

# Cost analysis of a primary health care centre in Bangladesh

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*This report describes the first-ever cost analysis of a primary health care centre in Bangladesh. The aim was to provide information on costs incurred on various health care activities available in a thana health complex, in relation to the number of patients and the intensity of use of services.*

*Overall costs were estimated by examining records and papers and by interviewing staff. Cost apportionment was carried out in three stages. In the first stage, all direct expenditure was calculated for each activity, e.g., wards, outpatient department, tuberculosis services, etc. In the second stage, general service costs, covering water, sanitation, security, and administration were divided among the various services. In the third stage, the costs of laboratory services were distributed according to the number of examinations carried out for each service.*

*The capital costs for 1979 were US\$ 36 382, of which 84.6% were incurred on the buildings. Recurrent costs for 1979 were US\$ 59 556, i.e., 62% of overall costs, reflecting the labour intensiveness of the health complex. The distribution of the costs among the various health care activities was detailed. It was found that, in general, the cost per unit of activity depended mainly on the intensity of use of the resources, e.g., unit costs incurred in the outpatient department, maternal and child health services, and subcentres were relatively low because of the high rate of utilization of services.*

*This study has demonstrated that it is possible to estimate unit costs in a thana health complex. It is hoped that the methods used here will provide a basis for further work of a similar nature.*

A study was carried out in 1979 to ascertain the costs<sup>a</sup> involved in providing different types of services in a primary health care centre in Bangladesh. The aims of the study were:

1. to assist the health administrators in controlling the costs and expenditures<sup>b</sup> in the health complex;
2. to assist in formulating the health complex budget on the basis of performance;
3. to contribute to decision-making about the health complex programmes and services in the light of the costs involved for each;
4. to provide a basis for cost-benefit, cost-effectiveness, and efficiency analysis;
5. to assist donor agencies in understanding the trend of costs and expenditure in the health complex system.

A *thana* is the smallest governmental administrative unit in Bangladesh, with an approximate

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<sup>a</sup> Costs refer to the total value of the resources used to produce certain services or goods, and not just to hard cash.

<sup>b</sup> Expenditure is the amount of cash spent to provide certain services; it may be more or less than the costs involved.

population of 200 000–300 000. There are 472 *thanas* in the country, and it is planned to have a health complex in each of the 356 rural *thanas* by 1985. At present, 312 of these are operating. Each *thana* health complex has several subcentres, and it is hoped that by 1985 there will be one subcentre in each union (a union has an approximate population of 15 000–25 000). These subcentres will be known as family welfare centres and there will be 12–20 subcentres attached to each *thana* health complex. They will provide outpatient consultancy by medical assistants and public health nurses, maternal and child health (MCH) care, family planning consultancy, and a dispensary.

Each health complex has a pathological laboratory, a theatre for emergency surgery, inpatient facilities with 31 beds, outpatient clinic with 5 medical officers, maternal and child health and family planning services, and home visiting service. All these services are controlled by an administrative section.

This study is the first of its kind in Bangladesh. The health complex studied is a prototype, and since each health complex has the same annual budget and all cover approximately equal populations, the results

obtained will provide information pertinent to other complexes in Bangladesh.

#### MATERIALS AND METHODS

The study examined two types of costs: (1) capital items (buildings, vehicles, furniture, and equipment), and (2) recurrent costs (food for the patients, petrol and oil for the vehicles, maintenance and repair costs, salaries and allowances of the staff, medicines, stationery, and general administrative expenses).

Records were examined, including work statements, account books, inventories, log books of the vehicles, price lists for medicines and equipment, attendance registers, and stock cards of medical supplies.

##### *Data collection*

Each subcentre was visited in order to assess the cost of items belonging to each site and the type of activities carried out there. Records were examined to ascertain the capital and recurrent costs at each site of the health complex, and the market value of all furniture was estimated. Staff of the health complex were interviewed to assess expenditure on salaries and allowances and sample studies were carried out to assess work statements, and types of activities performed for which there was no reliable record.

##### *Classification of sites and activities*

The activities and associated sites of the health complex were divided into three groups: (a) general services, including maintenance, water and sanitation, security, and administration, (b) intermediate services, such as laboratory facilities, and (c) final services (sites) covering wards, the outpatient department, the emergency department, the home-visiting service, the maternal and child health service, tuberculosis control, and the subcentres.

