	5.89	5.45	5.83	4.19	6.78	5.16	6.44	7.1
S/Charges-E&M	3.85	1.72	3.48	4.57	5.81	5.9	5.73	7.22	6.51	6.33	5.94	4.98	4.62	4.41	7.66	5.39	7.26	7.7
S/Charges-Endoscopy	0.71	0.47	1.03	0.95	1	1.34	1	1.26	1.68	1.58	1.23	1.2	1.26	0.89	1.28	1.13	1.8	1.8
S/Charges-ERCP	0.4	0.14	0.69	0.58	1.19	1.56	0.71	1.25	0.06	0	0	1.12	1.12	0.79	1.65	1.12	1.63	1.9
S/Charges-Gyane	3.55	1.8	2.5	2.04	1.6	3.73	2.44	3.03	3.71	3.94	3.5	2.08	3.75	2.31	5	3.33	5.09	4.36
O.T. Laperscopy	3.66	0.78	2.79	3.45	3.12	4.07	3.23	6.72	3.42	3.46	4.8	2.77	4.26	2.19	5.11	1.65	2.25	4.26
Others	11.97	3.08	1.36	5.25	4.52	5.22	5.1	2.57	3.76	4.9	2.81	3.6	4.11	4.12	7.38	1.52	5.46	4.39
Sales-Insulin	35.42	29.18	36.62	41.16	40.19	41.65	43.45	46.48	48.52	43.33	37.67	42.17	41.59	34.53	47.1	44.86	43.84	47.4
Sales-Medicine & Others	0.89	0.31	0.64	1.1	0.46	1.24	1.05	1.26	1.24	1.28	1.01	0.82	0.9	0.41	1.14	0.94	0.79	1.2
Blood Bank	1.24	0.72	1.01	1.11	1.57	2	1.54	1.71	1.58	1.19	1.27	1.56	1.35	0.87	1.49	1.18	1.58	1.53

Note:(-) No Information

ANNEX-4

Diabetic Association of Bangladesh

Comparative Expenses Statement for the Period July 1992-June 1997 (Figures in Lakh Tk.)

ANNEX-4

YEAR	92	92	92	92	92	92	93	93	93	93	93	93	93	93	93	93	93	93	94
Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Pay & allowance	34.74	36.76	39.45	36.18	35.65	35.89	36.42	36.48	57.93	36.14	63.28	43.75	36.67	38.77	41.97	44.79	42.37	46.56	48.18
Repairs & Machinary	0.83	5.73		1.25	1.39	0.98	0.91	0.60	1.00	0.92	6.69	0.51	1.41	6.45	2.14	1.85	1.46	1.51	2.24
Food & Other	3.51	4.21	4.56	3.39	4.35	4.22	5.32	3.80	3.55	3.77	5.65	2.56	3.60	3.69	4.15	7.85	4.85	4.58	5.49
Printing & Stationary	0.51	1.74	1.87	1.66	2.91	1.38	1.16	1.56	2.29	1.88	2.78	1.90	1.76	0.27	1.67	1.20	1.41	1.44	8.73
