Out-of-Pocket Spending on Maternal and Child Health in Asia and the Pacific

Impact of Maternal and Child Health Private Expenditure on Poverty and Inequity in Bangladesh

Bangladesh Facility Efficiency Survey 2011

TECHNICAL REPORT A

Australian AID

Efficiency Effectiveness Equity Economy
Health Economics Unit

ADB

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PREFACE

This report was prepared by the Institute for Health Policy in Sri Lanka under an Asian Development Bank (ADB) technical assistance project, *Impact of Maternal and Child Health Private Expenditure on Poverty and Inequity (TA-6515 REG)*. The Institute for Health Policy and authors gratefully acknowledge the funding made possible by ADB that was financed principally by the Government of Australia.

Australia is taking a leading role in global and regional action to address maternal and child health. A key part of this is to strengthen the evidence for increased financial support and the most effective investments that governments and donors can make to meet Millennium Development Goals 4 and 5. Australia supported this technical assistance project as a part of this commitment.

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two-thirds of the world's poor: 1.7 billion people who live on less than $2 a day, with 828 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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The fieldwork in Bangladesh was carried out with the support of the Health Economics Unit, Ministry of Health and Family Welfare, who collaborated on and facilitated the Facility Efficiency Survey 2011 and its linked Patient Exit Survey 2011, and who provided access to critical data sets and information required for this analysis. The authors express their sincere gratitude, in particular, to Prasanta Barua, former Additional Secretary and Line Director; Hafizur Rahman, Deputy Chief; and Ahmed Mustafa, Senior Assistant Chief, Health Economics Unit for their continuous support and encouragement.

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CURRENCY EQUIVALENTS

(as of 21 November 2012)

Currency Unit	–	taka (Tk)
Tk1.00	=	$0.012
$1.00	=	Tk79.85

ABBREVIATIONS

ADB	–	Asian Development Bank
DSF	–	demand-side financing
FES	–	Facility Efficiency Survey
FY	–	fiscal year
GDP	–	gross domestic product
MCH	–	medical college hospital
MCWC	–	maternal and child welfare centers
MNCH	–	maternal, neonatal, and child health
MOHFW	–	Ministry of Health and Family Welfare
PES	–	Patient Exit Survey
UHC	–	upazila health complex

NOTE

The fiscal year (FY) of the government ends on 30 June. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2007 ends on 30 June 2007.

EXECUTIVE SUMMARY

The Bangladesh Facility Efficiency Survey (FES) 2011 surveyed the services and costs in a nationally representative, stratified sample of 135 Ministry of Health and Family Welfare (MOHFW) facilities. Asian Development Bank technical assistance funded the survey, as part of its efforts to understand the challenges in improving provision of and access to maternal, neonatal, and child health (MNCH) services in Bangladesh.

Adapting the design of the earlier FES 1998 study, the FES 2011 collected data from sampled facilities using a questionnaire administered by field investigators. The survey sample included medical college hospitals (MCHs), specialized hospitals, district hospitals, general hospitals, upazila (subdistrict) health complexes (UHCs), maternal and child welfare centers (MCWCs), and union subcenters, with facilities involved in MNCH activities oversampled. Service indicators and recurrent unit costs for outpatient and inpatient services were estimated for fiscal year (FY) 2010. The survey data were also used in a separate analysis to estimate government expenditures on MNCH patients.

The major institutions delivering inpatient services, accounting for over 85% of all patient admissions, are UHCs, district hospitals, and MCHs in that order, while UHCs, district hospitals, MCWCs, and MCHs lead provision of institutional deliveries, accounting for almost 95% of such births. UHCs, union subcenters, district hospitals, and MCHs dominate outpatient delivery, accounting for almost 90% of such visits. UHCs are the key health facility, accounting for almost one-half of all inpatient admissions, institutional deliveries, and outpatient visits.

High levels of utilization characterize all major types of inpatient facility, with bed occupancy averaging 80%–100% at UHCs and MCHs, and over 100% at district hospitals. These high levels are due primarily to a high number of admissions in relation to available beds, since average lengths of stay are less than 4 days. In comparison to the situation in 1997 examined by the FES 1998, occupancy rates have fallen at MCHs and general hospitals, which used to have the highest occupancy rates (often in excess of 100%), but have increased at district hospitals and UHCs. This suggests that patient demand has either shifted to where the available beds are, or that facility provision has adjusted to match patient demand. Certainly, utilization rates indicate that the overall bed supply is being well used at all levels.

Patient throughput has substantially increased since 1997. This has been accommodated by significant improvements in operating efficiency, with average lengths of stay declining across all facilities, with the largest reductions seen at MCHs (i.e., 10 days to less than 4 days). Although staffing has increased in most facilities, this is much less than the increase in patients. At the same time, quality seems not to be negatively impacted, as case fatality rates have substantially improved since 1997. The average cost of an inpatient admission was Tk1,635 in FY2010, and that of an outpatient visit, Tk70. There is less variation in unit costs between facilities than in 1997, with UHC costs being close to average. There are no systematic differences in unit costs between different divisions, so geographical differences were not further examined in this report.

Facility budgets have been static in real terms, leading to substantial reductions in the real cost of patient delivery. In real terms, overall unit costs are one-half to one-third of the levels in 1997. These findings demonstrate that the MOHFW delivery system has not only expanded delivery of services in the previous decade, but that it has been able to finance much of the increase through efficiency gains. If further efficiency gains can be achieved, the cost of expanding service delivery will be much less than expected. The results also imply that further expansions in the delivery infrastructure are also needed, as most facilities are operating at optimal or above-optimal levels of utilization, with the system as a whole showing problems of undersupply.

I. INTRODUCTION

Background

Bangladesh has made substantial progress since the 1970s in expanding the coverage of healthcare services, and in reducing fertility and child mortality. However, despite the substantial gains in child and overall health, maternal mortality remains high, and most mothers give birth outside of healthcare facilities and without skilled birth assistance (NIPORT, Mitra and Associates, and Macro International 2012). For many health conditions, treatment by qualified providers, based in adequately equipped healthcare facilities using appropriate treatments, is critical to improving health outcomes and reducing mortality. Further improvements in maternal health and in overall health outcomes require that Bangladesh increase access to services, which in turn implies both additional financial investments as well as greater efficiency in the delivery of healthcare services. As the government is a major and essential provider of healthcare services for much of the population, this necessitates that Bangladesh routinely track the efficiency and costs of government healthcare delivery, for which regular monitoring and surveying of facility costs and performance is necessary.

In the early 1990s, reliable data and information on costs and efficiency of government healthcare services in Bangladesh were limited. Recognizing this, the Health Economics Unit of the Ministry of Health and Family Welfare (MOHFW) conducted the first national facility efficiency survey of MOHFW healthcare facilities in 1998 (Rannan-Eliya and Somanathan 1999). The Facility Efficiency Survey (FES) 1998 was the first nationally representative facility cost survey in Bangladesh, collecting data on costs, resource use, and performance of 121 MOHFW facilities, ranging from thana health complexes (e.g., upazila [subdistrict] health complexes [UHCs]) to medical college hospitals (MCHs) and specialized hospitals. The study provided, for the first time, national estimates of facility cost efficiency and unit costs for the major facility types, and its data were used by numerous subsequent studies. Following the 1998 study, the Health Economics Unit commissioned a follow-up study in 2007 (READ 2008), which attempted to replicate the earlier 1998 study. However, problems with data collection have limited the use of results from this survey.

To fill the gap need for updated data on facility costs and efficiency in Bangladesh, an Asian Development Bank technical assistance project undertook the FES 2011.[1] This survey intends to provide updated estimates of the unit costs of patient services at all major levels of MOHFW healthcare facilities, and analysis of the relative efficiency of service delivery in different institutions. The FES 2011 is linked to the parallel Patient Exit Survey (PES) 2011, whose objective is to assess the financial costs to households of accessing MOHFW medical services. These, in turn, support the estimation of the unit costs and patient out-of-pocket expenses of maternal, neonatal, and child health (MNCH) services provided by MOHFW. In addition to providing critical information for the costing of MNCH services in Bangladesh, this study and data will provide Bangladesh policy makers and researchers with critical baseline information to continue to assess and analyze the costs and efficiencies of government healthcare delivery.

This report presents the methodology and findings of the FES 2011. Details and findings of the parallel PES 2011 are presented in a separate technical report.

Objectives

The objectives of the FES 2011 are to obtain nationally representative estimates of recurrent and unit costs of service delivery in high- and mid-level MOHFW facilities; to assess the variation between facilities and

[1] Asian Development Bank. 2008. Technical Assistance for Impact of Maternal and Child Health Private Expenditure on Poverty and Inequity. Manila.

key categories of institutions in facility-level efficiency using ratio measures; to assess changes in costs and efficiency between 1997 and 2010; and to provide a national reference data set on costs, services, and inputs in government healthcare facilities, which could support estimation of MNCH-specific costs.

The FES 2011 study does not attempt to estimate capital costs of service delivery, because the estimation and analysis of capital costs requires extensive additional data collection, beyond available resources. Further, the capital costs of building and equipping a facility can be obtained using other methods, and will depend on policy preferences about the range of facilities and services to be provided.

II. STUDY DESIGN AND METHODS

Overview

The FES 2011 collected data from a representative national sample of all types of MOHFW inpatient facilities as well as selected types of outpatient facilities. The final sample consisted of 71 UHCs, 22 district hospitals and general hospitals, 8 MCHs and dental college hospitals, 6 specialized and other hospitals, 10 union subcenters, and 10 maternal and child welfare centers (MCWCs). The sample was stratified by division and type of facility, and was designed to ensure significant overlap of facilities surveyed by the FES 2007 and facilities involved in the demand-side financing (DSF) schemes, as well as overrepresentation of facilities involved in providing MNCH services. Final outputs from the survey include estimates of the unit costs of inpatient and outpatient treatment and efficiency indicators such as average length of stay and patients per doctor.

