Social Sector
Performance Surveys

Primary Health and Family Planning in Bangladesh

Assessing Service Delivery

Final Report
September 2005

For further information:

Simon.hunt@opml.co.uk
Team leader of Social Sector Performance
Surveys Financial Management Reform
Programme Bangladesh

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Preface

This report presents the results of the *Health and Family Planning Social Sector Performance Survey*. This was one of three surveys undertaken with the purpose of increasing the effectiveness and equity of public spending on these priority services. They were undertaken as part of the Financial Management Reform Programme (FMRP), which has as its goal 'to improve the efficiency and effectiveness of the allocation of public resources and to achieve a more equitable and improved public service delivery'.

Acknowledgements

Abbreviations

AG	Auditor General
AHI	Assistant health inspector
ANC	Antenatal care
ARI	Acute Respiratory Infection
ATP	Advanced Tour Programme
AUFPO	Assistant Upazila Family Planning Officer
BCC	Behavioural Change Communication
BOC	Bangladesh Oxygen Company
BP	Blood pressure
CAR	Contraceptive Acceptance Report
CDD	Control of Diarrhoeal Diseases
CIET	*Centro de Investigación de Enfermedades Tropicales* (Tropical Disease Research Centre).
CGA	Controller General of Accounts
CMMU	Central Medical Maintenance Unit
CMSD	Central Medical Supplies Department
CS	Civil Surgeon
DAO	District Accounting Officer
DD FP	Deputy Director Family Planning
DDO	Drawing and Disbursement Officer
DEA	Data Envelope Analysis
DGFP	Directorate General of Family Planning
DGHS	Directorate General of Health Services
DH	District Hospital
DRS	District Reserve Stores
EDCL	Essential Drug Company Ltd
EOC	Emergency Obstetric Care

EPI	Expanded Programme of Immunisation
ESP	Essential Service Package
FAPA	Foreign Aid Project Audit
FMRP	Financial Management Reform Programme
FPI	Family Planning Inspector
FTL	Field team leader
FWA	Family welfare assistant
FWV	Family welfare visitor
FY	Financial year
GoB	Government of Bangladesh
HA	Health assistant
HEU	Health Economics Unit
HI	Health Inspector
HIES	Household Income and Expenditure Surveys
HNPSP	Health, Nutrition and Population Sector Programme
HPSP	Health and Population Sector Programme
HRD	Human Resource Department
ICR	Internal Control Register
IM	Intramuscular
IPHN	Institute of Public Health and Nutrition
IUD	Intrauterine device
IV	Intravenous
LAMB project	Lutheran Aid to Medicine in Bangladesh
LCA	Leprosy Control Assistant
LD	Line Director
LLP	Local Level Plan
LMIS	Logistics and Management Information System
LPR	Leave Pending Retirement

MA	Medical assistant
MCH	Maternal and child health
MCWC	Maternal and Child Welfare Centre
MIS	Management Information System
MoF	Ministry of Finance
MO	Medical officer
MO (FW)	Medical officer (family welfare)
MO (SC)	Medical officer (sub centre)
MoHFW	Ministry of Health and Family Welfare
MO-MCH	Medical Officer – Maternal and Child Health
MR	Menstrual regulation
MSR	Medical and Surgical Requisites
OCP	Oral contraceptive pill
ORS	Oral rehydration salts
PHD	Public Health Department
PNC	Postnatal care
QA	Quality Assurance
RMO	Resident medical officer
SACMO	Sub-assistant community medical officer
SoE	Statement of expenditure
TB	Tuberculosis
Tk	Taka
TTBA	Traditional birth attendant
UAO	Upazila Accounting Officer
UFPO	Upazila Family Planning Officer
UFWC	Union Family Welfare Centre (sometimes FWC)
UHC	Upazila Health Complex
UHFPO	Upazila Health and Family Planning Officer

UHFWC   Union Health and Family Welfare Centre

USC   Union Sub-Centre

WHO   World Health Organization

Executive summary

Introduction

This report presents the results of the *Health and Family Planning Social Sector Performance Survey*[1]. It aims to stimulate policy debate and to support the public sector in becoming more performance-oriented and accountable. It does this by providing detailed information on primary health care and family planning service delivery, the beneficiaries, the management hierarchy supporting service delivery and the effectiveness of the public expenditure that finances it.

Much of the survey data covers the period between July 2003 and June 2004, which marked a watershed in the sector's development. The first Health and Population Sector Programme (HPSP) had ended and the subsequent Health, Nutrition and Population Sector Programme (HNPSP) was beginning. It was also a time of substantive organisational change in the Ministry of Health and Family Welfare (MoHFW) as the Health and Family Planning directorates de-unified. The survey can thus assess the operation of MoHFW services at this point and provide a baseline for developments over the coming years.

The purpose and scope of the survey were agreed by the Ministry of Finance (MoF), and detailed dialogue on the content was undertaken with the MoHFW. A stratified, clustered sample was designed around upazila- and union-level MoHFW facilities and the administrative hierarchy above them. These facilities are the main vehicle for delivering primary services. The estimates produced are nationally representative.

The report is arranged as follows:

- design and implementation of the survey is outlined in Chapter 1;
- service delivery, both in terms of the volume of outputs and quality of services, is assessed in Chapter 2;
- magnitude, distribution and management of vital inputs into the health system are assessed in the next four chapters. These cover finance (Chapter 3), human resources (Chapter 4), drugs and supplies (Chapter 5) and infrastructure and equipment (Chapter 6);
- equity implications of observed patterns of service delivery and resource availability are discussed in Chapter 7;
- issues concerning the sector's performance are discussed in Chapter 8, with a focus on measures of efficiency and productivity; and
- conclusions are drawn in Chapter 9.

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[1] The survey was one of three undertaken with the ultimate objective of increasing the effectiveness and equity of public spending on these priority services. It has been undertaken as part of the FMRP.

Survey findings

The publicly provided primary health and family planning services are functioning in Bangladesh. Facilities are open and staffed with medical or paramedic workers. Essential drugs and commodities are largely in stock. Some services—particularly outpatient, immunisation and family planning services—are used quite widely by the surrounding population. This is a considerable achievement, given that the MoHFW resources for upazila-level services amount to only 80 Taka (Tk) *per capita*, on average.

Chapter 2—Service delivery (p. 9 onwards)

Chapter 2, section 2.2 looks at the volume of service delivery. It shows that outpatient services provided by the Directorate General of Health Services (DGHS) are often very busy: the busiest Upazila Health Complexes (UHCs) and union facilities see over 9,000 and 2,000 outpatients a month, respectively[2]. This output translates into high levels of use by the catchment population. On an annual basis, DGHS outpatient utilisation is equivalent to 0.41 visits *per capita* at the UHC and 0.72 visits *per capita* at union facilities. Inpatient services at the UHC have fairly high rates of bed-utilisation, and vaccination and family planning services also operate at sizeable volumes. Through comparisons with previous surveys, it appears that UHC service volumes have increased quite markedly over the last five to seven years.

Some services, however, are poorly utilised. Outpatient services provided by Directorate General of Family Planning (DGFP) operate at a low level, possibly due to the irregular supply of drugs during 2003 and 2004. Facility-based deliveries account for only 2.7% of expected births. Antenatal and postnatal consultation rates are low. Combined with evidence about the availability of key obstetric staff, equipment and medicines, this presents a worrying picture of maternity services at upazila level.

As might be expected in Bangladesh, there is considerable seasonal variation in service delivery. This pattern of service delivery is not matched by the pattern of resource availability. There is also considerable variation in service utilisation between different areas: for DGHS outpatient services, some upazilas have up to three times more contacts *per capita* than others.

Section 2.3 looks at the quality of health services and raises concerns that put the high volume and utilisation of some services into perspective. A case study test of clinical knowledge taken by key workers shows both a low average level of knowledge, and considerable variation in knowledge between different workers. Only around one-third of patients were prescribed an appropriate choice of drug in appropriate doses and durations given their symptoms / conditions. The efficacy of drugs dispensed might, in any case, be compromised by poor storage conditions, as only 2% of storerooms meet World Health Organization (WHO) storage guidelines.

The user's experience of services is also investigated. Not one community group reported the nearby MoHFW facility to provide services for more than six hours a day, and more than half reported service availability was less than four hours a day. Patient consultations are short (particularly for DGHS services) and rarely involve either a physical examination or a written prescription. On a positive note, patient satisfaction seems high: most patients thought the health or family planning worker explained treatments 'reasonably well' or 'well' and that the provider was 'very pleasant' or 'pleasant' during consultation.

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[2] There is a table of key estimates at the end of this executive summary that illustrates some of the key findings of the survey.

There was practically no evidence from the patient exit poll interviews of payment for outpatient services, and it is thought that these services are genuinely free in most cases. However, results from the community interview show that one-quarter of communities do report the need to pay (quite significant amounts) for UHC consultations. One-fifth of communities report the need to pay for union-level services. It is thought that these contrasting results between patient and community interviews reflect a dual system of free (and brief) outpatient services operating alongside the option for more thorough consultations that are provided by health workers on a private basis. Users from communities that report payment tend to be better off than the average user.

Most of the service volume information in Chapter 2 relies on data from service registers and Management Information System (MIS) reports as the basis for analysis. However, investigation reveals widespread discrepancies in the way registers count repeat visits by patients, field patients and vaccinations, and in the way MIS aggregate this information. This finding indicates that the comparability of service statistics is limited. Moreover, a comparison of patient registers with patient headcounts observed by survey teams shows evidence of inflation of patient numbers in the registers, particularly at union level.

Chapter 3—Finances (p. 25 onwards)

Chapter 3, section 3.2 investigates financial inputs. Budgetary allotment for MoHFW services at the upazila level is only 80 Tk or US$1.4 *per capita* for non-sadar upazilas. This level of resources is considerably below that required to deliver comprehensively the Essential Service Package (ESP), Bangladesh's package of essential primary health services. The development budget (through which donor finance is channelled) accounts for a negligible proportion of this 80 Tk allotment.

Low absolute levels of finance notwithstanding, the allocation of resources could be improved. Non-wage allocations need to be increased—84% of the DGHS's and 91% of the DGFP's upazila-level allotment is earmarked for human resources. This contrasts with less than 1% of the overall MoHFW budget allocated for maintenance. As the budgets for drugs, maintenance and human resources are effectively controlled by higher levels, upazila-level managers have managerial discretion over less than 9% of their total allotment.

Overall disbursement rates are generally high, at 92% for the DGHS and nearly 97% for the DGFP, although there are some large variations between line-items and operational levels. The lowest disbursement rate is for maintenance expenditure, although this may reflect completeness of records and / or completion of works after the close of the financial year (FY), rather than actual under-spending.

Section 3.3 investigates financial management: systems are in place and operational; budgetary allotments arrive at spending units; accounts are kept and submitted; audits take place; and salaries are mainly paid on time.

However, there are some areas of concern. The first and third routine allotments arrive up to two months late for a number of DGHS facilities, and for DGFP less than 23% of total annual allotment was received in the first six months of the FY. This dramatically concentrates expenditure towards the end of the FY, with some line-items posting up to 40% of annual expenditure in June alone. Some line-items see a significant proportion of allotment arrive through emergency allotments. Seventy-seven percent of upazila DGHS offices are in debt.

There is a widespread discrepancy between the expenditure accounts kept by the CGA from upazila accounts offices, those kept by the DGHS finance department, and the upazilas themselves. CGA accounts record higher levels of expenditure than the DGHS

finance department accounts—for the field level up to 56% more. This raises concerns about how effectively expenditure can be monitored.

Audits are carried out frequently, but facilities sometimes do not receive a copy of their audits and thus do not know if they raise any queries. At the upazila level, only 49% of Auditor General (AG) and 34% of MoHFW audit queries are resolved.

There is survey evidence of informal payments being made to receive allotment letters from central finance departments in both directorates, and to get expenditure bills passed by the Accountant General's upazila accounts officer. The value of these payments is mainly set as a proportion (often 5%) of the allotment letter or expenditure bill concerned. The survey suggests that the informal payment system is widely entrenched.

Chapter 4—Human resources (p. 45 onwards)

Chapter 4, section 4.2 looks at human resource availability. The number of nurses, medical assistants (MAs), family welfare visitors (FWVs) and field workers per facility is relatively close to MoHFW standards. However, some 39% of UHCs have no resident medical officer (RMO) and nearly 60% of union sub-centres (USCs) have no medical officer (MO) in post. There is a general shortage of MOs at the UHC compared with MoHFW standards. Overall vacancy rates for Class I officers (almost all of whom are MOs) are around 42% for DGHS and 27% for DGFP in non-sadar upazilas. The majority of Class I officers are male, ranging from 61% of DGFP officers at union facilities to 91% for DGHS officers at the UHC.

Ratios of population to key workers are high, and for MOs this ratio has deteriorated in FY 2003/04. There is up to a 4:1 ratio for certain key workers between the poorest staffed upazilas and the best staffed, suggesting inequitable deployment. There are also some wide variations in the ratios between different types of workers (for instance nurse: MO) suggesting quite different mixes of workers are used to deliver services.

Section 4.3 looks at human resource management. Much of the analysis investigates the incentive framework for key workers. Salary scales are fairly compressed and there is evidence that remuneration varies between UHC and union levels, sadar and non-sadar facilities, and between sub-assistant community medical officers (SACMOs) and MAs. There is a problem of access to MoHFW accommodation. It is particularly acute for DGFP MOs at the UHC, and DGHS doctors at union level. Other sources of income in addition to the government salary are common, and the levels earned are high: for Class I officers they often approach or exceed MoHFW remuneration levels. The DGFP has problems paying its workers on time, particularly at the union level. In-service training varies greatly between different designations of worker.

The incentive framework thus has several areas of weakness, particularly for more senior workers and if they are based at union facilities. Some of the manifestations of this include: the aforementioned high level of vacancies, a high level of turnover (the annual transfers of Class I officers in-and-out of upazila-level posts represents an average of 80% of all these posts); short average duration of key workers in post; and problems of absenteeism. The survey used a carefully developed methodology to separate absences into those that can be explained legitimately and those that remain unexplained. As a result of this methodology, unexplained absences are generally lower than those implied by other studies, for instance that of the World Bank (Chaudhury and Hammer, 2003). Unexplained absences are highest for DGHS MOs at union level, and nurses at the UHC.

This chapter on human resources consistently identifies issues with MOs posted at USCs. They receive lower salaries and allowances than their peers at the UHC and only 2% stay in government housing. There are high vacancy rates (60%) for the post, short tenures of post

(nearly 50% have been in post for less than a year). One of the greatest problems is with unexplained absences (22% of those in post) and also high levels of absenteeism that can be explained. This suggests either that a better package of incentives and supervision will need to be provided for union level MOs, or that the objective of posting one officer per union facility should be reviewed.

Chapter 5—Drugs and supplies (p. 67 onwards)

Chapter 5, section 5.2 investigates drugs and supplies. There is generally reasonable availability of essential drugs and commodities at both UHC and union level, including at DGFP facilities. The exception is for safe motherhood drugs, which are unavailable in up to three-quarters of UHCs—some facilities said they never had these drugs in stock.

Upazila drug expenditure is low, with a mean of 3.5 Tk *per capita* from the Medical and Surgical Requisites (MSR) budget, and 1.6 Tk *per capita* from the Central Medical Supplies Department (CMSD). There is a high degree of variation in expenditure. The best-supplied upazilas have over four times the *per capita* drug resources of the worst supplied. UHC expenditure records show that, on average, UHCs receive their full MSR allotment. However, union facilities receive an average of 14% less than their MSR allotment of 75,000 Tk each. Whilst the CMSD looks to partially offset variations in the MSR supply, 34% of upazilas received no supply from the CMSD at all. Identifiable receipts of supplies from vertical programmes (such as the Acute Respiratory Infection (ARI) programme or the Emergency Obstetric Care (EOC) programme) via CMSD are low.

Section 5.3 investigates drug and supplies management. Drug supply systems vary from upazila to upazila and more than one-third do not supply the USCs direct from the District Reserve Stores (DRS), as intended. The requisition process is largely meaningless, as facilities receive less than 50% of the volume requested in almost all cases. Local drug and food procurement generally represents fair value for money compared with locally collected prices, although there are examples of high costs. Record-keeping through an indent system is relatively comprehensive and there is little evidence of drug loss in a comparison of issues and receipts between levels, although the proportion of CMSD supply notes without a value stated (27%) make tracking CMSD resource flows difficult.

There is much stronger evidence of drug loss when comparing average drug issues per patient recorded by facilities and the level of drugs received as reported by the patients themselves. For many drugs, facilities report issuing amounts two or more times greater than patients report receiving. This does not necessarily mean that all apparent leakage is occurring at the facilities themselves. It is also possible that these discrepancies cover up leakage higher up in the system, which is not picked up by the indent system of drug records.

Chapter 6—Infrastructure and equipment (p. 83 onwards)

Chapter 6 section 6.2 looks at equipment and maintenance. Upazila health offices are often missing vital management tools, such as vehicles, computers and photocopiers. Biomedical equipment is scarce at UHCs and there are specific problems with blood transfusion, sterilisation, incineration and power generation equipment. Through comparisons with previous surveys, there seems to have been little improvement in equipment availability over the last seven years. Buildings often fail to meet seven basic standards including, for instance, a functioning sewerage system or a leak-free roof.

Maintenance expenditure is around 1.36 lakh Tk per upazila (one lakh Tk is equal to 10,000 Tk). When compared with allotments, this represents only around 55% of the funds available, mainly because expenditure on routine maintenance works is lower than

expected—58% of upazilas have no routine maintenance work posted against them at all. It should be noted that the low 'disbursement' rates implied by these results are in contrast to national-level figures provided by Central Medical Maintenance Unit (CMMU), which show the unit to be fully spent in FY 2003/04. Extensive investigation of these discrepancies has taken place with the cooperation of CMMU, and a summary of the potential explanations is provided.

Section 6.3 looks at equipment and maintenance management. Upazilas are often not kept informed about maintenance entitlements: less than 10% of upazila offices receive notification of the maintenance allotment that they are entitled to from the civil surgeon (CS) or deputy director family planning (DD FP). Almost two-thirds of DGHS managers still went on to request annual maintenance, but only one-fifth said they received any. Only one-third of signed-off maintenance work was reported by recipient facilities to have been completed satisfactorily—23% was reported as not having been done at all.

Chapter 7—Equity (p. 93 onwards)

The survey investigates several aspects of service outputs and resource inputs from an equity and user perspective.

The chapter first looks at *per capita* resource allocation to see if it can be improved. The high-to-low ratios between the best- and worst-resourced upazilas are around 2:1 for budgetary allotments. The ratio is higher for actual expenditure levels and for levels of key workers—up to 4:1 for MOs stationed at the UHC. There is some evidence that family planning workers are slightly more evenly deployed.

These discrepancies are due both to the supply-based resource allocation system itself (whereby, for many inputs, all facilities should receive the same absolute level of resources regardless of catchment population), and the failure of this system to work as intended. In practice there are wide variations in the absolute resources allocated to facilities of the same type, in particular in worker postings, union-level MSR and maintenance allotments. Whichever the driving factor, the discrepancies in *per capita* resource allocation are beyond what would be associated with a systematic needs-based allocation system.

The analysis then looks at the age and gender of beneficiaries, and finds, as expected, that DGFP services are used predominantly by adult women. DGHS services also slightly favour adult females. The socioeconomic status of the average user identified in this survey is of a similar level to the average user identified in the *2001 Household Income and Expenditure Surveys* (HIES), who, in turn, was similar to the wider rural population.

Users of DGHS services are slightly poorer on average than users of DGFP services, as are users of union services compared with users of UHC services. Upazilas with higher *per capita* allotments tend to have better-off users than upazilas with lower *per capita* allotments, which adds to concerns over the equity of resource allocation. On a positive note, upazilas with higher service uptake tend to have users who are poorer than do upazilas with low service uptake, and users of facilities where communities report making payments, are better off than users in upazilas where no payment is reported.

Chapter 8—Performance (p. 101 onwards)

Chapter 8 looks at service efficiency and productivity. The relative efficiency of facilities and factors associated with variations in efficiency are modelled using econometric techniques. Results show that 24% of UHCs and 15% of union facilities can be considered as efficient relative to their peer group. These facilities can tentatively be identified as 'high

performers'. There is more variation in efficiency at union level than at the upazila level. When factors associated with varying efficiency levels are examined, equipment availability stands out with a strong positive association with efficiency at both union and UHC levels. There are additional associations with community reports of patient charges (UHCs) and recent management supervision (union facilities). All modelling results should be viewed with a fair degree of caution; in particular the modelling work does not take into account any service quality differences that may exist between facilities.

Analysis of productivity points to the wide variation in output per unit and to productivity differences between different types of workers and services. Health workers at union facilities see the highest number of outpatients per worker, at more than 40 patients per day—more than double that of family planning workers at union-level facilities. Interestingly, at the union level the output per family planning worker is lower in facilities containing health workers. Conversely, output per health worker at union level is not influenced by the presence of family planning workers. Crude comparison of the MoHFW's unit expenditures with previous studies suggest that services might be getting less expensive on a per-user basis, and that they are now amongst the cheapest in developing countries, although trends in service quality are not known.

Chapter 9—Conclusions (p. 115 onwards)[3]

There is a functioning public health and family planning service in Bangladesh, with finance, staff and drugs. There are also systems in place for management control of resources. Important services are being delivered to the population in often quite sizeable numbers. Considering the limited resources available, this is a strong foundation upon which to build.

The survey has nevertheless identified a number of areas where the health and family planning systems could improve.

There are substantial concerns about service quality, particularly around consultation time and thoroughness, key workers' knowledge and prescribing practices. Equipment availability and building conditions are also both poor. There are potentially bottlenecks in the maintenance system that compound very low levels of funding for maintenance (CMMU allotments represent only 1% of the overall MoHFW budget at upazila level).

There are opportunities for improving resource allocation between types of inputs and across different populations. Resource allocations are supply-driven and lead to variations in *per capita* financial resources, key workers, drugs expenditures and so forth that are too large to be justified even given varying demand patterns. There may also be opportunities to decentralise resources more. As drugs and maintenance budgets and the location and type of human resources are controlled by higher levels, upazila managers have little discretion over the majority of resources earmarked for their services.

There is a need either to revisit the incentive framework for certain key workers, particularly MOs at union level, or to question the feasibility of locating them in every facility.

The findings on speed payments and facility vs. patient drug issues raise concerns of resource leakage. Management systems should be strengthened to ensure better control and accountability, especially as CGA and DGHS accounting systems produce widely

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[3] There are also eight annexes to the report that cover: glossary of terms; additional methodological information; assessment of socioeconomic status of service users; service quality; sampling; impact of 2004 floods; key confidence intervals; and references.

different expenditure figures. Finally, the results of the econometric modelling that suggest UHC inefficiency is closely linked with community reports of patient payments are interesting and should be investigated further.

Overall, the MoHFW should be commended for providing a high volume of services despite very limited resources. There is, however, more that can be done with these limited resources, in particular if internal systems are strengthened so that the quality of services is strengthened, units are more efficient, and efforts are made to improve governance.

Table of key estimates

Service delivery and performance	
Monthly UHC outpatients (n)	5,551
Outpatient contacts per capita per year	0.41 (UHC), 0.73 (union)
Deliveries in UHC as a proportion of monthly births (%)	2.7
Facilities that are 'efficient' relevant to peer-group (%)	24 (UHCs), 15 (union)
Patients reporting providers attitude to be 'pleasant' or 'very pleasant' (%)	92
Patients with appropriate drug regimens (%)	35
Storerooms adhering to WHO storage standards (%)	2
Resource availability	
Budgetary allotment for MoHFW upazila services (per capita)	80 Tk or US$1.4
DGHS union-level facilities with a MO (%)	43
UHCs with key drugs in stock (%)	93 (co-trimoxazole)
	90 (amoxicillin)
	25 (IV/IM oxytoxins)
Allocation and distribution of resources	
Overall MOHFW disbursement rate (expenditure as % of allotment)	93
DGHS upazila-level allotment accounted for by human resources (%)	83
DGHS upazila-level allotment accounted for by maintenance (%)	1
DGHS allotment per capita ratios, highest-to-lowest (upazila level)	2:1
Population to MO, highest-to-lowest (upazila level)	4:1
MSR expenditure ratios, highest-to-lowest (upazila level)	6:1
Financial management	
DGFP total allotment made in the first six months of the FY (%)	23
Expenditure in June (as % of annual expenditure) (DGHS)	22 (utilities)
	40 (travel expenses)
Upazila level budget that UHFPO has discretion over (%)	< 9
Human resource management	
Annual Class I officer transfers (as % of Class I posts at upazila level)	83
DGHS MOs in post for less than one year (%)	42 (UHC)
	45 (union)
Workers paid on time every month of the year (%)	72
Drugs and supplies management	
Upazilas where union drug supply comes from the UHC (%)	32
Highest drug supply volume (as a % of volume requested by union facilities)	55 (Ferrous Sulphate tab.)
Drugs found that were out of date (%)	2
CMSD supply notes with no supply value indicated (%)	27
Number of patients recorded in register (as a % of number counted by survey team)	129 (DGHS – union level)
	168 (DGFP – union level)
Maintenance management	
Upazila-level expenditure (as % of allotments)	55
Upazila-level managers who received a copy of the maintenance allotment (%)	8.2 (DGHS)
	6 (DGFP)
Maintenance work carried out deemed 'satisfactory' (%)	33
Governance	
Drugs for which recorded facility issues greater than patient receipts	6 out of 7
Absenteeism amongst MOs at union facilities (%)	22 (unexplained)
	21 (explained)
DGHS accountants reporting need for speed payments (%)	59 (allotment letters)
	67 (expenditure bills)

Source: OPM

Note: All estimates are statistical means unless stated. Where upazila-level figures are given they are for non-sadar upazilas unless stated.

1. Introduction

This is the report on the *Health and Family Planning Social Sector Performance Survey.*

The report is divided into eight chapters. Following this introduction, Chapter 2 examines service delivery, both in terms of outputs and quality of services. Chapters 3-6 examine the essential inputs into primary level services: finance, human resources, drugs and supplies, and infrastructure and equipment. Chapter 7 looks at service delivery and resource availability from an equity perspective. Chapter 8 examines service performance. Finally, Chapter 9 draws together the main conclusions. Key findings are highlighted at the beginning of each chapter.

This introduction covers the survey's objectives and design. It gives a summary of the methodology used, including of sampling; it gives an overview of the fieldwork and data processing; and it discusses some key concepts used in the analysis of results.

1.1   SURVEY OBJECTIVES

This survey was one of three, covering primary health care and primary and secondary education. In each sector the findings are intended to stimulate policy debate and support the public sector in becoming more performance-oriented and accountable, with the ultimate objective of increasing the effectiveness and equity of public spending on priority services.

The findings will contribute to this goal by increasing the availability and use of information on the delivery of primary health care services, their beneficiaries, the management hierarchy supporting service delivery and the effectiveness of the public expenditure that finances them. They provide reliable, standardised information focused on the units that deliver services. This includes: the flow of resources (financial and material) to health facilities; the operation of control systems for these resources; the presence and utilisation of resources at the facility; the quantity and quality of services provided by the facilities; and the beneficiaries of the services.

The survey comes at a watershed in the health sector's development. The first Health and Population Sector Programme (HPSP) has ended, and the Health, Nutrition and Population Sector Programme (HNPSP) is beginning. It is also a time of substantive organisational change in the MoHFW. The survey can thus assess the operation of primary health care services at this point, and act as a baseline for developments over the coming years.

The survey focuses on the lowest tier of service provision in health care—upazila- and union-level facilities—since this tier is essential for the effective delivery of primary services. It concentrates particularly on the management systems and resources of the DGHS, although some information is also presented for the DGFP.

1.2   SURVEY DESIGN

The design of the survey began with an initial agreement on its purpose and scope with the Ministry of Finance (MoF). This was followed by extensive dialogue with the MoHFW on sector priorities, defining the detailed content of the surveys. Key sector policy and programme documents were also reviewed. A survey analysis plan, outlining the areas to

be covered and some of the main estimates to be produced, was then agreed with MoHFW and MoF.

Interviews and field visits were undertaken to develop an in-depth understanding of the operation of the management and supply systems that support the functioning of primary facilities. This provided a basis for the development of draft questionnaires. The questionnaires were piloted a number of times, each time improving their capacity to measure what was required and to deal with the considerable heterogeneity of systems that was encountered on the ground.

One element of the survey included tests of clinical knowledge for key workers with clinical responsibilities. These were developed from the training curricula of each cadre and were also piloted repeatedly. Further details of the knowledge tests are provided in Annex 4.

The survey collected information right down the hierarchy that governs the delivery of primary health services, including:

- District civil surgeon offices and DRS;
- UHCs (both DGHS and DGFP sides);
- Union-level level facilities (both health and family planning);
- Health and family planning workers;
- Health and family planning users and clients, their households and the communities in which they live.

At the CS's office and the health facilities, information was collected by interview and review of records and covered: finances and financial management; personnel; management and supervision; supplies of drugs, medical supplies and equipment; temperature and humidity of drug storerooms; maintenance; procurement; and service delivery.

A sample of key workers was interviewed at each facility. They were asked about their personal circumstances, recruitment, training and supervision, and salaries and allowances. The clinical knowledge tests were also administered.

Users were asked about: their health problem; the treatment that they had received; medicines prescribed and received; their satisfaction with the service they were given; and payments made and costs incurred. They also answered some questions designed to assess the socioeconomic status of their household. A sub-sample of patients was visited in their households, where more extensive socioeconomic information was collected. In addition, a community interview was undertaken with a group of individuals, mostly women, in the area surrounding each facility. They were asked about their perceptions of the services provided by the sampled health facility, about other service providers in the area and about factors affecting their choice of service providers. They also reported on a series of socioeconomic measures about the local population.

Information was also collected from central directorates and agencies. Allotment, expenditure and service delivery data was collected from the DGHS and DGFP offices. The Central Medical Supplies Department (CMSD) provided information on supplies to the sampled districts and facilities.

1.3 SUMMARY OF METHODOLOGY AND SAMPLING

Since one objective of the survey was to track resources from the Directorates and other central bodies to the facilities, a stratified, clustered sample was designed around the administrative hierarchy. This is shown illustratively in Figure 1.1 below.

In total 20 districts were sampled, of which Dhaka and Chittagong were selected with certainty and all other districts with probability proportional to population. Four upazilas were selected within each sampled district, the sadar upazila being selected with certainty and others with equal probability. Upazilas within the metropolitan areas of Dhaka and Chittagong were excluded from this sample because primary health facilities in these areas operate under the municipal corporations.