Other Adm. Exp.	0.39	1.73	0.31	0.11	0.38	0.21	0.20	0.42	0.22	1.22	0.15	1.49	0.91	0.43	0.59	0.56	0.28	0.56	1.22
Postage & Tel.	0.13	0.53	0.38	0.26	1.48	0.21	0.03	0.89	0.79	0.44	1.59	0.20	0.88	0.18	0.65	0.11	0.69	0.43	0.63
WASA charges	0.06	0.81	0.17	0.40	1.64	0.60	0.00	1.89	0.18	0.07	1.62	0.09	1.53	0.90	1.22	0.00	1.11	0.00	1.17
Medicine Purchase	2.25	1.82	1.72	0.95	3.41	1.47	1.02	2.48	3.81	1.89	2.44	5.21	1.17	0.75	4.66	0.89	4.72	0.56	9.24
Vehicle Maintenance	0.44	0.41	0.41	0.36	0.47	0.32	0.43	1.39	0.67	0.48	0.58	0.54	0.33	0.38	0.98	0.47	0.93	0.47	1.01
Edu. Tr. & Res.	0.45	1.25	7.82	0.86	1.62	0.42	0.16	0.77	0.51	0.39	0.39	0.46	0.23	0.44	0.28	0.59	2.14	5.16	1.75
Medical Gas	1.01	0.32	1.42	1.02	0.56	0.80	0.31	0.37	0.27	0.74	0.90	0.56	0.98	0.37	0.97	0.77	0.91	0.14	0.69
Electricity	0.58	0.60	1.49	0.88	0.18	2.25	3.69	1.48	1.69	0.85	2.49	0.15	1.18	0.16	2.61	0.25	1.39	2.49	1.06
Gas Charges	2.45	0.88	1.68	0.88	1.41	0.83	0.64	0.72	0.78	1.38	0.51	0.78	0.81	0.52	0.62	0.68	0.78	0.78	0.86
Chemical, Film, Glassware	7.82	8.82	49.56	4.24	5.71	19.32	16.93	8.46	15.91	9.77	26.87	25.37	20.30	19.61	17.48	25.51	19.66	6.67	21.87
Linen & Apparel	0.00	0.97	4.37	0.04	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.98	1.26	2.80	0.05	0.19
Capital Expenditure	1.26	6.55	3.49	9.82	2.13	10.15	0.84	2.18	4.42	5.97	4.00	5.38	5.54	2.11	2.93	5.17	5.52	28.16	39.31
Insulin Purchase	21.59	19.85	6.62	37.29	18.62	16.41	19.34	29.63	25.30	0.00	89.51	15.61	24.31	53.40	3.23	1.34	58.43	41.85	3.82
Gratuity Fund	-	-	-	-	-	-	-	-	-	2.10	2.10	17.90	2.10	2.10	2.10	2.10	2.10	2.10	2.10
Dep. Fund	-	-	-	-	-	-	-	-	-	2.50	2.50	25.00	2.75	2.75	2.75	2.75	2.75	2.75	2.75
Branch Aff. Fund	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jur. Sub. Exp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: (-) No Information