Sampling

The overall sampling frame consisted of all healthcare facilities with inpatient facilities operated by the director-general of health services, MOHFW in late 2007, plus all MCWCs and union subcenters. The sampling procedure was complex and involved taking four separate subsamples, as the study had several objectives:

(i) to ensure that the overall sample was representative of the facility types operated by MOHFW and would permit generation of national estimates;
(ii) to ensure substantial overlap with the FES 2007 sample, so that comparison and validation of the FES 2007 data could be done in the future;
(iii) to ensure substantial overlap and record linkage with the Health Economics Unit's Inpatient and Outpatient Morbidity Surveys 2009, whose samples largely overlapped those of the FES 2007;
(iv) to permit evaluation of the impact of the DSF intervention by including a representative sample of facilities involved in the universal and means-tested DSF schemes, as well as of facilities that had been surveyed previously by the Health Economics Unit, having been identified as control sites for comparison with the intervention sites; and
(v) to ensure adequate coverage of MCWCs, which focus on providing MNCH services, since this was of specific interest to the technical assistance project.

A core subsample of 74 facilities was selected randomly, plus 2 were added at the request of the Health Economics Unit from the list of inpatient facilities that had been previously selected for the FES 2007 sample (excluding rural health centers, MCWCs, and union health and family welfare centers, and UHCs covered by DSF schemes). The FES 2007 sample was chosen using a stratified multistage probability design, with facility types representing the different strata, which were further subdivided by administrative divisions (READ 2008). Higher-level hospitals were chosen randomly within these strata and divisional substrata, while UHCs were sampled from the same districts in which sampled district hospitals were located. The FES 2011 subsample of these was selected by randomly picking a subset of facilities within each of the FES 2007 substrata. Ayurvedic and homeopathic college hospitals were excluded. The smaller number was necessitated for budgetary reasons. In the case of MCHs and specialized hospitals, where the numbers of facilities concerned is small, smaller divisions were aggregated or a national sample was selected without stratification.

The second subsample consisted of 33 UHCs that were selected to ensure coverage of facilities involved in the universal or means-tested DSF intervention schemes, and of control district facilities that had been identified and previously surveyed by the Health Economics Unit in evaluations of the

DSF schemes (Hatt et al. 2010). The third subsample consisted of two 10-bed hospitals, one 20-bed hospital, and one trauma center, which were selected randomly without stratification from the national listing to ensure some coverage of these minor facilities. The fourth subsample consisted of 10 MCWCs and 10 union subcenters selected randomly from the national listing of these facilities.

The final FES 2011 sample consisted of 135 facilities distributed as shown in Table 1. Their distribution by division is given in Table 2.

Table 1: Distribution of Survey Sample by Strata, Facility Efficiency Survey 2011

Facility Type	Total Number in Country	FES 2011 Sample
Medical college hospitals	14	7
Dental college hospitals	1	1
District hospitals	53	18
General hospitals	9	4
Specialized hospitals	9	6
Infectious disease hospitals	5	1
Chest diseases/tuberculosis hospitals	11	2
Leprosy hospitals	3	1
Upazila health complexes	422	71
20-bed hospitals	29	1
10-bed hospitals	22	2
Trauma centers	5	1
Union subcenters	1,312	10
Maternal and child welfare centers	97	10
Ayurvedic college hospitals	1	0
Homeopathic college hospitals	1	0
Specialized centers	2	0
Other hospitals	6	0
Total	**2,002**	**135**

Table 2: Healthcare Facilities Surveyed by Facility Type and Division, Facility Efficiency Survey 2011

Facility Type	Dhaka	Barisal	Chittagong	Khulna	Rajshahi	Rangpur	Sylhet
Medical college hospitals	3	0	1	1	1	1	0
Dental college hospitals	1	0	0	0	0	0	0
District hospitals	6	2	3	1	2	2	2
General hospitals	2	0	1	1	0	0	0
Specialized hospitals	6	0	0	0	0	0	0
Infectious diseases hospitals	0	0	0	1	0	0	0
Chest diseases/tuberculosis hospitals	0	1	0	1	0	0	0
Leprosy hospitals	0	0	0	0	0	1	0
Upazila health complexes	20	8	15	7	9	5	7
20-bed hospitals	0	0	1	0	0	0	0
10-bed hospitals	0	1	0	1	0	0	0
Trauma centers	1	0	0	0	0	0	0
Union subcenters	4	1	2	0	2	1	0
Maternal and child welfare centers	1	1	2	2	1	3	0
Total	**44**	**14**	**25**	**15**	**15**	**13**	**9**

Data Collection

Data collection was done primarily through a field survey of sampled facilities, using a structured, English-language, paper questionnaire. The questionnaire used was adapted from that used in the FES 1998. This had been developed from a questionnaire developed for the Sri Lanka Public Facility Survey 1998 (Somanathan et al. 2000), which was a nationally representative cost and efficiency survey of government healthcare institutions in Sri Lanka. The study team revised the FES 1998 questionnaire to eliminate redundant or unnecessary questions and to improve question design where necessary. Specific changes that were made included adding additional questions about MNCH activities and extending the questions about availability of medicines and supplies to cover a number of items deemed critical for MNCH care delivery. The latter changes were made following advice from the United Nations Children's Fund, Bangladesh. Particular attention was paid to redesigning the question numbering to make it consistent across different facility types and to allow consistent question numbers to be reused in any follow-up survey. Following review by experts from the Health Economics Unit and Data International, the draft questionnaire was revised before being pilot-tested in five facilities.

The final questionnaire was administered at facilities by survey teams of two investigators from Data International, the survey firm responsible for all fieldwork. Prior to their visits, the questionnaire was forwarded officially to each facility by the Health Economics Unit, with an official request from MOHFW for cooperation. Data were collected by direct interview of facility staff members and by extraction from administrative records. In some cases, field collection of data was supplemented by extraction of data from central MOHFW records. Fieldwork took place from March to July 2011. Collaboration from facilities was excellent, and all sampled facilities were surveyed successfully (i.e., the survey response rate was 100%).

The survey collected data on income and recurrent expenditures, levels of staffing, availability of drugs and equipment, structural quality indicators, service volumes, and other indicators, at the time of the survey or for the previous fiscal year (FY) or calendar year. Most activity and staffing indicators were collected for the previous calendar year (2010), while financial data (e.g., facility income and expenditures) were collected for FY2009 and FY2010 (i.e., July–June). Data for a number of selected activity indicators related to MNCH services were collected for a longer time period (i.e., 2006–2010).

Item response was close to 100% for almost all questions. The only notable exceptions were the allocation of staff time to immunizations and other preventive services, and the numbers of staff members who were posted to the facility but were absent without approval. These questions elicited few responses and were not used in the final analysis. Other studies indicate a high level of staff absenteeism at Bangladesh healthcare facilities, up to 40% at UHCs (Chaudhury and Hammer 2004). The low response rates for the question on absent staffing could reflect reluctance to reveal its extent. However, it should be noted that the absence of staff members does not affect the computation of costs in this study, since the final cost to the government of delivering staff members includes the costs of employing those who do not show up for duty.

Data entry was done at Data International using Microsoft Access software. Entered data were then converted into Stata format (Stata Version 10.0) and transmitted to the study team at the Institute for Health Policy for analysis.

Data Cleaning

Stata (Version 12.0) was used for data cleaning. All variables (n = 1,920) were individually checked for missing and out-of-range values. Where missing values had been recorded when the questions were not applicable, these were recorded as zero. Where out-of-range values were discovered, these were corrected, if possible, by checking the original questionnaires or by asking the survey team to check with the facility concerned. If the error was not due to data entry, the value was treated as missing. Internal consistency of key variables was also checked when different parts of the questionnaire had asked similar questions (e.g., the size of specific personnel categories). Data on percentage staff time allocations were rescaled to ensure they added up to 100%. Finally, consistency and plausibility of key activity variables were reviewed, and potential errors flagged and corrected if possible, or treated as missing (e.g., the internal consistency of patient-day numbers, average length of stay, and bed numbers was checked for all facilities).

Cost Analysis

Facility costs were analyzed using a step-down cost accounting approach (Barnum and Kutzin 1993). Costs were first organized by cost centers according to three levels of costs:

(i) final patient services—inpatient treatment, outpatient treatment, and preventive care;
(ii) ancillary services—pharmacy, laboratory, and radiology; and
(iii) overhead and administrative support.

Analysis was restricted to recurrent costs only, as no data were collected to estimate capital expenditures. Where possible, inpatient costs were further disaggregated into medical and dental treatment, and within outpatient services, to medical treatment, dental treatment, and family planning services. Cost totals were based on the actual budgetary expenditures reported by the facility for each FY.

The wage and compensation costs of personnel categories were estimated by first approximating the total cost of each category as the product of the numbers of recorded personnel in each category and the midpoint of their applicable salary ranges (i.e., separately for senior consultants, junior consultants, medical officers, interns, dental surgeons, radiologists, nurses, and cooks). These category estimates were then

scaled so that their sums were equal to the actual total costs of salaries and allowances reported for the facility. This procedure was adopted, as it was not feasible to collect data on the actual combined salaries and allowances of each individual worker or of each specific staff category.

The costs of selected categories of medical, nursing, family planning officers, and class III and class IV staff members were allocated to cost centers using information collected on their time allocation in each facility. Where such time allocation data were missing, they were imputed by reference to facilities of the same type. The costs of selected categories of paramedical staff members were allocated to inpatient and outpatient treatment, according to data collected on the distribution of the relevant services. The costs of other staff categories were allocated according to reasonable assumptions about their job responsibilities. Table 3 gives details of the allocation assumptions for each staff category.