In this way a total of 79 upazilas were selected (Table 1.1). Within each upazila, the UHC and two union-level facilities were selected for interview. The union-level facilities were selected to ensure an approximate balance between types—namely, facilities that had a combination of health and family personnel, and facilities with personnel from either health or family planning only. This selection was based on a listing of union-level facilities in the sampled upazilas undertaken before the fieldwork began. Since the distribution of facilities was not uniform, the final sample of union facilities comprised 46 'combined' facilities, 40 'health-only' facilities and 64 'family planning-only' facilities:

Figure 1.1   Sampling scheme
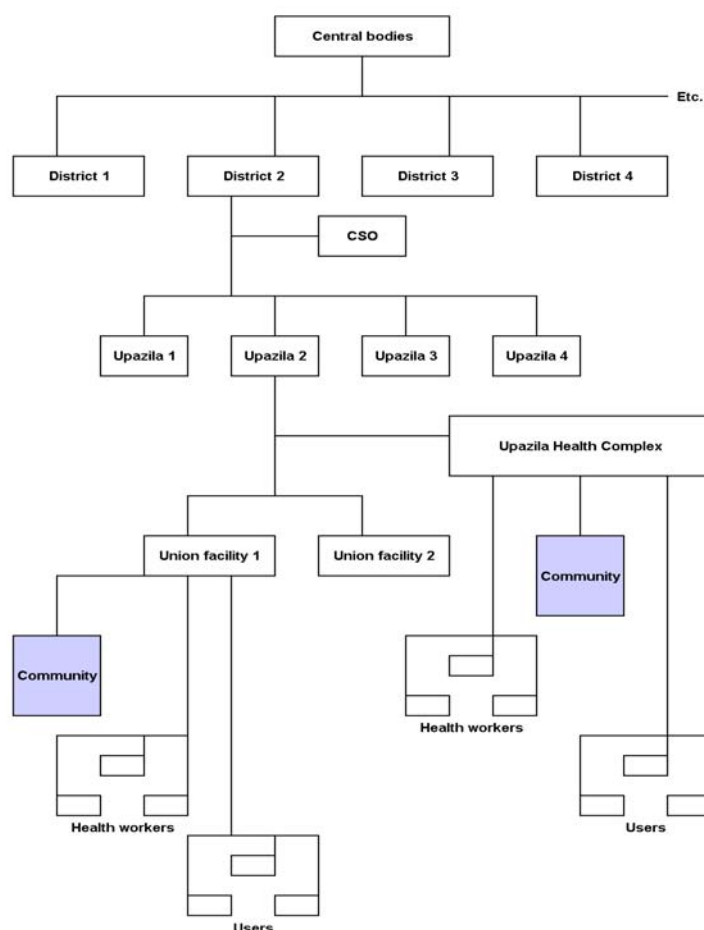
The civil surgeon (CS)'s office was surveyed in all the sampled districts. Fieldwork was also undertaken in the UHCs and union-level facilities of each selected upazila. In each of the

sampled facilities, key workers (officers and staff) were listed by designation and a sample was drawn. The resulting sample included medical officers (MOs), nurses, MAs and health assistants (HAs) of DGHS; and Medical officers, FWVs, sub-assistant community medical officers (SACMOs) and family welfare assistants (FWAs) of DGFP.

At each facility, the field teams also drew a systematic random sample of users, based on a listing of patients attending on those days. From these, two users were randomly sampled for a household visit. Other users were asked to bring together community members for the community interview.

No key workers, patients or communities were interviewed in the sadar upazila UHCs, because these facilities do not generally provide a comprehensive set of clinical services, as patients typically use the nearby district hospital (DH). For the same reason, only part of the UHC questionnaire was applied in these facilities. There were 18 such facilities in the sample. Some survey estimates for key workers and users therefore exclude that population.

Table 1.1   Sample units selected and interviewed

Unit	Number selected	Number interviewed	% interviewed
Districts	20	20	100
Upazilas and UHCs	79	79	100
Union facilities—all types	150	146	97
Health and family planning workers	867	730	84
Users	2,743	2,693	98
Households	414	375	91
Community interviews	313	304	97

Source: OPM.
Note: the selected interview sample is defined to allow for losses of higher level units.

Generally, sample losses were low. More than 97% of sampled units were interviewed for most samples (Table 1.1). The lowest proportion interviewed was in the health and family planning worker sample, at 84%—they sometimes could not be found or occasionally were too busy to provide an interview.

Analytical weights, the inverse of selection probability of each unit, were used to ensure that the estimates are nationally representative. These were adjusted for non-response where necessary. More details on the sampling and the calculation of the weights are given in Annex 5.

To increase the accessibility of the information, this report does not present information on the number of observations analysed in all tables. Estimates presented for lower level units (key workers and users) are generally based on well over 100 observations in the denominator. Estimates for health facilities and other higher level units may be based on smaller numbers and there are only 20 observations at the district level, although little analysis is done at this level (the major exception being maintenance allotment and expenditure). In some cases this might mean that some of these estimates have relatively large sampling errors. There are a total of 86 union-level facilities providing DGHS services and 110 providing DGFP services. Note that the number of union-level facility observations

when the analysis is disaggregated by directorate is higher than the total number of union facility observations, as some facilities combine services from both directorates. The complexity of the sample design makes the estimation of sampling errors and confidence intervals, and undertaking significance tests, complex. They are presented for some selected key estimates in Annex 5.

The analysis has made use of the maximum number of observations wherever possible. It is worth noting that the number of observations might differ even between very similar variables. For instance Table 2.1 presents findings on key inpatient service outputs and uses data from all 60 non-sadar UHCs sampled for the statistics on the number of monthly deliveries of all types. However, the statistic on caesarean sections that is presented in the same table uses only 28 observations, as many UHCs did not keep records with this level of disaggregation.

In order to give some idea of the scale of the survey, some information on the numbers of facilities and staff nationwide are given in the Table 1.2.

Table 1.2   Survey sample size and national facilities and staff

Unit	Survey numbers[1]	National
Districts	20	64
Upazilas and UHCs	79	403[2]
Union facilities—all types	150	3,349
Medical officers	288	14,269[3]
Nurses	122	8,236
MAs / SACMOs	271	5,598
FWVs	166	5,248
FWAs	105	22,350

Source: OPM, CMMU and HRD
Note: (1) All staffing sample sizes are based on theoretical maximum per facility, e.g. as if all sanctioned posts were filled. In practise sampling was done from the payroll in each facility so actual sampled numbers are lower than those given in this table. (2) Source of facility information from 2001/02 figures from Central Medical Maintenance Unit (CMMU) Annex B. (3) Source of all national manpower figures is the HRD data sheet 2003.

1.4   FIELDWORK AND DATA PROCESSING

The design and piloting of the questionnaires took place between February and April 2004. Interviewers were trained during a four week period, using lectures, copies of key documents and records, and classroom and field-based practice. A total of 14 field teams undertook the survey. The teams consisted of four members and were led by medical doctors.

Fieldwork began in July and ended in November 2004. It was undertaken in three phases. The first phase was conducted in a small number of districts to concentrate the field teams together so that they could be closely supervised. Most issues were identified and resolved at this stage.

Three roving quality control officers checked up on the work of the field teams. They reviewed completed questionnaires, cross-checked questionnaires against original data, and clarified any problems. The Mitra survey managers and Oxford Policy Management (OPM) specialists also reviewed the quality of the fieldwork, and helped to resolve queries at various stages. Respondents were generally cooperative once the endorsement of the MoHFW was made clear. Where there were issues, MoHFW officers assisted in ensuring cooperation.

The process of unification and de-unification of the two directorates within the MoHFW affected both the design and implementation of the survey. Particularly on the family planning side, records could take a variety of formats, using either unified or post-unified documentation systems. Questionnaires had to be particularly complex to address this, and the interviewers had to be able to deal with the various formats. In a few cases records took such an unusual format that some desired information was simply not available.

Some periods of the fieldwork corresponded with floods that affected Bangladesh in 2004. The survey managers sent out scouts to collect information on the degree to which each of the sampled districts was affected by the floods. This information was used to plan the fieldwork around the floods to minimise their impact. Since different districts were affected at different times, this strategy was reasonably successful. In addition, further data on the effects of the floods was collected in each district during fieldwork. This was used to assess any possible impact on the survey findings.

Data was entered in Microsoft Access, to which some variable type and range checks were applied. More extensive consistency checks were undertaken in Stata. Discrepancies were resolved with field teams and, where necessary, followed up in the field.

1.5   KEY CONCEPTS IN ANALYSIS

The analysis presented in this report covers diverse areas. Each section explains the analysis that is presented there. This section outlines some concepts and measures that are used at different points in the analysis. Some of them are outlined in greater detail in the Annexes.

Levels of analysis

The report distinguishes levels of analysis in a number of ways. Some analyses discusses **operational level** in the Government of Bangladesh budgetary sense, in which various operational entities are distinguished by their different budget codes (these include the CS's office, the DH, upazila clinic-level, upazila field-level and special facilities).

As an example, operational level is the basis for distinguishing between **clinic-** and **field-levels**. Clinic-level describes fixed facilities and the workers and service based within; field-level describes workers and services not based in any facility (in terms of this survey this pertains mainly to HAs and FWAs).

The analysis also distinguishes simple geographical groupings—districts, upazilas and unions. For instance, when the survey refers to upazila-level resources, it normally refers to resources at both field- and clinic-level (and within clinic-level for both the UHC and any union facilities). When the survey refers to union-level, it generally refers to only those unions where there are MoHFW facilities present, unless otherwise indicated.

This report uses the term **facility** to mean a building providing health services. They may be services provided by DGHS, DGFP, or both. The facilities surveyed are mainly the UHCs, USCs (DGHS union facilities), Union Family Welfare Centres (UFWCs) (DGFP facilities) or Union Health and Family Welfare Centres ('combined' health and family planning facilities). The side of the facility is used to distinguish the services provided by the two different directorates—the health side meaning the officers and staff employed by DGHS and the services they provide, the family planning side meaning the same for DGFP.

When discussing financial resources, the report may refer to economic codes. These are individual line-items in the MoHFW budget, for example 4600 indicates Pay of Officers and 4801 indicates travel expenses.

Tracking

The term **tracking** means 'following' resources from a point of origin, usually central or district office, to their destination, which is usually the health facilities or individuals. This is generally done by comparing information on the amount allocated, issued or remitted from the sending body, with the amount recorded as received at the receiving unit. It is usually dependent on the comparison of documentary records at each level, although some comparisons may be based on physical observation or verbal reports (such as patients' reports of drugs received from a facility). For this reason, it is often quite dependent on the content and quality of the records.

Leakage refers to the recipients receiving less than was intended. The interpretation of such differences depends on a number of considerations, including the details of the allocation or remittance process and questions of data quality.

High and low deciles

Quite often the variation in a measure is of as much interest as its mean. For example, the variation in expenditure per capita on upazila- and union-level health services is an important measure of the equity of the distribution of MoHFW inputs across the population. One measure of variation is the ratio between the highest and lowest values that are observed. However, such a measure is sensitive to outliers or to data error affecting one particular point. For this reason, the first and ninth deciles of the distribution are used as indicators of the spread of values. These are the points below and above which the most extreme 10% of values fall. They therefore give a more conservative measure of the spread of values in the population. They are identified as 'low decile' and 'high decile' in the tables of this report. Reference is sometimes made in the text to the 'high-to-low decile ratio'— this is simply the high value divided by the low value.

Per capita analysis

All upazila-level figures expressed in *per capita* terms in this report are derived from upazila population figures from the 2001 census. These population figures are inflated by cumulative annual population growth between 2001 and 2004 to give a current population size.

All union-level figures expressed in *per capita* terms are derived from union population figures from the 1991 census and inflated by cumulative annual population growth between 1991 and 2004.

Household socioeconomic status and consumption

Information was collected on household socioeconomic status in two ways.

First, all patients reported on some basic household characteristics, including the education of the household head, the construction materials and amenities of the dwelling (such as the source drinking water and the type of toilet used), the ownership of selected consumer goods and agricultural assets, and attitudes towards female autonomy. This information provides useful measures of background characteristics.

Second, more extensive information was collected on the sub-sample of users whose households were visited. They reported on their household's consumption and expenditure. This information is used to estimate household consumption levels and income poverty, as is done in the *Bangladesh Household Income Expenditure Survey* (HIES). Wherever possible, the questionnaires were designed to collect information on both consumption and other socioeconomic variables in a similar format to the HIES.

For patients who provided only more basic information, their predicted consumption levels were estimated using this information. This was done using statistical models that relate consumption-expenditure to other household characteristics, based on data from the HIES and from the SSPS household surveys (both health and secondary education). More detail on this approach and the use of the predicted values is provided in Annex 5.

2. Service delivery

2.1 INTRODUCTION AND OVERVIEW

Key findings

Volume of service delivery

- DGHS facilities are often very busy. The busiest UHCs saw over 9,000 outpatients in June 2004; the busiest union facilities saw over 2,000 outpatients. When evidence is compared with previous surveys, UHCs appear to be getting busier.

- Across both directorates and all levels and type of services, there is a very wide variation in output between the busiest and least busy facilities. This raises questions about the current allocation of resources, which tends to be fixed on a per-facility basis.

- Uptake levels are mixed. DGHS outpatient services are well used by their catchment population at the union level, where outpatient utilisation is equivalent to an average of 0.732 visits *per capita* per year. Immunised children and family planning clients also represent a good proportion of their relevant populations.

- Other services are poorly used. Facility-based deliveries at the UHC account for 2.7% of expected births, and antenatal and postnatal care reach only a small proportion of pregnant women and expected births, respectively.

- There is seasonal variation in service delivery that is not matched by resource provision.

- Satellite services occur in most unions, and there is good community knowledge and reported use of these services.

Quality of service delivery

- Average scores in a test of clinical knowledge as applied to key workers are low, and there is large variation between workers.

- Only around one-third (35%) of patients were both given an appropriate drug and told to take it in appropriate dosage, frequency and duration.

- Ninety-eight percent of storerooms fail the WHO storage standards with respect to either temperature or humidity, often by a considerable margin.

- No community group reported a MoHFW facility providing services for more than 6 hours a day and over half reported service availability was less than four hours a day.

- Patient consultations are short (particularly within DGHS) and rarely involve either a physical examination or a written prescription.

- There is little evidence found of payments for services as measured by patient exit poll interviews. However, around one-quarter of community interviews reported the need to pay for local UHC services and one-fifth for local union-level services. The mean payment amounts reported by communities were 35 Tk and 50 Tk for the two types of facility respectively.

- Most patients thought the health or family planning worker explained treatments 'reasonably well' or 'well' and that the provider was 'very pleasant' or 'pleasant' during consultation.

Service statistics

- There is evidence that facility records of patient numbers are inflated when compared with the number of patients counted by the survey field teams.

- There is wide discrepancy in the way patient registers record repeat patients, field patients and vaccinations, and in the way MIS systems aggregate this information, which will reduce the comparability of service statistics.

Service statistics overview

The main system for reporting on service delivery is the Management and Information System (MIS). The MIS has undergone a considerable number of changes in recent years.

After unification of the DGHS and DGFP directorates in 1998, a multi-organisation task-force developed and tested a set of unified MIS instruments—around 30 tools at the upazila level and below. Due to delays in procuring and printing the registers, this process took 2.5 years and registers were only finally introduced nationwide by early 2001, when training in their use commenced. After de-unification of the two directorates in 2004, the information system became more complicated as some facilities maintained the use of unified MIS systems whereas others returned to those in place before 1998.

The records that were reviewed for this survey include:

- DGHS: indoor and outdoor statistics reports. This provides basic service volume for inpatient and outpatient curative services. The extent of disaggregation by gender and age in practice varies between facilities. Each level aggregates the volumes from previous levels and reports upwards, e.g. the upazila totals include the UHC and union level and the district totals include the DH.
- DGFP: monthly information statistics. A two-page report that collects information from field level upwards on maternal and child health and family planning service volumes.

This section looks at the volume of service delivery, both in terms of output (raw numbers) and uptake (*per capita*), and presents findings disaggregated by service type, facility type and over time. It then investigates various aspects of actual service quality as measured by key worker knowledge, accuracy of drug regimens, drug storage conditions and so forth. It finishes with an investigation into the quality of service statistics and their comparability between sources.

2.2 VOLUME OF SERVICE DELIVERY

This section presents on service output and service uptake. The levels of service output found are given below:

Table 2.1   Upazila- and union-level consultations

Level	Type	Number of monthly contacts			
		Low	Mean	High	n
(Non-sadar) upazila	DGHS				
	Outpatients (upazila-wide)[1]	5,541	10,019	18,303	33
	Outpatients (UHC, Jun 04)	2132	5,551	9,023	43
	Measles immunisations	330	619	1,053	61
	Acute respiratory infection (ARI) consultations for children under 5 years old	0	343	580	59
	DGFP				
	Outpatients [2]	307	1,801	3,946	50
	Antenatal contacts [3]	122	488	912	59
	Family planning cycles (reversible methods)[4]	4,701	14,153	24,840	61
	Referral and postnatal contacts	28	106	203	59
Union level	DGHS				
	Outpatients	729	1,431	2065	76
	DGFP				
	Outpatients	47	177	421	83
	ANC contacts	12	38	66	99
	Family planning cycles (reversible methods)	38	843	2,264	103

Source: OPM facility questionnaires.
Note: (1) The DGHS outpatient estimates in this table and Table 2.4 are calculated across only those non-sadar upazilas that include union facilities' outpatients in their monthly MIS reports. (2) All results for family planning outpatient consultations in this table and in Table 2.4 are calculated as the sum of childcare and Adult General Patient Management cases reported by family planning MIS (e.g. see Table 2.10). (3) All results for ANC contacts in this table and in Table 2.4 are calculated as the sum of all ANC visits, e.g. the first, second and third visits. (4) All results for active family planning clients reported in this table and in Table 2.4 are calculated as the sum of all active clients using reversible family planning methods as recorded by family planning MIS reports. These methods are: oral contraceptives, condoms, injection, copper T and norplant. Figures for permanent contraception methods (ligation, vasectomy, sterilization) are not included in these figures.

Table 2.1 shows that there is a large variation in output between units. Some facilities are very busy indeed delivering certain services: the busiest UHCs saw over 9,000 outpatients in June 2004; the busiest union-level facilities over 2,000 in the same month. The quietest facilities saw many times fewer these numbers. There are some services that seem to be

under-utilised in all locations—ARI services for children under five years old and antenatal care (ANC) contacts are good examples.

The variations in service volumes raise the question of the allocation of resources such as drugs and manpower. This tends to be done on a per-facility basis in Bangladesh, so that each facility receives a similar amount of drugs and has a similar number of key workers, operational finance, and so forth. These results imply that this allocation system results in some facilities receiving many more times the amount of resources per patient or client than others. Indeed, this is the subject of much deeper analysis in the chapter on equity (Chapter 7).

Table 2.2 presents findings on service output for inpatient services:

Table 2.2   Inpatient services

Non-sadar UHCs with 31 beds	Low	Mean	High	n
Inpatient admissions/month	164	283	412	60
Inpatient days/month	548	775	965	28
Average length of stay in days	2.4	3.2	3.9	28
Bed utilisation	58%	82%	102%	28
Normal deliveries/month	3.8	16.1	34.8	60
Caesareans/month	0	1.4	3.3	22

Source: OPM facility questionnaire.
Notes: Monthly inpatient averages were calculated using MIS information for the period July 2003–June 2004.

Inpatient services are relatively busy in all UHCs, with the lowest bed utilisation levels running at 58% and the highest at full utilisation. The average length of stay varies between 2.4 and nearly four days, per admission. A different picture is painted by the number of facility-based deliveries, which are low everywhere. The busiest UHCs handled only 35 deliveries a month and the mean is closer to 16 per month.

It is interesting to draw some comparisons between the results from this survey and previous studies into the inputs and outputs of UHCs. In the table below, current findings are compared with those from the Bangladesh facility efficiency study (HEU 1999, using 1997 data) and a public expenditure review (HEU 2002, using 1999 data) representing a seven-year time elapse:

Table 2.3   UHC service evolution between 1997 and 2004

Source	HEU 1997	HEU 1999	SSPS 2004
Number of beds	31	31	31
Mean no. of MOs	5.5	n/a	5.4
Number of nurses	6.2	n/a	9.7
Annual outpatients (mean)	50,000	36,180	66,612
Annual inpatient admissions (mean)	2,300	2,230	3,396

Source	HEU 1997	HEU 1999	SSPS 2004
Annual deliveries (mean)	95	n/a	192
Bed occupancy (%)	75	74	82
Average length of stay (days)	n/a	4.8	3.2
Bed throughput (number of patients per bed per year)	75	73	110

Source: HEU (1997, 1999), OPM facility questionnaires.
Note: n/a, not applicable.

From Table 2.3 it appears that UHC services are busier than seven or five years ago. UHCs handle considerably more outpatients, and inpatient numbers are also increased, resulting in greater occupancy rates and shorter patient stays. Even the facility-based number of deliveries is increased, although it is still low. The number of MOs has not changed, but there are more nurses in each UHC by 2004.

Looking only at the total volume of services delivered does little to help us understand to what extent services are meeting the needs of the catchment population. Table 2.4 shows uptake levels as measured by output *per capita*:

Table 2.4   Upazila- and union-level service uptake[1]

Level	Service	Low	Mean	High	n
	DGHS				
	Outpatient consultations/month/1000 population	19	35	55	31
	Inpatient admissions/month/1000 population	0.6	1.2	1.9	60
	Total deliveries (% of monthly cumulative birth rate)[2]	0.5	2.7	6.1	60
	Measles immunisation (% of under-1 population)	77	94	119	61
	Under-5 ARI consultations/month/1000 under-5 population	0.8	9.2	19	59
(Non-sadar) upazila	**DGFP**				
	Outpatient consultations/month/1000 population	1.7	6.8	14	50
	Antenatal contacts/month/1000 pregnant women	7	24	50	59
	Family planning cycles (reversible methods)/1000 women of reproductive age	95	218	426	61
	Referral and postnatal contacts (% of monthly births)	0.05	0.2	0.3	59

Level	Service	Low	Mean	High	n
	DGHS				
	Outpatients consultations/month/1000 population	23	61	103	73
Union level	DGFP				
	Outpatient consultations/month/1000 population	2.2	6.6	13.6	81
	Family planning cycles (reversible methods)/1000 women of reproductive age	6	135	385	100
	ANC contacts/month/1000 pregnant woman	6	19	33	96

Source: OPM facility questionnaires.
Note: (1) Monthly averages were calculated using MIS information for the period July 2003–June 2004. (2) The CBR has been calculated at 31 births per 1000 population (1995–2000 Bangladesh national average CBR, source: UN Population Division.

Mean monthly outpatient contacts for DGHS are fairly high at 35 per 1000 of the upazila population and 61 per 1000 of the union population (where there are union facilities). Extrapolating onto a yearly basis, this would imply DGHS outpatient contacts at the UHC are equivalent to around 0.41 visits *per capita* per year and around 0.73 visits *per capita* per year for union facilities. Thus, it is possible to say that DGHS outpatient services are reasonably well used by the surrounding communities, although these utilisation rates imply other providers are also widely used. Immunisation rates also appear high, at nearly 100% of the under-1 population for the measles inoculation (this is scheduled at 9 months of age in Bangladesh). Finally, the number of monthly cycles of reversible family planning methods recorded by the family planning MIS would imply active family planning clients account for 21.8% of women of reproductive age (upazila-level figures[4]).

For other services, uptake rates are rather lower. Facility-based deliveries account for only a very low proportion of expected births (2.7%). Whilst this is not the indicator measure of safe delivery (proportion of births attended by trained midwifes is preferable), the sheer low level of this result combined with later evidence around the low availability of specialist gynaecologist staff (Table 4.1), the availability of female doctors in general (Figure 4.2), obstetric medications (Table 5.1) and key equipment (Table 6.2), are enough to raise serious concerns about safe motherhood provision at the upazila level[5].

Other services with lower rates of utilisation include DGFP-provided general outpatient services, which are much lower than for DGHS, probably a reflection that many DGFP facilities had irregular supply of medicine during FY 2003/04. Antenatal contacts also appear low, as do under-five acute respiratory infection (ARI) cases.

The quality of care may help to explain why there is such variation in utilization between different types of services. Section 2.3 discusses quality in some detail and finds areas of concern. If these concerns are also shared by service users, they may be willing to use MoHFW services for public health needs (such as satellite services or immunisation) or for

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[4] This level of contacts is higher than the equivalent figure for unions with a DGFP facility (135 per 1000). The most likely explanation of this is the poor state of DGFP records at union level, such that they exclude field worker family planning contacts, which are reported directly to the UHC.

[5] At the sadar upazila level a network of Maternal and Child Welfare Centres (MCWC), run by the DGFP are also important providers of institutional delivery services, as is the sadar hospital itself.

general outpatient care, but they may prefer other providers for conditions perceived as more risky or important, such as safe motherhood or under-five ARI cases.

Table 2.4 also shows the very wide variations in service uptake between units. For DGHS outpatient contacts *per capita*, the ratio between high and low deciles is nearly 3:1 at the upazila level and over 4:1 at the union level. For other service types, such as deliveries and under-five ARI services, and for all DGFP services, the degree of variation is higher. These variations are of a similar degree to those presented in Table 2.1 and Table 2.2, which may imply that absolute service volumes differences are not simply driven by the size of the catchment population.

The analysis presented so far presents monthly averages taken across the period July 2003–June 2004. It is also important to look at output variations over time (Figure 2.1) to understand better the pattern of service demand.

Figure 2.1   Variation of output over time (DGHS)
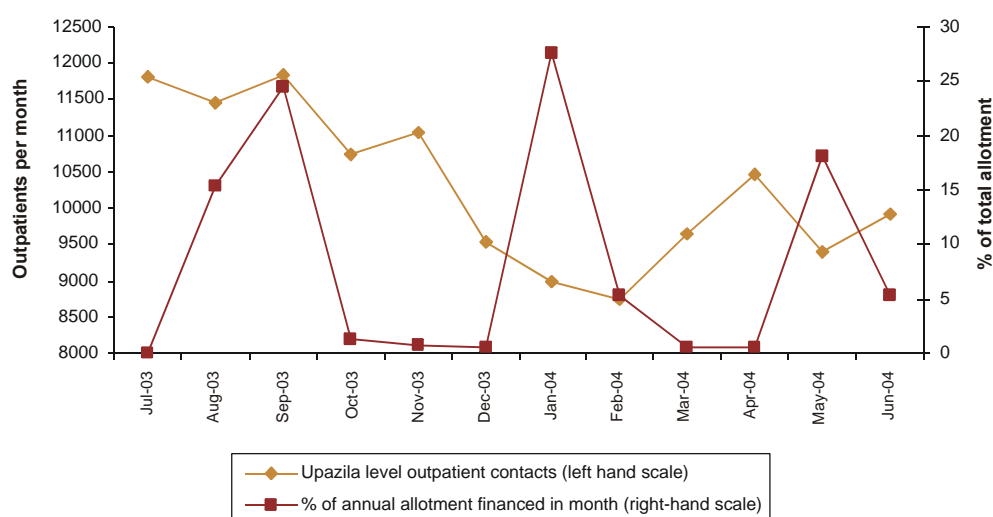
The variation of upazila output, as measured by the mean volume of outpatients per month, reflects the normal seasonal patterns in Bangladesh, with the lowest output levels during the dry season (and the second dry season in May) and the highest levels during the monsoon summer period. The percentage of the annual budgetary allotment provided per month is displayed against the right-hand axis. This shows that in July, one of the busiest months, there is no funding. By contrast, January sees significant allotment just as services quieten down for the dry season. It should also be noted that budgetary allotment does not necessarily convert into inputs that provide services in a timely way (see for instance Figure 3.4).

Satellite services

The survey investigated satellite services that are operated from union-level facilities. The services are provided by field staff (HA and FWA) and supervisory staff from the nearest union-level facility and, as such, are a good example of workers from both DGHS and DGFP combining to provide a service.

Table 2.5   Satellite services

	DGHS n = 79	DGFP n = 101
Union facilities that run satellite services (%)	92	100
Communities that are aware of these satellite services (%)	91	80
Of these, communities that report using these satellite services (%)	100	100
Average number of satellite service points per union	6.5	6.7
Average number of days of operation per month for satellite services	1.9	2

Source: OPM facility and community questionnaires.

Satellite services are remarkably prevalent, with 92% of DGHS facilities and all DGFP facilities reported as running services. Community knowledge of these services is also high and in all cases where communities knew of a service, they reported using it.

2.3   QUALITY OF SERVICE DELIVERY

During the design of the surveys, a lack of empirical evidence about the **quality** of MoHFW services was identified. The survey thus has specifically designed modules to provide proxies of clinical quality, including the clinical knowledge of health and family planning workers, the accuracy of patients' prescriptions and drug storeroom conditions. There is also information on patients' experience of accessing health services, including waiting time, workers' attitude and payment.

Clinical knowledge

The survey applied a custom-designed clinical knowledge test to the health and family planning workers who were interviewed. The detail of these case-based tests is presented in Annex 4. The tests are based on the basic curricula for each designation of worker, as well as expert practitioner assessment of the practical knowledge required competently to provide the most frequently demanded services at upazila- and union-level facilities. The questions were tailored to particular key worker designations and were administered by especially trained medical doctors. The test scores are calculated as a percentage of the maximum possible score, and the results are shown in Table 2.6.

Table 2.6   Key worker clinical knowledge

	Low (%)	Mean (%)	High (%)	n
MO (DGHS)	40.0	61.2	84.0	108
Nurse	5.3	25.4	52.6	103
MA	18.8	42.3	75.0	119
HA	28.6	46.0	64.3	64
MO -MCH (DG FP)	36.0	59.6	80.0	38
FWV	28.0	47.4	64.0	155
SACMO	12.5	40.8	68.8	45
FWA	4.3	16.5	30.4	98

Source: OPM personnel questionnaires.

Before discussing the implications of these scores, some caveats should be noted. This test cannot measure all aspects of clinical knowledge, and should not be used to compare knowledge level between different designations of key worker, as each received different tests. Health and family planning workers also gave up their free time to complete the tests, and may not have always answered as comprehensively as their knowledge would allow, although the enumerators were trained to probe and prompt.

Nevertheless, the results do suggest that many key workers have substantial gaps in their clinical knowledge. The mean tests scores are not high considering that the test designers assume that a fully competent worker would approach 100% correct answers in each test. In addition, the variation in test scores within a particular designation of health worker is often large, which suggests that some workers require refreshment of their skills to catch up with their more knowledgeable peers.

Appropriate drugs

The survey collected detailed information during the patient interview on the patients' reported conditions, symptoms, and any drug regimen relayed by the health worker during consultations (as either reported verbally or recorded from written prescriptions). For certain symptoms[6], this data was reviewed by experienced Bangladeshi doctors who assessed whether the medicine prescribed was appropriate given the symptoms presented, and whether the patient correctly noted the duration and dosage of the course of medicine. The guidelines this panel followed in making this assessment are detailed in Annex 4. The results are presented in Table 2.7.

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[6] These were: diarrhoea; fever; cough / respiratory problems; skin diseases; abdominal pain / stomachache; headache; chest pain; nutritional / underweight / poor growth.

Table 2.7   Drug regimen accuracy

Drug choice		Reported regimen			Both drug choice and all regimen details appropriate
n = 1771		Quantity per dose appropriate	Doses per day appropriate	Duration appropriate	
Appropriate[1] (%)	67	87	80	52	31
Either appropriate or potentially appropriate[2] (%)	79	88	81	53	38

Source: OPM patient questionnaires.
Note: (1) Drugs that were deemed 'appropriate' have an absolute indication (first choice) for the condition in question. (2) Drugs which have a relative indication for the condition in question were categorized as 'potentially appropriate'.