Diabetic Association of Bangladesh

Comparative Expenses Statement for the Period July 1992-June 1997 (Figures In Lakh Tk.)

ANNEX-4

YEAR	94	94	94	94	94	94	94	94	94	94	94	95	95	95	95	95	95	95
Month	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Pay & allowance	48.54	68.96	48.36	68.55	48.15	49.42	50.05	57.74	52.17	53.39	55.89	55.36	84.49	53.98	85.69	59.95	68.66	61.94
Repairs & Machinary	0.87	1.76	1.06	1.04	1.77	9.96	9.73	5.89	1.79	1.02	3.73	5.73	2.23	4.06	4.20	3.71	8.78	5.84
Food & Other	4.20	5.06	6.21	5.62	6.08	6.65	7.74	7.63	5.79	5.59	5.51	7.81	5.12	4.94	7.64	7.01	4.84	7.99
Printing & Stationary	2.28	2.29	1.63	1.12	2.17	1.51	2.57	1.59	1.53	0.97	2.03	2.85	1.38	2.08	2.18	1.78	2.22	2.59
Other Adm. Exp.	0.73	0.69	0.83	0.50	0.86	1.04	0.88	0.75	0.55	1.55	0.70	0.58	1.43	0.72	1.48	0.81	6.08	2.71
Postage & Tel.	0.88	0.46	0.51	0.21	0.57	0.62	0.57	0.14	0.53	0.50	0.75	0.39	0.55	1.10	0.55	0.56	0.48	0.76
WASA charges	0.14	0.68	0.00	1.36	1.38	0.00	0.00	0.08	1.87	0.00	1.10	0.07	1.24	0.08	1.32	0.00	1.24	0.08
Medicine Purchase	2.06	5.46	1.22	2.65	3.85	6.15	3.40	2.55	3.13	4.73	3.97	0.88	1.25	4.75	5.10	3.02	1.91	5.53
Vehicle Maintenance	0.83	0.69	0.53	1.30	1.17	0.50	0.70	1.24	0.61	0.75	0.88	0.80	1.08	0.62	0.61	1.27	1.17	1.02
Edu. Tr. & Res.	0.96	0.68	2.35	0.82	0.46	1.16	2.81	1.39	0.95	0.99	7.94	2.53	2.27	4.82	3.90	1.59	1.60	1.09
Medical Gas	1.13	0.43	0.00	0.81	1.00	1.64	1.46	1.45	1.05	0.77	0.00	0.87	1.12	0.20	2.78	0.42	0.26	1.63
Electricity	0.62	4.31	1.16	1.70	2.50	1.57	1.88	1.70	1.64	1.55	6.21	0.96	3.18	2.07	2.87	4.84	0.18	9.74
Gas Charges	0.70	0.86	0.61	0.68	0.76	0.75	0.85	0.75	0.84	0.83	0.74	0.64	0.61	0.83	0.41	0.45	0.56	0.51
Chemical, Film, Glassware	23.27	12.09	10.14	9.91	12.92	6.95	14.17	14.87	18.74	17.80	15.33	28.28	14.75	22.35	33.11	10.20	26.18	21.06
Linen & Apparel	0.66	0.24	0.17	0.83	0.76	1.21	1.70	0.96	1.82	1.08	1.01	0.37	0.76	0.08	0.81	0.25	0.80	0.42
Capital Expenditure	11.18	4.89	20.71	32.31	32.66	18.08	32.29	10.22	46.28	39.67	17.12	50.54	21.40	9.41	46.27	31.72	61.50	54.02
Insulin Purchase	2.53	0.00	58.33	6.09	40.18	33.01	3.75	40.16	40.14	87.98	30.48	0.36	17.37	0.32	14.84	6.72	4.80	24.00
Gratuity Fund	2.10	2.10	2.10	2.10	2.10	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Dep. Fund	2.75	2.75	2.75	2.75	4.75	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.30	5.00
Branch Aff. Fund	-	-	2.00	4.50	7.72	0.18	1.33	0.12	0.08	0.08	1.12	4.20	4.13	0.13	1.13	8.23	19.65	2.80
Jur. Sub. Exp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.57