Table 3: Allocation of Staffing Costs to Cost Centers, Facility Efficiency Survey 2011

Staff Categories	Basis of Allocation
Consultants and specialists	Reported time allocations for consultants (inpatient or outpatient treatment)
Other medical officers and interns	Reported time allocations for medical officers (inpatient or outpatient treatment)
Resident medical officers	Reported time allocations for resident medical officers (inpatient or outpatient treatment)
Dental surgeons and medical technologists (dental)	Based on time allocations (inpatient or outpatient treatment) of dental surgeons at Dhaka Dental College Hospital
Pathologists and medical technologists (pathology)	100% to laboratory
Radiologists and medical technologists (radiology)	100% to radiology
Pharmacists and medical technologists (pharmacy)	100% to pharmacy
Family planning officers	100% to outpatient treatment (family planning)
Nurses, matrons, and nursing superintendents	Reported time allocations for nurses (inpatient or outpatient treatment)
Physiotherapists and occupational therapists	Distribution of physiotherapy services provided to inpatient and outpatients
Sanitary inspectors, health inspectors, assistant health inspectors, health assistants	100% to preventive
Thana health and family planning officer	100% to outpatient family planning
Directors and civil surgeons	100% to overhead and administrative support
Administrative officers, accounts officers, social welfare officers, other administrative staff	100% to overhead and administrative support
Storekeepers	10% to radiology, 10% to laboratory, and 80% to pharmacy, adjusted for whether services available at facility
Rent controller	100% to inpatient
Accountants, cashiers, typists, drivers, and other class III staff	100% to overhead and administrative support
Ward boys	100% to inpatient
Sweepers	80% to inpatient, 20% to outpatient
Laundry and tailor staff, cooks, and stretchers	100% to inpatient
Member of lower subordinate staff, security guards, gardeners, other class IV staff	100% to overhead and administrative support

The value of medicines costs was obtained from the budgetary data on actual costs for medicines in each FY and allocated to the pharmacy cost center. The value of other medical supplies costs was obtained from the budgetary data on actual costs for medical supplies in each FY. Fifteen percent of these costs were allocated to laboratory, and 15% to radiology, if these services were available at a facility. The remaining supplies costs were allocated to overhead and administrative support. Laundry and diet costs were allocated 100% to inpatient treatment. All other costs not allocated to any cost center were allocated to the overhead and administrative support cost center.

Once the total costs of each cost center were obtained, the costs of ancillary, overhead, and administrative support cost centers were distributed to the final patient service cost centers (i.e., inpatient, outpatient, and preventive) as follows:

(i) Pharmacy. These were allocated to inpatient and outpatient treatment according to the percentage distribution of medicines by value by a facility's pharmacy to inpatient wards and outpatient departments. This percentage distribution was estimated according to the actual distribution by value of medicines for a sample of four months (i.e., January, April, July, and October) during 2010.

(ii) Laboratory. These were allocated to inpatient and outpatient treatment according to the weighted total of laboratory tests reported as being provided to inpatients and outpatients during 2010. Urine tests were given a weight of 0.5 versus 1.0 for blood tests and all other laboratory tests.

(iii) Radiology. These were allocated to inpatient and outpatient treatment according to the weighted total of radiology examinations reported as being provided to inpatients and outpatients during 2010. CT scans were given a weight of 25; MRI scans, 40; and lithotripsy services, 100, while all other radiology examinations were given a weight of 1. These weights were based on consideration of the published price list for radiology examinations by government hospitals, as well as price differences in the United States.[2]

(iv) Overhead and administrative support. These costs were prorated across the inpatient, outpatient, and preventive cost centers, after the ancillary service costs had been apportioned.

Once the final costs of inpatient, outpatient, and preventive services was obtained, the unit costs of inpatient and outpatient services were acquired by dividing the relevant costs into the numbers of inpatient and outpatient services delivered. Unit costs were calculated for outpatient visits, admissions, available beds, and bed-days and utilized bed-days. Lack of additional data prevented more detailed disaggregation of units cost by type of ward or medical department. A number of other efficiency and activity indicators were also estimated for each facility. These included average length of stay, bed occupancy rate, annual bed turnover rate, case fatality rate, and cesarean section rate for facility childbirths.

Once the final facility-level estimates were obtained, national-level estimates were generated, applying post-survey weights. These weights were computed as the ratio of the number of surveyed facilities to the total number of facilities of the same type and the same sampling strata in Bangladesh.

Selected cases of missing data were replaced by imputed values. Missing data on staff time allocations to inpatient and outpatient use were imputed using the observed averages for the relevant type of facility. A similar procedure was used if data were missing for budget line items, ensuring that the total of line items matched the reported budget totals, if available. Where data were imputed, the missing data accounted for less than 10% of all records with respect to the variable concerned. Institute for Health Policy staff members carried out all data analysis using Stata 12.0.

[2] As reported in an online price directory (New Choice Health. http://newchoicehealth.com).

III. RESULTS

Hospital Characteristics

Facilities in each category show considerable homogeneity, except in the case of MCHs and specialized facilities. Table 4 and Table 5 summarize key statistics as reported by each category of facility for 2010.

Table 4: Key Input Indicators (2010) of Sampled Facilities, Facility Efficiency Survey 2011

Facility Type	Beds (number)	Doctors (number)	Nurses (number)	Other Staff (number)	Recurrent Expenditures (Tk million)
Medical college hospitals	669	175	252	28	200
	(306.7)	(77.5)	(114.8)	(20.9)	(110.0)
Dental college hospitals	400	83	55	5	56
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
District hospitals	125	19	41	4	30
	(57.4)	(10.4)	(21.5)	(3.0)	(9.8)
General hospitals	175	24	80	5	64
	(64.5)	(7.5)	(17.8)	(5.8)	(19.0)
Specialized hospitals	344	108	211	29	160
	(233.6)	(44.2)	(142.9)	(20.5)	(82.0)
Infectious disease hospitals	20	2	4	0	5
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Chest diseases/ tuberculosis hospitals	20	2	4	0	3
	(0.0)	(0.7)	(1.4)	(0.0)	(0.6)
Leprosy hospitals	20	2	8	1	5
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Upazila health complexes	37	8	10	4	20
	(9.6)	(4.2)	(4.0)	(4.5)	(6.0)
20-bed hospitals	20	2	5	1	14
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
10-bed hospitals	10	1	2	1	2
	(0.0)	(1.4)	(1.4)	(0.7)	(0.8)
Trauma centers	22	1	3	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Union subcenters	0	1	0	1	1
	(0.0)	(0.5)	(0.0)	(0.5)	(0.2)
Maternal and child welfare centers	18	2	1	3	2
	(4.2)	(1.0)	(1.1)	(2.7)	(0.8)

Note: Mean values in sample with standard deviation in parentheses.

Table 5: Key Activity Indicators (2010) of Sampled Facilities, Facility Efficiency Survey 2011

Facility Type	Outpatients	Inpatients	Bed Occupancy (%)	Operations Performed	Childbirths
Medical college hospitals	289,383	52,320	80	14,509	3,482
	(147,196)	(43,011)	(40)	(9,009)	(2,446)
Dental college hospitals	62,835	104,000	70	2,263	0
	(0)	(0)	(0)	(0)	(0)
District hospitals	136,475	18,651	130	2,625	1,203
	(52,623)	(7,101)	(70)	(3,015)	(887)
General hospitals	231,246	13,003	100	1,942	1,877
	(149,605)	(9,620)	(30)	(780)	(1,124)
Specialized hospitals	100,845	13,843	60	7,264	0
	(75,443)	(16,193)	(40)	(10,905)	0
Infectious disease hospitals	0	1,958	60	0	0
	(0)	(0)	(0)	(0)	(0)
Chest diseases/tuberculosis hospitals	0	85	60	0	0
	(0)	(0)	(0)	(0)	(0)
Leprosy hospitals	9,562	79	50	0	0
	(0)	(0)	(0)	(0)	(0)
Upazila health complexes	96,754	5,061	100	248	695
	(86,082)	(2,962)	(60)	(379)	(1,033)
20-bed hospitals	123,491	7	0	0	0
	(0)	(0)	(0)	(0)	(0)
10-bed hospitals	38,374	598	50	0	0
	(3,085)	(809)	(70)	(0)	(0)
Trauma centers	2,378	13	0	0	0
	(0)	(0)	(0)	(0)	(0)
Union subcenters	15,300	0	0	0	0
	(10,646)	(0)	(0)	(0)	(0)
Maternal and child welfare centers	20,434	1,012	50	271	840
	(14,403)	(1,004)	(50)	(338)	(531)

Note: Mean values in sample with standard deviation in parentheses.

The typical UHC is a 31- or 50-bed facility, staffed by 8 doctors (range 2–19), 10 nurses (range 2–20), and 4 other staff members. With an average recurrent budget of Tk20 million, it delivers 96,754 outpatient visits, 5,061 inpatient admissions, and 248 operations a year. UHCs deliver only basic medical services in practice, and few operative interventions. They show considerable homogeneity in their basic characteristics reflecting their funding and staffing according to fixed norms.

District hospitals and general hospitals are larger facilities, with a typical bed size of 150 (range 100–250), staffed by 22 doctors (range 8–44), 48 nurses, and 4 other staff members. With an average recurrent budget of Tk47 million (range Tk30–Tk100 million), the typical district hospital or general

hospital delivers an average of 183,860 outpatient visits, 15,827 inpatient admissions, and 2,288 operations a year. District hospitals and general hospitals generally provide basic medical services only, although at a higher level of sophistication than UHCs.

MCHs are larger, inpatient medical facilities, which provide a range of different services, including specialities. Their bed size ranges from 250 to 1,100 with 90–325 doctors and 153–479 nurses. Their budgets are much larger, averaging Tk200 million.

Operating Hours

The regular hours of operation are similar at all levels. Major facilities offer routine outpatient services for 6 hours per day, 6 days per week, while being open to emergencies on a 24 hour/7 days per week basis (Table 6).

Table 6: Operating Hours of Sampled Facilities, Facility Efficiency Survey 2011

Facility Type	Maternal and Child Welfare Centers	Upazila Health Complexes	District and General Hospitals	Medical College Hospitals	Specialized Hospitals
Routine Outpatient Services					
Hours per days	6.4	6.4	6.5	6.5	6.5
Days per week	5.6	6.0	6.0	6.0	6.0
Emergencies or Others					
Hours per days	21.6	24.0	24.0	24.0	24.0
Days per week	6.3	7.0	7.0	7.0	7.0

Equipment and Utilities

As would be expected, the availability and range of equipment available at facilities improves at higher levels (Table 7). All UHCs, district hospitals, general hospitals, and MCHs have laboratories and operating rooms, although in 7% of UHCs, the laboratories are nonfunctional. Only 94% of UHCs have been provided and have functioning x-ray machines. All district hospitals, general hospitals, and MCHs have functional x-ray machines. Ultrasound machines and blood banks are found only in MCHs, and the availability of ambulances is not universal in UHCs. Generally, all facilities have basic utilities (Table 8), such as electricity, piped or deep-tube well water, and refrigerators. Thirteen percent of UHCs report having no telephones.