The headline finding is that only around one-third (35%) of patients were prescribed both an appropriate (or potentially appropriate) drug and in appropriate dosage, frequency and duration. This result is largely driven by the significant proportion of regimens (48%) that mis-state the duration of a course of treatment. If course duration is excluded from the analysis, the proportion of patients with wholly appropriate drug regimens rises to nearly 60%.

It is not likely that the treatment course durations are mis-stated due to a problem of drug availability—as this is found to be fairly good (see Table 5.1). It is more likely that the explanation lies with the established practice in MoHFW facilities for patients to be given a 'starter' prescription of medication at the facility itself, and to be told to purchase the remainder of the course at a private pharmacy, or to collect it by returning to the facility a few days later. In practice, patients very often do not return: only 6% of patients interviewed were repeat patients following up an initial visit within the previous fortnight.

Aside from the concern around drug course duration, it is unclear why only 83% of regimens have appropriate dosage (quantity of drugs per episode) and only 80% have appropriate frequency (times of drugs per day), or why only 80% of patients are prescribed an appropriate drug in the first place. Managers will want to look at training and supervision of prescribing practices in order to address these findings.

Conditions in the drug storeroom

Certain drugs[7] lose their efficacy and can even present health dangers under adverse storage conditions, such as high temperature and humidity. Many of the drugs stored at MoHFW upazila-level facilities are potentially susceptible to degradation. To test whether degradation is an actual issue for the MoHFW, the surveys collected information for the ambient temperature and humidity in UHC and district reserve storerooms. Quality control

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[7] Deliver/ JSI (2003) cite the following medicines as having stability problems under tropical conditions: amongst solids (tablets) acetylsalicylic acid, amoxicillin, ampicillin, penicillin V, retinol; amongst oral liquids (syrups) paracetamol; and amongst injections / injectables ergometrine, methylergometrine, adrenaline, reconstituted antibiotics.

measures were devised to ensure readings were as accurate as possible[8]. The main findings for the UHC are presented in Figure 2.2, with the WHO standards marked by the bold line:

Figure 2.2   Storeroom temperature and humidity
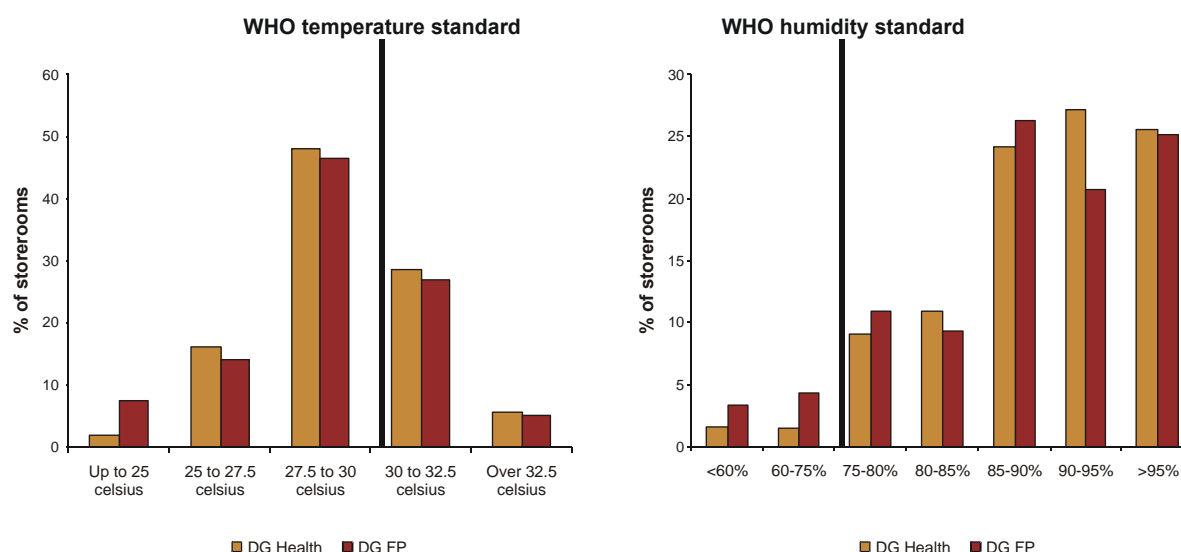
The storeroom conditions appear to be far from optimal. The mean storeroom temperature was nearly 29°C for both DGHS and DGFP storerooms, and the mean humidity level 88% and 86%, respectively. The recommended WHO guidelines (WHO, 1996) for the highest acceptable temperature and humidity for drug storage are 30°C and 60% respectively, and less than 2% of storerooms satisfied both conditions. Although the DGFP has purpose-built storerooms in some upazilas, there was little evidence that this resulted in more favourable temperature and humidity conditions.

Although it was outside the scope of this survey, a useful next step would be to have some of the stored medicine and medical commodities pharmacologically tested for their efficacy and safety.

Patients' experience of using services

The surveys examined several aspects of patient experience, including service availability, prescription knowledge, opening times and waiting times.

Figure 2.3 shows some key results concerning opening hours as reported by communities in the direct vicinity of the sampled facilities.

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[8] The thermometers used were calibrated to an accuracy of 0.1 Celsius, and this was accredited by the United Kingdom Accreditation Service (UKAS). The hygrometers (instruments that measure humidity) were accurate to within 3% of relative humidity. Enumerators were carefully trained in the use of the equipment, including the resting time required for accurate measurement, the location of measurement (e.g. out of direct sunlight and away from walls) and the safe transport and storage conditions need to preserve the accuracy of the instruments.

Figure 2.3   Service availability—opening hours per day
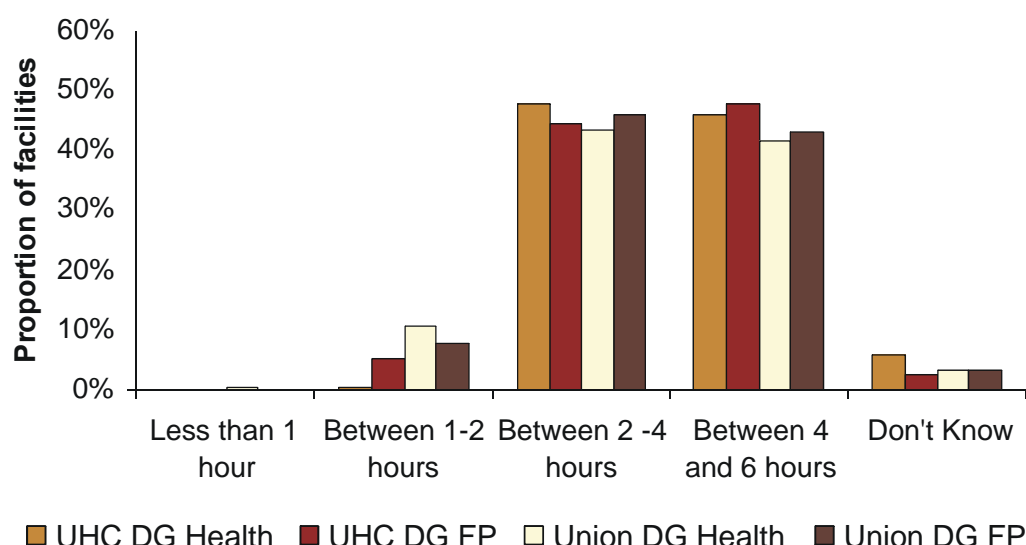
The official opening hours for MoHFW facilities between Saturday and Wednesday are from 9.00 am to 4.00 pm (a total of 7 hours). Yet not a single community reported the availability of services to be more than 6 hours, and more than half of all communities responded that their local MoHFW facility was open no more than four hours. This supports the anecdotal evidence that both health and family planning workers and their client communities have become conditioned to services being available from around 10.00 am, closing when the last patient or client in the queue has been seen.

Table 2.8 shows some key results around patients' and communities' experience of using MoHFW services.

Table 2.8   Patients' and communities' experiences

	UHC		Union	
	DGHS	DGFP	DGHS	DGFP
Waiting and consultation times				
Mean consultation time reported by patient (minutes)	4	6	3	4
Mean observed consultation time per patient[1] (minutes)	5.5	11.1	3.7	12
Mean implied waiting time per patient[2] (minutes)	14.5	14.4	11.3	10.6
Procedures				
Patients receiving physical examination or test (%)	15	43	16	20
Patients receiving written prescription (%)	27	7	7	2

	UHC		Union	
	DGHS	DGFP	DGHS	DGFP
Worker attitude and communication				
Patients reporting worker explained treatment 'very well or reasonably well' (%)	81	91	83	85
Patients reporting worker' attitude 'very pleasant or pleasant' (%)	89	95	92	92
Patients stating they know drug regime (%)	55	63	67	59
Payment for normal outpatient services				
Patients reporting having made a payment (%)		3		
Communities reporting usually making a payment (%)	25		19	
Mean payment for communities reporting payment (Tk)	35		50	

Source: OPM patient and community questionnaires.

Notes: (1) This has been calculated by facility as the sum of health worker or family planning worker availability in minutes (taking account of the number of workers on duty at that time), divided by the total patient flow. As such, it incorporates any 'slack' time and is thus an upper limit on the actual consultation time. (2) This has been calculated by subtracting from the observed entry and exit time for each patient the mean reported consultation time (e.g. the second row in Table 2.8). (3) The number of observations of patient-reported payment were too few to give robust disaggregation.

Reported consultation times are relatively short—and seem to be shorter for DGHS. The time per patient (calculated as the total of worker availability in minutes divided by patient flow) supports this finding. DGHS services have on average only 5.5 minutes per patient at the UHC and 3.7 minutes per patient at the union level (where there is usually only one health worker on duty). The thoroughness of the consultation in these circumstances must be brought into question, and the impact of these short consultations can be seen in two related findings.

First, very few consultations involve physical examination or tests. DGFP consultations are the best but still inadequate: at the UHC some 43% of patients / clients receive physical examinations; and for DGHS services fewer than 16% of patients receive physical examinations. In explaining these low levels, the results concerning the gender of medical officers (see Figure 4.2) should be borne in mind as well as the shortage of time per patient.

Second, consultations often do not result in a written prescription. Prescriptions are obviously not often used as a mechanism for relaying drug regimes to patients: if they are issued at all it is often to specify type and quantity of drug to be purchased at a private pharmacy. The usefulness of written prescriptions will in any case be compromised by the levels of literacy in Bangladesh.

Whilst the evidence so far may have somewhat worrying implications for the quality of the patient consultation process, the patients themselves report the interaction in more satisfactory terms. Although inferred, waiting times do not seem unduly long—on average

less than 15 minutes in all facilities. On average more than 84% of all patients reported that the health worker giving the consultation had explained the treatment either 'very well' or 'well'. Provider attitude ratings are even higher—for instance 92% of patients at the DGHS union-level report health workers had a 'pleasant' or 'very pleasant' attitude during consultations. These results paint the perceived quality of MoHFW services in a more favourable light than, say, the results from households surveyed the 2000 Service Delivery Survey (CIET, 2001). The CIET survey found the third-most frequently reported problem with government health services to be poor staff attitude, and found that the mean waiting time was over 40 minutes.

Results from the patient exit poll interviews found very little direct evidence of patients having to pay for services—only an average of 3% across all facilities. These figures are lower than those reported by the *2000 Service Delivery Survey*, which found 16% of households reported payment for a 'ticket' in the UHC and 20% at union level, although the mean reported payment was only 7 Tk. Results from this survey's community interviews, however, report a higher incidence of payment: around 25% of communities reported the need to pay for routine outpatient services at UHC and around 20% at union facilities. Of these, the mean reported payment amount was 35 Tk and 50 Tk, respectively. This is more in line with the *2000 Service Delivery Survey*'s finding that on average 20% of users reported making a personal or unexplained payment to service workers.

It is initially quite difficult to reconcile the results concerning patient payments. Certainly the presence of the survey enumerators may have influenced charging practices during the patient interviews, but the community interviews circumvent this effect. The evidence suggests there might be two well-understood consultation processes operating at MoHFW services, and the nature of these different consultations discussed below.

The majority of consultations begin by registering the patient in the patient registers and may involve a (normally short) wait to see the on-duty health or family planning worker. The consultation itself is short, rarely involves physical examination and even more rarely a written prescription. It may end with a drug 'chit' for a handful of pills to be collected from the pharmacist as the start of a course of treatment, the regimen of which will have been communicated verbally, and the continuation of which depends on the patient returning to a private pharmacy or returning to the facility. Consultations take place only during a short opening period (see Figure 2.3) of less than six, or more likely less than four, hours per day. There is usually no payment for these services.

A special consultation involves going directly to the office or chambers of the health or family planning worker in question. Patient details do not enter the official register, and hence these patients are not captured by health or family planning information systems. These consultations are more thorough, and will involve a physical examination and, possibly, laboratory tests. A written prescription detailing a full course of treatment is more likely. Payment of a non-trivial amount (35–50 Tk) is often made. These consultations will normally take place after the main consultations have finished, often in the afternoons. It should be noted that it is not illegal for MoHFW workers to undertake dual practice, but it is not permitted to do so from MoHFW facilities.

2.4   SERVICE DELIVERY MANAGEMENT ISSUES

Accuracy of patient records and service statistics reporting

Much of the evidence on service volumes presented in section 2.2 relies on patient and client registers, and Management Information System (MIS) reports. It is thus important to

assess these records and reports for accuracy. Conscious of this, the survey gathered data from up to four different records of patient numbers. These sources included the daily patient register (both on the day of patient interview and from seven days earlier), the monthly register where separate, and where possible the monthly MIS report. These data were then compared with the actual observed number of patients counted in the facilities during the survey visits to assess whether there was any evidence of inflation of records. The results are presented in Table 2.9.

Table 2.9   Validity of records of patient numbers

Patients in register (as % of patients counted by survey enumerators)	DGHS		DGFP	
	UHC	Union	UHC	Union
Patients recorded that day in register (%)	98	132	97	147
95% CI		115–150		
Patients recorded in register on same day previous week (%)	130	143	n/a	n/a
95% CI		122–164		
Implied from monthly register total (%)	169	92	90	120
95% CI	144–194			
Implied from MIS reports (%)	n/a	104	n/a	n/a

Source: OPM patient and facility questionnaires.
Note: CI, confidence interval; n/a, not applicable.

Table 2.9 shows some evidence of patient inflation in the records[9]. The evidence is strongest at union level: for DGHS facilities, three out of four sources of patient records have a mean number of patients higher than observed levels; for DG FP facilities all available sources are higher. There is less evidence for patient inflation at the UHC level. Two out of three DGHS sources of patient records show a higher number of patients than the actual number observed, but neither of the two DGFP sources is higher.

One implication of register inflation is that service delivery volumes are exaggerated. This would indeed raise questions over the output and uptake figures presented in the first part of this chapter. Another implication of register inflation, if done deliberately, might be to provide cover for drug pilferage. The survey design teams were told many anecdotes of drug pilferage absorbed through 'ghost' patients. This describes the practice of inflating patient registers and records to make them appear to justify high levels of drug disbursement.

However, there is also fairly strong evidence that patient registers are simply kept unsystematically.

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[9] For DGHS facilities, those records with a mean significantly different to observed patient numbers have the 95% confidence interval given.

Table 2.10   Service statistics comparability—upazila level

		Yes (%)
DGHS	Include union level activity in monthly upazila reports?	62
	Do monthly reports count repeat patients on each visit?	17
	Vaccinations counted as a separate contact in UHC outpatients register	46
	Source of outpatient data	UMIS 43
		Indoor and outdoor statistics 54
DGFP	ANC register counts repeat patients separately at UHC?	51
	Family planning register counts repeat patients on each visit at the UHC?	41
	MCH register counts repeat patients on each visit at the UHC?	29

Source: OPM facility questionnaires.

Table 2.10 illustrates that comparability of service statistics is likely to be low between upazilas. This is because patient records, which in turn are the basis of DGHS and DGFP MIS systems, record differently the number of patients using MoHFW health services depending on particular practices in each upazila. There are also differences in the way that raw data from registers is used to compile the monthly MIS reports. Thirty-eight percent of DGHS upazila level monthly inpatient and outpatient reports do not include union facilities statistics.

Table 2.11 assesses the comparability of union level service statistics.

Table 2.11   Service statistics comparability—union level

	Field level services counted as a separate contact	Repeat patients counted as a separate contact
DGHS outpatient registers (%)	49	12
DGFP MIS monthly reports (%)	60	16

Source: OPM facility questionnaires.

Table 2.11 shows union-level service statistics also have comparability issues. The confusion over whether field level and / or repeat patients are included in various registers continues at union level. Union facilities with similar patient flows will record quite different service volumes, depending on whether these patients are counted separately.

3. Finance

3.1   INTRODUCTION AND OVERVIEW

Key findings

Financial Inputs

- MoHFW upazila-level services have very low absolute levels of funding of around 80 Tk (or US$1.4[10]) *per capita*.

- Budgetary allotments to human resources alone account for most of the budget, at around 84% of resources for DGHS, and 91% for DGFP. Allotments for operational expenses and maintenance are low, as are allotments from the development budget.

- As drugs, maintenance and human resource budgets are effectively controlled by higher levels, upazila level managers have managerial discretion over less than 9% of the total allotment.

- Actual expenditure produces some re-allocation towards operational expenses from human resources for DGHS, but not DGFP. Overall, both directorates are slightly underspent—total MoHFW expenditure is 75 Tk *per capita* (compared with an allotment of 80 Tk).

Financial management

- DGHS allotments arrive at least one and often two months late in the first quarter of the FY. Allotments are also late in the final quarter of the year. On average, it takes nearly two weeks for an authorised allotment letter to travel from Dhaka to an upazila.

- For DGFP, less than 23% of the total annual allotment was made in the first six months of the FY. Expenditure is concentrated towards the end of the FY: DGHS offices posted 22% of total annual utility expenditure and 40% of travel expenses in the final month of the year.

- Seventy-seven percent of upazila DGHS offices are in debt. Electricity suppliers are the main creditor.

- There is considerable discrepancy between expenditure reporting channels. Upazila-level expenditures recorded by the CGA are up to 156% of those recorded by DGHS Finance Department.

- Most offices have been audited in the past three years. Major audit queries are much rarer in internal MoHFW audits. Many upazilas do not receive a copy of their audit reports. Only 49% of AG and 34% of MoHFW audit queries are cleared at the upazila level.

- Informal (or 'speed') payments are widely prevalent, both for receiving allotment letters (reported by 59% of DGHS accountants) and passing expenditure bills (67% of DGHS accountants). Most speed payments are a set proportion of the value of the letter / bill and most are valued at between 5% and 10%. Evidence suggests that the informal payment system is widely entrenched.

System overview

Like other spending Ministries in Bangladesh, the MoHFW issues allotments (spending authorisation) from its Directorate finance offices to its spending units. The lowest

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[10] Converted at an average interbank US$: Bangladesh Tk exchange rate for the FY 2003/04.

spending unit for both DGHS and DGFP is the upazila office. Beneath this level (for instance, to union level) the supply of goods and services is in kind.

The officers mandated to authorise spending are called Drawing and Disbursement Officers (DDOs). At the upazila level, the current DDOs are the Upazila Health and Family Planning Officer (UHFPO, DGHS), Upazila Family Planning Officer (UFPO, DGFP) for non-clinical family planning services and Medical Officer- Maternal Child Health (MO-MCH, DGFP) for clinical family planning services.

A stylised financial flow chart for DGHS is shown in Figure 3.1

Figure 3.1   Financial flows in DGHS
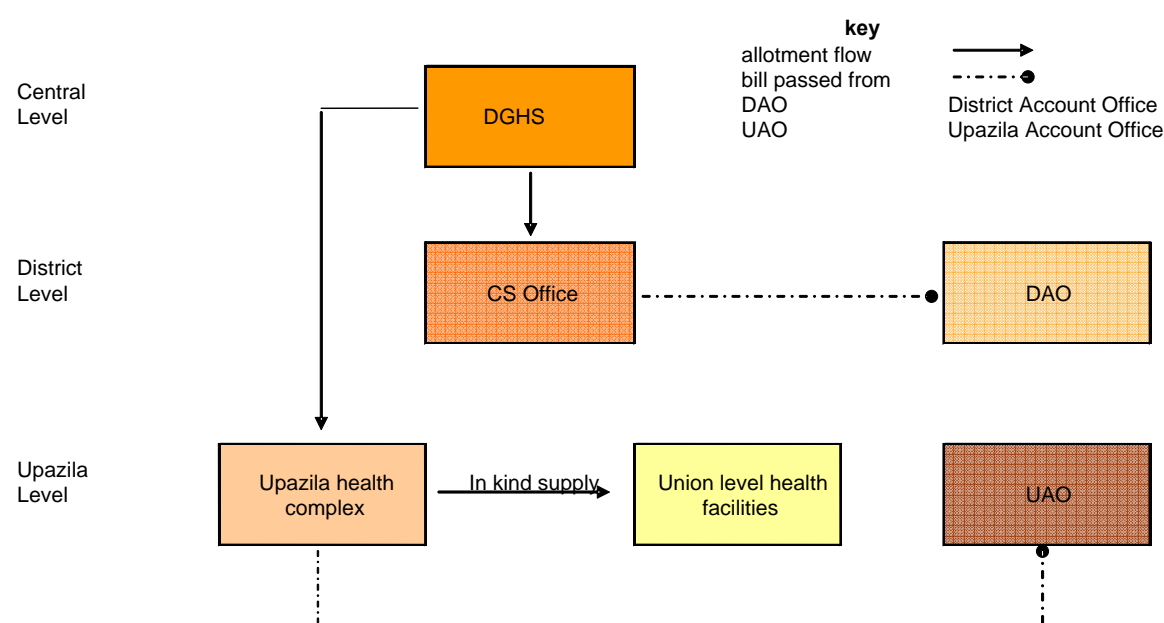
Expenditure follows a set process that can be summarised as follows: DDOs, after citing the budgetary authorisation (or allotment) and after verification that there is sufficient balance on account, submit bills for expenditure to the local Accountant General's Office. This office will 'pass' the bill and issue a payment instruction and / or cheque.

Accounting for monies spent is the responsibility of both the Accountant General's office and the finance department in MoHFW spending units. This is done mostly through maintenance of the allotment register. This keeps a running total of the balance against each economic code for each spending unit, with credits as indicated by the periodic allotment letters, and debits as entered from individual bills. These registers were an important source of financial information for this survey.

3.2   FINANCIAL INPUTS

The survey investigated the level, composition and distribution of MoHFW allotments and expenditures. Much of the analysis is similar in style to that conducted in Public Expenditure Reviews, although this survey is uniquely able to analyse the resource flow at upazila level.

Allotments

The allotment values for upazila health and family planning offices are shown in Table 3.1 below for FY 2003/04.

Table 3.1   MoHFW annual allotment to upazila level [1]

Non-sadar upazilas	Low	Mean	High	High to low ratio	n
	Tk *per capita*				
DGHS (DDO total) [2]	29.6	45.3	64.3	2.2	59
MSR budget (estimated from DGHS district budget) [3]	2.0	3.1	4.0	2.0	59
DGFP (DDO total)	22.4	30.7	38.9	1.7	60
CMSD (allocated from district level) [4]	0.1	1.6	4.4	-	52
CMMU (allocated from district level)[5]	0.4	0.9	1.1	2.8	54
MoHFW overall total	61.1	79.9	102.1	1.7	43

Source: OPM civil surgeon and facility questionnaires.
Notes: (1) All figures for FY 2003/04. Deciles are drawn separately for each row in the table. (2)'DDO total' is the mean per capita value of total allotment as recorded from all the allotment letters found for FY 2003/04 at the sampled units (i.e. field level, clinic level and development). (3) As the MSR budget line-item is handled by the civil surgeon's office, and within-district allocation made through the indent supply system, the value of the MSR budget allotment has been estimated as 15,000 Tk x number of beds at the UHC plus 75,000 Tk x number of union sub-centres in the upazila. (4) As no allotment for CMSD is available for an individual upazila, actual CMSD expenditure figures are shown. These are inferred from the district level based on the number and type of facilities in the upazila and after accounting for a share of CMSD resources that are used at the sadar (district) hospital. (5) CMMU allotments have been inferred from the district level based on the number and type of facilities in each district (using data supplied by CMMU).

The striking feature of Table 3.1 is the low absolute level of budgetary allotment for upazila health and family planning services. The combined mean for the MoHFW is about 80 Tk (or US$1.4) *per capita*. This is insufficient to provide a basic range of services with universal coverage as envisaged by the Essential Service Package (ESP). One of the most comprehensive resource projections for the comprehensive delivery of the ESP (HEU, 2001) put the required expenditure as 171 Tk or US$ 3.3 *per capita* at 1998/99 prices.

Drug and medical supplies budgets are relatively low in *per capita* terms. MSR allotment to upazila level is around 3.1 Tk *per capita* or 7% of overall DGHS allotment. This represents only approximately US¢ 5 *per capita*. Furthermore, it must be remembered some MSR expenditure is on non-drug items, such as linen, minor equipment and chemical reagents. The CMSD is an additional source of drugs and supplies, but the value of this is also low: at around 1.6 Tk *per capita* (see section 5.2).

The variation in budgetary allotments between upazilas is also noteworthy. It is particularly acute for DGHS and CMMU, where the best-resourced upazilas receive more than twice the *per capita* allotment of the poorest-resourced. This again shows the drawbacks of a facility-based resource allocation system, as unless the facilities are optimally located, there will be large variations in *per capita* resource availability.

It is worth noting which resources have not been captured by the survey and therefore are not included in Table 3.1. Family planning drugs and commodities are supplied in kind through the DGFP logistics system, which does not record the values of supply at district or upazila level. Twenty-seven percent of CMSD supply notes that the survey found had no value indicated and thus the CMSD estimate is likely to be an underestimate. Any resources supplied by the development budget and not captured in the DDOs accounts at upazila level (for instance, in-service training courses provided by a vertical programme), will also not be captured. Despite these caveats, the estimate of upazila-wide resource availability (Table 3.1) is one of the most comprehensive available.

Aside from the absolute levels of budgetary allotment, the survey data allows an examination of the mix of levels and inputs in the budget allotment. Table 3.2 shows allotments disaggregated by operational level and by line-item.

Table 3.2   Upazila budget allotment, by operational level and line-item as % of total allotment

Non-sadar upazilas	DGHS (n = 59)			DGFP (n = 61)		
	Low	Mean	High	Low	Mean	High
By operational level						
Revenue Budget—Clinic level 2744 (%)	35	43	55	11	25	50
Revenue Budget—Field Level 2714 (%)	38	50	59	16	29	46
Development Budget (%)	0	1	2	19	30	48
Joint Field and Clinic (%)				0	16	30
MSR (%)	5	7	10			
Total for DG (%)		100			100	
By line-item						
4500s Pay of Officers (%)	4	7	9	2	3	5
4600s Pay of Establishment (%)	32	38	44	41	46	52
4700s Allowances (%)	35	39	42	38	42	45
4801 Travel Expenses (%)	0	1	2	1	3	5
4816 and 4821 Utilities (%)	1	1	1	0	0	0
Other Operating Costs (%)	4	7	11	1	6	10
MSR (%)	5	7	10			
Total for DG (%)		100			100	

Source: OPM facility questionnaires.
Notes: Deciles are drawn separately for each row in the table.

The figures by operational level, show that mean field-level allotment accounts for a somewhat higher proportion than clinic-level allotment for both directorates, although disaggregation is more difficult for the DGFP as some of the development budget pertains to the field level, and some units record clinic- and field-level allotments together. This result is likely to be due to salary and allowance payments to the numerous field staff.

Development budget allotments received at the upazila level represent less than 1% of total finance available for the DGHS but 30% of finance for the DGFP—largely because some family planning workers are paid out of the development budget. The development budget does finance some inputs that are provided in kind (such as in-service training and family planning commodities), or through vertical programmes (such as the expanded programme of immunisation (EPI), the use of which is quite high, see Table 2.4). Nevertheless, the negligible allotments from the development budget that are actually made available to upazila level managers may be of interest to international development partners who provide the majority of finance for the development budget.

Figures by line item show that a great proportion of upazila-level allotment is earmarked for human resources (officer salaries, staff salaries and allowances)—a mean of 84% for DGHS and 91% for DGFP of total allotment. These are very high proportions and it is likely human resources are crowding out complementary inputs such as drugs, maintenance, equipment and operational expenses, which are funded at very low levels. This balance of resources between different inputs is likely to be allocatively inefficient.

Comparisons with previous survey data suggest the allocation of resources between line-items has not changed much at all over the past seven years. A 1997 study (HEU, 1999)[11] found that recurrent costs at the UHC (then called the thana health complex) were distributed as follows: personnel accounted for 84%; drugs and medical supplies 8%; and other items accounting for the remaining 8%.

One implication of the balance of resources between line-items is to determine just what proportion of resources the upazila-level managers have discretion over. As a minimum, there is a mean of 5.6 Tk *per capita*, which is controlled by the district level on the upazilas' behalf (for MSR, CMSD supplied drugs and equipment, and maintenance). Moreover, of the upazila-level allotment itself, 84% of DGHS's allotment and 91% of DGFP's allotment is spent on human resources, the numbers, place of posting and remuneration of which are determined by the directorates or from divisional level. All the UHFPO effectively controls is a mean of 4.5 Tk *per capita* for travel expenses, utilities and other operating costs. The similar figure for the UFPO is 2.5 Tk *per capita*. So out of the total upazila level budget of 80 Tk *per capita*, only around 7 Tk, or less than 9% of the allotment, is available for discretionary expenditure by upazila-level managers. Such low levels of discretionary expenditure must bring into question whether there is sufficient flexibility and sufficient incentives to manage resources effectively.

Expenditure

Budgetary allotments only provide authorisation to spend. To translate into actual services, allotments will need to be disbursed at the right time, on the correct inputs and at the right location. The survey investigated upazila-level expenditure, both in and of itself, and in relation to allotments. Summary data is shown in Table 3.3.

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[11] Health Economics Unit; Bangladesh Facility Efficiency Study; Working Paper 16; November 1999

Table 3.3 MoHFW expenditure

Non-sadar upazilas[1]	Low	Mean	High	High to low ratio	n
	Tk *per capita* (mean allotment in brackets)				
DGHS (DDO total)	27.2	41.2 (45.3)	63.0	2.3	53
MSR budget (inferred from DGHS district budget)	0.9	3.5 (3.1)	5.4	6.0	53
DGFP (DDO total)	15.8	28.9 (30.7)	37.9	2.4	60
CMSD (estimated from district level)[2]	0.1	1.6 (-)	4.4	-	52
CMMU	0.0	0.4 (0.9)	1.3	-	61
MoHFW overall total	48.7	74.9 (79.9)	101.9	2.1	45

Source: OPM civil surgeon, CMMU and facility questionnaires.
Data: (1) Deciles are drawn separately for each row in the table. (2) Health Economics Unit; Bangladesh Facility Efficiency Study; Working Paper 16; November 1999.

MoHFW expenditure from all sources is around 75 Tk *per capita*, as opposed to an allotment of 80 Tk *per capita*. Proportionately, the most severely under-spent area is maintenance (CMMU). A low level of maintenance disbursement is surprising given the poor physical condition of many facilities, and an extensive investigation has taken place with CMMU to identify potential reasons for this low disbursement result. A detailed discussion of these investigations is available in section 6.2 from p. 89 onwards.