Each activity is carried out mainly on one site, although it may also be partly associated with other sites, e.g., tuberculosis control activities are carried out mainly in the outpatient department but patients may also be admitted to the wards. All the general and intermediate activities are in support of the final services.

##### *Description of the activities by site*

*Emergency:* activities consist of consultation, dispensing, dressing of wounds, and minor operations.

*Laboratory:* simple pathological examinations are carried out, e.g., tests of sputum for acid-fast bacilli, microscopy of stools and urine, blood cell counts,

erythrocyte sedimentation rate, examination of blood slides for malaria parasites, haemoglobin estimation, and urine tests for sugar and albumin. These are all support activities.

*Ward:* these services were reckoned in terms of patient-days.

*Outpatient department:* consultations, dispensing of medicines, and injections.

*Domiciliary services:* home visits during which blood slides are collected and immunizations are carried out.

*MCH services:* consultations, immunization, and dispensing.

*Tuberculosis control services:* consultations and dispensing of medicines.

*Subcentres:* consultations and dispensing of medicines.

*Administration:* supports the intermediate and final services, and consists of registration and issuing of notices, salaries, reports, etc.

*Basic services:* for support in other ways, e.g., providing water supplies (deep tubewell with petrol-driven pump), sanitation (septic tank), maintenance (plumber/electrician) and security (night guards).

##### *Costing*

Depreciation of capital assets was estimated in order to calculate annual capital costs. A 10% interest rate was assumed on the capital items to account for the interest paid against foreign loans and for the opportunity cost, i.e., the revenue foregone by the government in financing a non-profitable organization. The capital depreciation and interest are shown in this paper as the cost of the capital items for 1979.

Costs were accounted ultimately against the components of activities so as to determine the unit cost for each activity. Costs per patient were accounted on the basis of the number of new patients treated in each site.

Costs were accounted in US dollars; the official exchange rate at the time of this study was 15 Bangladeshi taka to the dollar.

##### *Cost apportionment*

Costs were apportioned in three stages. In the first stage all direct expenditure, such as salaries and supplies, was calculated for each site. Capital costs were distributed among the sites, using the following criteria:

— costs of service buildings, according to the area utilized for each activity;

- costs of staff lodgings, according to the area occupied by the resident staff working in each site;
- cost of equipment and furniture, according to the site/activity in which they were employed;
- vehicle costs, according to the mileage attributable to each site/activity.

In the second stage, general service costs were divided among the intermediate and final services. The costs of basic services such as water, sanitation, maintenance, and security were allocated according to the building space occupied by each service site. The administrative costs were distributed according to the amount of paper work produced for each site.

In the third stage, the cost of the laboratory services were distributed according to the number of examinations requested by each service. Also, a part of the costs of the outpatient department were allocated to MCH, tuberculosis control, and the wards, according to the services that had been provided for each one of these activities.

In this way, the distribution of costs was carried to such an extent that no further subdivision was possible. The costs obtained in the third stage are thus the total costs for each final site and its specific activity.

Costs incurred on the training of staff were not accounted in this study, since adequate data were not available. Costs associated with visits of supervisory staff from the district or national level were not included as the visits were infrequent.

*Unit costs* for each type of service were obtained by dividing the total annual costs incurred on the associated site by the number of components of the activity carried out there.

*Costs per patient* were obtained by dividing the total annual costs incurred on a site by the total number of new patients treated in the year.

*Costs per inhabitant* were obtained by dividing the total costs incurred in the *thana* health complex by the total population of the *thana* in 1979.

## RESULTS

Since 1964, US\$ 227 993 have been spent in developing the capital assets of the Dhamrai *thana* health complex (Table 1); of this amount, US\$ 13 288 came from UNICEF in the form of equipment and vehicles, while US\$ 6693 came from public donations which were used to help establish and equip some subcentres. These sums represent, respectively, 5.8% and 2.9% of the assets of the health complex.

The capital costs for 1979 were US\$ 36 382 which covered depreciation and a 10% interest on the investments. Of this, 84.6% was incurred on the buildings,

Table 1. Capital assets of Dhamrai health complex, 1979

Asset	Value (US\$)	Source
<b>Buildings</b>		
Health complex	196 562	
Subcentres	6 693	Public donation
Subtotal	203 255	
<b>Vehicles</b>		
Bus	6 000	
Motorcycle	753	
Subtotal	6 753	UNICEF
Furniture	667	
Equipment	10 783	National agencies
	6 535	UNICEF
Subtotal	17 318	
<b>Total</b>	<b>227 993</b>	

while the cost of the furniture was nominal, since most of the furniture had little or no market value at the time of this study (Table 2).