Table 7: Availability of Key Equipment at Sampled Facilities, Facility Efficiency Survey 2011

Facility Type	X-Ray		Laboratory		Operating Room		Blood Bank		Ultrasound		Ambulance	
	F	O	F	O	F	O	F	O	F	O	F	O
Medical college hospitals	100	100	100	100	100	100	100	100	86	71	100	100
Dental college hospitals	100	100	100	100	100	100	0	0	100	100	0	0
District hospitals	100	100	100	100	100	100	56	56	0	0	100	94
General hospitals	100	100	100	100	75	75	100	100	0	0	100	100
Specialized hospitals	100	100	100	100	83	83	67	67	67	67	83	83
Infectious disease hospitals	0	0	0	0	0	0	0	0	0	0	0	0
Chest diseases/tuberculosis hospitals	0	0	50	0	0	0	0	0	0	0	0	0
Leprosy hospitals	0	0	100	100	0	0	0	0	0	0	0	0
Upazila health complexes	94	77	100	93	92	79	4	4	0	0	100	96
20-bed hospitals	0	0	0	0	0	0	0	0	0	0	100	100
10-bed hospitals	0	0	0	0	0	0	0	0	0	0	0	0
Trauma centers	100	100	100	100	100	100	0	0	0	0	0	0
Union subcenters	0	0	0	0	0	0	0	0	0	0	0	0
Maternal and child welfare centers	10	0	0	0	90	90	0	0	0	0	80	70

F = percentage of facilities having equipment, O = percentage with equipment operational.

Table 8: Availability of Key Utilities at Sampled Facilities, Facility Efficiency Services 2011

Facility Type	Laundry		Refrigerator		Toilets		Piped Water or Deep-Tube Well		Electricity or Generator		Telephone	
	F	O	F	O	F	O	F	O	F	O	F	O
Medical college hospitals	57	57	100	100	100	100	100	100	100	100	100	100
Dental college hospitals	0	0	100	100	100	100	100	100	100	100	100	100
District hospitals	6	6	94	94	100	100	100	100	100	100	100	100
General hospitals	50	50	100	100	100	100	100	100	100	100	100	100
Specialized hospitals	83	83	100	100	100	100	100	100	100	100	100	100
Infectious disease hospitals	0	0	100	100	100	100	100	100	100	100	100	100
Chest diseases/tuberculosis hospitals	0	0	100	50	100	100	100	100	100	100	0	0
Leprosy hospitals	0	0	100	0	100	100	100	100	100	100	0	0
Upazila health complexes	3	3	94	94	99	97	97	97	100	100	87	86
20-bed hospitals	0	0	100	100	100	100	100	100	100	100	0	0
10-bed hospitals	0	0	0	0	100	100	50	50	100	100	0	0
Trauma centers	0	0	100	100	100	100	0	0	100	100	0	0
Union subcenters	0	0	0	0	100	100	40	30	80	80	0	0
Maternal and child welfare centers	0	0	80	70	100	100	90	90	90	90	80	80

F = percentage of facilities having services, O = percentage with services operational.

Availability of Services

MCHs are designated to provide and do provide all major types of services, such as obstetric, gynecological, pediatric, and major surgical care (Table 9). UHCs, district hospitals, and general hospitals are similar in the services that they actually provide, with more than 90% in each category providing obstetric, gynecological, pediatric, and minor surgical services. This is notable, despite only 4% of UHCs designated to provide obstetric services and 1% designated to provide pediatric services. Major surgery is generally only available at district hospitals, general hospitals, and above. A large proportion of UHCs are designated to provide dental services, but only a few do (90%).

Table 9: Types of Services Provided at Sampled Facilities, Facility Efficiency Survey 2011

Facility Type	Union Subcenters		Maternal and Child Welfare Centers		Upazila Health Complexes		District and General Hospitals		Medical College Hospitals	
	D	P	D	P	D	P	D	P	D	P
Obstetric	0	0	100	100	96	90	94	94	100	100
Gynecological	0	0	100	100	97	92	100	100	100	100
Pediatric	30	30	100	100	99	99	100	100	100	100
Medical	100	100	70	80	100	97	100	100	100	100
Minor surgical	0	0	80	50	90	66	100	100	100	100
Major surgical	0	0	80	70	58	32	100	100	100	100
Dental	0	0	0	0	100	90	100	94	100	100

D = percentage of facilities designated to provide services, and P = percentage actually providing services.

Staffing

MCHs and specialized hospitals have more staff members than district hospitals and general hospitals, which have more staff members than UHCs (Table 10). District hospitals and general hospitals have 2–3 times as many doctors as UHCs, and 5–6 times the number of nurses. However, both categories have similar numbers of other staff members.

The staff mix varies across categories of facility. The nurse-doctor ratio increases at higher levels, while the ratio of other staff members to doctors and nurses decreases. While the number of skilled staff members (i.e., doctors and nurses) in relation to beds is approximately similar at all levels, the number of total staff members per bed is higher in UHCs than in other facilities. The higher ratios of staff members to beds at UHCs are due to relatively higher numbers of other staff members. The reason for greater staff intensity at the lower UHC level is not apparent.

Generally, doctors allocate 50%–70% of their time to inpatient duties in all levels of facilities (higher in MCHs), while nurses allocate higher proportions of their time (Table 11).

Table 10: Key Staffing Indicators for Major Facility Types, Facility Efficiency Survey 2011

Facility Type	Doctors, Including FPOs	Nurses	Other Staff Members	Total Staff Members	Nurse–Doctor Ratio	Staff–Bed Ratio
Medical college hospitals	174	247	27	448	1.4	0.7
Dental college hospitals	83	55	5	143	0.7	0.4
District hospitals	19	41	4	64	2.4	0.5
General hospitals	26	78	3	107	3.1	0.6
Specialized hospitals	108	211	29	348	2	1.4
Infectious disease hospitals	2	4	0	6	2	0.3
Chest diseases/ tuberculosis hospitals	2	4	0	6	3.2	0.3
Leprosy hospitals	2	8	1	11	4	0.6
Upazila health complexes	6	9	4	19	2	0.6
20-bed hospitals	1	0	1	1	0	0
10-bed hospitals	2	1	3	5	0.8	0.3

FPO = Family Planning Officer
Note: National estimates using data from Facility Efficiency Survey 2011.

Table 11: Allocation of Staff Time to Inpatient Care, Major Facility Types, Facility Efficiency Survey 2011 (%)

Facility Type	Doctors	Nurses
Medical college hospitals	53	92
Dental college hospitals	27	95
District hospitals	28	99
General hospitals	11	69
Infectious disease hospitals	100	100
Chest diseases/ tuberculosis hospitals	100	100
Leprosy hospitals	65	90
Upazila health complexes	22	94
Union subcenters	0	0
Maternal and child welfare centers	46	61

Note: National estimates using data from Facility Efficiency Survey 2011.

Patient Delivery

All facilities provide both outpatient (Table 12) and inpatient services (Table 13), except for union subcenters, which provide only outpatient services, and chest disease/tuberculosis and infectious disease hospitals, which provide primarily inpatient services. MCHs are more focused on inpatient work, treating 10 times as many inpatients as UHCs, but only 3 times as many outpatients. Childbirth admissions represent 83% of admissions at MCWCs and 6% of admissions at UHCs but a much smaller proportion at MCHs.

The inpatient load increases in severity with the higher level of facility (Table 13). The annual numbers of major surgical interventions increase from 49 at the UHC level to 1,040 at the district hospital and general hospital level and 5,676 at the MCH level. The implied differences in severity also correlate with higher mortality rates at higher levels, ranging from 0.4% at the UHC level to 3.1% at the MCH level, as well as longer lengths of stay.

Table 12: Average Annual Number of Outpatient Services and Diagnostic Tests by Facility Type, 2010

Facility Type	Outpatient Visits	Dental Outpatient Visits	Immunizations	Laboratory Tests	Radiology Exams
Medical college hospitals	287,170	16,514	3,789	22,682	11,758
	(214,652–307,502)	(8,267–22,548)	(0–7,408)	(9,932–27,079)	(3,708–20,219)
Dental college hospitals	135,367	5,281	1,768	6,283	2,568
	(118,417–144,072)	(0–9,425)	(0–0)	(3,175–6,755)	(1,251–4,281)
District hospitals	177,623	8,966	23,930	3,855	2,093
	(133,575–139,325)	(7,877–8,549)	(0–5,606)	(1,998–5,080)	(1,360–2,017)
General hospitals	100,845	0	0	79,871	8,340
	(46,104–161,958)	(0–0)	(0–0)	(2,401–83,735)	(3,599–17,253)
Infectious disease hospitals	0	0	0	0	0
	(0–0)	(0–0)	(0–0)	(0–0)	(0–0)
Chest diseases/ tuberculosis hospitals	0	0	0	0	0
	(0–0)	(0–0)	(0–0)	(0–0)	(0–0)
Leprosy hospitals	9,562	0	0	357	0
	(9,562–9,562)	(0–0)	(0–0)	(357–357)	(0–0)
Upazila health complexes	81,431	3,004	20,054	2,635	300
	(50,941–94,949)	(0–2,213)	(0–22,501)	(1,144–3,165)	(0–593)
Union subcenters	15,300	0	0	0	0
	(9,728–17,520)	(0–0)	(0–0)	(0–0)	(0–0)
Maternal and child welfare centers	20,433	0	1,643	167	0
	(9,879–29,304)	(0–0)	(0–0)	(0–0)	(0–0)

Note: National estimates, with interquartile ranges in parentheses below.