It is instructive to look at disbursements at a more disaggregated level. Table 3.4 shows disbursement (expenditure as a proportion of allotment) by operational level and by line item.

Table 3.4   Upazila-level disbursement, by operational level and by line-item

Non-sadar upazilas	DGHS				DGFP			
	Low	Mean	High		Low	Mean	High	
	(%)	(%)	(%)	n	(%)	(%)	(%)	n
By operational level								
Revenue Budget—Clinic level 2744	71	94	122	52	0	104	184	59
Revenue Budget—Field Level 2714	57	89	116	52	41	88	118	61
Development Budget	0	202	514	25	0	155	230	59
Joint Field and Clinic		n/a			0	42	138	38
MSR	70	103	143	51		n/a		
Total for DG	66	92	112	52	59	97	130	61
By line-item								
4500s Pay of Officers	54	84	120	52	38	122	143	61
4600s Pay of Establishment	79	100	121	52	61	99	129	61
4700s Allowances	53	86	121	52	56	101	132	61
4801 Travel Expenses	44	94	154	52	62	109	170	61
4816 and 4821 Utilities	54	108	162	52	0	61	100	36
Other Operating Costs	27	81	120	52	17	75	131	61
MSR	70	103	143	51				
Total for DG	66	92	112	52	59	97	130	61

Source: OPM facility questionnaires.
Notes: Deciles are drawn separately for each line in the table.

Table 3.4 reveals that the expenditure mix shifts away from field level for both directorates compared with allotments. DGHS is also underspent in human resource inputs (DGFP is overspent, mainly on officers' pay), travel expenses and in other operating costs. DGFP is underspent most significantly in utilities and other operating costs. Overall, both directorates are slightly underspent (92% and 97%, respectively).

When allotments are so small in absolute terms (see Table 3.1), both the overall failure to spend budgets entirely and the large variation in disbursement rates between different budget levels and items, as well as between upazilas, point to the existence of bottlenecks and inefficiencies in the financial management system. It is also not clear how some upazilas can exceed their allotment. The 'high' total disbursement rates are 112% and 130% for DGHS and DGFP, respectively. The next part of this chapter investigates financial management in more detail.

3.3　FINANCIAL MANAGEMENT

The survey investigated a number of critical areas of financial management, including: the timing of budgetary allotments within the FY; the accuracy of expenditure reporting between different accounting systems; upazila debt levels; audit processes; and the prevalence of informal payments.

Cash-flow: emergency vs. normal allotments

This survey investigated the relative incidence of normal and emergency ('special') allotment letters received by upazilas during FY 2003/04. In DGHS, normal allotments should be made for the first half of the FY in July, and for the third and fourth quarter in January and April, respectively. They are occasionally supplemented by emergency or special allotments following the revised budget and / or emergency needs of particular upazilas.

The first two columns of Table 3.5 show the mean number of allotment letters that include specific DGHS line-items. The third column shows how the total allotment value is distributed between normal and emergency letters. The second panel shows the same analysis for DGFP.

Table 3.5   Upazila DGHS and DGFP allotment process

All upazilas	DGHS (n = 79)			DGFP (n = 80)		
	Allotment letters (n)		Funding from normal allotments (%)	Allotment letters (n)		Funding from normal allotments (%)
	Normal	Emergency		Normal	Emergency	
4500s Salary of officers	4.6	0.1	97	4.5	0.2	98
4600s Salary of staff	6.2	0.3	98	14.9	0.6	98
4700s Allowances	7.0	0.9	96	15.7	1.2	97
4801 Travel expenses	6.0	2.1	65	12.2	2.4	72
Utilities (4816, 4821)	1.9	0.3	92	1.0	0.1	93
Other operating costs (other heads)	6.2	2.8	76	12.5	2.2	73
All allotment letters	8.1	3.1	95	18.9	4.0	96

Source: OPM facility questionnaires.

For both DGHS and DGFP, normal allotment letters are more common than emergency letters, with DGFP appearing to receive more allotment letters generally. For DGHS the majority of normal allotment letters included officer salary allotment, staff salary allotment, allowance allotment and travel expenses allotments. On average only about one-quarter of normal letters included any utility allotment[12]. Emergency letters appear to comprise mainly travel expenses allotments and other operating costs for both directorates. It is unclear why normal allotments are less sufficient for these particular items.

Cash-flow: allotments and expenditure over time

The upazila allotment and expenditure data examined earlier in Section 3.2 can also be disaggregated by month. This allows the comparison of intended and actual flows of allotment and expenditure in Figure 3.2.

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[12] In fact one DGHS upazila had no utility allotments at all.

Figure 3.2   Allotment flow by month, July 2003—June 2004
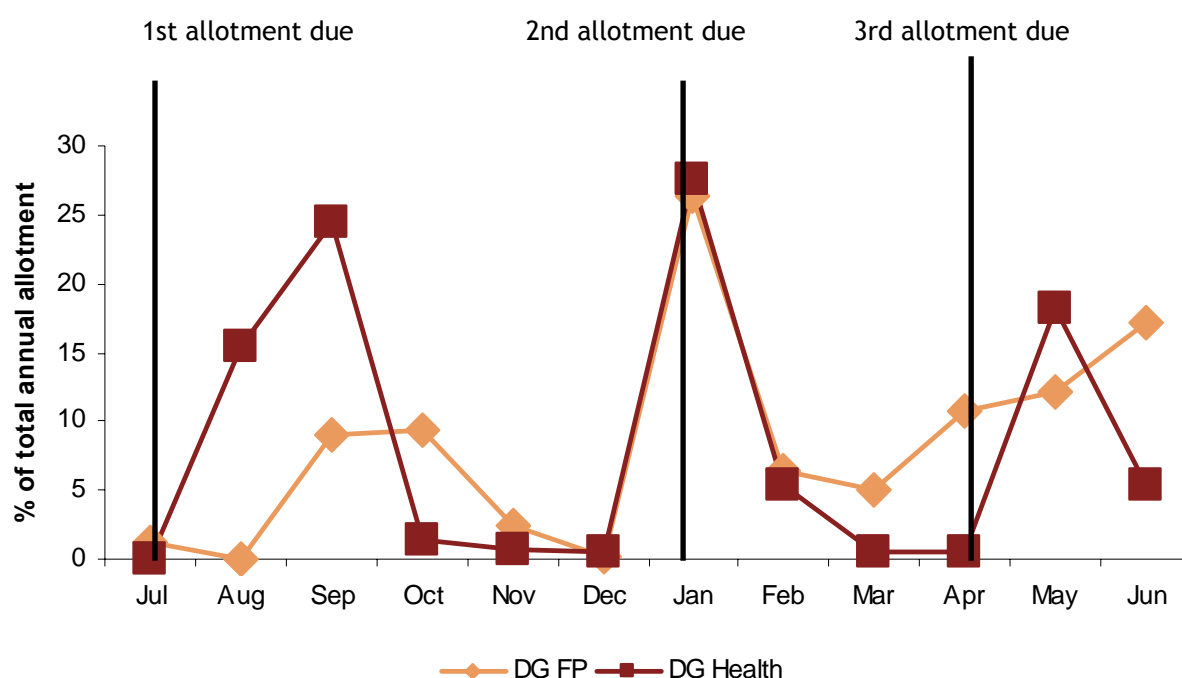
Notes: This figure is generated using the date of receipt of budget allotment letters. Missing dates have been imputed using the mean lag between date sent and date received. The figure presents total allotments across all line items and operational levels at upazila level. The figures plotted are for upazila DDO budget lines, i.e. they do not include inferred maintenance or CMSD allotments.

Figure 3.2 shows that allotments arrive at spending units late for both DGHS and DGFP. For DGHS, there is almost no funding at the beginning of the FY, with the majority of first-half allotments arriving as late as September. January's allotment is generally on time, but the final allotment due in April is again one or two months late.

For all budget line items other than revenue budget salary and allowances, an allotment authorisation is necessary before expenditure can commence. The results from Figure 3.2 therefore suggest that, whilst workers can continue to be paid, finance for operational items (fuel, supplies, utilities) is not available at all during the first month or two of the FY, and may be followed by a dash to spend at the end of the FY (made worse as there is no carry-over of funds possible into the next FY—what is not spent cannot be retained by the DDO). This flow of funding is unlikely to support the uninterrupted delivery of health services and is particularly serious given that the survey has also found July, August and September to be the busiest months in terms of outpatient utilisation (see Figure 2.1).

The situation for DGFP looks even more difficult, with very few resources being allotted before January. There is a possibility this result has been affected by the de-unification of the two directorates in January 2004, although the survey methodology was careful to separate out DGHS from DGFP allotments during 2003.

To examine the pattern of UHC health-side allotment more carefully, Figure 3.3 plots the proportion of annual allotment received per month for four components of DGHS DDO

allotment: human resources (officer and staff salary and allowances), travel expenses, utilities and other costs.

Figure 3.3   Allotment flow by month by line item (DGHS)
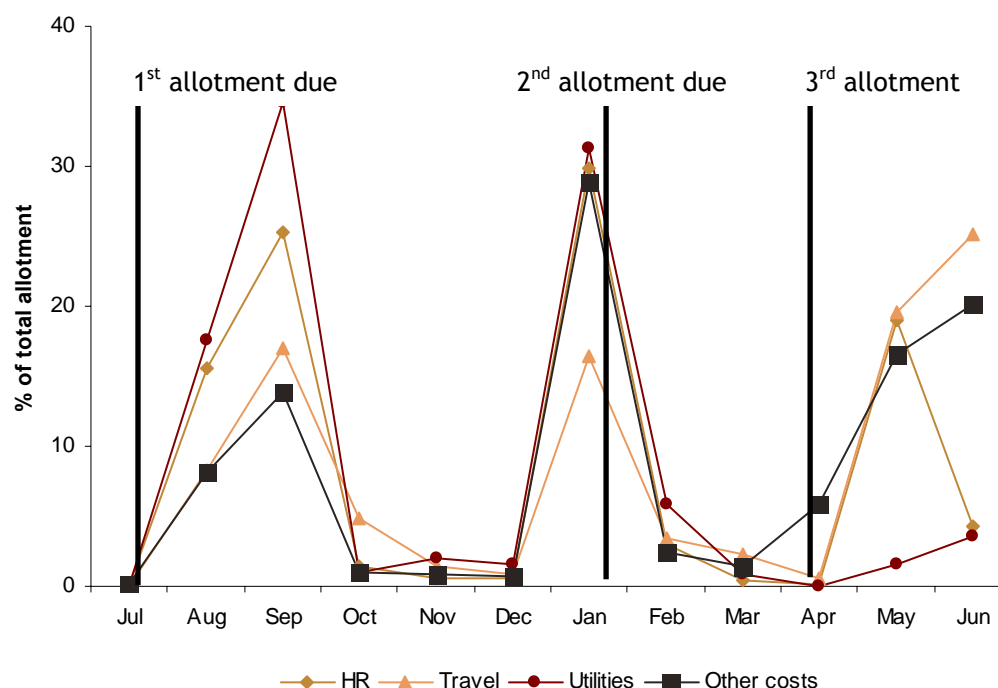
Figure 3.4 shows that the pattern of aggregate allotment allocation extends to these four line-items. Utility allotment is concentrated at the beginning of the FY. The allotment of 'other costs' and 'travel' is concentrated towards the end of the FY.

In an attempt to pin-point where the delays in allotment are occurring, the lags between the dates that allotment letters are issued from the DGHS and DGFP finance departments and the dates they are received at spending units have been calculated (Table 3.6).

Table 3.6   Time taken between allotment letter issue and receipt (days)

	Low	Mean	High
DGHS (n = 75)	3.9	13.5	29.3
DGFP (n = 67)	6.3	9.9	14.3

Source: OPM facility questionnaires.

The lags between issue and receipt of letter are around 10–14 days. As the first and third allotment in particular are up to two months late arriving at facilities, data suggests that the majority of the delay in receiving allotments is in getting the allotment letters approved and issued at the Directorate head office and central ministry level. Nevertheless, a transit time of up to a fortnight on average for DGHS (with the most severely delayed letters taking up to a month in transit) is unfortunate given the ramifications this will have on purchasing key inputs and in turn on service delivery. Simple processes, such as express courier or fax (notwithstanding the levels of equipment

availability presented in Table 6.1), or other methods of electronic delivery could substantially reduce these lags.

The flow of actual expenditure is, of course, most important for service delivery. This is shown in Figure 3.4, which plots the expenditure on the same four line-items presented in the previous figure[13].

Figure 3.4   Expenditure by month by line item (DGHS)
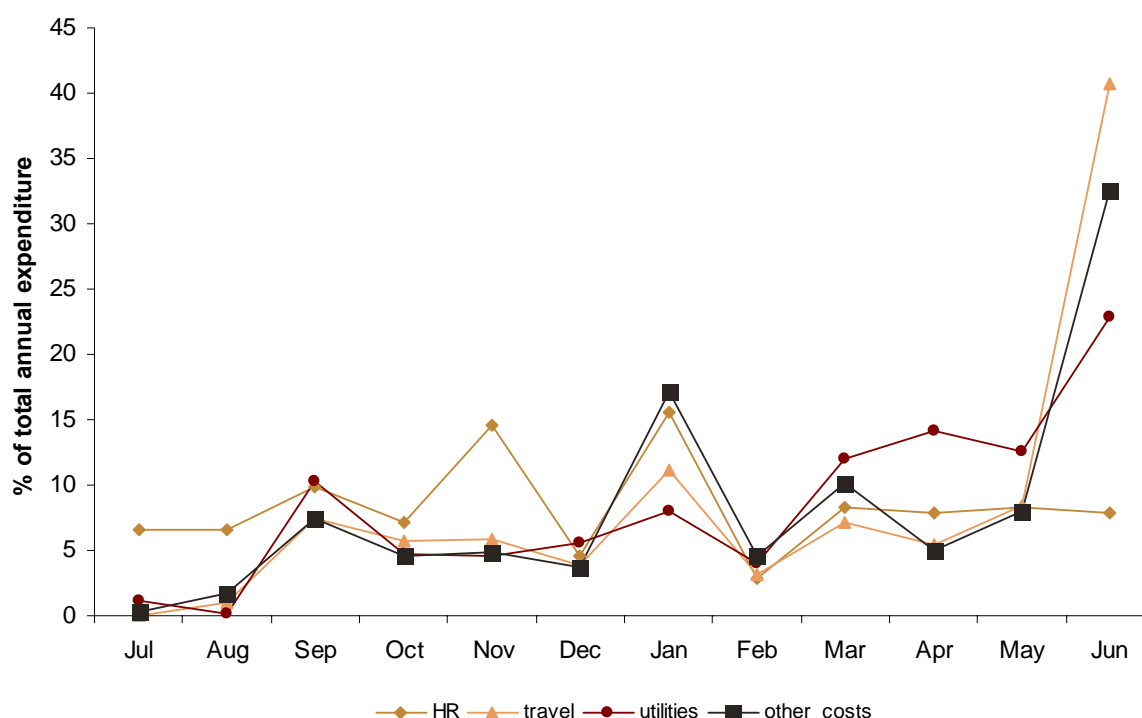
Figure 3.4 suggests that, with the exception of human resources, monthly expenditure as a proportion of annual expenditure is smoother over time than for allotments[14], but it is heavily concentrated towards the end of the FY, with a considerable proportion of total annual expenditure (22% for utilities, 31% for 'other costs' and 40% for travel expenses) made in the final month alone. This is likely to have consequences on service delivery: for example, if travel costs are incurred only at the end of the FY, little fieldwork or fieldwork supervision is taking place over the rest of the year unless key workers pay for expenses out of their own pockets. Similarly, if utility expenditures are only posted in June, then utility debts might be accrued over the rest of the year.

This finding contributes to a picture of expenditure bottlenecks at the upazila level. Table 3.3 and Table 3.4 showed that overall disbursement is less than 100%. The analysis above shows that, although there are some delays in getting the allotments to upazila level, there is a further lag in expenditure. To some extent this might be influenced by when

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[13] However, this figure is based on information from less than the full sample of upazilas, because in 17 cases only annual or biannual expenditure data was available from the accountant. This figure is based only on upazilas where expenditure data was posted regularly thoughout the year, to avoid the possibility that the end-year expenditure bias arises from different accounting practices.

[14] The spikes in the human resource budget line in November and January are likely to be due to the Eid bonuses paid in these months.

payments enter the accounting system—items may be bought on credit and expenditures are also recorded only once a month. However, the financial powers of DDOs may benefit from further review to see if a more timely and responsive system can be developed.

Debt levels

One potential result of delays in allotment and bottlenecks in expenditure would be for upazila level managers to smooth expenditure through procuring goods and services on credit. Therefore, the survey investigated upazila debt levels in DGHS. The main findings are summarised in Table 3.7.

Table 3.7   DGHS upazila-level debt

Upazilas offices in debt (all upazilas, i.e. n = 79) (%)	77
Upazilas offices in debt and with a debt tracking system (%)	61
Mean debt (Tk), across all facilities whether in debt or not	160,913

Source: OPM facility questionnaires.

The data show that 77% of upazilas are indeed indebted to creditors. Across all upazilas the mean level of debt is 160,913 Tk, with the upper decile being 427,000. The most indebted UHC sampled has total debts of 578,171 Tk. Although these figures may look alarming, overall debt is a small proportion of the value of annual total allotment: about 0.9% in sadar upazilas and 1.7% in non-sadar upazilas (although as debt is concentrated in a few areas, it will represent a much higher proportion of the relevant line-item's allotment).

Although many facilities have developed debt-tracking systems, in practice these do not seem to function well. Even where a debt record system is in place, 62% of DGHS accountants were unable to specify the total level of debt. Furthermore, where the accountant's total debt figure was available, it was rarely the same as the total debt recorded by survey enumerators from disaggregated debt information, and in fact was mostly lower.

Turning to debt composition, for the 61% of UHCs with debt and with a debt-tracking system, debt was accumulated on the items shown in Figure 3.5.

Figure 3.5   Upazila debt levels by creditor (DGHS)[15]
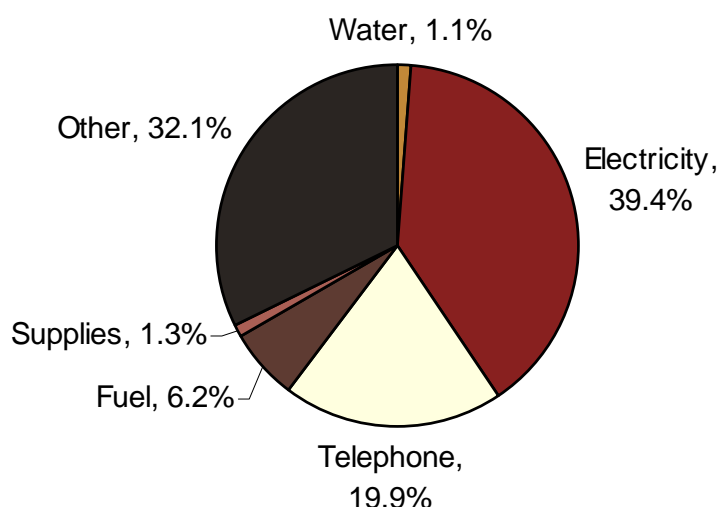
Figure 3.5 shows that, on average, approximately 60% of debt is for utilities (electricity, water, telephone). This is perhaps unsurprising given the nature of utilities expenditure flow reported in Figure 3.4. These findings on debt levels may be one manifestation of delayed allotments to the upazila level.

Expenditure records comparisons

As mentioned in the systems overview at the beginning of this chapter, there are two formal accounting channels in the MoHFW. One channel is through the Upazila Accounts Officer, who is the Accountant General's representative. Expenditures are recorded from every bill, and these are compiled into a set of expenditure accounts available through the CGA office in Dhaka. Another accounting channel is through the Finance Department in the DGHS and then to the MoHFW Financial Management Unit. It depends on periodic statements of expenditures drawn from the allotment registers at the facilities.

The surveys undertook a comparison of expenditure records from these two accounting channels, and also compared them with records of expenditure from the facilities themselves[16]. This comparison was done on a line-item by line-item basis, and then by individual upazila, for total expenditure during the FY 2003/04.

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[15] Where total debt was not reported by the accountant, total debt levels were inferred by summing across debt categories.

[16] It was hoped that this type of tracking analysis would also be undertaken to compare what allotments the DGHS and DGFP finance departments recorded as sending to the upazilas, with the data presented elsewhere in Chapter 3 on what upazilas recoded as actually having received. Unfortunately, the DG finance departments were fully occupied with the preparation of the annual budget between May and July 2005 and were unable to provide this data in time for this report. Efforts are ongoing, however, it is hoped this analysis can be included as an additional annex to the report in the near future.

Table 3.8   Expenditure comparison between CGA, DGHS finance department, and upazila records

Mean ratios	CGA to DGHS finance department	CGA to upazila	DGHS finance department to upazila
Field level (2714) (%)	156	116	100
n	55	55	55
Clinic level (2744) (%)	123	129	106
n	55	55	55

Source: OPM facility and central level questionnaires.

The recorded discrepancies within DGHS between the central Dhaka finance department records, and upazilas, are quite small, with finance department records representing 100% and 106% of the expenditure recorded at upazila offices for field and clinic level, respectively. The variation is also much smaller than for other ratios.

However, there is much greater and more variable expenditure variation between the CGA and upazila records (a mean ratio of 116% and 129%, respectively) and between the CGA and the DGHS finance department records (156% and 123%, respectively)[17].

This finding is concerning, as in theory all three sources of expenditure information should be the same. If CGA's data is incorrect and its expenditure reporting is inflated, it raises queries over the reasons for this inflation as well as concerns over whether bank accounts are being reconciled and the accuracy of the Government of Bangladesh (GoB) expenditure accounts. If the DGHS finance department's data is incorrect, it has implications for how budget performance can be monitored and how financial controls can be exercised. If the upazila information is incorrect, then as the source of information for both accounting channels it could imply neither of the other sources of financial information can be trusted.

The DGHS has indicated to the survey team that considerable efforts are ongoing to improve expenditure reporting and to tackle some of the potential sources of reporting error, such as incorrect treatment of deposit accounts (e.g. for user charges such as ambulance use). It is thus hoped that a repeat of this analysis with FY 2004/05 figures would show an improvement in comparability.

Audit

Given potential concerns about the accuracy of expenditure accounting systems, the practice of thorough and routine audit becomes an even more important financial management tool. This survey investigated the frequency and types of audits that upazila (Health-side) and CS Offices have recently undergone. Figure 3.6 shows the proportion of offices undergoing audits in the three years prior to the survey. The results are disaggregated by audit type: Auditor General audits (AG), Ministry of Health and Family Welfare audits (MoHFW), and Foreign Aid Project Audits (FAPA).

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[17] The implied ratios of discrepancies between these three sources should be the same. However, that any two of the three ratios for the field level cannot be used to impute the third reflects the use of simple indexes in these calculations.

Figure 3.6   Proportion of units audited in past three years
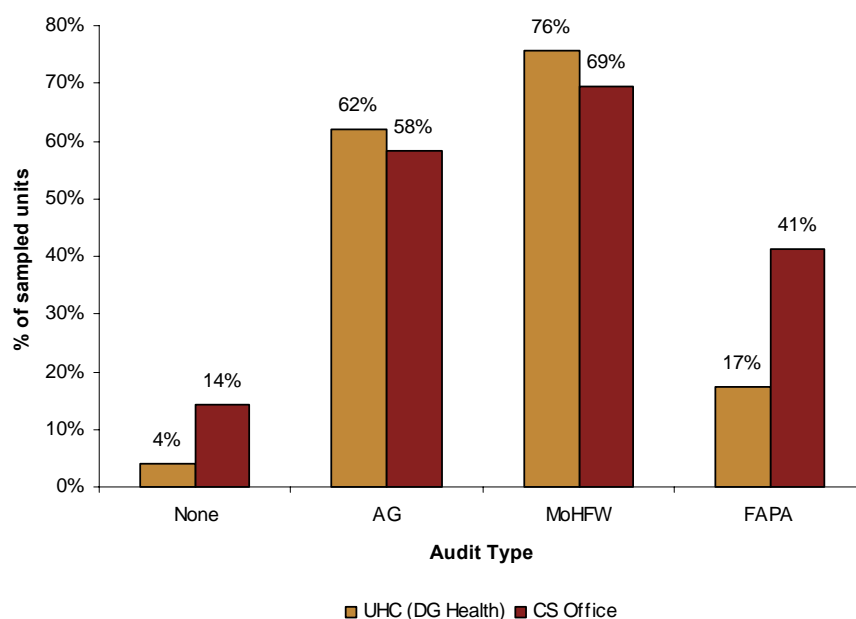
Figure 3.6 shows that 14% of CS offices and 4% of upazilas have had no audits of any kind in the last three years. The proportions audited by the AG and the MoHFW are almost the same for both UHCs and CS Offices.

For those units that underwent an audit, the survey investigated some key characteristics of the audit procedures, as shown in Figure 3.7.

Figure 3.7   Audit characteristics
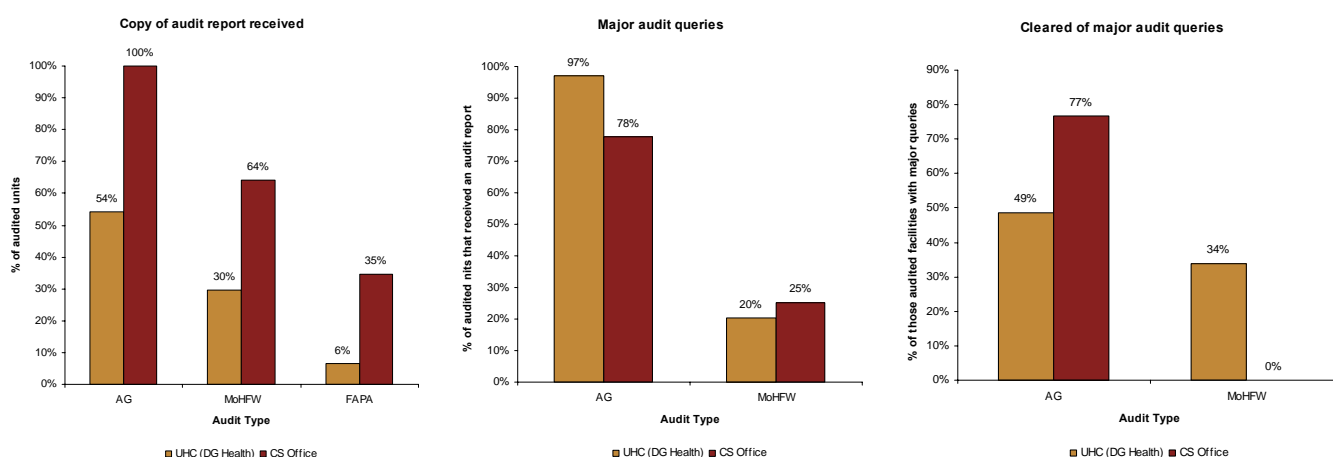
The key findings can be summarised as follows. First, audited CS Offices appear more likely to receive a copy of the audit report, from any source, than audited UHCs. The likelihood of receiving a copy of the audit report varies dramatically by audit type—receiving an AG audit report is most likely, and receiving a FAPA audit report is least likely. The best chance a UHC has of receiving a copy of an audit report is of one conducted by the AG's department, and even then only 54% of facilities receive a copy. Such low levels of information-sharing reduce the effectiveness of audit as a financial management tool, as

without knowing where there are queries or faults, upazila level managers can do little to rectify them.

Second, AG audit reports are more likely to include major queries than are MoHFW audit reports.

Finally, the likelihood of being cleared of a major query varies considerably across both audit type and across UHCs and CS Offices. The rates of query clear-up are quite low: only 49% of AG and 34% of MoHFW audit queries are resolved for the UHC level.

Informal charges—'speed payments'

Audits and expenditure-tracking are tools that might capture formal leakage from the financial system, for instance through the reconciliation of different expenditure reports. However, a significant issue identified during the survey design stage was the need for some MoHFW officials to make 'speed payments', either for facilitating the receipt of allotment letters from central DG offices or for the passing of expenditure bills by the AG accounts office[18].

Speed payments are an informal arrangement between officials in order to expedite a 'service' and do not represent leakage from budgeted resources *per se*. They thus cannot be captured by investigating expenditure records. Hence the survey asked accountants about the prevalence, format and value of speed payments that they had to make during the course of their duties. These results are, if anything, downwardly biased due to the sensitive nature of the question, although survey enumerators were trained to remind the respondent about the confidentiality of the survey at this point.

The main findings on the prevalence of speed payments are given in Table 3.9.

Table 3.9   Prevalence of informal payments

	Accountants reporting need for speed payments sometime in the FY[19] (%)	
	To receive allotment letters	To have expenditure bills passed
CS Office	37	73
Upazila—DGHS	59	67
Upazila—DGFP	29	61

Source: OPM facility questionnaires.

The findings suggest that the demanding of speed payments to receive allotment letters is common. The proportion reporting the need to pay for expenditure bills is relatively constant between the three responding groups, which might reflect a standard 'charging' structure levied by the AG accounts office. Speed payments for allotment letters are an internal MoHFW problem, and in particular DGHS appears to be badly affected.

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[18] Survey teams subsequently reported verbal reports from MoHFW accountants of speed payments being made to receive a clean audit. However, this evidence is strictly circumstantial and cannot be verified as the insight came too late to be incorporated into questionnaire design.

[19] Around a third of the field team leaders (FTLs) also reported that both DGHS and DGFP accountant staff reported the need for speed payments to pass audits, but questions concerning these payments were not recorded in the main questionnaires.

Table 3.9, however, looks only at the need to make a payment at least once in the FY. Figure 3.8 looks at the frequency of payments for allotment letters.

Figure 3.8   Frequency of informal payments for allotment letters
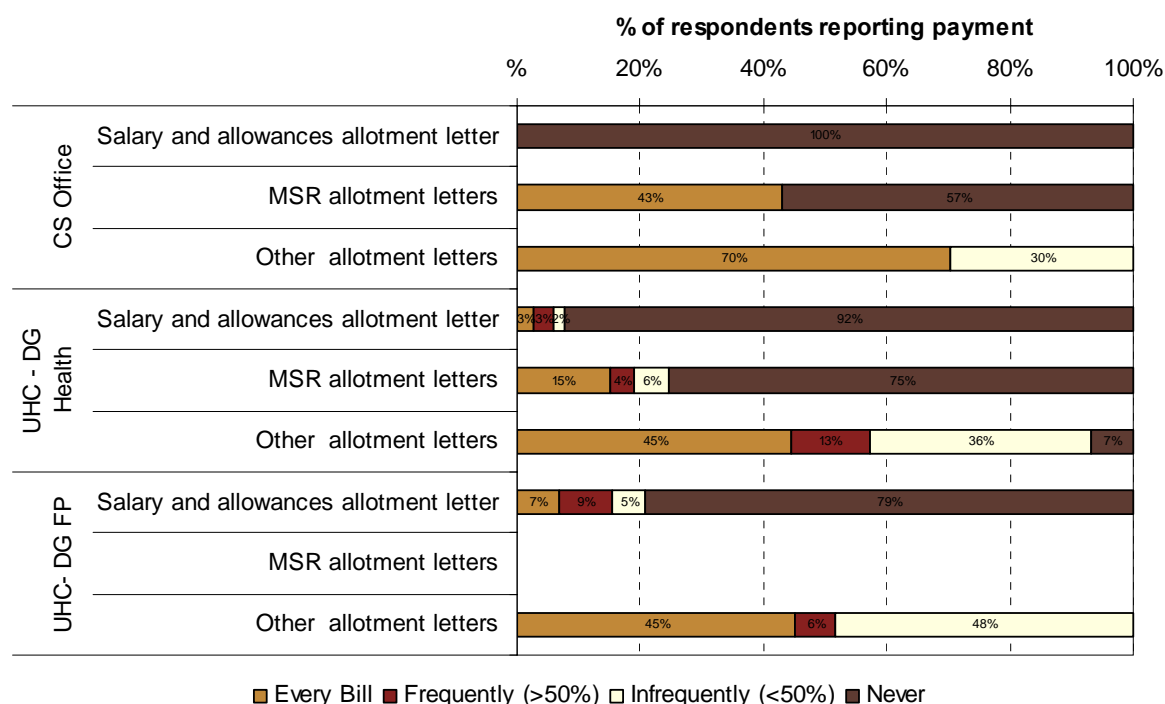
Speed payments for allotment letters are most prevalent for 'other' allotment letters, rather than for non-salary and allowance and non-MSR allotment letters. For these letters, the proportion of accountants reporting payment is over 90% in DGHS.