The recurrent costs for 1979 were US\$ 59 556, i.e., 62% of the overall costs. This indirectly indicates the labour intensiveness of the health complex. In fact, 68.2% of the recurrent costs were incurred on the salaries and allowances of the staff. The next highest amount was spent on medicines, which comprised 16.4% of the recurrent costs for 1979. Of the total annual cost of US\$ 96 000 incurred for the health complex, 35.8% was spent on buildings, 42.3% on salaries and allowances, and 10.2% on medicines.

The distribution of costs among the sites after the first stage of cost apportionment is shown in Table 3. The highest proportion was spent on the domiciliary service, the wards, and the administration.

Table 4 shows the distribution of costs after the second and third stages of cost apportionment. At the second stage, the administrative costs were redistributed to the appropriate sites; at the third stage, the laboratory costs were redistributed and certain final activities were allocated to the proper sites, e.g., all MCH activities, wherever they were carried out, are shown under MCH. At the final stage of the cost analysis, the total cost of the MCH service was second only to the domiciliary service, whereas at the first stage, MCH occupied sixth place.

The final estimate of unit costs shows that one patient-day in Dhamrai cost US\$ 4.88 in 1979; one consultation cost US\$ 0.16 in the outpatient department, but US\$ 1.16 in the emergency unit, US\$ 0.09

Table 2. Distribution of capital and recurrent costs for Dhamrai health complex, 1979

Item	Capital costs		Recurrent costs		Total costs	
	US\$	%	US\$	%	US\$	%
Buildings	30 784	84.6	3 564	6.0	34 348	35.8
Vehicles	2 126	5.8	1 544	2.6	3 670	3.8
Furniture	128	0.4	176	0.3	304	0.3
Equipment	3 344	9.2	0	0	3 344	3.5
Medicine			9 787	16.4	9 787	10.2
Food and laundry			2 100	3.5	2 100	2.2
Salary			38 837	65.2	38 837	40.5
Contingencies			1 757	3.0	1 757	1.8
Staff allowances			1 791	3.0	1 791	1.9
<b>Total</b>	<b>36 382</b>	<b>100</b>	<b>59 556</b>	<b>100.0</b>	<b>95 938</b>	<b>100.0</b>

Table 3. Total and unit costs, in all sites of the Dhamrai health complex, after the first stage of cost distribution<sup>a</sup>

Site	Unit of activity	No. of activities	Total cost (US\$)	Unit cost (US\$)
Wards	Patient-day	4 355	16 314	3.75
Outpatient department	Consultations, dispensing	94 686	11 559	0.12
Emergency service	Consultations, dispensing, dressings, or minor operations	2 576	2 680	1.04
Laboratory	Tests	4 836	2 778	0.57
Domiciliary service	Home visits	428 904	23 420	0.05
Tuberculosis control	Consultations, dispensing	1 320	2 248	1.70
Maternal and child health service	Consultations, dispensing, and immunization	21 587	7 507	0.35
Subcentres	Consultations, dispensing	149 004	11 653	0.08
Administration <sup>b</sup>	Paper work	2 003	14 239	7.10

<sup>a</sup> These costs do not include those incurred for night guards and a plumber, septic tank and deep tubewell installation.

<sup>b</sup> Administrative costs include the cost of the health complex store, and costs incurred on the vehicles when used for non-specific purposes.

in the subcentres, and around US\$ 0.04 for MCH services. Home visits, excluding MCH activities, cost US\$ 0.06 each, and consultations for tuberculosis control cost US\$ 2.65 each.

Table 5 shows the cost per patient for each type of service. Thus, each hospitalization cost US\$ 24.41, each tuberculosis patient cost US\$ 31.75, and each new patient seen in the outpatient department cost US\$ 0.37. It is possible that the average cost per hospital admission might be reduced if the occupancy of beds (38% in 1979) were to increase.

Finally, Table 6 shows that the annual cost of the health complex activities per head of population in the *thana* came to US\$ 0.40. Of this, 90% was paid by the Government of Bangladesh, 7.5% by UNICEF, and 2.5% by public donations.

The per capita cost of US\$ 0.40 should be seen in the light of the use of services by the population. In 1979, there were 1.1 consultations and 1.8 home visits per capita, 3.7 hospital admissions per 1000 population, and 0.5 tuberculosis control consultation per 1000 population.