Table 13: Indicators of Inpatient Activity by Facility Type, 2010

Facility Type	Admissions	Bed Occupancy Rate (%)	Average Length of Stay (no. of days)	Bed Turnover Rate	Major Surgical Operations	Case Fatality Rate (%)
Medical college hospitals	50,406	80	4.0	77	5,676	3.0
	(28,262–80,978)	(50–130)	(3.4–4.7)	(57–85)	(2,920–7,770)	(0.6–5.3)
Dental college hospitals	18,837	130	2.9	168	852	1.6
	(14,881–21,422)	(100–150)	(2.0–3.5)	(127–214)	(199–1,141)	(0.9–2.1)
District hospitals	18,203	110	5.4	87	1,227	1.0
	(7,498–26,080)	(80–130)	(4.5–5.2)	(50–104)	(972–1,449)	(0.6–1.3)
General hospitals	13,843	60	6.3	37	2,551	2.9
	(2,838–22,484)	(20–80)	(4.0–6.6)	(15–45)	(708–3,291)	(0–6.9)
Infectious disease hospitals	1,958	60	2.2	98	0	1.4
	(1,958–1,958)	(60–60)	(2.2–2.2)	(98–98)	(0–0)	(1.4–1.4)
Chest diseases/ tuberculosis hospitals	85	60	63.7	4	0	6.9
	(69–101)	(60–60)	(63.7–63.7)	(3–5)	(0–0)	(5.8–7.9)
Leprosy hospitals	79	50	43.2	4	0	0.0
	(79–79)	(50–50)	(43.2–43.2)	(4–4)	(0–0)	(0.0–0.0)
Upazila health complexes	4,043	90	2.8	119	49	0.4
	(2,648–5,104)	(60–100)	(2.3–3.2)	(83–145)	(0–0)	(0.1–0.5)
Union subcenters	1,012	50	3.3	56	194	0.2
	(561–1,048)	(30–50)	(2.6–3.9)	(28–52)	(0–335)	(0.0–0.1)

Note: National estimates, with interquartile ranges in parentheses below.

Deliveries account for a large proportion of all admissions at district hospitals, general hospitals, and UHCs, and most admissions at MCWCs. As shown in Table 14, there have also been significant increases in the number of childbirths at all types of facility since the FES 1998, but especially at UHCs.

Deliveries by Cesarean Section

There is considerable uncertainty about what is an optimal rate of cesarean sections in childbirth, owing to the difficulty in controlling for medical indications. The World Health Organization has suggested that 10%–15% is an acceptable overall rate but acknowledges that robust empirical evidence is lacking to support this (World Health Organization et al. 2009). However, there is consensus that in poor populations in developing countries low cesarean section rates reflect inadequate access to obstetric facilities, while in many higher-income populations in these same countries rates may be too high.

The proportion of babies delivered by cesarean section in MOHFW facilities is higher than the recommended World Health Organization levels at all facility levels, and has grown substantially since the FES 1998, increasing from 34% to 51% of all births at MCHs Table 14. There is also a change in rates at UHCs from zero to 19% during the same period, but this reflects an upgrading of services at UHCs, which in 1997 were not equipped to undertake cesarean sections at all. Table 15 also shows an upward trend in cesarean section rates from 2006–2010 in both DSF and non-DSF facilities. There is also a marked increase in rates at UHCs involved

in the universal DSF scheme, but this results in a convergence with rates in other UHCs, suggesting that the impact of the universal DSF scheme was to remove existing barriers to access that affected these facilities more.

These increasing trends and overall high rates are consistent with the national data reported by MOHFW, as well as the findings of the successive Bangladesh Demographic and Health Surveys (NIPORT, Mitra and Associates, and Macro International 2009, 2012).

When overall institutional births were low, as in the 1970s–1990s, a high cesarean section rate at institutions could be explained by the likelihood that the more difficult childbirths ended up in institutions, since the overall population rate was still low (Chowdhury et al. 2009). However, the recent increases in cesarean section rates at both public and private facilities make this explanation less valid, as the Bangladesh Demographic and Health Survey 2011 found that over 17% of all births are now by cesarean section and constitute 35% of all births to women in the richest quintile (NIPORT, Mitra and Associates, and Macro International 2012).

Consultation with local experts suggests that there are a number of other interrelated factors that may be contributing to increased cesarean section rates, such as increased age of marriage and first parity, as well as rising education levels and increased patient demand for the procedure, particularly in urban areas. Based on the data from the FES 2011, it is difficult to assess the exact causes of these increased rates, including whether these rates reflect increased admission of higher-risk mothers or if they are the consequence of unnecessary cesarean sections. In addition, it is unclear whether this increasing trend in babies delivered by cesarean section is a problem. This topic certainly warrants further investigation.

Table 14: Childbirth Admission Statistics at Major Facility Types, 1997 and 2010

Facility Type	Deliveries 1997	Deliveries 2010	Cesarean Sections 1997	Cesarean Sections 2010
Medical college hospitals	4,622	3,416	1,572	1,754
	(14.8)	(6.8)	(34.0)	(51.0)
District hospitals	392	1,269	52	321
	(5.3)	(6.7)	(13.3)	(25.3)
General hospitals	1,135	1,813	238	801
	(11.4)	(10.0)	(21.0)	(44.2)
Upazila health complexes	99	320	0	60
	(4.2)	(7.9)	(0.0)	(18.8)
Maternal and child welfare centers	0	840	0	277
	(0.0)	(83.0)	(0.0)	(33.0)

Note: Values in parentheses indicate the percentage of admissions that are deliveries, and the percentage of deliveries that are by cesarean section. The 1997 estimates are from the Facility Efficiency Survey 1998.

Table 15: Number of Cesarean Sections as a Percentage by Study Type, 2006–2010

Study type	2006	2007	2008	2009	2010
Universal DSF	7.5	9.3	14.2	21.5	21.6
Mean-tested DSF	15.1	19.5	22.9	26.0	26.5
HEU control UHCs (non-DSF)	3.7	1.1	2.9	6.2	4.8
Other UHCs (non-DSF)	17.9	18.7	21.4	22.7	23.9
Total	**17.5**	**18.4**	**20.9**	**22.6**	**23.7**

DSF = demand-side financing, HEU = Health Economics Unit, UHC = upazila health complex

Evaluation of Inpatient Delivery

Most facilities report high levels of bed occupancy rates, admission rates, and bed turnover (Table 13). Overall, these have substantially increased since the FES 1998, indicating significant increases in both patient demand and service delivery at MOHFW facilities, with reductions in very high bed occupancy rates at MCHs and general hospitals, and increases in bed occupancy rates at district hospitals and UHCs (Table 16). The highest occupancy rates are found at MCHs (80%), district hospitals (130%), and general hospitals (110%), compared with an average 90% occupancy at UHCs. The higher rate at higher-level facilities probably reflects patient preferences for the better care provided by higher-level facilities. The average length of stay is short, at 2.8 days at UHCs and district hospitals. This coupled with the high occupancy rates suggests that most of these primary-level facilities are operating close to or above optimal capacity levels.

Table 16: Inpatient Throughput Indicators, 1997 and 2010

Facility Type	Bed Turnover Rate, 1997	Occupancy Rate, 1997 (%)	Average Length of Stay, 1997 (no. of days)	Bed Turnover Rate, 2010	Occupancy Rate, 2010 (%)	Average Length of Stay, 2010 (no. of days)
Medical college hospitals	50	110	10.3	77	80	4.0
District hospitals	94	90	3.8	168	130	2.9
General hospitals	82	150	8.6	87	110	5.4
Upazila health complexes	74	70	3.9	119	90	2.8

Note: 1997 estimates are from the Facility Efficiency Survey 1998.

Performance indicators can be used to assess relative facility performance (Barnum and Kutzin 1993). Following the method of Pabón Lasso (1986), Figure 1 summarizes the pattern in bed occupancy and turnover rates (and therefore implicitly the average length of stay) in UHCs in the FESs 1998 and 2011. The crossed, bold horizontal and vertical lines in the diagram indicate respectively the mean values for turnover rates and bed occupancy, in the FES 1998. These divide the 1998 observations into four quadrants:

(i) hospitals with low bed turnover and low bed occupancy rates, indicating a surplus of hospital beds relative to the existing demand (lower-left quadrant I);
(ii) hospitals with high bed turnover and low bed occupancy rates, characterized by unnecessary hospitalizations, an oversupply of beds, or the use of beds for simply observing patients (upper-left quadrant II);
(iii) high bed turnover and high bed occupancy rate hospitals, characterized by hospitals that have reached an appropriate level of efficiency, with relatively few vacant beds at any time (upper-right quadrant III); and
(iv) hospitals with low bed turnover and high bed occupancy rates; these either are serving patients with more serious or chronic illnesses or have an unnecessarily long average length of stay (lower-right quadrant IV).

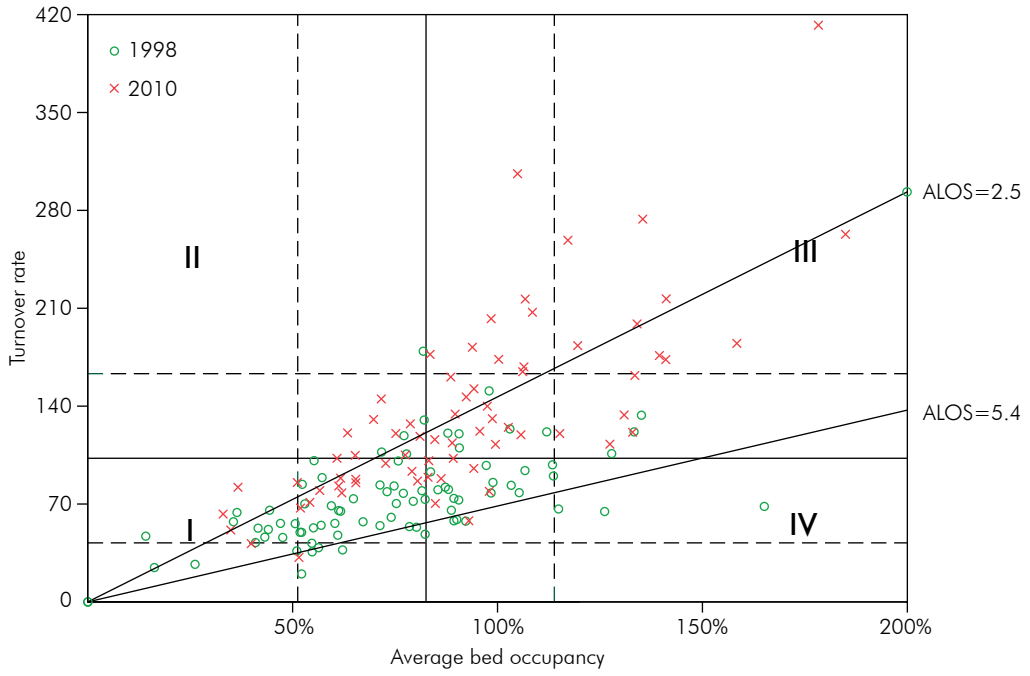
Note that as an average length of stay is equal to 365 times the ratio of the bed occupancy rate to the turnover rate, facilities lying along any straight line that passes through the origin have the same average length of stay. Two diagonal rays passing through the origin are shown, which represent points on which facilities have an average length of stay either one standard deviation below the FES 1998 mean

(average length of stay = 2.5 days) or one standard deviation above the FES 1998 mean (average length of stay = 5.4 days). Points above the upper diagonal ray represent facilities with lengths of stay less than 2.5 days, and those below the lower diagonal ray represents facilities with lengths of stay greater than 5.4 days. Points in between the two rays will have lengths of stay that are intermediate.