Figure 3.9 repeats the analysis for expenditure bills.

Figure 3.9   Frequency of informal payments for expenditure bills

% of respondents reporting payment
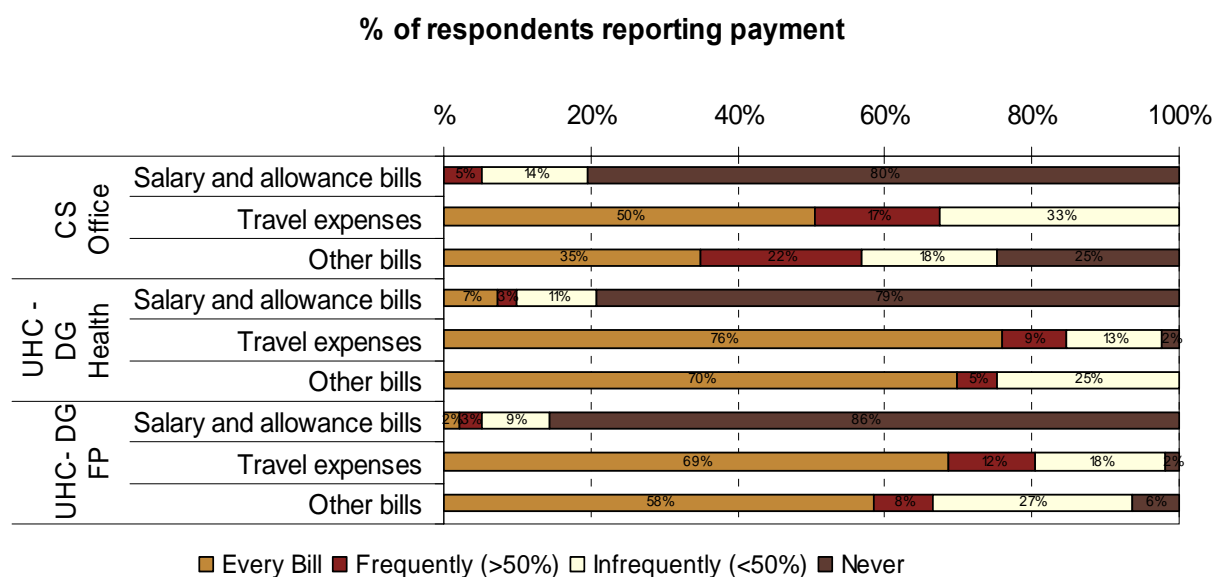
Speed payments for expenditure bills are also most prevalent for travel expenses and 'other' expenditure. At upazila level over 90% of accountants report having to make payments to get these bills passed, compared with only 14-21% for salaries and allowances.

An issue is the format of speed payments. Speed payments take one of two types—either a flat fee levied per allotment letter / expenditure bill passed, or set as a proportion of the value of the letter / bill, as shown in Figure 3.10.

Figure 3.10 Format of informal payments
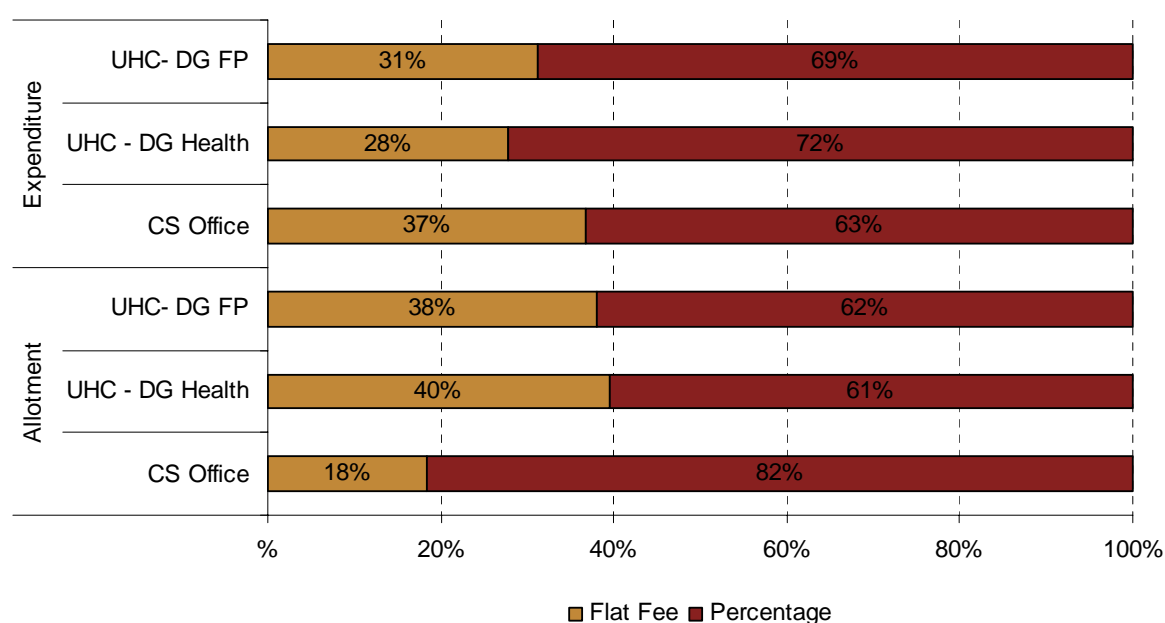
Percentage-type fee payment is prevalent in two-thirds of cases, as measured across both directorates and for both facilitating allotment letters and passing expenditure bills. The

value of 'percentage' speed payments also shows evidence of following a convention, as shown in Figure 3.11.

Figure 3.11 Distribution of value of percentage speed payments (all types)
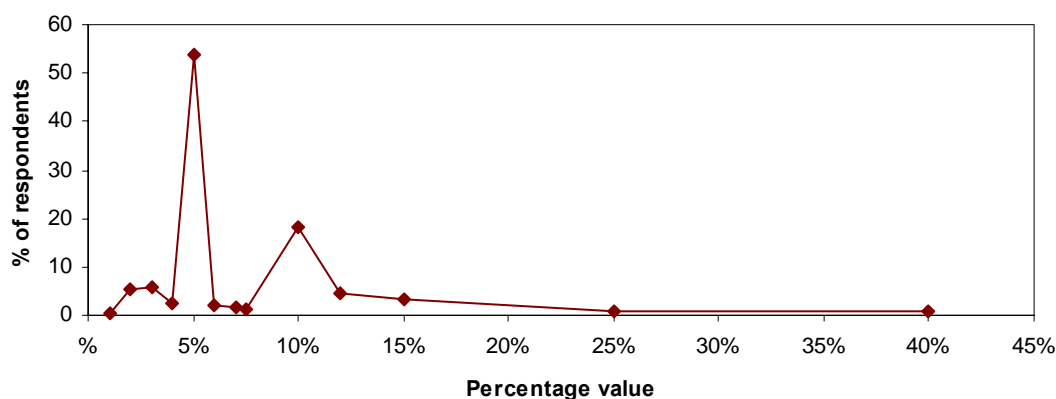
For percentage-based speed payment, the most common rate was 5%, mentioned by more than 50% of the respondents making such payments. Ten percent speed payments were mentioned by around 20% of the respondents.

The consistent findings on the type (flat fee or percentage), and the average value of speed payments, might suggest they are a fairly endemic feature of the MoHFW financial system. It is not difficult to see how this could happen. Speed payments are not taken from the budgetary resource in question at the time of payment (and hence will not be captured by formal expenditure tracking analysis). Rather, they are initially financed from the official's own pocket. The initial expense of making a speed payment (which at 5% of some allotments might be quite substantial in absolute terms) may then force the official to re-coup these costs. One way that this might happen is through the extension of informal charges to other workers, for instance through charging a levy on the collection of salaries. In this way a system of speed payments entrenches itself as each official in a chain of payments depends on lower levels to finance payments demanded by higher levels.

4. Human resources

4.1 INTRODUCTION AND OVERVIEW

Key findings

Human resource inputs

- The number of nurses, MAs, FWVs and field workers found in this survey is generally close to MoHFW standards. However, some 39% of UHCs have no RMO in post and nearly 60% of USCs have no MO. There is also a shortage of other MOs at the UHC compared with MoHFW standards.

- Vacancy rates for Class I officer posts are 42% for the DGHS and 27% for the DGFP. Deputation rates for these officers are 11% and 8%, respectively.

- Population to key worker ratios are high, and for MOs has deteriorated in FY 2003/04. There is up to a 4:1 ratio difference for certain key workers between the worse- and best-resourced upazilas, suggesting inequitable deployment.

- There are wide variations in the ratios between some designations of key workers (for instance nurse: MO).

- The majority of Class I officers are male, ranging from 61% of DGFP officers at union facilities up to 91% for DGHS officers at the UHC.

Human resource management

- Salary scales are relatively compressed—no worker has a maximum package more than 190% of the minimum package. There is evidence that remuneration varies between sadar and non-sadar union facilities, and SACMOs and MAs.

- There are major problems of late salary payment for union-level family planning staff (only 35% of such staff did not experience late payment in FY 2003/04), but workers at other levels are mostly paid on time every month. There is some evidence of discrepancy between remuneration recorded on the payroll and remuneration received.

- There is a problem of access to MoHFW accommodation. It is particularly acute for DGFP MOs at the UHC and DGHS MOs at USCs.

- Sources of income in addition to MoHFW remuneration are common and the amounts earned are high. For Class I officers it often approaches or exceeds MoHFW remuneration levels.

- Class I officer transfers are a very high proportion of Class I posts at upazila level (around 83% annually). Over 40% of DGHS MOs have been in post for less than one year.

- The frequency of in-service training availability varies greatly between different designations of worker.

- There is some management supervision from divisional and district level to UHC level, and by upazila of union facilities, although the frequency could be improved and supervision tends to focus on administrative matters.

- Unexplained absences are most problematic amongst nurses and DGHS MOs at union level. The level of explained absences is also high amongst several designations of worker.

System overview

MoHFW human resource management functions are handled at a number of levels:

- Payment of pay and allowances for staff is made by the DDO for the upazila. This implies, for the DGHS for example, that all staff must come to the upazila health accountant (normally located at the UHC) to collect their monthly salary, which they take in cash. A roll register or acquittance register is maintained and it is against this that staffing details and a record of salary payments are kept. The register must be consulted in raising the bill for pay and allowances. The survey used the bills themselves as the source of most salary and allowance information.

- Class I and II officers are self-drawing officers for pay and allowances and submit individual bills for their own salary and allowances. The DDOs (UHFPOs, UFPOs and MO-MCHs) have no power of authorisation over these payments.

- Postings and personnel transfers are handled at several levels. The relevant sanctioning authorities are: the CS for Class III and IV transfers within a district; the divisional director for most Class II and I officers; and the department of administration in DGHS for some Class I officers (e.g. UHFPOs). If a transfer has been authorised, the relevant sanctioning authority must copy a 'transfer letter' giving details of the sanctioned transfer, to both the new and old facility and the new and old spending authorities. Personnel files (both at the DDO and UAO's offices), bill preparation (DDO), bill registers (DDO and UAO) and acquittance registers (DDO) must all be adjusted accordingly. Disciplinary procedures are handled through a similar hierarchy.

- Overall management and supervision at the upazila level is handled by the UHFPO for DGHS, the UFPO for field-based DGFP personnel and the MO-MCH for clinic based DGFP personnel. In practice the UHFPO may delegate: UHC management to the RMO; union facility management to the most senior officer at each union facility (either a MO or a MA); and field services management to the health inspector.

A stylised illustration of the functions and key personnel at various levels of the MoHFW is shown in Figure 4.1.

Figure 4.1   MoHFW human resource functions and key personnel

Central Level (some transfer instructions)

Minister-MOHFW
Secretary
Joint Secretaries
Deputy & other secretaries

DG level (some transfer instructions)

DG- Health
Line Directors

DG-FP
Line directors

Divisional level (Class I and II transfers)

Divisional Director (Health)

Divisional Director (FP)

District level (Class III and IV transfers, supervision)

Civil Surgeon
Store keeper-DRS
Statistician
Assistant head clerk
Accountant

DD FP
Other office staffs

Upazila level (Pay and Allowance function, management and supervision)

UHFPO
1 RMO
1 Specialist: Medicine   2 medical assistants
1 Specialist: Surgery   5 Staff Nurses
1 Specialist: Gynae   Store keeper
1 Anaesthesiologist   Statistician
2 Medical officers   Assistant clerk
1 Dental Surgeon   Upazila accountant

Field level
UFPO
1 AUFPO
Store keeper
Assistant clerk
Upazila accountant

Clinical level
Medical offficer-MCH
1 Senior Family Welfare Visitor
Assistant clerk
Upazila accountant

Union level

For Union sub centre (Health alone)
1 **Medical officer**
1 Medical assistant
1 pharmacist
1 MLSS

For Health & Family welfare centre (combined Health & FP)
Health side
1 **Medical officer**
1 medical assistant
1 pharmacist
1 MLSS
FP side
1 **Family welfare visitor**
1 Aya

For Family welfare centre (FP alone)
1 **Medical officer**
1 SACMO
1 Family welfare visito
1 pharmacist
1 MLSS/ Security guard
1 Aya

4.2   HUMAN RESOURCE INPUTS

Sufficient numbers of trained medical and paramedical staff are the bedrock of any health system. The survey investigated the number of workers at different facilities, the population / worker ratios and changes in these ratios over the previous year, the ratio between different types of worker, and the gender of MOs.

Numbers of health and family planning workers

The survey measured the number of key workers on the payroll and in-post at each facility at the time of interview. The findings are presented in Table 4.1.

Table 4.1   Number of health and family planning workers at UHC[1]

Non-sadar UHCs	Mean number present	Facilities with none (%)	Staffing norm
DGHS MOs			
UHFPO	0.96	4	1
RMO	0.61	39	1
Anaesthesiologist	0.31	69	1
Dental Surgeon	0.27	73	1
Gynaecologist	0.26	76	1
Specialist Medicine	0.11	90	1
Specialist Surgery	0.14	86	1
MO	2.69	2	2
All MOs (excluding UHFPO and RMO)	3.78	2	7
Other DGHS workers			
Nurses (all types) [2]	9.67	0	10
MAs at UHC	1.80	0	2
DGFP			
MO-MCH	1.03	13	1
Other family planning MOs at UHC	0.02	99	1
FWVs at UHC (including senior FWVs)[3]	2.15	2	n/a

Source: OPM facility questionnaires.
Notes: (1) This table does not adjust for deputations. (2) This staffing norm is for staff nurses and was revised in 2004. (3) All figures in this report relating to FWVs include senior FWVs, where appropriate.

The proportion of UHCs with no RMOs (39%) is particularly low, although in practise the more junior doctors will often work as the acting RMO. The mean number of other MOs at UHC level (3.78) is around half that of the seven posts intended. This is leaving critical shortages amongst specialist staff, with only around one-quarter of UHCs having a gynaecologist (either specialist or junior level) and only slightly more with an anaesthesiologist. In contrast, there seem to be a full complement of nurses at non-sadar UHCs, which is surprising given the reported shortage of nurses in Bangladesh.

Table 4.2   Key workers at the union level

	Mean number present	Facilities with none (%)	n	Staffing norm
DGHS union facilities				
MOs	0.32	68	36	1
MAs	0.91	18	36	1
HAs	3.83	0	36	n/a
DGFP union facilities				
Family planning MOs	0.02	98	49	1
SACMO	0.54	46	49	1
FWVs	0.99	8	49	1
FWAs	4.45	1	49	n/a
Combined union facilities				
MOs	0.50	51	43	1
MAs	0.92	8	43	1
HAs	3.37	0	43	n/a
SACMO	0.10	90	37	0
FWVs	0.96	7	37	1
FWAs	4.23	0	37	n/a

Source: OPM facility questionnaires.

At the union level, the MoHFW's policy of having a MO head each facility is a long-way from being met. Sixty-eight percent of DGHS facilities, 98% of DGFP facilities and 51% of combined facilities, have no MO in post. For DGFP facilities, there are also often no SACMOs (46% of stand-alone DGFP facilities have no SACMO), which implies these facilities are often headed by a FWV.

The survey also calculated population-per worker ratios at upazila and union levels, as shown in Table 4.3.

Table 4.3   Population: health and family planning worker ratios

Level	Designation	Low	Mean	High	High to low ratio	n
DGHS						
Upazila level	MOs	20,472	45,886	83,418	4.1	61
	Nurses (all types)	14,146	29,489	51,093	3.6	61
	MAs	33,593	58,612	84,947	2.5	61
Union level (all unions)	MOs	68,739	152,880	262,956	3.8	61
	MAs	50,051	101,635	178,163	3.6	61
	HAs	5,300	7,622	10,587	2.0	61
In unions where there is a DGHS facility	MOs	10,935	23,566	32,625	3.0	35
	MAs	11,113	26,001	36,663	3.3	75
	HAs	4,600	8,765	14,910	3.2	61
DGFP						
UHC level	All family planning MOs at UHC	125,250	231,782	351,501	2.8	54
	FWVs at UHC	61,419	136,640	226,880	3.7	60
Union level (all unions)	SACMOs	35,251	76,532	112,620	3.2	59
	FWV	21,370	33,246	44,541	2.1	61
	FWA	4,471	5,625	7,140	1.6	61
In unions where there is a DGFP facility	SACMOs	17,506	25,471	35,058	2.0	42
	FWV	14,429	24,692	35,625	2.5	77
	FWA	3,671	6,854	8,989	2.4	83

Source: OPM facility questionnaires.
Note: The figures in Table 4.3 are calculated by dividing catchment population by the number of workers (of each type) serving that population. However, they report only on those upazilas and union facilities where key workers are present and do not take account of those where no personnel are found. Table 4.1 shows that with certain designations (i.e. RMOs) the proportion of facilities without certain workers can actually be quite significant. The figures also use union population data provided by census data. They are based on union administrative boundaries which may not reflect practical health service delivery boundaries.

There are sizeable population numbers per worker. The findings also show that the distribution of human resources may not be equitable—the best-resourced 10% of facilities have considerably more workers than the worst-resourced 10%. The inequality of allocation is more severe in DGHS than in DGFP, and more severe at upazila level than at union level. The most inequitably distributed designation is DGHS MOs.

The population / personnel ratios improved for all staff (i.e. the population per worker ratio has decreased) between 2003 and 2004. However, for Class I officers, the ratio has deteriorated for all but sanctioned post numbers. In other words, there was a greater population per MO in post and per MO actually working (e.g. after deputations) in 2004 than in 2003.

It is interesting to see Bangladesh's overall population-to-doctor ratio in a regional comparison (Table 4.4).

Table 4.4   International population-to-doctor ratios

	Maldives	**India**	**Sri Lanka**	**Thailand**	**Myanmar**	**Bangladesh**	**Bhutan**	**Nepal**
Population -per-doctor	1,195	1,916	2,432	3,341	3,352	4,521	6,384	18,439
Year	1998–2000	1997–98	1998–2000	1998–99	1998–2000	1997–2000	1998–99	1998–2002

Source: OPM and various.
Note: This table has been compiled from a number of different sources. Full details and references are given in Annex 6.

Not only does Table 4.4 show that MoHFW upazila population: MO ratios are far above the national average, but it also shows that Bangladesh as a whole has fewer MOs *per capita* than neighbouring countries.

Vacancies and deputations

The analysis so far presented focuses on workers actually in post. This is not necessarily the best indication of the MoHFW's aims and goals for staffing patterns. These are better expressed by the sanctioned numbers of workers at each facility. Vacancy rates can then be calculated as the difference between the sanctioned number of workers and the number in post. Deputation rates are also presented. This is the difference between the number of workers in post (e.g. on the payroll at any one facility) and those actually working (e.g. after accounting for authorised leave such as study leave). These different dimensions of the human resource picture are presented in Table 4.5 and Table 4.6.

Table 4.5   Sanctioned, in-post and working manpower (upazila level)

Non-sadar upazilas Class of personnel and directorate	No. of Sanctioned posts	Vacancy rate (%)			Deputation rate (%)
	Mean	Low	Mean	High	Mean
DGHS					
Class I Officers	12.4	15.4	42.8	71.4	10.8
Class III Staff	99.5	12.5	20.9	32.6	1.3
Class IV Staff	23.8	3.6	23.0	42.1	1.2
DGFP					
Class I Officers	3.4	0.0	27.2	66.7	7.9
Class II Officers	2.2	0.0	55.1	100.0	0.1
Class III Staff	90.1	7.1	18.6	30.2	0.1
Class IV Staff	20.4	4.3	31.1	58.3	1.8

Source: OPM civil surgeon questionnaires.

Mean vacancy rates are high across all classes, with the lowest being 18.6% for Class II DGFP staff. The mean vacancy rate amongst Class I officers (mainly MOs) is over 40% in DGHS and 27% in DGFP. In the most under-resourced upazilas, the Class I vacancies rates are around 70% for both directorates. There is also notable deputation amongst Class I officers—around 10% of officers are working in a different location to where they are posted for DGHS and around 8% in DGFP.

Key worker ratios

In any health system, striking an optimal balance between different types of personnel is important for efficiency reasons. Some key personnel ratios are presented in Table 4.6.

Table 4.6   Key worker ratios

			Ratios between key workers			
			Low	Mean	High	n
DGHS	UHC (non-sadar)	Nurse / MO	0.9	2.2	3.3	62
		MO / MA	1.5	2.4	5	61
		Nurse / MA	3.5	5.8	11	61
	Union	MA / MO	1	1.8	3.5	52
		HA / MO	5.5	10	25	71
DGFP	UHC (non-sadar)	FWV / MO-MCH	0.7	1.8	3	71
	Union	FWV / SACMO	1	2.4	3.3	77
		FWA / FWV	4.2	5.8	8	79

Source: OPM facility questionnaires.

The mean nurse: MO ratios at the UHC are lower than might be expected for a first-level referral unit. More revealing than perhaps the means, are the variations in ratios across the sample facilities. The highest ratios are often three or four times greater than the lowest ratio. This implies that similar facilities in practice have to use quite different mixes of worker inputs to provide health services. This in turn may have implications for the range of services that can be offered and for the quality of care.

Gender balance of Class I officers

A suitable gender balance in the employment of MOs will be an important factor in promoting demand for MoHFW services amongst female patients in particular. The survey's findings on this gender balance are presented in Figure 4.2.

Figure 4.2   Gender balance amongst Class I officers
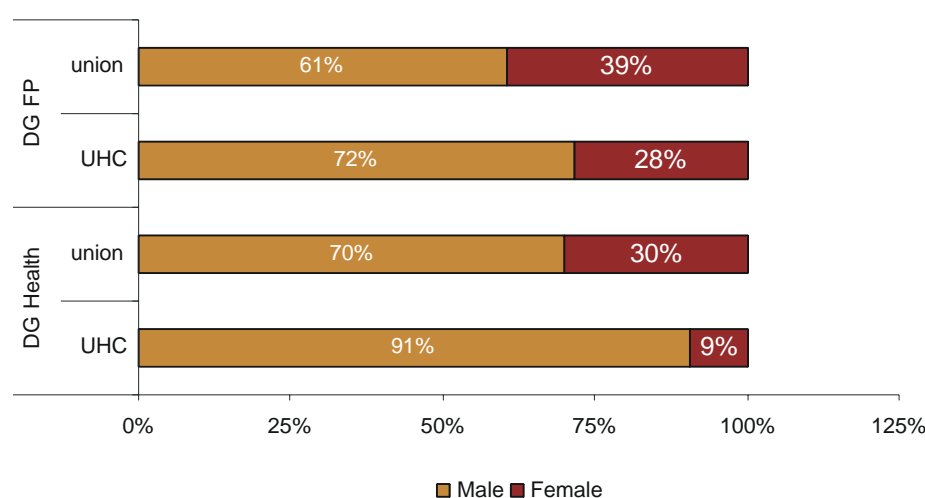
Throughout MoHFW upazila services, Class I officers are predominantly male. There are proportionately more female officers at union level than at the UHC, and in the DGFP compared with the DGHS. Within the DGHS, 62% of UHCs and 70% of unions have no female doctor. The comparable figures within the DGFP are 62% and 56%, respectively (it should be noted though, that the union level figures are calculated from only 20 observations).

4.3   HUMAN RESOURCE MANAGEMENT

This section looks at how human resource inputs are managed. Much of the analysis examines the incentive framework for workers—i.e. their remuneration and its timeliness, the availability of accommodation, and the level of their additional incomes. The transfer and posting system is investigated by looking at worker turnover, the average number of transfers and duration of service. Salary payment discrepancies and attendance levels are also discussed.

Remuneration levels

One important aspect of human resource management, because it is a key factor in employee motivation, is an appropriate remuneration structure. The survey's findings are given in Table 4.7.

Table 4.7   Monthly salary and allowances[1]

	Low (Tk)	Mean (Tk)	High (Tk)	High-to-low ratio (%)
UHC				
DGHS—MOs[2]	7,405	10,012	13,150	178
DGFP—MOs	8,692	10,104	12,900	148
All nurses	5,814	7,884	10,935	188
MAs	6,885	9,849	10,835	157
Union level				
MOs	7,405	9,551	13,150	178
MAs (all levels)	6,885	9,773	10,737	156
Family planning—SACMO	6,648	8,650	10,270	154
HAs	4,014	5,410	6,153	153

Source: OPM facility questionnaires.
Notes: (1) All figures presented are before deductions, e.g. for rent, benepole (welfare) funds, etc. (2) Excluding UHFPO and RMO.

The best-paid workers are paid between 150% and 190% more than the worst paid, which shows some compression in salary scales, although of a degree not atypical in developing countries. Career salary progression is slow and often consists of small annual increments. SACMOs at union level get paid less than their counterparts (union level MAs) in DGHS, despite very similar training and qualifications. The mean difference in their salary and allowances is 1,191 Tk per month.

There are also differences in salary ratios between union-level workers posted in the sadar upazila and those working in other upazilas, and between combined union facilities and those facilities run by a single directorate:

Table 4.8   Mean monthly salary and allowances—union level (Tk)

	Sadar	n	Non-sadar	n	Stand alone	n	Combined	n
Union-level MOs (DGHS)	11,576	7	9,090	15	8,699	7	9,905	15
MA	9,520	18	9,823	42	9,570	26	10,136	34
SACMOS	8,017	20	7,359	73	7,454	54	7,579	39
FWVs	8,886	8	8,609	35	8,643	39	8,892	4
HA	5,667	6	5,354	38	5,171	22	5,549	33
FWAs	5,544	18	5,428	72	5,391	50	5,584	40

Source: OPM facility questionnaires.
Notes: All figures presented are before deductions, e.g. for rent, benepole funds, etc.

Key workers based in union facilities in sadar upazilas are paid higher salaries and allowances than those based in non-sadar upazilas. The same is true for union facilities where workers from both directorates are posted. As remuneration is closely related to job duration this suggests more experienced staff are posted to these facilities.

Timeliness and accuracy of remuneration payments

The incentives facing key workers are not linked just to the official levels of salary but also to actually being paid on time and in full. The findings on the timeliness of salary and allowance payments are presented in Figure 4.3.

Figure 4.3   Number of months in a year in which salaries are paid late
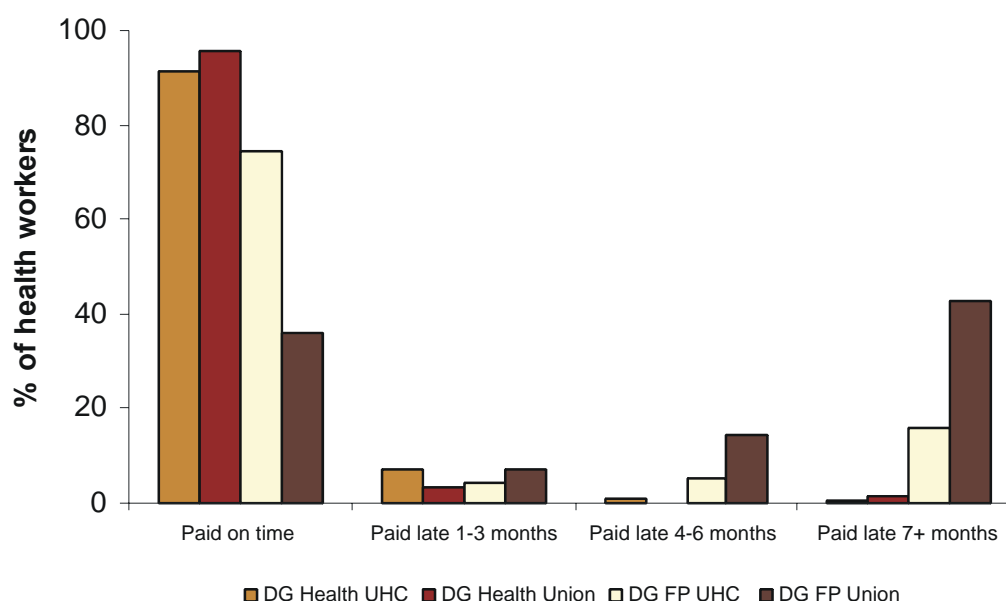
The findings show a certain polarisation of experiences. Across the MoHFW as a whole nearly 72% of key workers reported being paid on time every month of the FY. However nearly 19% of workers are paid late for 6 months or more of the FY. Salary payment timeliness is influenced greatly by facility type. The poorest timeliness is at DGFP union facilities where only 35% of workers were paid on time throughout the year, and 48% were paid late in at least six months in the year. This is, in turn, largely driven by the high proportion of workers at these facilities who are paid from the development budget, which was not approved for much of the FY 2003/04.

The survey also investigated the discrepancies between net pay and allowances as recorded on the payroll and as reported by the individual when interviewed, as shown in Figure 4.4.