Table 4. Total and unit costs, in all sites of the Dhamrai health complex, after the second and third stages of cost apportionment

Site	Second stage of apportionment			Third stage of apportionment		
	No. of activities	Total cost (US\$)	Unit cost (US\$)	No. of activities	Total cost (US\$)	Unit cost (US\$)
Wards	4 355	20 224	4.64	3 955	19 286	4.88
Outpatient department	94 686	13 826	0.15	82 501	12 974	0.16
Emergency service	2 576	2 981	1.16	2 334	2 701	1.16
Laboratory	4 836	3 500	0.72			
Domiciliary service	428 904	30 360	0.07	428 904	25 560	0.06
Tuberculosis control	1 320	3 248	2.46	1 320	3 493	2.65
MCH service	21 587	8 588	0.04	35 878	20 939	0.58
Subcentres	149 004	13 213	0.09	124 188	10 985	0.09

Table 5. Cost per patient of the final activities of the Dhamrai health complex, in 1979

Service	Total cost (US\$)	No. of patients	Cost per patient (US\$)
Wards	19 286	790	24.41
Outpatient department	12 974	34 705 <sup>a</sup>	0.37
Emergency service	2 701	946	2.86
Domiciliary service	25 560	53 354 <sup>b</sup>	0.48
Tuberculosis control	3 493	110 <sup>a</sup>	31.75
MCH service	20 939	35 878	0.58
Subcentres	10 985	51 024 <sup>b</sup>	0.22

<sup>a</sup> New patients only.

<sup>b</sup> This figure covers only patients who received immunization, or who gave a blood sample. Other domiciliary services were not accounted for, since they are considered to be negligible in terms of the time required.

Table 6. Per capita costs of the Dhamrai health complex and source of finance, 1979<sup>a</sup>

	Source of finance			Total
	Government	UNICEF	Public donation	
Total cost	86 355	8 284	1 300	95 939
Cost per capita	0.36	0.03	0.01	0.40

<sup>a</sup> Total population of Dhamrai *thana* in 1979 was 237 109.

## DISCUSSION

Literature on cost analysis of health complexes and services is scarce and is often concerned with specific problems rather than overall considerations (1-5). However, several workers have provided useful guidelines for a general cost-benefit analysis of health services (6-8).

The present paper has outlined the costs involved in providing services in a primary health care centre in rural Bangladesh.

Government efforts to provide health services to the rural population started in 1960. By 1970, there were 140 rural health centres (RHC), each with 6 beds, including 2 for MCH services (9). After independence in 1972, a scheme was drawn up to establish one health complex in each of the rural *thanas* of Bangladesh by 1985, with 3 subcentres attached to each complex; this was later revised in favour of establishing one subcentre in each union. Some of the complexes were to be converted from the existing rural health centres, of which there were then 150. At present, 312 health complexes are working, with 31 beds in each, including 6 for MCH care. These health complexes offer comprehensive health services, as well as referral to better equipped facilities.

The budgetary provision for each *thana* health complex (including 3 subcentres) in 1974-75 was approximately US\$ 356 000. Of this, US\$ 201 230 were earmarked for extension of each existing rural health centre (9). The Dhamrai health facilities were built in 1964, as an RHC with 3 subcentres, at a cost of approximately US\$ 41 000. In our study we found that only US\$ 162 000 were spent on extending this to a health complex in 1974-75. Presumably the

budgeted figure was an average one for the whole period covered by the first 5-year plan (1974-78). Naturally, towards the end of the period, costs would have been higher than during the earlier years, because of inflation. For example, in 1974-75, it was estimated that the establishment of a subcentre would cost approximately US\$ 8000, while in 1981-82 the actual cost was US\$ 26 500. In fact, the estimated national Annual Development Programme (ADP) budget for the health sector, which was formulated in 1976-77, had to be revised less than 12 months later from US\$ 21 million to US\$ 25 million. In 1978, the total budget was approximately US\$ 29 million. In the same way, the recurrent budget increased from US\$ 13 million to US\$ 18 million within two years. Of this total, US\$ 16 million were to be spent on direct services to the patients and the remainder (11%) was for administration and training (10). In our study, it was found that about 14% of the total recurrent costs were incurred on administration. Of the US\$ 16 million allocated for direct services, about 8% and 5% were to be spent on tuberculosis control and MCH activities, respectively, in 1976-77. In our study, the respective proportions were 3% and 7%, if the general costs are considered. This difference is possibly because of differences in costing methods or the variety of institutes included in the national study.