Note: (-) No Information

Diabetic Association of Bangladesh

Comparative Expenses Statement for the Period July 1992-June 1997 (Figures in Lakh Tk.)

ANNEX-4

YEAR	95	95	95	95	95	96	96	96	96	96	96	96	96	96	96	96	96	97
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Pay & allowance	64.65	82.28	66.94	70.23	71.59	69.37	185.33	69.08	108.71	79.14	80.21	82.31	75.13	79.49	84.55	77.89	79.32	195.86
Repairs & Machinary	18.37	4.22	2.65	6.89	5.89	2.56	2.76	1.84	2.38	4.86	3.38	5.25	2.61	1.59	16.28	4.26	9.38	3.25
Food & Other	6.82	7.56	8.43	7.55	6.68	10.98	4.52	8.44	4.99	8.26	7.32	8.65	8.65	10.09	9.42	8.55	16.85	16.96
Printing & Stationary	4.86	1.98	3.13	3.29	1.25	2.05	1.24	2.41	3.79	2.11	1.96	3.02	1.89	3.79	2.80	7.59	1.42	2.94
Other Adm. Exp.	5.40	2.45	1.79	2.38	1.67	2.59	3.16	2.94	1.46	3.56	3.41	1.34	2.73	2.16	4.15	4.11	1.95	1.87
Postage & Tel.	0.46	0.37	0.79	0.79	0.60	1.24	0.07	0.56	0.61	0.93	0.95	0.72	0.83	0.83	0.93	2.55	0.39	1.02
WASA charges	0.00	0.00	0.08	1.95	1.04	0.00	0.00	1.45	0.09	1.38	0.83	1.26	0.12	0.00	6.82	0.08	1.32	6.08
Medicine Purchase	11.49	5.69	4.71	8.13	2.70	9.55	6.16	8.31	6.90	1.83	6.35	6.51	1.28	8.29	13.44	8.19	5.21	3.29
Vehicle Maintenance	0.82	1.06	0.23	1.97	0.18	1.75	0.97	0.80	1.76	1.24	3.71	2.08	1.07	0.89	1.05	2.38	0.93	1.98
Tda. Tr. & Res.	4.32	1.43	2.38	10.05	3.49	1.72	1.08	0.32	4.20	1.93	1.15	0.43	2.32	1.50	1.03	12.59	0.60	5.26
Medical Gas	0.15	2.51	1.50	1.56	0.25	2.27	0.57	1.37	0.45	2.11	2.23	1.42	0.21	0.19	3.30	0.55	3.48	0.17
Electricity	5.31	5.32	5.31	5.15	3.85	2.59	0.10	3.05	2.88	9.84	6.19	7.04	7.21	7.21	7.39	7.76	8.73	4.67
Gas Charges	0.46	0.46	0.63	0.58	0.09	0.76	0.02	0.74	0.68	0.30	0.69	0.68	0.29	0.00	2.35	2.98	1.12	0.16
Chemical, Film, Glassware	17.68	24.94	27.04	25.71	21.98	30.62	27.65	16.28	39.85	28.71	38.52	25.08	32.97	42.02	40.15	24.88	29.00	22.41
Linen & Apparel	1.50	0.78	2.57	0.32	1.28	6.07	2.16	0.13	3.80	0.73	0.86	6.43	1.32	0.37	0.16	1.71	2.67	2.77
Capital Expenditure	49.95	57.95	49.89	125.91	138.47	261.20	173.62	53.68	79.45	48.29	215.86	81.83	51.79	31.89	83.19	73.82	45.00	33.36
Insulin Purchase	67.28	1.54	3.92	183.60	66.15	44.52	7.90	0.96	111.13	36.53	1.62	29.97	3.86	9.52	41.10	12.91	4.23	0.73
Gratuity Fund	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Dep. Fund	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Branch Rit. Fund	0.28	0.19	0.26	0.77	1.04	3.60	0.05	0.00	5.39	2.00	38.67	0.63	1.31	2.55	3.51	0.26	0.79	1.76
Pur. Sub. Exp.	1.50	1.50	0.64	0.64	1.31	0.88	0.64	0.81	0.83	0.63	0.69	1.42	0.80	0.26	0.00	0.27	0.28	0.00

Note: I-I No Information

Diabetic Association of Bangladesh ANNEX-4

Comparative Expenses Statement for the Period July 1992-June 1997 (Figures in Lakh Tk.)

YEAR	97	97	97	97	97
Month	Feb	Mar	Apr	May	Jun
Pay & allowance	87.94	88.99	117.17	85.65	88.47
Repairs & Machinary	2.73	1.97	6.83	2.15	2.23
Feed & Other	8.05	8.66	8.92	8.61	9.16
Printing & Stationary	1.91	2.77	3.37	0.90	2.85
Other Adm. Exp.	2.06	2.39	2.45	1.66	2.37
Postage & Tel.	0.26	0.91	1.56	0.14	1.32
WASA charges	0.80	1.81	2.47	0.80	1.48
Medicine Purchase	5.52	7.82	3.22	13.45	8.72
Vehicle Maintenance	0.85	0.75	1.52	0.84	0.73
Edu. Tr. & Res.	7.26	8.05	2.29	4.60	2.73
Medical Gas	6.37	4.95	2.93	4.15	5.28
Electricity	5.80	4.61	7.32	7.46	7.50
Gas Charges	0.05	1.24	0.18	0.11	0.99
Chemical, Film, Glassware	18.76	28.82	16.01	38.53	53.67
Linen & Apparel	0.36	2.03	0.23	0.81	0.46
Capital Expenditure	17.15	38.50	111.68	22.81	69.55
Insulin Purchase	0.80	4.70	9.70	41.19	90.32
Gratuity Fund	2.50	2.50	2.50	2.50	2.50
Dep. Fund	5.00	5.00	5.00	5.00	5.00
Branch Affl. Fund	0.30	1.69	1.44	6.07	30.19
Jur. Sub. Exp.	0.00	0.00	0.00	0.00	0.00