Figure 4.4　Discrepancies between payroll and reported earnings
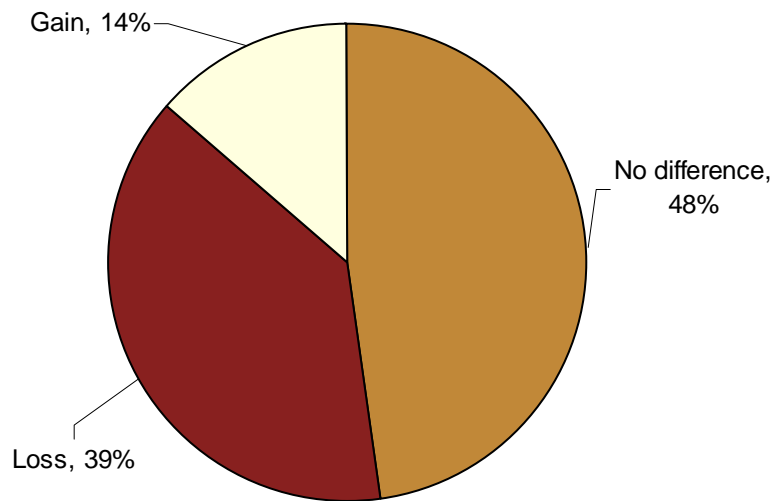
This methodology is obviously subject to respondents remembering their previous month's net take home pay accurately, which they will not always do. Around 48% of respondents reported the same take home pay as recorded on the payroll. Of those remaining, the number reporting a negative variance (e.g. a lower amount of take home pay than recorded on the payroll) outstripped those reporting a positive variance, by nearly three to one.

Figure 4.5 overleaf plots the variations of the 52% of the sample who reported discrepancies.

Figure 4.5　Distribution of salary variance (Tk)
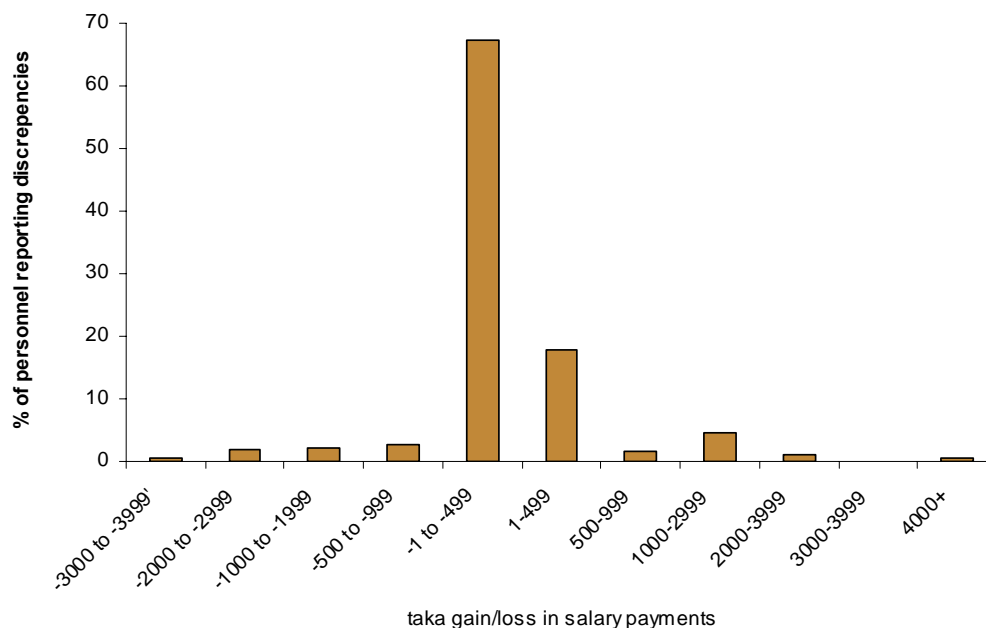
Sixty-seven percent of all respondents reporting a discrepancy received 1–499 Tk less than what was recorded on the payroll. Some of this is inevitably due to inaccurate remembering of the exact take home pay and indeed the mean level of discrepancies, at a 95% confidence level, is not significantly different to zero. However, as so many of the small discrepancies are of a loss and not a gain, this result could be consistent with a degree of 'skimming' of monthly salary and allowances by those officials responsible for processing these payments. Indeed the prevalence of informal or 'speed' payments highlighted in Chapter 3 suggested that accounting staff will need to re-coup some of the payments. It is possible they do this through taking a small cut from monthly salary and allowance payments.

Therefore, whilst by no means providing clear evidence of 'salary skimming', this finding does lend limited support to reports from the field of such a practice and it merits further investigation.

Accommodation

The availability of good quality accommodation is another important part of the incentive framework for well-educated public sector workers who are often asked to work in rural areas far from their place of origin. At the UHC, all MOs, nurses and MAs are entitled to MoHFW accommodation. At the union level, MOs, MAs / SACMOs and FWVs are eligible for accommodation if it exists. The proportion of key workers living in MoHFW accommodation is shown in Figure 4.6.

Figure 4.6   Proportion of key workers who live in MoHFW accommodation
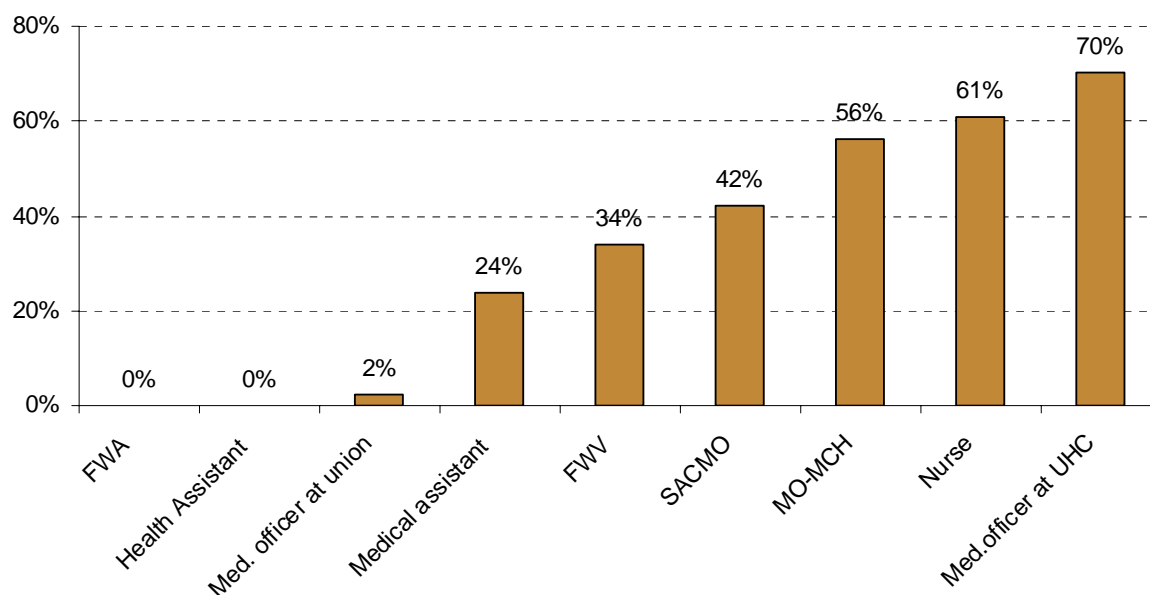
No category of key worker is fully housed in MoHFW accommodation. Most concerning is the tiny proportion of USC MOs (2%) who live in MoHFW accommodation. This must significantly reduce the ability to recruit and retain MOs at this level. It is also unclear why DGFP MOs (MO-MCHs) have lower housing rates than DGHS MOs at the UHC (56% to 70%).

Table 4.9, below, shows that the accommodation problem is centred on the UHC and DGHS union facilities, and not on DGFP union facilities.

Table 4.9   Accommodation stock by facility type

	Mean number of houses/flats	Facilities with no accommodation (%)	Houses (as % of key workers in post)[1] (mean)
UHC	10.3	2	51[2]
USC (DGHS)	0.5	71	45
Family welfare centre (DGFP)	1.7	13	112
UHFWC (Combined)	1.3	28	122

Source: OPM facility questionnaires.
Note: (1) Health workers are defined as: at UHC, the UHFPO, RMO, MO-MCH and UFPO, all other doctors, and nurses; at USC, doctors and MAs; at FWCs, SACMOs and FWVs; and, at UHFWCs FWVs, SACMOS, doctors and MAs. (2) This figure of 51% is likely to be an overestimate as it is possible the reporting of UHC house numbers by the UHFPO may have included houses for family planning side as well

Family planning workers at the union level are likely to work at a facility with adequate housing. This is not the case for DGHS staff at either UHC or union level, where the number of key workers is around twice that of the number of houses. If the DGHS is to deliver on its policy of providing accommodation for key workers at union facilities, either private sector accommodation of an adequate standard needs to be available and workers remunerated so that they can afford to rent this accommodation or, failing this, a large-scale programme of construction looks necessary.

Accommodation levels have an interesting relationship with absenteeism levels (see Figure 4.13). In facilities where no key workers are found to be absent, around 100% of key workers have MoHFW accommodation. For those facilities with at least one key worker absent, only 70% of key workers have accommodation.

Additional incomes

As part of its investigation into the incentive framework, the survey asked workers whether they had any income in addition to their MoHFW salary and allowances. MoHFW employees are permitted to have additional incomes, even from medical practice, as long as it not earned during official hours of duty. The results displayed below show the proportion of respondents who said they had additional income on the left-hand scale (light coloured bars); and of those that said yes, their reported mean additional income per month in Tk on the right-hand scale (thin, dark bars).

Figure 4.7   Additional incomes

Legend: ■ % that have additional income   ■ Monthly alternative income (mean in taka)
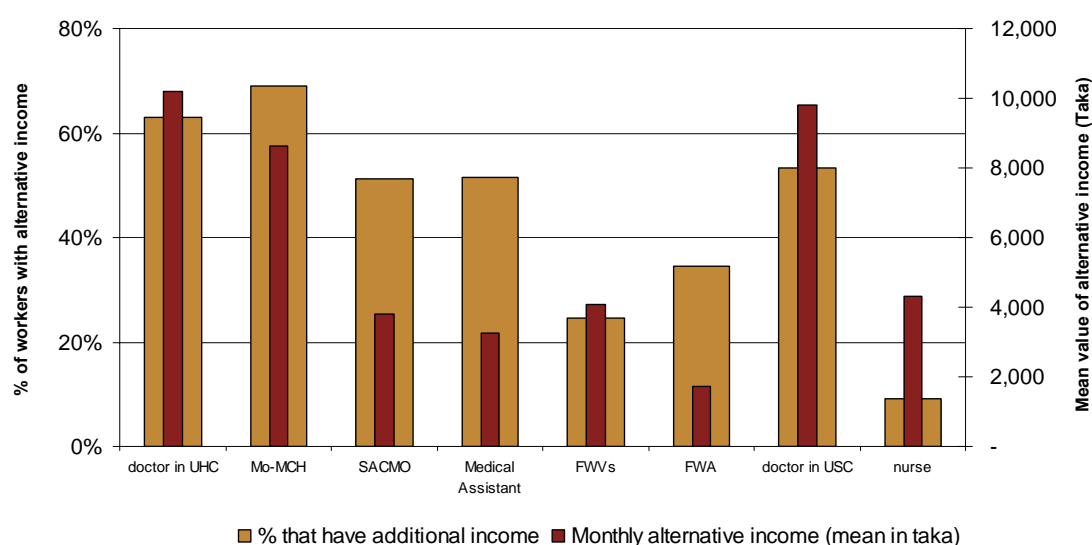
The majority of MOs, SACMOs and MAs have additional incomes. Amongst those who report additional income, for MOs the mean value of additional incomes approaches or exceeds official levels. For instance DGHS MOs at the UHC have an additional income of 10,179 Tk compared with 10,012 official remuneration; for DGHS MOs at union level, mean additional income is 9,807 Tk compared with 9,551 Tk official remuneration.

Transfers

The transfer of key workers from one facility to another is vital both to balance resources across MoHFW services as a whole and also for an individual's career development. However, too high a rate of transfer means that service continuity and institutional memory may be affected, to say nothing of the costs of such transfers and disruption to the individual concerned.

The survey's findings with respect to the transfer system are illustrated below:

Table 4.10   Class 1 officer turnover (DGHS upazila level)

	Transfers (as % of number in-post)		
Upazilas n = 65	Low	Mean	High
Transfers into post	0	41	100
Transfers out of post	0	42	100
All transfers (gross turnover rate)	33	83	167

Source: OPM facility questionnaires.
Notes: Turnover is calculated as number of transfers in FY 2003/04 as a proportion of Class I in post at beginning of FY. They include transfers, postings and deputation letters. Only transfers that are confirmed as having taken place are included in this sample. Class I transfers within the upazila (which are rare) are not counted.

Turnover rates are very high. Around 41% of the Class I payroll at the time of interview had arrived at the upazila during the year, and a similar proportion had left (although both

means are skewed upwards by a few upazilas with very high turnover). Such levels of turnover amongst management staff could make it difficult to assign responsibility and accountability for performance. It will also impact on relationships with other governmental and public service departments and on relationships with patients and communities.

The survey also analysed the origin and destination of transfers using district-level information, and the findings are presented in Figure 4.8.

Figure 4.8   District-level transfer direction (Class I officers)
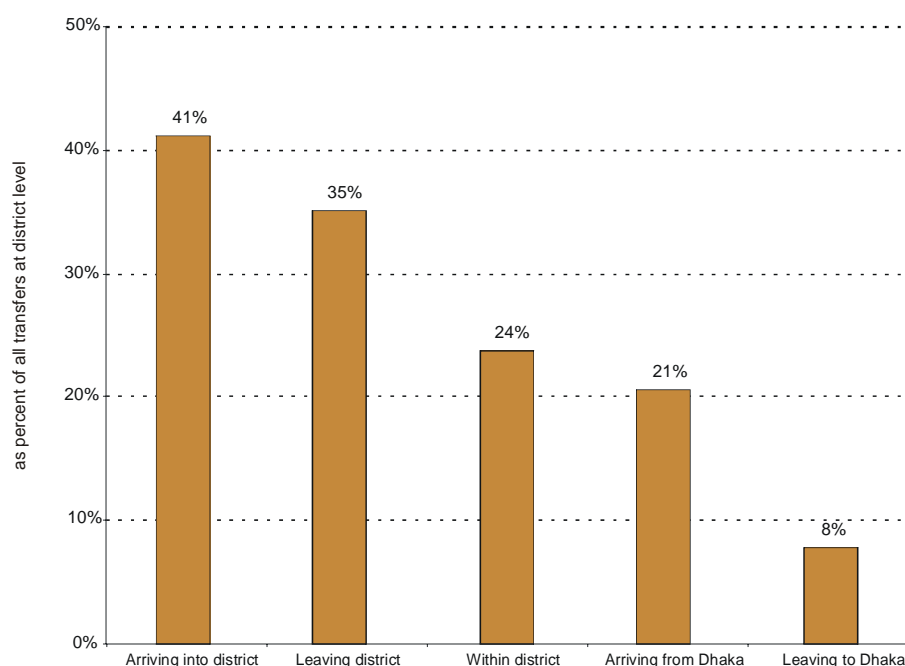
This suggests an inflow into the district level. Interestingly, there are more transfers arriving from Dhaka than leaving to Dhaka. This might suggest that the MoHFW is having some success in re-distributing human resources out of the capital. However, these figures do not include Class I officers at medical college hospitals and central facilities, so it is not a complete picture.

Duration of service

The average duration of service amongst key workers also supports the finding of high turnover rates (Figure 4.9).

Figure 4.9   Average duration of service in current posts (months)
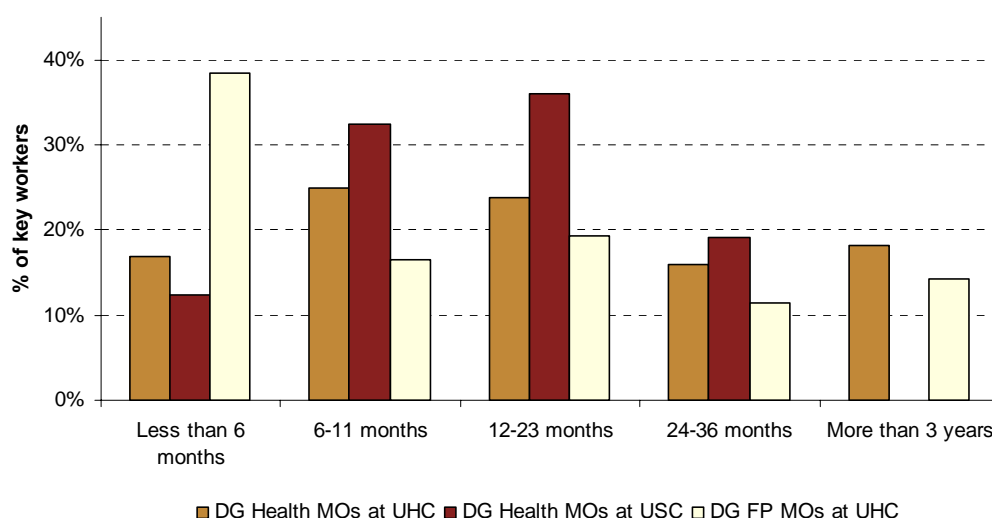
Over 40% of MOs at UHC and union level have been in post for less than one year. The proportions for MOs (mainly MO-MCHs) in Family Planning within their first year of posting are even higher. There were no union-level MOs surveyed who had been in post for more than 36 months. This turnover rate, allied with high vacancy rate for union-level MOs, suggests retention is a serious issue at these facilities.

In-service training

Regular in-service training is vital to keep clinical and management skills refreshed. Findings on the frequency of in-service training are shown in Figure 4.10, below. The thick, light bars correspond to the left-hand axis and show the proportion of key workers who have received more than two days training in the past year. The thin, dark bars correspond to the right hand axis and show the mean numbers of days of training for those respondents who have had any at all.

Figure 4.10 In-service training
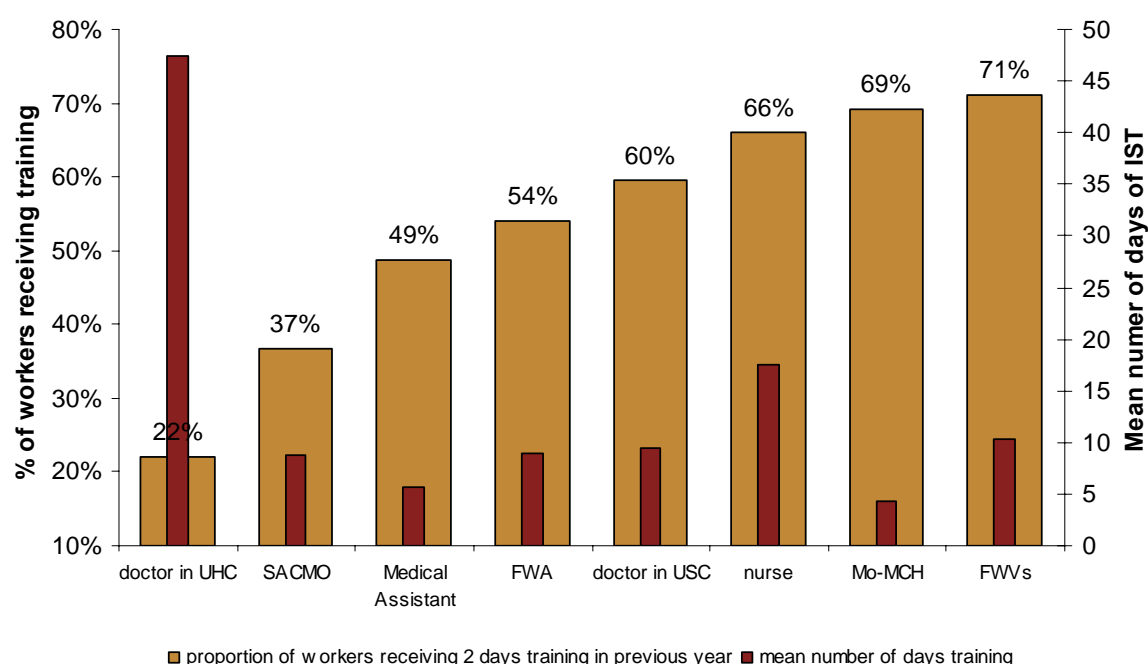
The prevalence of in-service training varies greatly between designations. There must be particular concerns about the amount of training received by MOs in the UHC (although when they do go for training, the average duration is long—more than 45 days) and amongst SACMOs and MAs. Although not shown here, by far the most common training courses is on EPI (expanded programme of immunisation).

Supervisory systems

Effective supervision is also vital for the maintenance of clinical and management standards. The survey investigated the extent to which facilities had been visited by their supervisors in the previous month (Table 4.11).

Table 4.11   Facilities visited by supervisory staff in past month

		Facilities visited in previous month (%)	n
UHC (DGHS)	Divisional Director	23	77
	District Health Superintendent	29	77
	CS	87	77
UHC (DGFP)	Divisional Director FP	21	76
	DD FP	69	76
Union level—DGHS	UHFPO	17	47
	District Health Superintendent	0	44

		Facilities visited in previous month (%)	n
Union level—DGFP	UFPO	24	62
	Assistant UFPO	58	42
	Senior FWV	15	56
	MO-MCH	18	55

Source: OPM facility questionnaires.

There is a fair degree of supervision reported to be taking place, particularly to the upazila level. Divisional directors are reported to reach one-fifth to one-quarter of UHCs each month, which is very surprising given the large size of their administration. Both CS and the DGFP deputy director are also active in visiting UHCs each month. Within the upazila, the degree to which the UHFPO and UFPO visit each union facility is perhaps more disappointing (the proportion of union facilities supervised in the previous month is 17% and 24%, respectively), although DGFP officers and staff typically have more union facilities to cover.

Of course adequate frequency of supervision is only part of the picture—supervision must be effective too. Heads of union facilities were asked what their supervisors did during their last supervisory visit (Figure 4.11).

Figure 4.11 Supervisory activities of union-level facilities
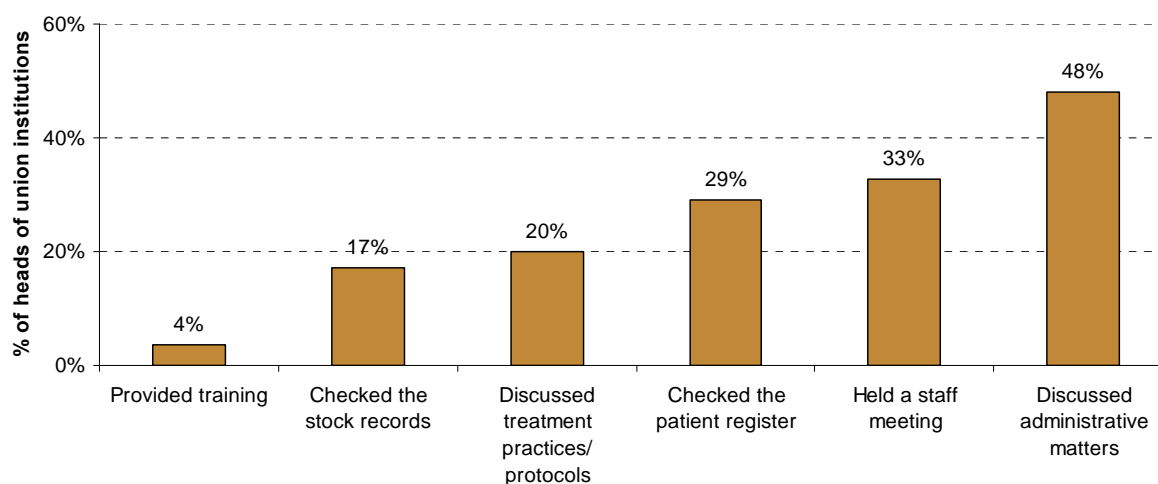
There is very little on-the job training (4%) or discussion of clinical matters (20%) undertaken on supervisory visits. Stock records were inspected in less than one-in-five visits and the patient register in less than one-in-three. Most supervisory visits seem to discuss administrative matters. Only 34% of union heads-of-facilities reported that supervisory visits resulted in any operational change, with 40% saying there was no change and 26% reporting that no problems were identified (these results are not shown) [20]. It may be worth reviewing supervisors' roles in light of these findings.

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[20] The key worker interviews reveal that 54% reported that the last time they saw their supervisor there was an 'exchange of greetings only'.

Another supervisory mechanism for union facilities is the regular meetings held at the UHC of the in-charge officer or staff of all union facilities in the upazila. They were asked what degree of influence they thought they had over the management decisions taken at these meetings:

Figure 4.12 Union influence over management decisions
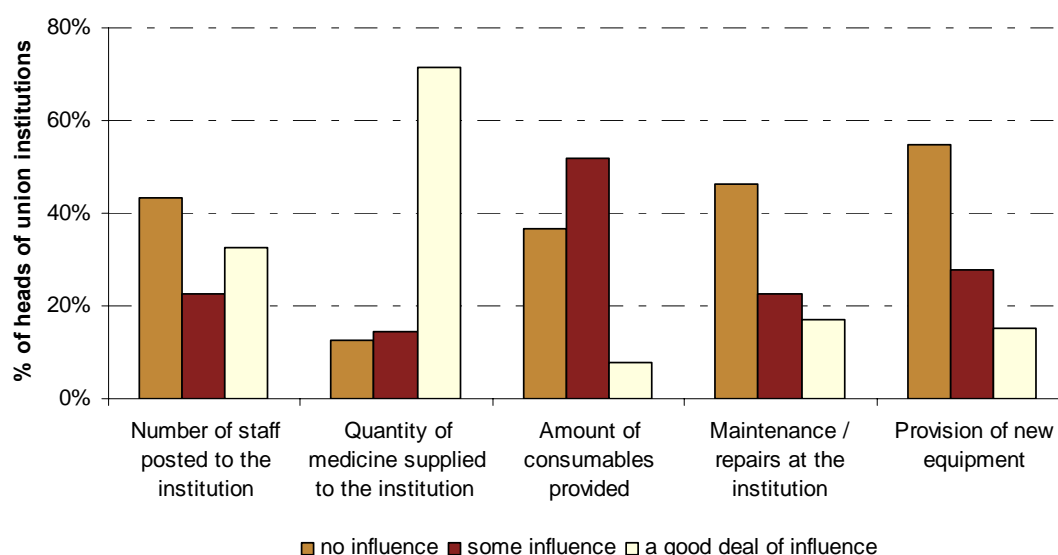
Apart from the quantity of medicine supplied to the facility, union-in charges did not generally feel that they could strongly influence key management decisions to their facility. Maintenance and equipment provision were least open to influence. These findings may reflect the degree of autonomy that the upazila management itself has in such matters.

Worker attendance and unexplained absences

The survey investigated the attendance of key workers at each facility by reconciling a headcount with the payroll records of workers posted to that specific facility (and therefore not the numbers of sanctioned posts as some previous absenteeism estimates have erroneously used). In the case of the UHC the key worker headcount was conducted through an unannounced return visit approximately five days after the main survey. The methodology for collecting data on absent workers was also careful to assess whether workers were legitimately absent due to shift work, authorised leave, deputation or supervisory work[21]. In this way it could categorise absences as either explained or unexplained. The results are shown in Figure 4.13.

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[21] Workers at the UHC are only classified as 'unexplained absence' if other health workers report the sampled worker as on unauthorized absence, or if the enumerator can find no written evidence of leave authorization. For DGHS workers, a worker's absence will in addition not be classified as 'unexplained' if there is a record of the worker being on night duty the previous evening. At union level, workers were only classified as 'unexplained absence' if the payroll and other records at the upazila identifies an individual as in-post and due to be on duty, and the respondent at the facility has never heard of them or reports unauthorized absence. As a result of this, it is not strictly possible to say whether those whose absence is unexplained are absent or actually 'ghost' workers who do not exist at all. The searches were conducted at random times of the working day and not just at facility opening times (officially 9.00 am) or closing times (officially 4.00 pm) as with other investigations into attendance.

Figure 4.13 Attendance levels
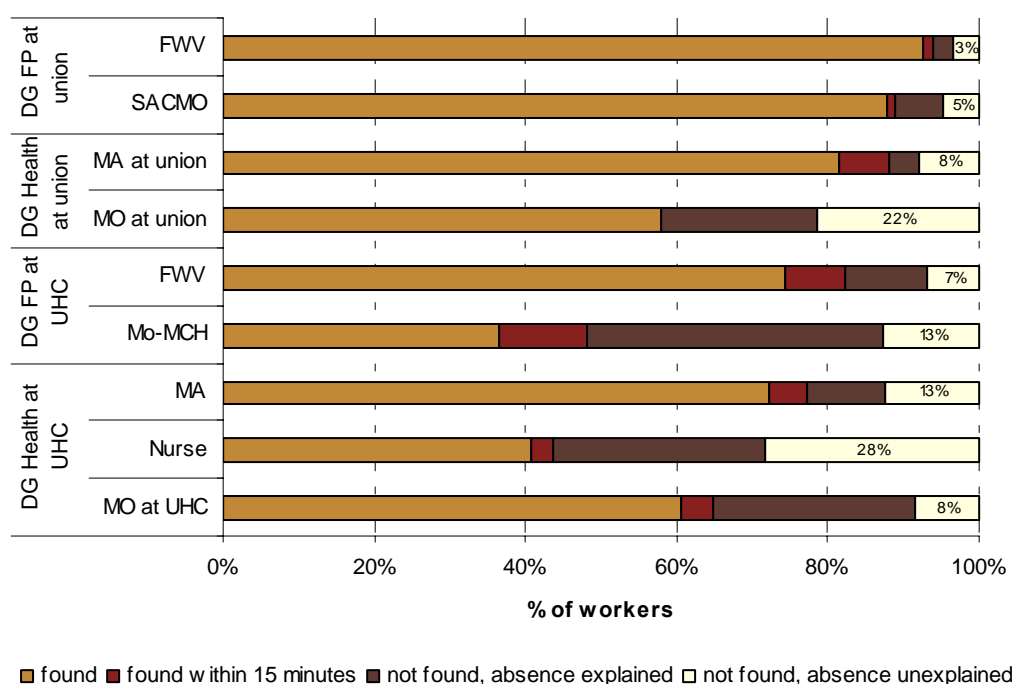
The findings show that unexplained absenteeism seems to be a more severe problem at UHC level than union level[22]. At union level, the highest level of unexplained absenteeism is amongst DGHS MOs at 22%. At UHC level, there were notable rates of 'unexplained absences' amongst family planning MOs (13%), and DGHS MAs (13%) and particularly amongst nurses (28%).

Also significant at UHC is the degree of absence that is explained. Less than 40% of MO-MCHs, for instance, were found immediately; this figure was just over 40% for nurses and 60% for MOs. This would suggest there is a significant amount of administrative or other duties away from station that is required. For MOs, it could also be an indication of the proportion on leave for postgraduate studies.

The findings concerning absenteeism are mixed. As the methodology carefully distinguishes between unexplained and explained absences, the results do not appear as adverse as other recent surveys into health worker absenteeism in Bangladesh. One example of such a survey was the World Bank's 2003 Ghost Worker study (World Bank; Chaudhury, Hammer, 2003)—its results are compared with SSPS in Table 4.12, below.

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[22] This could be due to the surprise of the unannounced return visit to the UHC, whereas the union level may have been warned of the survey team's arrival, despite the enumerator's best efforts to keep their subsequent destination confidential when first at the UHC.