The ADP budget of 1976-77 envisaged US\$ 29 904 for each of the 356 *thana* health complexes, including a foreign exchange component of US\$ 5618 (1). In the present study, the corresponding sum was found to be US\$ 31 255 (including the cost of equipment), which was obtained from the Government. The budgeted recurrent costs and expenditures for each health complex in 1976-77 were US\$ 5165, US\$ 1736, US\$ 927, and US\$ 862 for salaries, allowances, contingencies, and medicine/equipment, respectively (1). However, in Dhamrai, the actual costs in 1979 were found to be US\$ 38 837, US\$ 1791, US\$ 1757, respectively, for salaries, allowances, and contingencies, and US\$ 5204 for medicines with no expenditure on equipment. The reasons for these huge discrepancies are not known but may be related to differences in the programme budgets for 1976 and 1979.

As has already been stated, this study is the first of its kind in Bangladesh, so it may be worth while to consider its potential use within the national health information system. This study has shown that the unit costs of services provided in a *thana* health complex can be estimated. The method of cost analysis used is easily reproducible, at least up to the first stage of allocation (10). Procedures for further distribution of the costs may be formulated. While the distribution of administrative costs may be carried out in several ways, it is believed that the method followed in this paper is easily replicable.

It is hoped that this study will provide a basis for further work of a similar nature. The results obtained in studies of this sort will provide useful information on the cost of various services in an organization. This type of cost information should provide a sound background for the formulation of performance budgets.

This paper has also indicated the utilization pattern and volume of different services provided in a health complex. The results show that, in Bangladesh, the cost per unit of activity depends mainly on the intensity of use of the resources.

It seems that this sort of cost information can provide a good basis for efficiency analysis. Comparisons between complexes can thus be made on a sound basis. This method of cost analysis can also be used in analysing activities in the private health sector. Estimates of private expenditure on health should be linked with results such as those presented here, so that a complete picture of costs incurred on a particular service can be obtained.

According to various sources (9, 11), Government expenditure on health services in Bangladesh is about US\$ 0.54 per capita per year. This figure was arrived at by dividing the total national health budget by the population of the country. However, the greater share of the national health budget is allocated to institutions in urban areas, e.g., of the total ADP budget in 1976-77, only 39% was reserved for *thana* health complexes, the only form of health care available in rural areas, while the remainder was spent on hospitals and teaching institutes (9). Only 17% of the recurrent budget for that year went to the *thana* complexes.

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## RÉSUMÉ

## ANALYSE DES COÛTS D'UN CENTRE DE SOINS DE SANTÉ PRIMAIRES AU BANGLADESH

Ce rapport décrit la première analyse des coûts d'un centre de soins de santé primaires au Bangladesh. L'objectif était de fournir des renseignements sur les coûts des diverses activités de soins de santé exercées dans un complexe sanitaire de *thana* (la plus petite unité administrative) en fonction du nombre de malades et de l'intensité de l'utilisation des services.

On a estimé les coûts globaux en examinant des dossiers et des documents et en interrogeant le personnel. La ventilation des coûts a été effectuée en trois étapes. Au cours de la première, la totalité des dépenses directes a été calculée pour chaque activité, par exemple salles de malades hospitalisés, consultation externe, services de tuberculose, etc. Au cours de la deuxième étape, les coûts des services généraux, couvrant l'eau, l'assainissement, la sécurité et l'administration, ont été divisés entre les différents services. Dans la troisième étape, les coûts des services de laboratoire ont été ventilés entre les services selon le nombre d'examen effec-

tués pour chacun.

Les dépenses d'investissement pour 1979 ont été de US\$ 36 382, dont 84,6% destinés aux bâtiments. Les dépenses de fonctionnement pour 1979 ont été de US\$ 59 556, c'est-à-dire 62% des coûts totaux, reflétant l'intensité du travail du complexe sanitaire. La ventilation des coûts selon les diverses activités de soins de santé a été détaillée. On a observé qu'en général, le coût par unité d'activité dépendait principalement de l'intensité d'utilisation des ressources, par exemple les dépenses unitaires encourues dans la consultation externe, les services de santé maternelle et infantile et les sous-centres étaient relativement basses en raison du taux élevé d'utilisation des services.

Cette étude a démontré qu'il était possible d'estimer les coûts unitaires dans un complexe sanitaire de *thana*. On espère que les méthodes utilisées ici serviront de base à de nouveaux travaux de même nature.

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