ANNEX-5

Diabetic Association of Bangladesh

Bed Statement of BIRDEM Hospital by month for the period Jan'94 to Jun'97

Year	94		95		96		97	
Month	Admission	Occup.	Admission	Occup.	Admission	Occup.	Admission	Occup.
Jan	514	7329	558	7865	779	10849	971	13923
Feb	478	6928	483	7295	455	6563	642	10396
Mar	465	7023	576	7965	698	9567	1081	12967
Apr	531	7998	629	8710	691	9892	947	11348
May	528	7998	572	8514	822	10815	1107	13961
Jun	519	7985	693	8921	893	10967	1196	13953
Jul	583	8196	727	9511	998	11809	-	-
Aug	576	8637	827	10581	1043	12253	-	-
Sep	549	8338	852	10039	1160	12892	-	-
Oct	676	8778	726	10035	1120	13996	-	-
Nov	551	8273	740	9685	964	12627	-	-
Dec	553	7893	673	9070	984	12480	-	-

(continued from inside of the front cover)

The **Computer Information Services (CIS)** offers a Centre-wide backbone that allows office staff to connect to an array of computer information systems. CIS also offers a Web Server that hosts ICDDR,B web page (http://www.icddrb.org) and provides an on-line e-mail system that allows users to send/receive e-mails and browse web pages from their desktops.

Dissemination and Information Services Centre (DISC) provides easy access to literature on diarrhoeal diseases, nutrition, population studies, environmental and behavioural studies in general by means of Current Contents (Life Sciences and Clinical Medicine), MEDLINE, NUTRITION, POPLINE, and AHEAD databases, 30,600 books and bound journals, 12,750 reprints of articles and documents, 352 current periodicals, etc. DISC maintains several in-house databases for its users and publishes the quarterly Journal of Diarrhoeal Diseases Research (and bibliography on diarrhoeal diseases within the Journal), two quarterly newsletters Glimpse (in English) and Shasthya Sanglap (in Bangla), a staff news bulletin ICDDR,B News, the DISC bulletin (current awareness service), working papers, scientific reports, monographs, and special publications.

Staff: The Centre currently has over 200 researchers and medical staff from more than ten countries doing research and providing expertise in many disciplines relating to the Centre's areas of research. Over 1,200 personnel are working in the Centre.

What is the Centre's Plan for the Future?

In the 38 years of its existence, ICDDR,B has evolved into a research centre whose scientists have wide-ranging expertise. Future research will be directed toward finding cost-effective and sustainable solutions to the health and population problems of the most disadvantaged people in the world. The Centre's Strategic Plan: "To The Year 2000" outlines work in the following key areas:

Child Survival: Priority areas for research in child survival include: improvement of the case management of diarrhoea; acute respiratory infections; risk factors for low birth rate and potential interventions; nutritional deficiency states (including micronutrients); immunization-preventable infectious diseases; and strategies for prevention, including modifications in personal and domestic hygiene behaviours, provision of appropriate water supply to and sanitation for the households, and the development of effective vaccines.

Population and Reproductive Health: The Centre played a key role in conducting pioneering research in the areas of population and family planning and raising the contraceptive use rate among women of reproductive age in Bangladesh to almost 45% through its technical assistance and operations research. The 1994 Cairo Conference hailed Bangladesh as a family planning success story, using Matlab as the model for MCH-FP programmes throughout the world. The Centre continues its research in maternal health and safe motherhood and has initiated community-based research on reproductive health and STD/RTI/HIV infections.

Application and Policy: The Centre recognizes, and has given a high priority to, the need to transform research findings into actions by replicating the successful interventions piloted in its projects and through its research and training activities. The Centre will increase its communication, dissemination and training in its efforts to influence international and national health policies in the areas of its expertise.

Centres of Excellence: As a means of addressing these new initiatives in child survival and population and health research and structuring our existing programmes into Centre-wide initiatives, five Centres of Excellence are proposed as the scientific research, investigative and training arms for key areas of activities. These Centres of Excellence are in the following areas: Nutrition; Emerging and Re-emerging Infectious Diseases; Integrated Management of Childhood Illnesses; Vaccine Trials; and Reproductive Health. The Centres of Excellence will be interdisciplinary with scientists from each of the four scientific divisions engaged in the dialogue of formulating policy, developing research protocols, and conducting clinical, hospital-based and community-based trials. Outputs will include research findings, policy development and training capacity that will be used locally and nationally and that can be applied regionally and globally.

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