As the figure demonstrates, the distribution of UHCs in the FES 2011 has shifted upwards and to the right compared to the FES 1998, which means that the large increases in patient throughput at UHCs have involved increases in both bed turnover and bed occupancy rates. Almost one-half are also in quadrant III as defined by FES 1998 observations. This represents a significant improvement in overall efficiency, with most facilities in 2011 attaining efficiency levels that would have been considered above average or good in 1998.

Furthermore, the upward shift of the facilities indicates that many are achieving very short lengths of stay (i.e., less than 3 days), which implies that there is little room for improving output by reducing the average length of stay. Given that many of these facilities are also near or above 100% occupancy, these facilities lack the capacity to meet the presented demand by simply increasing patient flow rates. The overall implication of these results is that the bed supply is inadequate to meet overall patient demand, which in turn is relatively low compared to other countries (OECD 2010).

Figure 1: Changes in Inpatient Performance, Upazila Health Facilities, 1997–2010



ALOS = average length of stay

Facility Cost Structures

Detailed information was collected on costs at each facility. This was used, as described above, to estimate unit costs for services. These cost estimations are for recurrent costs only, and therefore underestimate full costs. In addition, costs of services administered and funded by the Family Planning Division were not considered.

Table 17 gives the overall distribution of costs by category in each group of facilities. Personnel costs account for a high 80% of total recurrent costs at UHCs. The proportion is lower at district hospitals, general hospitals, and MCHs, where spending on drugs and other medical supplies is relatively higher. Spending on medicines represent only 8% of recurrent budgets at UHCs and 13% at MCHs. This level is likely to be too low to be optimal.

Within inpatient facilities, inpatient services account for the greater share of all costs (Table 18). At UHCs, preventive services account for a large share of overall costs owing to the large numbers of health assistants positioned to support outreach activities. The cost mix for outpatient services is similar to that of inpatient services in all facilities, except that drug costs are relatively higher for outpatient services (Table 16 and Table 17).

Table 17: Distribution of Costs by Cost Category, Major Facility Types, FY2010 (%)

Cost Category	Personnel	Medicines	Medical Supplies	Other	Total
Medical college hospitals	56	13	7	25	100
General hospitals	56	14	16	14	100
District hospitals	56	18	7	19	100
Upazila health complexes	80	8	2	10	100
Maternal and child welfare centers	51	12	5	31	100
Union subcenters	86	11	3	0	100

Note: Estimates are for recurrent expenditures, FY2010.

Table 18: Distribution of Costs by Functional Activity, Major Facility Types, FY2010 (%)

Cost category	Inpatient	Outpatient	Preventive	Total
Medical college hospitals	82	18	0	100
General hospitals	77	23	–	100
District hospitals	69	31	–	100
Upazila health complexes	39	28	34	100
Maternal and child welfare centers	42	55	3	100
Union subcenters	–	95	5	100

Note: Estimates are for recurrent expenditures, FY2010.

Inpatient Unit Costs

Three indicators of inpatient costs were estimated: (i) annual cost per available bed, (ii) cost per bed-day occupied, and (iii) cost per admission. The average cost of an outpatient visit was also estimated. A summary of results is given in Table 19.

Specialized facilities, MCHs, general hospitals, and small inpatient facilities are the most costly facilities for the delivery of inpatient services. Surprisingly, but similar to the FES 1998 findings, the cost per available bed and per bed-day occupied is lowest in district hospitals and general hospitals, and highest in UHCs among major facility types.

There are several possible explanations for the relatively high unit costs at UHCs. First, UHCs have higher staff–bed ratios compared with district hospitals, general hospitals, and MCHs. Second, the staff mix at UHCs is more expensive than at district hospitals and general hospitals, which use relatively more nurses per doctor and fewer class III and class IV employees. Overall, the ratio of administrative and other support staff members to doctors and nurses is highest at UHCs, which would add to the relative cost of delivering services. Finally, patient demand is higher for the level of services offered by higher-level facilities than for those at UHCs. These results confirm the earlier finding of the FES 1998 that UHCs are of less-than-optimal size to achieve economies of scale.

Table 19: Unit Costs for Inpatient and Outpatient Services, FY2010

Facility Type	Bed Available per Year	Bed-Day Occupied	Admissions	Outpatient Visits
Medical college hospitals	239,652	989	3,812	132
	(193,973–296,913)	(545–1,314)	(2,955–4,408)	(66–277)
Specialized hospitals	425,906	3,482	17,388	505
	(223,527–568,270)	(1,276–6,300)	(8,392–26,878)	(376–539)
Infectious disease hospitals	235,368	1,112	2,404	–
	(235,368–235,368)	(1,112–1,112)	(2,404–2,404)	
Chest diseases/ tuberculosis hospitals	155,460	607	36,915	–
	(133,525–177,395)	(607–607)	(35,128–38,703)	
Leprosy hospitals	185,937	1,089	47,073	151
	(185,937–185,937)	(1,089–1,089)	(47,073–47,073)	(151–151)
General hospitals	263,050	734	4,396	98
	(230,992–293,260)	(496–1,096)	(2,214–5,867)	(86–121)
District hospitals	179,946	429	1,194	77
	(171,640–201,918)	(346–529)	(899–1,488)	(54–84)
Upazila health complexes	210,675	708	1,962	79
	(150,833–248,929)	(514–923)	(1,380–2,473)	(50–92)
Maternal and child welfare centers	36,469	316	932	47
	(31,210–49,583)	(110–329)	(552–1,196)	(35–48)

Note: Estimates use FY2010 actual expenditures and utilization data for the 2010 calendar year, interquartile ranges in parentheses below.

Outpatient Unit Costs

Outpatient unit costs are highest in specialized and higher-level facilities, such as MCHs and specialized hospitals (Tk505). However, they are lowest at UHCs, district hospitals, and MCWCs. This is a significant improvement since the FES 1998, when UHCs were found to be relatively high-cost in delivering outpatient services. Although overall cost structures have not changed, the increased patient throughput at UHCs would have reduced unit costs.

Figure 2 and Figure 3 illustrate the sensitivity of unit costs to patient utilization at UHCs. The greater the utilization, the lower the unit costs, which reflects the relatively static budgets provided to UHCs in particular. This suggests that a significant improvement in technical efficiency was obtained in Bangladesh as a result of increasing patient demand at facilities from 1997 to 2010.

Changes in Cost Efficiency 1997–2010

The FES 2011 data reveal that patient throughput has significantly increased at all types of MOHFW facility since 1997. The changes in key indicators at UHCs, the health facilities that account for one-half of all patient services, are summarized in Table 20.

There has been little expansion in the number of average beds but significant increases in numbers of key staff members (i.e., doctors, 44%; nurses, 51%), and even larger increases in inpatient volume by 72% and outpatient volume by 62%. This has been financed by a tripling of average facility budgets from Tk6 million to Tk18 million. The increase in inpatient volume has been accommodated through increases in bed turnover (61%) and in occupancy rates (15%), and a significant reduction in lengths of stay (–28%). The net result has been little change in the unit costs of admissions in nominal taka, and a modest increase in unit costs of outpatient visits.

Figure 2: Relationship between Inpatient Unit Costs and Admission Rates, Upazila Health Complexes, 2010

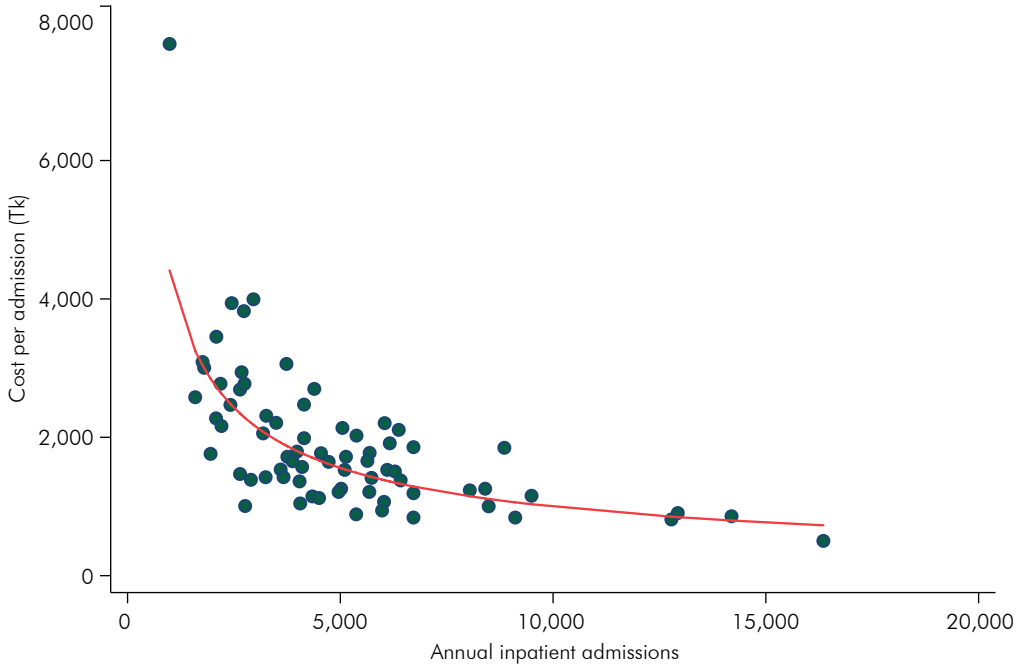


Figure 3: Relationship between Outpatient Unit Costs and Outpatient Visits, Upazila Health Complexes, 2010