Table 4.12   SSPS vs. World Bank (2003) absenteeism results

	SSPS 2004 (%)			World Bank 2003 (%)
	Explained	Unexplained	Total	Total
Doctor—UHC	27	8	35	41
Doctor—union	22	21	42	44
Nurse	28	28	56	58
Paramedic—UHC	10[1]	13	23	17.6
Paramedic—union	4	8	12	
FWV	3	3	6	5 (20 for senior)

Source: OPM facility questionnaires and World Bank (2003).
Notes: (1) SSPS figures are for an MA at UHC level.

However, total levels of absenteeism (whether explained or unexplained) found by this survey are still quite comparable—the degree of explained absence should also be of concern given the already low levels of workers in post.

The findings on explained absenteeism completes a concerning picture around MOs at union level. Throughout this chapter it has been shown that the officer in this category faces poor incentives. Their official remuneration (see Table 4.7) is lower than MOs at the UHC; the proportion with accommodation is very low (Table 4.9), and this manifests itself in high vacancy rates (Table 4.2), short durations of time in-post (Figure 4.9) and high levels of unexplained absences. Given all of this evidence, it must be asked whether it is tenable to continue the policy of placing MOs in these union facilities.

5. Drugs and supplies

5.1 INTRODUCTION AND OVERVIEW

Key findings

Inputs of drug and supplies

- In general there is reasonable availability of essential drugs and commodities at both UHC and union level, including at DGFP facilities. The exception is for safe motherhood drugs, which are unavailable in up to three-quarters of UHCs. Some reported they never had these drugs in stock.

- Upazila drug expenditure levels are low, with a mean of 3.5 Tk *per capita* from the MSR budget, and 1.6 Tk *per capita* from CMSD. There is a high degree of variation in expenditure—the best-supplied upazilas have over four times the *per capita* drug resources of the worst supplied.

- Breakdown of total MSR expenditure reveals that transport costs account for over 6% and local procurement for over 40% of the total (despite guidelines that this should not exceed 30%).

- Expenditure records show that on average, UHCs receive their full MSR allotment. However, union facilities receive an average of 14% less than their MSR allotment of 75,000 Tk each.

- Thirty-four percent of upazilas received no supply from CMSD at all during FY 2003/04. There was limited evidence of vertical programmes supplies (for instance Acute Respiratory Infection (ARI) and Emergency Obstetric Care (EOC) programmes) being received from CMSD.

Drugs and supplies management

- Less than two-thirds of upazilas had the mandated 'direct supply system', whereby union facilities receive their MSR supply direct from the district stores.

- The process by which UHCs and unions requisition drugs from district stores is largely meaningless, with volume supplied rarely exceeding 50% of that requested.

- There was little evidence found of drugs being out of date.

- Forty percent of UHC storekeepers issue drugs and supplies to workers other than the RMO and nurse-in-charge, who are officially authorised to collect supplies.

- Twenty-seven percent of CMSD supply notes come without any indication of the value of supply.

- The local drug and food / diet procurement processes generally represent fair value for money compared with locally sampled prices, although there are examples of high unit costs.

- There is only limited evidence of drug loss as measured through reconciliation of the MSR indent system between district stores and health facilities. The strongest finding is that the value of MSR recorded as received at union facilities are 93% of that recorded as sent, but this is not statistically significant.

- There is, however, much greater evidence of drug loss when comparison is made between the average drug issues per patient as recorded by facilities and those reported by the patients themselves. For many drugs, facilities report issuing amounts two or times greater than patients report receiving.

System overview

There are essentially three main channels by which MoHFW facilities are supplied with drugs and equipment from the centre.

Upazila-level health managers do not control any drug and equipment budget. The MSR budget is nominally allocated to upazila level, but it is financially controlled by the district CS's office. He will use approximately 70% of the upazila level MSR budget to procure items from central organisations and parastatals (chiefly the Essential Drug Supply Company or EDCL), with the remaining 30% procured from local sources.

The MSR-financed drug supply system is ostensibly a 'pull' system, i.e. upazila and union managers request and are supplied items via an indent system. At each level the drug store has a register that lists incoming (receipt) and outgoing (issues) of drugs and supplies, as well as the current stock (the internal control register (ICR)). It will normally also keep track of the value of supply, so that managers may monitor within year 'expenditure' against their allocation. This also allowed this survey to track receipt against issue between levels. Requisition and supply is normally made on a monthly basis for UHCs and a quarterly basis for union facilities.

DGFP has an entirely separate supply system[23] that is entirely indent-based all the way up to central levels where all procurement is managed. There are no drug or equipment funds managed by DGFP upazila or district-level managers. The system has fairly sophisticated stock control monitoring systems (including maintenance of a buffer stock) and supply is 'pushed', but based on reported usage. Much of the management of the DGFP system is sub-contracted to an external supplier.

In addition to the directorate-based supply systems, central block budgets and development budgets finance the procurement of items through the Central Medical Stores Department (CMSD). These supplies are mainly 'pushed' down to service delivery units and the value of supply is not posted against the CS's or UHC's budgets.

A stylised summary of the various drug and supplies systems are given in Figure 5.1.

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[23] Though storage of medical supplies and equipment at upazila level is often shared with the DGHS.

Figure 5.1 MoHFW drug and equipment supply system
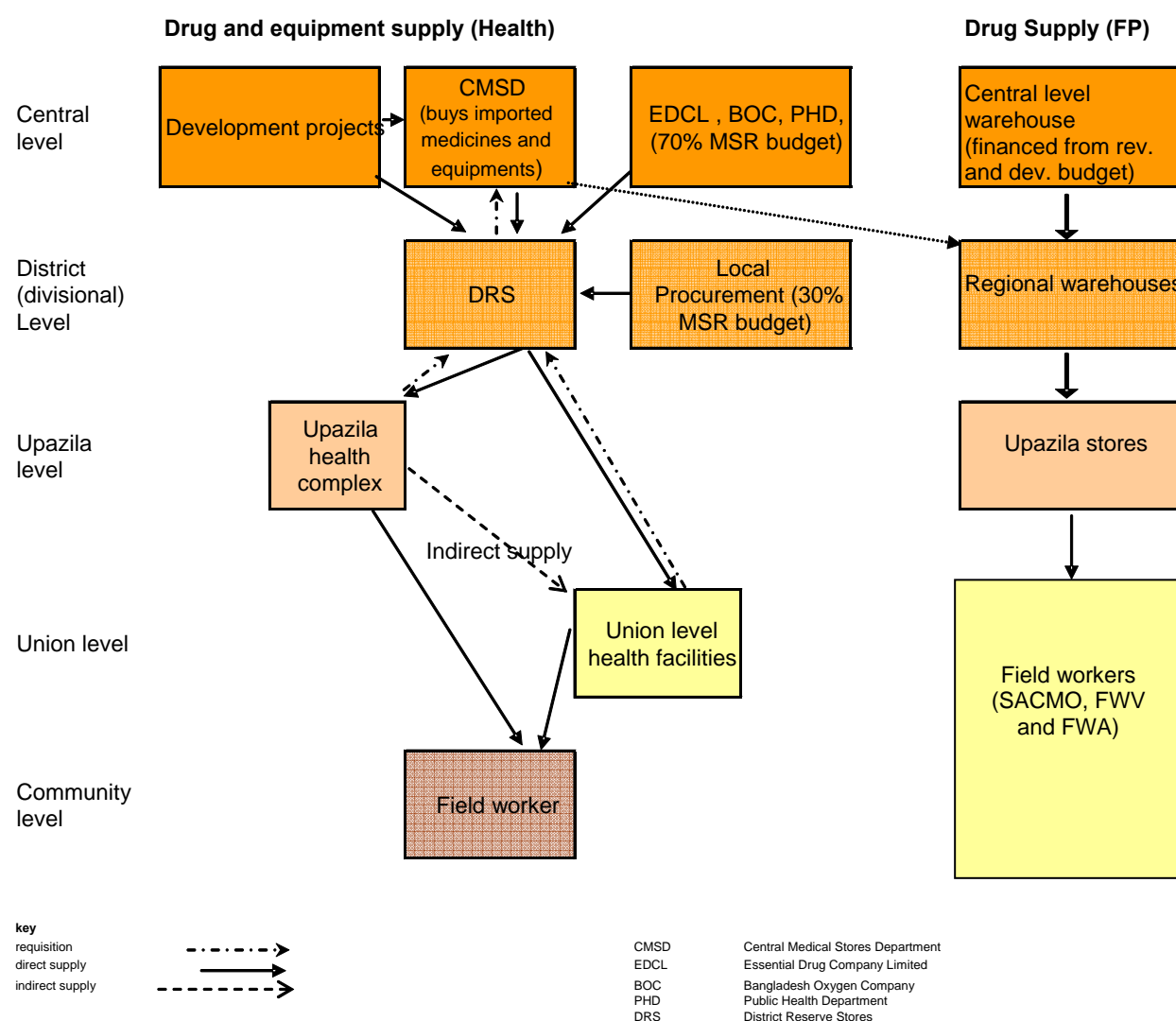
5.2 PRESENCE AND INPUTS OF DRUGS AND SUPPLIES

The survey investigated drug and medical and non-medical supply inputs at district, upazila and union level. The analysis presented is for DGHS.

Drug availability

Of prime importance to service delivery is the presence of essential drugs and commodities. The survey undertook a stock-take at each facility sampled and the results are given in Table 5.1.

Table 5.1   Drug and commodity availability

Drug / commodity	UHCs with drug in stock (health side)[1] (%)	DGHS union facilities with drug in stock (%)	DGFP union facilities with drug / commodity in stock (%)
	n = 61 unless indicated	n = 83 unless indicated	n = 56 unless indicated
Cap amoxicillin 250/50 mg	90	58 (n = 82)	63.4
Cap tetracycline 250/500 mg	97	85	55.4
Intravenous (IV) / intramuscular (IM) anticonvulsants (any type)	24 (n = 51)	n/a	n/a
Intravenous / intramuscular antibiotics (any type)	58 (n = 55)	n/a	n/a
Intravenous / intramuscular oxytocins (any type)	25 (n = 52)	n/a	n/a
Ointment neomycin (for eye / ear)	39 (n = 58)	30 (n = 80)	83.4
Tab albendazole / levamisol	78 (n = 60)	87	83.3
Tab aluminium hydroxide 250 mg + magnesium	94	87	n/a
Tab co-trimoxazole 480/960 mg	93	69	62.5
Tab ferrous sulphate + folic acid	89	90	n/a
Tab metronidazole 200/400 mg	94	77	82.4 (n = 58)
Tab phenoxymethyl penicillin (penicillin)	89	64	n/a
Tab ranitidine 150 mg	89	43	n/a
Tab salbutamol 2/4 mg	62 (n = 60)	56	79.3 (n = 58)
Tab vitamin B complex	92	93	84.9 (n = 59)
Complete DDS kit (19 items)	n/a	n/a	25.6 (n = 102)
Complete DDS kit (28 items)	n/a	n/a	24.7 (n = 103)
Oral pill—standard dose (Ovral+ C5)	n/a	n/a	25.3 (n = 103)
Oral pill—*sukhi*			71.6 (n = 104)
Depo-Provera	n/a	n/a	84.3 (n = 103)
Condoms	n/a	n/a	65.3 (n = 102)
Disposable syringe	n/a	n/a	80.3 (n = 102)

Source: OPM facility questionnaires.
Note: (1) Stock at the UHC was measured from the storekeeper's register. (2) Tab, tablet; Cap, capsule; n/a, not applicable.

There is reasonable drug and commodity availability, including at union levels. The main availability problems relate to intravenous / intramuscular drugs used as part of safe motherhood (i.e. oxytoxins, antibiotics and anticonvulsants). Availability of these drugs is

one of the requirements of a facility equipped to provide basic emergency obstetric care, so it seems many UHCs cannot provide such care. Indeed, a large proportion of UHCs said they never had stock of these drugs in stock (56%, 30% and 49% for anticonvulsants, antibiotics and oxytoxins, respectively. This is not shown in Table 5.1).

At the union level, drug and commodity availability is also reasonable at facilities of both DGHS and DGFP. Perhaps surprisingly, given the delay to the development budget approval in FY 2003/04, DGFP facilities are well stocked. It seems there was a resumption of medicine supply around the beginning of the survey period including the issuance of drug kits (known as DDS kits), and that these are captured in the survey results. Anecdotal evidence points to low supply and poor availability during most of FY 2003/04.

Finally, there was almost no evidence of expired drugs being stored. This is not a totally comprehensive finding, as out of the 900 drug packets investigated, 36.7% had no expiry date indicated. However, of the remainder, only 2% were out of date.

MSR and CMSD expenditure

The survey collected data on MSR expenditure in two ways: first the value of supply reported as sent to upazilas by the district reserve store[24]; second, the value of drugs and supplies recorded as received by the upazilas from the district reserve store. The survey also allows the attribution of CMSD expenditure recorded at the DRS down to the upazila level[25]. The results are given below for MSR expenditure recorded by the district reserve store and CMSD (see also Table 3.3).

Table 5.2   MSR and CMSD expenditure tk *per capita*

Non-sadar upazilas	Low	Mean	High	High to low ratio	n
MSR	0.9	3.5	5.4	6.1	53
CMSD	0.1	1.6	4.4	40.6	52
Combined[1]	2.3	5.4	10.1	4.4	45

Source: OPM civil surgeon questionnaire.
Notes: (1) These values are not the sum of the previous rows due to the totals being calculated over a different number of observations.

Upazila-level MSR expenditure levels are low, with a mean of 3.5 Tk *per capita* for non-sadar upazilas. CMSD adds, on average, another 1.6 Tk *per capita*. The mean value of combined MSR and CMSD expenditure is 5.4 Tk or less than US$ 0.1 *per capita*. In contrast, public sector drug expenditure is around US$5.6 *per capita* in Thailand, around US$0.85 in Indonesia, and around US$0.38 in Myanmar.[26]

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[24] It would not be possible to calculate this from the upazilas themselves, as some upazilas receive an allocation for union facilities whereas other upazilas have union facilities supplied direct from the district reserve stores. See Figure 5.3 for more detail.

[25] As mentioned in Chapter 3, quoted CMSD expenditure figures are inferred from the district level based on the number and type of facilities in place in the upazila and after accounting for a share of CMSD resources that are at the sadar hospital. Twenty-seven percent of CMSD supply notes do not have an indication of their value on the note, so this level of expenditure is almost certainly an underestimate.

[26] Figures in 1995 purchasing-power parity US$. Source: 'Financing drugs in South-East Asia: Health Economics and Drugs; WHO DAP Series No. 8'. It should be borne in mind these figures may not be strictly comparable, as they include higher secondary or tertiary services.

Low absolute levels of expenditure are compounded by significant variation in expenditure. There is more than a six-fold different in MSR expenditure between high supply and low supply upazilas. CMSD expenditure looks to compensate slightly for this, so that the combined high to low ratio for both MSR and CMSD is around 4.4.

The survey has also investigated the composition of both MSR expenditure and CMSD supply, and the findings are shown in Figure 5.2.

Figure 5.2   MSR and CMSD expenditure by supplier
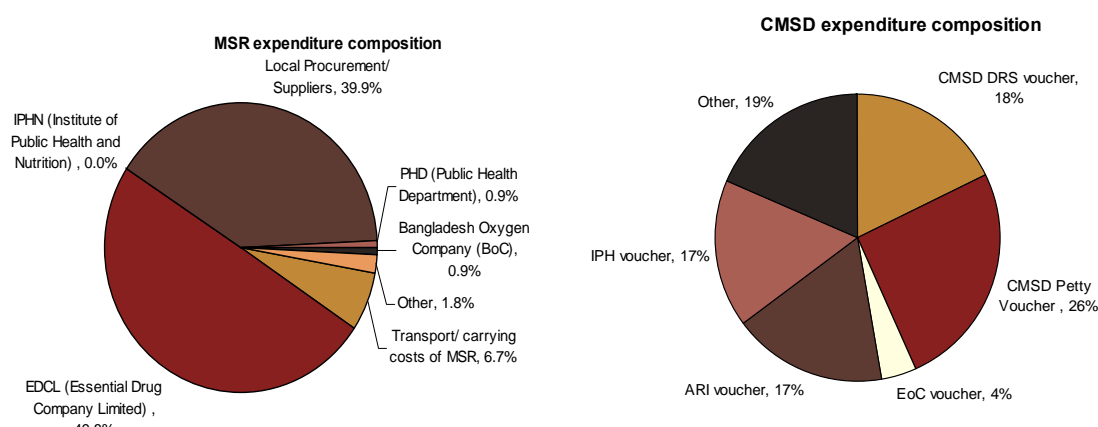
Figure 5.2 suggests a number of conclusions. For upazila-level MSR, local procurement accounts for an average of 40% of upazila-level MSR budget. According to procurement guidelines this amount is not supposed to exceed 30% of the MSR budget. It seems that other sources of supply have been reduced within the FY to allow this reallocation. Further investigation of the reasons why district-level managers vire expenditure towards local procurement sources would be useful, but one possible explanation is the desire to ensure the flow of drugs throughout the FY. The main source of supplies remains the Essential Drugs Company (EDCL), a parastatal manufacturer, but EDCL supplies are made only periodically.

An important conclusion from the analysis of the composition of CMSD expenditure is that there is little evidence of substantive supplies from vertical programmes. The ARI and EOC vertical programmes represent only 17% and 4% of total CMSD supply value, respectively.

The survey has also investigated MSR supply value, as reported as received by UHC and union facilities. The findings are shown in Table 5.3.

Table 5.3   MSR reported as received by facilities

Level	Upazila (non-sadar) (n = 20)			UHC (non-sadar) (n = 34)			Unions where there are facilities (n = 57)		
	Low	Mean	High	Low	Mean	High	Low	Mean	High
Value (Tk)	3,76,438	8,58,737	16,41,956	1,59,684	4,66,432	5,68,185	0	63,415	92,760
Value (Tk) *per capita*	1	4.8	6	n/a[27]	n/a	n/a	0	2.8	5.1
Number of MSR supplies	5.0	11.2	21.0	7.0	13.6	25.0	3.0	5.2	8.0
Number of CMSD supplies	1	5.8	10	2	3.9	10	n/a	n/a	n/a

Source: OPM.
Note: n/a, not applicable.

The results corroborate the findings of Table 5.2, except the values are presented are those recorded at the facilities in question, rather than as recorded by the district as sent. This information was collected from records of drug supply notes.

Table 5.3 suggests that UHCs receive their full allotment. In FY 2003/04 the MSR allotment per bed was 15,000 Tk per year or 4.65 lakh Tk for a 31-bed UHC (all UHCs in the survey were 31 beds). The mean MSR receipt for UHCs in the sample was 4.66 lakh Tk.

In contrast union facilities are under-spent. Unions are supposed to receive 75,000 Tk—instead they received 64,771 Tk, which is 14% less. More generally, the drawbacks of an institution-based allotment rule (per bed in the case of UHC) are apparent by the wide variation in *per capita* expenditure. In both UHC and union cases, the top decile facilities have more than three times the value of *per capita* supply of the lowest decile. In addition, over 10% of union facilities have a drug supply value of more than 92,000 Tk. It is not clear how this can happen given the allotment rule of 75,000 Tk per union institution.

5.3   DRUG AND SUPPLIES MANAGEMENT

The survey investigated various management aspects of the drug supply system. Four main areas were investigated: aspects of the MSR supply system itself; MSR procurement performance; drug loss as measured through reconciliation of supply notes between levels; and loss as measured through reconciliation of patient receipts with drug outflows from facilities.

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[27] There is no meaningful UHC catchment population figure available by which to divide absolute MSR expenditure levels: sadar union population would not take into account the additional MSR allocated to UHCs for inpatients; upazila-wide population would not reflect the presence of peripheral union facilities.

MSR supply system

The survey investigated various aspects of the MSR supply system: the operation of the supply system; the flow of MSR supplies over time; the MSR requisition process; within-UHC drug distribution; losses; and the availability of CMSD expenditure information.

The method of MSR supply varies between districts and even between upazilas in the same district. In theory, union facilities are supposed to receive their MSR supply direct from the DRS (a 'direct' system), bypassing the UHC. Figure 5.3 gives details.

Figure 5.3   Drug supply method by upazila
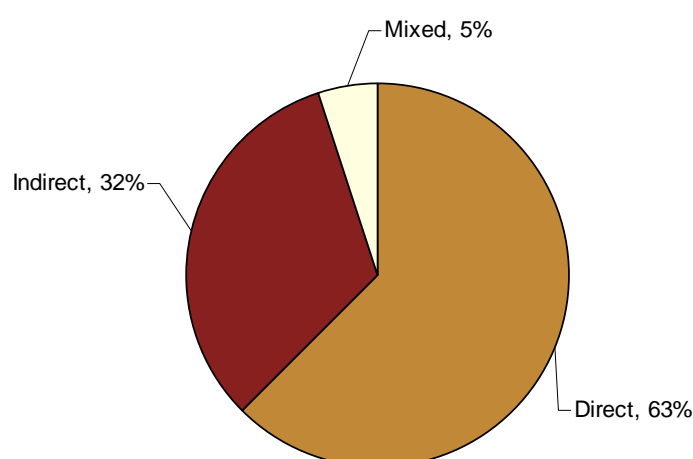
In practice, the survey found that only 63% of upazilas had a direct supply system, with the remainder either supplying all unions via the UHC (an 'indirect' system) or using a mixture of direct or indirect systems within the same upazila. Further work is needed to clarify which system is optimal, although as there is a mean of 22 USCs in each district sampled, there are poor economies of scale involved in each one collecting their drug supply independently. Having a mix of systems also makes auditing or reconciliation of drug supply difficult as the investigator is not sure whether the UHC total supply includes its peripheral union facilities.

The survey investigated MSR flow to UHCs over time, and the results are presented in Figure 5.4.

Figure 5.4   Mean UHC MSR supply per month
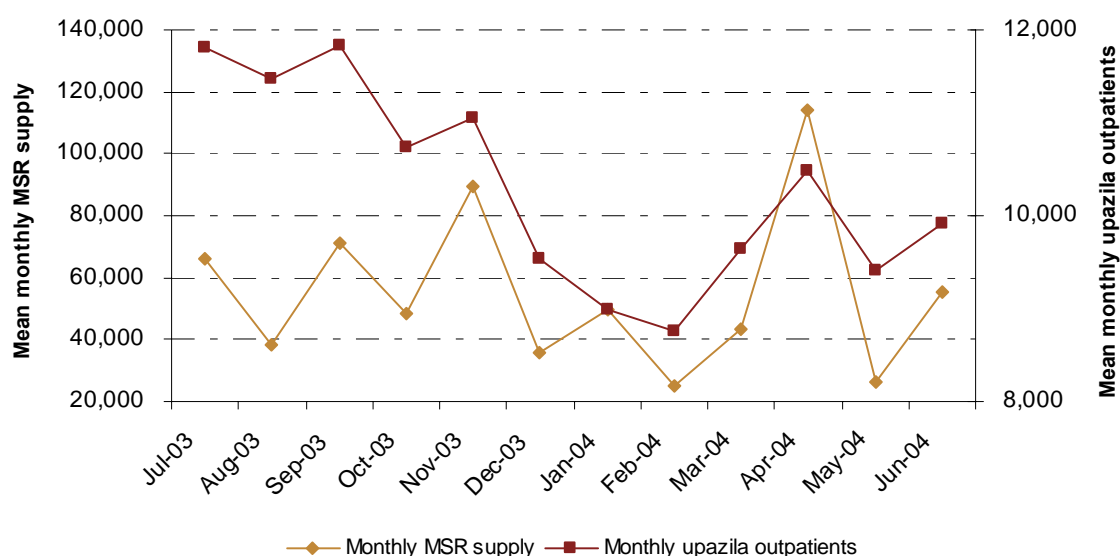
There is a peak in the value of MSR supply in April, which is the first month of the final quarter of the year. Other than in this month, the flow of MSR is relatively smooth throughout the year, but is not particularly related to patient utilisation, particularly during the first six months of the year. These patterns could be explained by the time it takes the district level stores to order and receive items from the EDCL, and by the fact that these supplies often arrive in the final quarter of the FY.

The survey has also investigated the process by which service delivery units 'call-down' or request drug supply. Figure 5.5 summarises the supply of major drug types as a proportion of the volume requested by facilities[28]:

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[28] Figure 5.5 shows an average of the supply-to-requisition proportion for the first and last supply in the financial year.

Figure 5.5 Average MSR supply as a proportion of volume requested
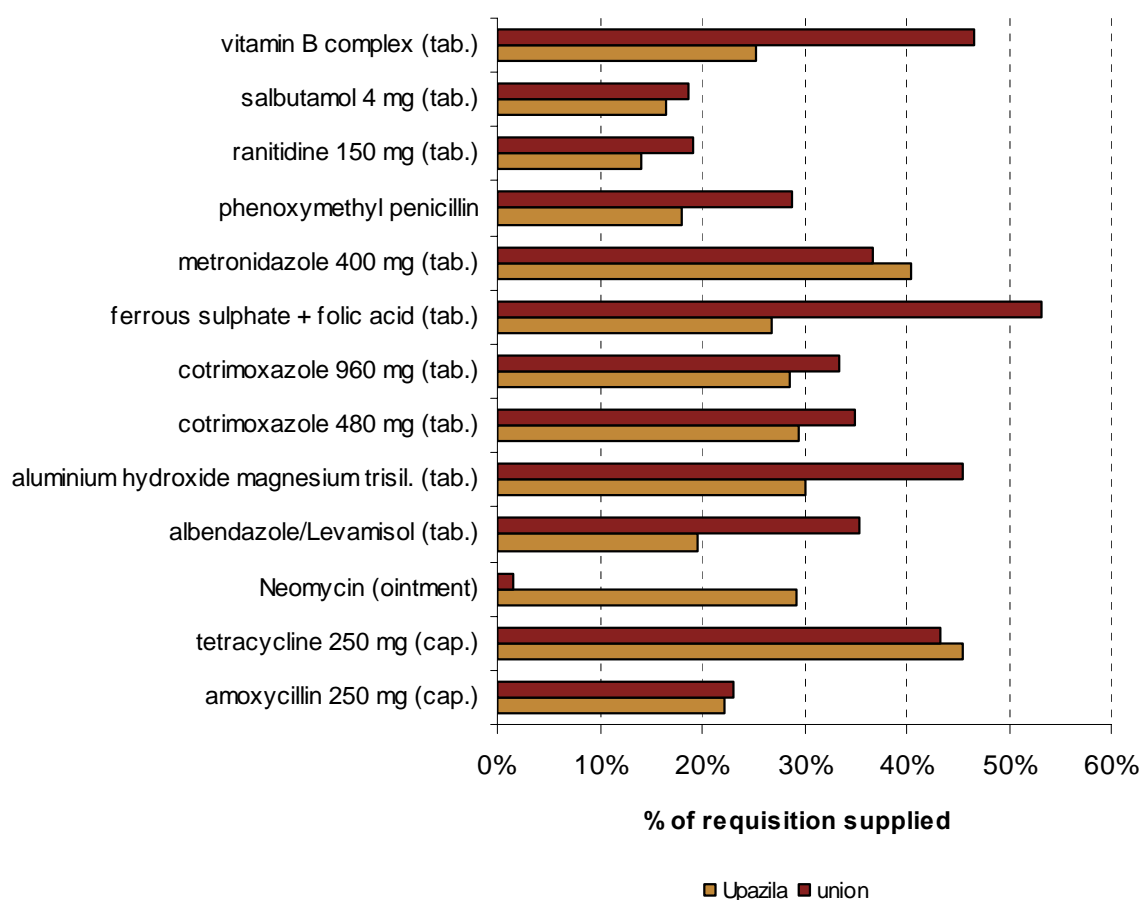
Note: Tab, tablet; Cap, capsule.

These results suggest that the drug requisition process is rather meaningless, as supply volumes are not even close to the volume requested, and for only one drug exceeds 50%. Four drugs in particular seem to be in acute under-supply: neomycin (used principally for bacterial conjunctivitis and otitis media); phenoxymethyl penicillin (a useful antibiotic for ARI, fevers and coughs); ranitidine (for treating peptic ulcers); and salbutamol (for treating bronchial asthma and patients with respiratory diseases).

The survey investigated the issue of drugs to the officers and staff within the UHC. In theory only RMOs and the nurse-in-charge are entitled to sign for drugs from the storeroom. In practice 40% of UHC health storekeepers issued drugs to other workers. Figure 5.6 shows that, amongst these, the main recipients are MAs and field staff (often health superintendents).

Figure 5.6   UHC storekeeper issues to non-authorised workers
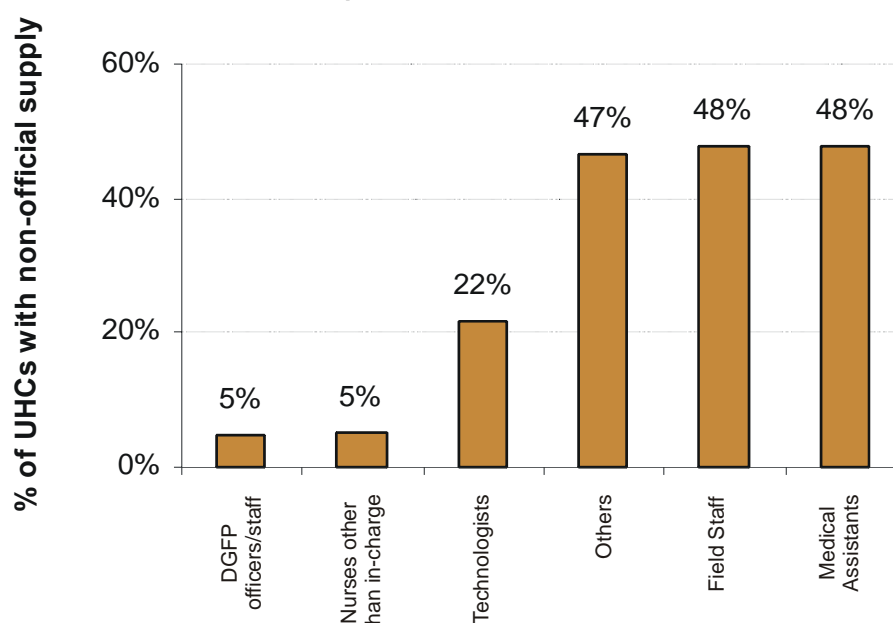
In explanation for issuing to non-authorised personnel, a third of storekeepers thought this was 'normal', whilst 56% explained these drug issues were for 'urgent patient needs'.

A final management issue around the drug supply system is the recording of values on CMSD-supply notes. All CMSD expenditure figures presented in this report are likely to underestimate those sources where supply notes do not regularly come with expenditure values attached. In particular, the share of CMSD expenditure represented by CMSD petty supply vouchers and the Institute of Public Health, are likely to be underestimated—as many of the supply notes from these sources have no values on them. This in itself is an important result as it implies that expenditure analysis or audit of CMSD supplied drugs and equipment is very difficult. In fact an average of 27% of supply notes from CMSD are received by the DRS without a value attached.

MSR and diet procurement

The survey investigated the prices paid in local MSR procurement undertaken by the CS office on behalf of upazilas. Table 5.4 summarises the results for a sample of important drugs.