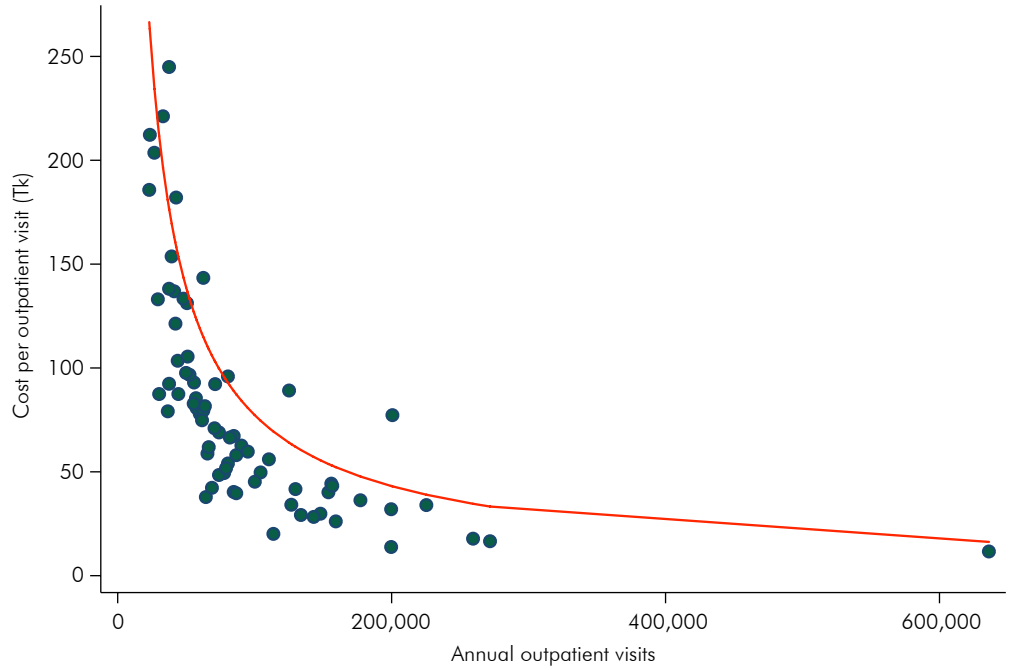


Table 20: Changes in Key Operating Indicators at Upazila Health Complexes, 1997–2010

Indicators	1997	2010
Inputs		
Total recurrent expenditures (Tk million)	6.28	18.23
Medicines expenditures (Tk million)	0.27	2.0
Hospital beds	31.7	34.8
Doctors	4.3	6.2
Nurses	6.3	9.5
Outputs		
Admissions per year	2,347	4,043
Outpatients per year	50,228	81,431
Inpatient Efficiency Indicators		
Bed turnover rate (annual)	74	119
Bed occupancy rate (%)	75	90
Average length of stay (no. of days)	3.9	2.8
Unit Costs		
Admissions (Tk)	1,938	1,962
Outpatients (Tk)	63	79

Notes: Estimates for 1997 from Facility Efficiency Survey 1998, and for 2010 from the Facility Efficiency Survey 2011. Statistics are weighted means.

In real terms, the increase in average operating budgets is only double, and unit costs for both inpatient admissions and outpatient visits have fallen. This is illustrated in Table 21, which shows the changes in unit costs when deflated using the gross domestic product (GDP) deflator for Bangladesh to account for changes in prices. In constant taka terms, unit costs of admissions have almost halved, and those of outpatient visits have changed little.

However, the GDP deflator, or only accounting for general price changes, underestimates the changes in affordability of these services. Given that health services are labor-intensive, and the general tendency of government revenue to increase in line with GDP, an alternative deflator is nominal GDP per capita. The bottom panel of Table 21 shows the relative unit costs of patient services using this as the deflator. Compared to changes in GDP per capita, overall operating budgets have fallen, and unit costs for admissions have fallen by two-thirds, and for outpatient visits by one-half. What this means is that for any given level of health spending as a share of GDP, UHCs can deliver 3 times as many inpatient episodes and twice as many outpatient visits in 2010 as they could in 1997. These are significant increases in output, and imply that even at current levels of expenditure effort, Bangladesh can achieve substantial increases in service delivery if it continues to achieve increases in operating efficiency. This finding is consistent with the global evidence that most public sector delivery systems do sustain continuous improvements in service delivery efficiency and productivity, typically of the order of 1%–3% per year (Rannan-Eliya 2009).

Table 21: Changes in Budgets and Unit Costs of Patient Services in Real Terms, Upazila Health Complexes, 1997–2010

Indicators	1997	2010
Nominal Taka		
Total recurrent expenditures (Tk million)	6.28	18.23
Cost per admission (Tk)	1,938	1,962
Cost per outpatient visit (Tk)	63	79
Constant 2010 Taka		
Total recurrent expenditures (Tk million)	11.71	18.23
Cost per admission (Tk)	3,617	1,962
Cost per outpatient visit (Tk)	118	79
Deflated Using GDP per Capita		
Total recurrent expenditures (Tk million)	21.14	18.23
Cost per admission (Tk)	6,525	1,962
Cost per outpatient visit (Tk)	212	79

GDP = gross domestic product

Note: Constant 2010 Taka estimates derived using GDP deflator from World Bank (http://data.worldbank.org/indicator/NY.GDP.DEFL.ZS). GDP per capita in nominal taka used to deflate lowest three rows derived from World Bank WDI Online data on GDP and population.

It is beyond the scope of this study to explain what has driven these improvements in operating efficiency. However, two possible factors are suggested. One factor is increasing awareness of services by the population leading to increasing demand. Simply increasing patient demand would act to reduce unit costs, given that UHCs can accommodate substantially more patients. The FES 1998 study found that most UHCs were operating at below-optimal levels of utilization, and that opportunities existed to achieve substantial economies of scale by expanding patient volume, while keeping staffing numbers constant. The second is the substantial increase in the observed budget allocation to medicines, from 4.3% to 10.9%. Availability of medicines is a common determinant of patient demand for services at healthcare facilities, and if this increase in spending had resulted in increased availability of medicines at UHCs, this may have encouraged increased patient utilization.

Quality

A critical issue is whether these changes in unit costs and cost-efficiency have been at the expense of quality. There are two types of quality that would be relevant: quality of clinical care or technical quality, and patient satisfaction or consumer quality. Unfortunately, there is a lack of systematic data that can be used to assess changes in any of these aspects of quality over time. A number of ad hoc studies have examined both clinical and consumer-observed quality levels at single points in time (Siddiqui and Khandaker 2007), but none of these have been repeated. The most that can be said is that case fatality rates have fallen between the FES 1998 and FES 2011 studies in all levels of facility (Table 22). This may be because clinical care has improved, or because the average severity of inpatient cases has fallen, or both. However, there is no evidence of substantial reductions in clinical quality in MOHFW institutions during this time, so technical efficiency gains may not have been achieved at the expense of quality. This conclusion would be reasonable in a global context, since long-term increases in patient throughput and reductions in cost-efficiency have been accompanied elsewhere, usually by improvements in quality (Rannan-Eliya 2009).

Further work on this issue is clearly warranted. One way in which clinical quality could be monitored would be for the Inpatient Admissions Records Survey 2006–2007 to be repeated on a regular basis, and for its data to be routinely analyzed to assess quality. This survey, which collected data on the diagnosis, patient demographics, and treatment interventions of a national sample of inpatients, provides an opportunity to track quality of care over time.

Table 22: Changes in Case Fatality Rates by Facility Level, 1997 and 2010 (%)

Facility Type	1997	2010
Medical college hospitals	9.6	3.0
District hospitals	3.2	1.6
General hospitals	12.1	1.0
Upazila health complexes	1.8	0.4
Maternal and child welfare centers	–	0.2

Note: 1997 estimates are from the Facility Efficiency Survey 1998.

Equity

An important aspect of government healthcare delivery is the extent to which is it is accessible by the poor. MOHFW's goals include not only increasing service delivery but also improving coverage of the poor. Overall healthcare utilization in Bangladesh, in both public and private sectors, is inequitable and pro-rich (O'Donnell et al. 2007). Although equity was not assessed in the FES 1998 study, the FES 2011 study does so by also including an additional patient exit survey. This additional survey, the PES 2011, collected data on the socioeconomic characteristics of a sample of patients using the surveyed facilities, which permits categorization of them by wealth quintiles. This patient survey, the detailed findings of which are reported in the accompanying Technical Report B, confirms the overall inequality in healthcare use of MOHFW facilities. Overall inequality in use of MOHFW facilities is high, although less in MCWCs and UHCs than in MCHs (Table 23).

Table 23: Inequalities in Utilization of Patient Services by Wealth Quintile (%), by Facility Type, Patient Exit Survey 2011 Estimates

Facility Type	Poorest	Q2	Q3	Q4	Richest	Concentration Index
Outpatients						
Medical college hospitals	1.4	3.8	17.0	26.7	51.1	0.50*
District hospitals	1.7	3.3	17.0	40.6	37.5	0.43*
General hospitals	0.0	4.6	6.9	33.7	54.9	0.56*
Upazila health complexes	2.5	6.5	17.6	38.9	34.5	0.38*
Maternal and child welfare centers	0.6	4.0	8.3	28.5	58.7	0.58*
All patients	2.6	5.8	16.7	37.9	36.9	0.41*
Inpatients						
Medical college hospitals	2.7	3.0	23.0	33.7	38.3	0.40*
District hospitals	2.2	3.9	17.8	42.1	34.0	0.40*
General hospitals	0.0	11.0	16.8	31.1	41.1	0.39*
Upazila health complexes	3.0	7.8	19.4	41.5	28.4	0.35*
Maternal and child welfare centers	0.0	1.8	3.8	43.0	51.3	0.57*
All patients	2.6	5.3	17.7	37.6	36.8	0.42*

Q = quintile

Notes: Results are weighted to represent national means across all patients. Asterisks indicate statistical significance of concentration indices: * $p < 0.001$. The concentration index is a summary measure of overall inequality, ranging from -1.0 (complete pro-poor inequality) through 0 (perfect equality) to +1.0 (complete pro-rich inequality).

The PES 2011 results cannot be compared with the situation in 1997, as no patient exit survey was conducted then. However, evidence from the Household Income and Expenditure Surveys, conducted by Bangladesh Bureau of Statistics, suggests that inequality in use of government health facilities has not improved significantly in the previous 15 years.

Cost Differences between Demand-Side Financing and Non-Demand-Side Financing Facilities

An important intervention by MOHFW in recent years to improve overall access to MNCH care is the piloting of DSF schemes at UHCs, which provide incentive payments to both patients and healthcare institutions to increase use of MNCH services. A more detailed discussion of these schemes and the findings from the FES 2011 and PES 2011 are given in the accompanying Technical Report B.

The schemes, which consist of both means-tested and universal variants, pay supplementary amounts to participating institutions, depending on the numbers of mothers using the scheme. This is reflected in higher overall costs or expenditures by DSF-scheme facilities, as shown in Table 24. Annual expenditures at DSF-scheme facilities are on average Tk4 million–Tk5 million higher than in non-DSF UHCs. However, these higher expenditures are mostly incurred on personnel costs and not on medicines. This is expected, as it is consistent with the scheme procedures. Medicines expenditures are similar across all categories of UHCs. However, because overall patient throughput is much higher in DSF-scheme UHCs, average unit costs are much lower. This suggests that it is primarily the effects of the DSF schemes on patient demand and staff behavior that drive the overall increases in outputs at these facilities.

Table 24: Differences in Cost Levels and Unit Costs between Demand-Side Financing and Non-Demand-Side Financing Upazila Health Complexes

Indicator	Non-DSF	Means-Tested DSF	Universal DSF
Hospital beds	34	42	37
Total recurrent expenditures (Tk million)	17.6	22.4	21.3
Medicines expenditure (Tk million)	2.59	2.17	2.48
Medicines expenditures as share of budget (%)	14.7	9.7	11.7
Total recurrent expenditures per bed (Tk)	540,600	555,855	589,119
Medicines expenditure per bed (Tk)	38,636	26,075	36,073
Cost per admission (Tk)	1,960	1,661	1,286
Cost per outpatient visit (Tk)	79	100	60

DSF = demand-side financing.
Note: Statistics are mean values for facilities in survey sample.

IV. CONCLUSIONS

The FES 2011 demonstrated the feasibility of assessing costs and efficiencies in MOHFW facilities using a sample survey. Furthermore, the comparability of the FES 2011 with the earlier FES 1998 provides the data to analyze changes in facility performance between the two surveys. However, gaps remain in the data from the FES 2011 and linked PES 2011, which limit the conclusions that can be drawn. These primarily relate to the quality of service delivery. Information on quality is needed to make a full assessment of cost and efficiency changes. Experience with the Inpatient Admissions Records Survey 2006–2007 suggests such quality data can be collected in a systematic manner using sample surveys. Collection and linkage of such data to a cost survey would make both types of data much more useful for policy makers and researchers. It is recommended that the Health Economics Unit repeats the Inpatient Admissions Records Survey 2006–2007 and FES 2011 every few years and in combination so the data can be linked. This would support continuous tracking of changes in facility performance and efficiency, and better assessment of efficiency adjusting for quality.

Of the various facilities that MOHFW operates, UHCs, district hospitals, and MCHs dominate inpatient service delivery, accounting for over 85% of all patient admissions in 2010, and almost 95% of institutional deliveries. UHCs, union subcenters, district hospitals, and MCHs dominate outpatient delivery, accounting for almost 90% of outpatient service delivery by MOHFW institutions. UHCs are the key health facility, accounting for almost one-half of all inpatient admissions, institutional deliveries, and outpatient visits.

The primary use of resources at higher-level facilities is to provide inpatient services. About 60%–80% of the budget at district hospitals, general hospitals, and MCHs is used for this purpose. However, only 39%–42% of the budget is used for inpatient services at UHCs and MCWCs. In the case of UHCs, this is because one-third of expenditures are for preventive service provision, and in the case of MCWCs, because of their focus on outpatient care provision.

The average cost of an inpatient admission was Tk1,635 in FY2010, and that of an outpatient visit, Tk70. There is less variation in unit costs between facilities than there was in 1997, with most UHC costs being closer to average levels. There were no systematic differences in unit costs between different divisions.

The FES 2011 was accompanied by the linked PES 2011. Its results show that overall utilization of services of MOHFW facilities at all levels is inequitable and pro-rich. Inequality in utilization is also greater at higher-level facilities.

Compared to the findings of the FES 1998, overall patient utilization at MOHFW facilities has significantly increased. This has been achieved by significant improvements in operating efficiency and increases in bed turnover rates, with the average length of stay declining across all facilities, with the largest reductions seen at MCHs where the average length of stay has declined from over 10 days to less than 4 days. High levels of utilization characterize all major types of inpatient facility, with bed occupancy averaging 80%–100% at UHCs and MCHs, and over 100% at district hospitals. These high levels are due primarily to a high number of admissions in relation to available beds, since average lengths of stay are short at less than 4 days. In comparison with the situation in 1997 examined by the FES 1998, occupancy rates have fallen at MCHs and general hospitals, which used to have the highest occupancy rates often in excess of 100%, but increased at district hospitals and general hospitals. This suggests that patient demand has either shifted to where the available beds are, or that facility provision has adjusted better to match patient demand. In parallel with the increase in patient throughput, staffing has

increased in most facilities; this was much less than the increase in patients. The ratios of patients to staff members have thus increased, which probably reflects improvements in staff productivity.

However, it is impossible to assess how these improvements have affected or been at the expense of quality. There is almost no data to make this assessment. All that can be noted is that case fatality rates have substantially improved since 1997, implying improvement in some aspects of clinical care quality. As quality is an important aspect of overall care delivery, future studies like this should collect data on patient treatment process and patient outcomes to also assess changes in quality.

The overall picture of low lengths of stay and high bed occupancy rates indicates that secondary and tertiary facility provision by government is inadequate to meet demand, despite substantial efficiency gains by MOHFW healthcare institutions. Service provision needs to be substantially expanded, and particularly at the level of UHCs and district hospitals. Overall healthcare utilization of inpatient and outpatient services in Bangladesh remains low compared to other Asian countries. Outpatient visits to physicians probably number less than 2 per capita per year compared with 4–6 in Asia as a whole, and inpatient admissions number less than 40 per 1,000 capita per year compared with 130–140 on average in Asian countries (OECD 2010). Clearly, supply constraints are more important than demand constraints in explaining the low level of healthcare utilization in Bangladesh.

Facility budgets have been static in real terms, so this has led to substantial reductions in the real cost of patient delivery. In real terms, overall unit costs are one-half to one-third of the levels in 1997. These findings demonstrate that the MOHFW delivery system has not only expanded delivery of services in the previous decade, but that it has been able to finance much of the increase through efficiency gains. If further efficiency gains can be achieved, the cost of expanding service delivery will be much less than often feared. A critical question is then what can be done to encourage and facilitate further efficiency gains. This question should be a priority for further research. The FES 2011 results only provide some potential directions to answering this. Clearly overall staff productivity has changed. Patient throughput has increased, as evidenced by the shorter lengths of stay, but the drivers of this need investigation. Further, the increase in budget allocations to medicines may have had a positive impact. Evidence from other countries generally supports the idea that medicines supply is a key element of quality as assessed by potential patients, so improving the availability of medicines would increase patient demand and thus drive unit costs lower.

The results imply that further expansions in the delivery infrastructure are also needed, as most facilities are operating at optimal or above-optimal levels of utilization, with the system as a whole evidencing problems of undersupply. Nevertheless, Bangladesh can achieve substantial increases in service coverage through future efficiency gains, even if it does not substantially increase government health expenditures as a share of national income. However, a mix of more budgetary funding and further efficiency gains would be the more optimal outcome.

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For More Information

This AusAID financed ADB RETA 6515 project, with support from the Health Economics Unit of the MOHFW, conducted several studies on out-of-pocket expenditures on maternal, newborn, and child health (MNCH) in Bangladesh including an analysis of household OOP expenditures, public sector facility costs, an exit survey of OOP expenses, and overall MNCH expenditures.

Publications on these findings are available from:
ADB: www.adb.org/publications/
Health Economics Unit of the MOHFW: www.heu.gov.bd/

Other publications from this project on the impact of out-of-pocket expenditures on MNCH in Asia and the Pacific are available at www.adb.org/publications/

Impact of Maternal and Child Health Private Expenditure on Poverty and Inequity in Bangladesh

Bangladesh Facility Efficiency Survey 2011: Technical Report A

The efficiency and cost of Ministry of Health and Family Welfare (MOHFW) healthcare services in Bangladesh are critical constraints on how far the Government of Bangladesh can expand healthcare coverage in the country. Regular information can assist MOHFW in improving the efficiency of service delivery.

The Bangladesh Facility Efficiency Survey (FES) 2011 surveyed the services and costs in a nationally representative, stratified sample of 135 Ministry of Health and Family Welfare (MOHFW) facilities. The sample included medical college hospitals (MCHs), specialized hospitals, district hospitals, general hospitals, upazila (subdistrict) health complexes (UHCs), maternal and child welfare centers (MCWCs), and union subcenters. Service indicators and recurrent unit costs for outpatient and inpatient services were estimated for fiscal year (FY) 2010, and assessments are made of efficiency gains since 1997, when the last Bangladesh Facility Efficiency Survey was conducted.

The FES 2011 shows that there are high levels of utilization in all major types of inpatient facilities, with bed occupancy averaging 80%-100% at UHCs and MCHs, and over 100% at district hospitals. Since 1997 patient throughput has substantially increased, and been accommodated by significant improvements in operating efficiency, reflected in a decline in average lengths of stay across all facilities. Quality of care seems not have been negatively impacted, as case fatality rates have substantially improved since 1997.

There has been little increase in real terms in facility operating budgets since 1997, so overall unit costs have been reduced substantially to one-half to one-third of 1997 levels. The findings suggest that the MOHFW delivery system has not only expanded delivery of services in the past decade, but that much of the increase has been financed through efficiency gains.

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