Table 5.4   MSR unit costs from local procurement—district level

Drug		Local procurement prices (Tk)			Procurement to local pharmacy price ratio (%)	
		Low	Mean	High	Mean	Max
amoxicillin (inj. with water)	500 mg	24.0	24.1	25.0	99	115
amynophyline (inj.)	10 ml	4.0	4.4	5.5	88	113
cloxacillin (inj.)	500 mg	12.4	22.2	24.3	92	106
dexamethasone (inj.)	10 mg	5.8	8.7	9.7	65	79
hydrocortisone (inj.)	500 mg	59.0	59.8	60.0	144	193
ketamine (inj.)	500 ml	99.0	165.7	395.0	97	105
penicillin (inj. with water)	10 ml	6.2	7.5	9.0	118	150
sintocin / osin / pitons (inj.)	5 IU/ml	7.0	7.6	8.4	84	99
ciprofloxacin (tab.)	500 mg tab	9.3	10.5	12.0	86	117
erythromycin (tab.)	500 mg tab	3.5	5.1	8.0	119	209

Source: OPM facility questionnaire.
Note: tab., tablet; cap., capsule; inj., injection.

On the whole, local procurement prices are relatively consistent across the survey: the exceptions are cloxacillin, ketamine and erythromycin, which have wide variation in prices. In 7 out of 10 sampled drugs, the local procurement tenders were lower than an average of local pharmacy prices, although to some extent wholesale purchase would be expected to yield a discount over pharmacy retail prices. In summary, it could be argued that the local procurement process is relatively consistent and efficient.

However, most drugs have at least one observation where local procurement prices were more expensive than the local pharmacy, often by a considerable margin. For instance, the highest procurement price recorded for hydrocortisone and erythromycin was nearly twice that in nearby pharmacies. It remains important to investigate the value for money of local procurement on a case-by-case basis.

The survey also investigated the price performance of food (known as 'diet') procurement. The diet supplier contract is overseen by a tender committee at the UHC, unlike MSR procurement, which is managed at the CS's office. Table 5.5 shows the prices achieved through procurement as a proportion of price estimates provided by the cook in the UHC and through community interviews.

Table 5.5   Food procurement price as ratio of cooks' and communities' estimates

	UHC cook (%)		Community interview (%)	
	Mean	Max	Mean	Max
Kerosene	15	120	15	109
Oil (soyabean or mustard)	76	105	67	128
Masur	85	120	87	120
Sugar	88	120	89	120
Potato/aloo	93	120	93	140
Salt	91	157	98	157
Milk	87	150	99	183
Hen's egg	100	214	100	344
Coarse rice	113	160	115	150
Meat (mutton or other)	96	204	137	196
Bananas	123	480	140	300

Source: OPM facility and community questionnaires.

Again, it looks if the procurement process is performing relatively efficiently. Rice, bananas and possibly meat are all procured at greater cost than the cook and community interview would suggest, but other goods are procured at similar or lower prices benefiting from scale. As with drug procurement, it is important not to let averages mask the disaggregated picture, as all foodstuffs have at least one example of poor value procurement.

Drug and supplies expenditure tracking—formal loss

From the results of previous surveys (for instance the *Strengthening Management and Governance Report, 2004*), drug leakage was identified as a potential governance issue facing DGHS facilities.

The survey tracked the flow of drugs from the DRS to the UHC and to union facilities, by reconciling the DGHS's indent system between levels. This involved the comparison of both the volume and value of drugs on supply notes at both district stores and UHC levels. The main results are shown in Table 5.6.

Table 5.6   Formal tracking—MSR expenditure from district stores

	Supply notes missing (%)	Supply notes found with no value (%)	Recipient value of each supply note (as % of sender value)	n
District—UHC comparison of supply notes	2	2	99	58
95% CI			97.5 - 100.3	
District—UHC MSR expenditure records	-	-	93	20
95% CI			83.7 - 101.7	
District—Union facilities — comparison of supply notes	0	6	93	76
95% CI (lower, upper)			84.1 - 101.3	

Source: OPM facility and civil surgeon questionnaires.
Note: CI, confidence interval.

No findings of drug loss through this method are statistically significant. At the UHC, slightly over 2% of all supply notes from the district were missing, and a further 2% arrived at the UHC with no value indicated, so reconciliation with the sender's records was not possible. Of those notes that remained (over 95%), the values recorded by the recipient were a mean of 99% of that recorded by the sender.

At union facilities there is evidence of either slightly greater drug loss and / or poorer record keeping. Whilst very few supply notes were actually missing, over 5% had no values indicated and thus were impossible to reconcile with the senders' records. Of those notes found and with value indicated, the recipient value was on average 92.7% of the value recorded by the issuer.

The survey also compared the annual upazila-level MSR expenditure totals between that recorded as sent by the DRS and that recorded as received at the upazila stores. This was possible in the 20 cases of an 'indirect' supply system, whereby some upazilas had the entire upazila MSR budget supplied through the UHC. This found evidence of either greater drug loss and / or poorer record keeping. Mean expenditure as recorded at the upazila level was only 93% of that recorded as sent by the DRS for this sub-sample.

Finally, the survey tracked a sub-sample of the supply of individual drugs by volume from district level to lower levels (as opposed to tracking the value of supply notes). There does not seem to be any noticeable drug loss using this approach. The survey also tracked CMSD supply notes from central CMSD stores to UHCs and found little evidence of missing supply (these results are not shown in table form).

Overall, there is no convincing evidence of drug loss as measured through the comparison of records of drug issue and receipt found at different levels.

Facility vs. patient-reported drug issue

The method of drug tracking described will not capture any leakage as covered up through inflated records of drug issues to patients. For this reason, the survey also collected information from patients on the type and quantity of drugs they were supplied. It then collected information from the outpatient department drugs register on drug outflow for

the same day of patient interviews (although this information was collected several days later). By comparing the mean drug supply per patient between the two sources, the surveys can identify whether patients receive what the facilities claim they do. The results are displayed in Table 5.7 as a ratio of facility records of drug issues to patient reported receipts.

Table 5.7   Ratios of facility-recorded drug issues vs. patient receipt

Union facilities and non-sadar UHCs	Lower 95% CI	Mean (%)	Upper 95% CI	Facilities (n)
aluminium hydroxide 250 mg + magnesium trisilicate 400 mg (antacid) (tab.)	191	338	484	70
vitamin B complex (tab.)	204	436	667	58
co-trimoxazole (tab.)	157	288	417	46
ferrous sulphate + folic acid (tab.)	275	690	1103	40
metronidazole 400 mg (tab.)	152	336	519	34
albendazole / levamisol (tab.)	91	265	438	27
tetracycline 250mg (cap.)	109	339	569	24

Source: OPM facility and patient questionnaires.
Note: tab, tablet; cap, capsule CI, confidence interval.

For all but albendazol / levamisol, facilities' records of drug issue per patient are statistically greater than patient receipts, at 95% confidence levels. Levels of drug over-recording are very high—between two-and-a-half and seven times higher than patients said they received.

This finding may support anecdotal evidence that inflating recorded patient numbers and / or drug issue volume per patient are the mechanisms by which drug leakage in the DGHS is adjusted for. It adds to growing evidence in this report (for instance from speed payments), that resource loss cannot easily be tracked through formal channels (e.g. reconciliation of records between levels). Rather, it is necessary to capture the experience of end users (e.g. accountants paying speed payments; patients issued with fewer drugs than officially recorded, and so forth) to assess leakage from the system.

6.   Infrastructure and equipment

6.1   INTRODUCTION AND OVERVIEW

Key findings

Infrastructure, equipment and maintenance inputs

- Most UHOs have no vehicle, computer or photocopier.

- Functioning biomedical equipment is scarce at UHCs. There are particular problems with blood transfusion, sterilisation, incineration and power generation equipment.

- Basic equipment at union level is also often lacking: sterilisation, lighting, weighing, height measurement and ARI timing equipment are in particularly short supply.

- Buildings are judged to lack almost half the essential attributes to be in a good physical condition. The average score of physical condition is 3.9 for UHCs and 3.8 for union facilities out of seven7 key attributes.

- Mean maintenance expenditure is around 1.36 lakh Tk per upazila. This expenditure represents only 55% of available allotments. This finding is driven mainly by a low level of expenditure on routine maintenance works, as expenditure on emergency works is much closer to allotment levels. Whereas only 10% of upazilas sampled have no emergency maintenance expenditure posted against them, this rose to 58% for routine expenditure.

- These maintenance expenditure results are in contrast to national-level data provided by CMMU, which show healthy rates of disbursement. There are a number of potential explanatory factors, including the interpretation of 'allotments' for CMMU, the completeness of records at CMMY district office level (where the survey team collected data), and the on-going nature of routine work after the close of the FY.

Infrastructure, equipment and maintenance management

- Less than 10% of health and family planning upazila-level managers are passed a copy of the maintenance allotment from their district level managers (the CS and Deputy Director Family Planning (DD FP), respectively).

- While 64% of DGHS managers requested annual maintenance, only 20% reported receiving any.

- Forty-three percent of the work orders signed off by the UHC as carried out by CMMU was reported to be 'done unsatisfactorily' and 23% was reported in the survey as 'not being done at all'.

Systems overview

Section 2.2 reveals that routine maintenance expenditure accounts for very little of the overall MoHFW total at upazila level. However, during the survey design, poor maintenance of buildings regularly emerged as one of the chief concerns of MoHFW personnel. Individual facilities do not hold their own maintenance budget, but instead depend on the Construction and Maintenance Management Unit (CMMU) to provide maintenance inputs. Hence the survey investigated the inputs and management of CMMU resources.

CMMU constructs and maintains all facilities at union, upazila and district level up to 100 beds. Larger building works are left to the Public Works Department. CMMU headquarters controls its own budget, which it allots to the district CMMU office. The district CMMU

office then calls for work requests[29] from both DGHS and DGFP facilities[30], compiles them into work lots, issues tender notices for works, evaluates the tender submissions and then quality-controls the work by independent suppliers and makes payment. A stylised description of the maintenance system is shown in Figure 6.1.

Figure 6.1 CMMU maintenance system
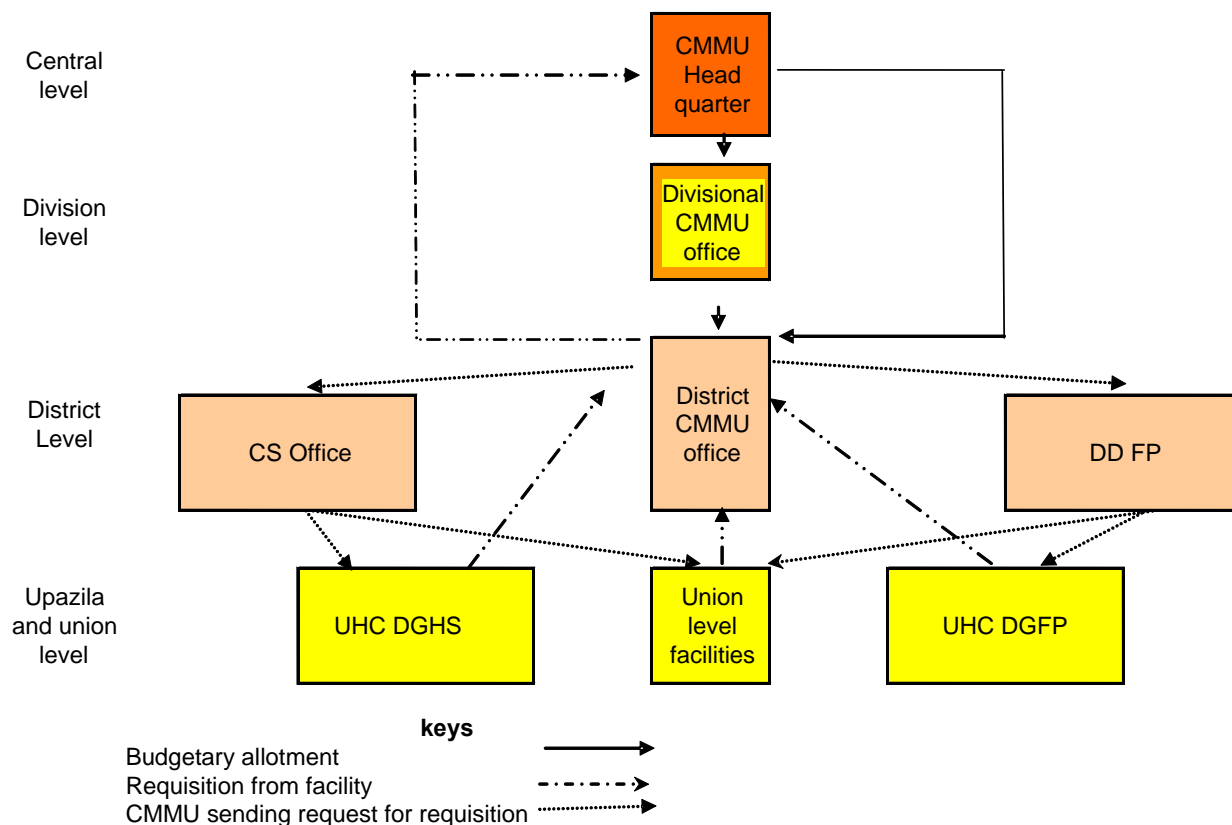
There are at least three main types of maintenance allotments available to CMMU:

- 'Periodical maintenance' is carried out on a two-to-three year basis and includes activities such as: plastering and minor repairs of doors / windows, floors, walls and roofs etc; all types of painting works, such as whitewashing, plastic painting, distempering, enamel painting; replacement of water pipelines, sewerage lines, septic tank, soak-wells, water tanks, painting of soil pipes, water pipes, sanitary pipes; and the repair of electric lines, transformers, water pumps and generators.

- 'Routine' (sometimes called 'annual') maintenance covers maintenance due on a yearly basis, such as repairing and replacing electrical equipment, water supply equipment, and sanitary works.

- 'Emergency' maintenance covers work required on an emergency basis to prevent and / or avoid disruption of service delivery. It includes the replacement / renovation of essential items such as electrical transformers, generators, deep-

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[29] There is a standard *pro forma* called the 'standard rate of schedule' with costs laid down by the CMMU HQ for this purpose.

[30] It is not possible to disaggregate expenditure by directorate from CMMU records.

tube-wells, water pumps, and so on. It is sometimes combined for expenditure reporting purposes with a fourth category, 'day-to-day' maintenance that includes petty repair of doors / windows, replacement of glass of doors / windows, petty repairs in floors, walls and roofs, repair / replacement of door locks, doors-windows fittings / fixtures and so forth.

It is important to realise that CMMU is not responsible for the maintenance of biomedical equipment. This is the responsibility of the National Electro-medical Equipment Maintenance Engineering Workshop or NEEMEW, and this aspect of maintenance has not been investigated in the survey.

6.2 INFRASTRUCTURE, EQUIPMENT AND MAINTENANCE INPUTS

Infrastructure

The survey investigated the presence and functioning of essential administrative and biomedical equipment and the condition of the physical buildings. Table 6.1 concerns the presence of administrative and management equipment.

Table 6.1   Administrative equipment per DGHS upazila office

All upazilas n = 79	UHCs without equipment (%)	Where there is equipment, mean number per UHC	Where there is equipment, items not-functioning (%)
Cars / jeeps	87	1.4	20
Computer	89	1.2	19
Motorcycles	10	2.3	39
Photocopier	94	1.0	n/a
Telephones	1	1.1	7

Source: OPM civil surgeon questionnaires.
Note: n/a, not applicable.

Computer and transport facilities are particularly lacking at UHC level. Lack of transport facilities will impede the upazila office's supervisory function and might cast doubt on the high reported supervision levels (see Table 4.11). Only one sampled upazila had a photocopier. Where equipment is in place, significant proportions are not functioning— nearly 40% in the case of motorcycles.

The survey also investigated what vital plant and biomedical equipment is available and functioning at UHC facilities, taking account of whether equipment can be made available by calling upon the DGFP side:

Table 6.2   Plant and biomedical equipment at UHCs (DGHS)

Non-sadar upazilas n = 59	UHCs without functioning items (DGHS side only) (%)	UHCs without functioning items (either DGHS or DGFP) (%)
Autoclave	37	12
Blood bank	99	99
Blood transfusion / screening equipment	85	85
Freezer	2	1
Generator	65	65
Incinerator	81	77
Microscope	0	0.0
Steriliser	15	14
Thermal boxes	17	17
X-ray machine	43	43

Source: OPM facility questionnaires.

The results point towards limited availability of equipment. Equipment for safe blood transfusion is very scarce indeed. In practice, patients are often referred to private clinics for this service. The large proportion of UHCs without a functioning generator will limit emergency surgical services. Sterilisation is also an issue, with one-third of UHCs without a functioning autoclave to produce sterile linen, gauzes and surgical bandages (although this figure drops if DGFP equipment is included). Bio-waste is likely to be a major problem, as functioning incinerators are missing in three-quarters of UHCs. This is corroborated by anecdotal evidence from SSPS survey teams, which found evidence of bio-waste, including sharps, in UHC grounds.

A facility efficiency survey conducted in 1997 (HEU, 1999) evaluated the presence of similar items. This found 48% of UHCs (then called Thana Health Complexes) had functioning X-ray machines (SSPS found 57%), 100% had a functioning generator (SSPS found 65%), 100% had a functioning operating theatres (SSPS found 86%, although given the results in Figure 6.2 this should be viewed with some scepticism), and 2% had functioning blood banks (SSPS—1%). So apart from X-ray machines there has been little improvement in equipment presence and functionality over the last seven years.

Equipment availability is also limited at union level, as Table 6.3 shows.

Table 6.3   Plant and biomedical equipment at union facilities (health and family planning)

Equipment item n = 143	Union facilities with no functioning item (%)	Equipment item n = 143	Union facilities with no functioning item (%)
ARI timer	89	Scissors	33
Autoclave	97	Spirit lamp	91
Blood pressure machine	22	Stethoscope (foetal)	98
Gynaecological examination tools	98	Stethoscope (normal)	18
Height scale	93	Thermometer	46
Pressure steriliser	91	Vaccination thermal box	99
Weighing scale for babies	89	Weighing scale	91

Source: OPM facility questionnaire.

Nearly nine-tenths of union level health facilities do not have ARI timers or weighing scales, and fewer have height scales or sterilisation equipment. Where equipment is in place, it mostly works—although this finding is probably a result of the simplicity of the items concerned.

The survey has also investigated the condition of health buildings. For all types of facilities a composite 'score' was awarded based on seven physical attributes of the building:

Infrastructure physical condition 'score' based on:

1. Functioning sewerage system
2. Functioning toilets for outpatients
3. No cracks in exterior walls
4. Non-blocked drains
5. No missing windows
6. Walls painted within the past year
7. Non-leaking roof

Therefore, the maximum 'score' per facility was 7. On average, UHCs scored 3.9 and unions 3.8. The distribution of scores is presented in Figure 6.2.

Figure 6.2   Physical condition of buildings
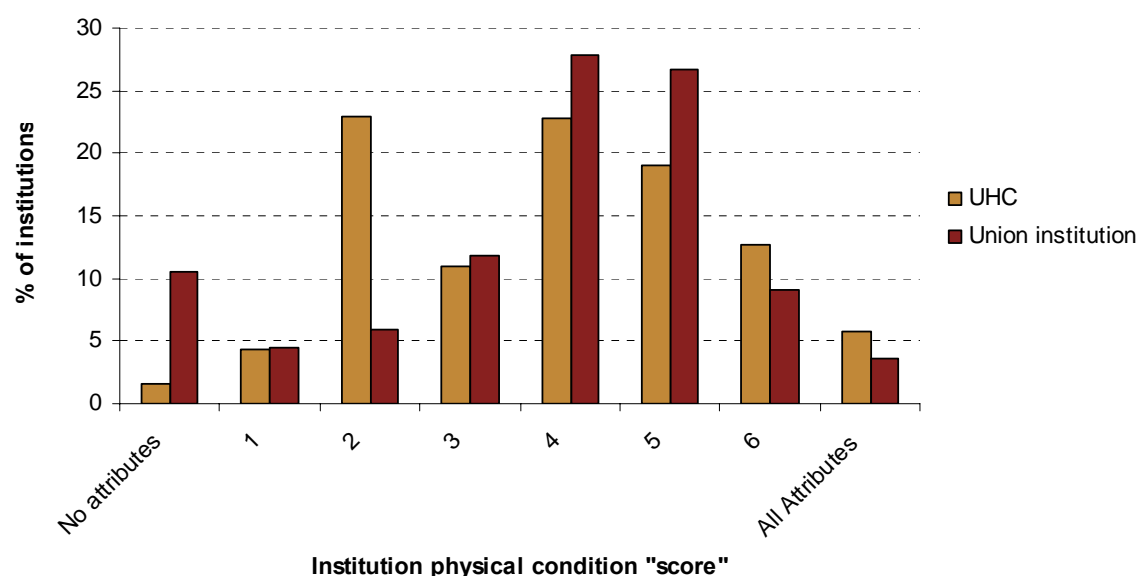
As the seven conditions tested might be considered essential characteristics for a good-quality health building, it is worrying that so many facilities are lacking several of the conditions simultaneously. Only a very few facilities (5% of UHCs and less than 4% of union facilities) scored all seven attributes. It is worth noting that this result has been discussed with CMMU, who contend that a higher proportion (60–70%) have all attributes in place.

If the survey data is correct, poor building conditions are the reality of the current maintenance system. The subsequent analysis looks at some of the possible causes and focuses in particular on both inadequate budget allocation (allotment) to, and subsequent low budget execution by, the maintenance unit (CMMU).

However, before this analysis is presented, and in defence of CMMU, it must be stated that UHC and union management and staff also have a responsibility to maintain their buildings. There are anecdotal reports of inadequate cleaning and unblocking of drains, toilets, gutters; and failure to remove mosses and other plant growth from roofs. For want of these simple preventative measures, facilities are permanently disabled and fabric and structure permanently damaged. A better culture of maintenance is also an important part of the required response to poor building conditions.

Maintenance allotments and expenditures

The survey conducted a detailed investigation of CMMU accounts at the district level in order to gather allotment, expenditure and disbursement data. Allotment information was gathered from the CMMU memorandum sent to executive engineers at the start of each FY with information on budget allocations (and which details the breakdown of allotments in an annex). Expenditure information was gathered from expenditure registers and / or work orders. The information was collected for three levels: first, overall totals per district; second, for the upazila (or thana) level, total per district; and finally, on a per-upazila basis. Expenditure information was collected for two types of maintenance works: routine / annual works and emergency works, and the combined totals of both. The results are shown in Table 6.4.

Table 6.4   Average CMMU expenditure and disbursement

		District-wide totals		Individual
		Overall	Upazila / thana level	Upazila / thana
Routine / annual	Expenditure (Tk)	11,05,118	7,07,425	1,02,331
	Disbursement rate (%)	64	51	53
	n	16	14	108
Emergency / day-to-day	Expenditure (Tk)	2,59,891	1,66,453	28,765
	Disbursement rate (%)	92	84	89
	n	16	12	77
Total	Expenditure (Tk)	14,59,598	7,92,805	1,37,806
	Disbursement rate (%)	65	50	55
	n	15	10	65

Source: OPM CMMU questionnaire.

The results of principal interest concern individual upazila / thanas (last column in Table 6.4). Around 1.37 lakh Tk is spent annually per upazila, on average, between the two types of maintenance works. This expenditure level has been compared with the allotment information available in order to calculate the approximate 'disbursement rate'—this appears to be around 55% overall. The main driver of this is the low expenditure for routine maintenance (53% of allotments). Expenditure on emergency maintenance works account for a much greater degree of its own allotment (89%), but represents only a small proportion of total expenditure (around one-quarter).

A similar trend is evident for district-wide data where, again, in particular routine expenditure accounts for only 51–64% of allotment. However, the number of observations is low enough at this level to raise concerns about the robustness of these findings.

CMMU has kindly pointed out to the survey team that its national expenditure for FY 2003/04 was 1,309 lakh Tk, as opposed to an allotment of 1,390 lakh Tk, yielding an overall national disbursement rate of 94%, much higher than the rates implied by Table 6.4. The survey team and CMMU have extensively discussed the possible reasons for the discrepancies between the two sets of data, and also undertaken additional quality control exercises including revisiting a number of the sampled CMMU offices during August 2005 to double-check data collection. Out of this work come a series of possible explanations for the discrepancies between the survey data and the national data, and these are discussed below.

First, the data may have been mis-collected and / or mis-entered. However, as mentioned earlier, in addition to the normal quality control techniques employed by the survey (see section 1.4), further repeat visits to selected sample sites showed no error in data collection. Data entry has been double-checked using the original questionnaires, and some omissions were found for emergency expenditure when district offices only had total expenditures available. This has been re-entered and results in the 'disbursement' rate for emergency expenditure rising to the current quite high levels shown in Table 6.4.

Second, the survey was reliant on the district-level CMMU offices for accounts information (almost all survey data was collected at the district level and below, see section 1.3).

However, the DDO for CMMU is actually the executive engineer who sits at the divisional level. It is from this office that expenditure bills are drawn up and paid. The function of district offices is more to help to prioritise works, draw up tender documents, and to supervise works once they are underway. It is therefore possible that CMMU district office accounts are not kept as completely or as up-to date as at the divisional level, and thus data-collection from these offices could have omitted some expenditure.

Third, it is possible that through careful tendering processes, savings can be made over the initial cost estimates for work identified. Five out of the 18 CMMU offices visited highlighted this as a reason why expenditures were less than allotments

Fourth, the concept of an 'allotment' is itself somewhat nebulous for CMMU. Its headquarters only initiates firm allotments to the executive engineer at the divisional level. He may then follow a set of detailed guidelines (e.g. *Annexure B 'Level-wise and District-wise Allocation for Maintenance'*) in terms of breaking the allotment down further between districts in the division, and between the levels of expenditure (union, thana, district) and types of work (routine and emergency). However, these guidelines have not been re-issued since FY 2001/02 and nor is following them strictly mandatory. The executive engineer will listen to the assistant engineers at the district level, who in turn attempt to set priorities in consultation with the CSs and DD FP, in finalising the breakdown of the budget. There may even be reallocations based on construction work or periodical maintenance, data on which was not collected in the survey. As such, the allotments that have been collected and used to calculate detailed disbursement rates in Table 6.4, should not be interpreted too rigidly—although it is to be expected that across the country as whole reallocations would cancel each other out to some extent[31].

A final explanation for low expenditure levels lies with the possibility that routine maintenance works (which, as mentioned above, drive the low total 'disbursement rate' found in Table 6.4 of 55% for upazilas) may not always be fully complete by the end of the FY. If this is the case, when the survey teams visited the CMMU offices between one and three months after the end of FY 2003/04, not all expenditures may have featured in the registers. In practice this seems quite likely, as 9 out of the 18 CMMU offices sampled mentioned that routine works were still ongoing at the time of the survey team's visit.

The full explanation of the maintenance 'disbursement' rate is therefore not fully resolved, but is likely to stem from a combination of the factors discussed above. In tackling either low disbursement or late finalisation of works—or both—it is important to understand the constraints within which CMMU has to operate. CMMU itself is significantly under-staffed, lacks vital operational equipment, such as vehicles, and does not have full departmental status within the MoHFW. It has applied to become the Health Engineering Department, which will also incorporate vehicle and biomedical equipment maintenance, and this needs to be considered seriously by the MoHFW if maintenance levels and quality are to be improved. Other options to improve maintenance include better coordination between the district level MoHFW officers (e.g. CS and DD FP) and greater focus on maintenance staff provision at upazila level, such as janitors, sweepers and cleaners.

It should also be remembered that overall levels of financing are very low for maintenance. Table 3.1 shows that the proportion of MoHFW upazila level allotments earmarked for maintenance is around 1%, almost certainly too low by international standards. The organisational reforms that may result in the Health Engineering

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[31] Table 6.4 does provide limited evidence for systematic re-allocations occurring between levels, as the 'disbursement' rate for the district total (e.g. including sadar facilities) is higher than the total for the thana level (65% as opposed to 50%), but these figures should be viewed with caution due to the low number of observations available.

Department, will need to be accompanied by a reallocation of the budget towards maintenance in order for the level of equipment functionality (Table 6.2) and building condition (Figure 6.2) to be improved.

Finally, as with other areas of this report, the variance of maintenance expenditure between upazilas is quite high and whereas only 10% of upazilas have no emergency expenditure during the course of the FY, 58% of upazilas have no routine expenditure at all. There may be a justification for spending a certain amount on each facility every year in order to provide greater preventative maintenance.

6.3   ASSET AND MAINTENANCE MANAGEMENT

Requisition process

The survey investigated how upazila-level managers access their maintenance budgets. The findings are given in Table 6.5.

Table 6.5   Maintenance budget and requisition processes

	Health office (RMO)		Family planning office (UFPO)
	Annual	Emergency	Annual
Upazilas that received a copy of their maintenance budget entitlement (% of all respondents)	8	n/a	6
Upazilas making requisition for works (% of all respondents)	64	77	37
Upazilas with work carried out (according to respondents) (% of all respondents)	20	63	61
Upazilas with work carried out according to CMMU records (% of all respondents)	25	63	n/a
n	57	62	61

Source: OPM facility and CMMU questionnaires.
Note: n/a, not applicable.

The principal finding is that managerial knowledge or enthusiasm around maintenance processes is scant across both directorates. Whilst the data is not strictly comparable, it seems that for both directorates, less than 10% of upazila-level managers received notification of the annual maintenance budget. Endorsing and forwarding a copy of this budget is the responsibility of the CS and DD FP, respectively, who receive a maintenance allotment letter from the CMMU executive engineers.

Despite the lack of allotment notification, most upazila DGHS offices went on to make requisitions for some kind of maintenance work, but often were disappointed, probably due to resource constraints. This was particularly the case for major pieces of annual maintenance work. Only 20% of upazilas reported receiving annual maintenance work in

2003/04 (the equivalent figure from CMMU records is 25%). In all facilities where maintenance work takes place, the officer in-charge receives a copy of the 'work order' from CMMU.

Equipment and maintenance tracking

The survey found that a mean of 93% of assets named by respondents across all facility types as present, were found by enumerators. Survey teams reported that there is rarely an organised and up-to-date asset register in place to facilitate answering this question.

The survey also investigated how satisfied upazila-level managers are with maintenance work undertaken by tracking individual CMMU 'handing-over documents' back to 15 recipient UHCs. Copies of these documents were collected at CMMU district offices and bore certifications from recipients that work described therein had been satisfactorily completed. For each work described, RMOs at the recipient facility were asked whether the work was actually done satisfactorily, unsatisfactorily, or not at all. The results are given in Table 6.6.

Table 6.6   Works described in CMMU 'Handing Over Documents'

n = 104	Works reported by UHC (%)
Work done satisfactorily	33
Work done unsatisfactorily	44
Work not done at all	23

Source: OPM facility questionnaires.

Only approximately one-third of individual work orders were completed satisfactorily in the view of the recipient UHCs, and worryingly, around one-quarter were reported as 'not done at all'. It should be pointed out that at the time of work completion all work orders are signed off as satisfactory by the facility in-charge before CMMU approves expenditure, so it is not clear why the UHC respondents subsequently reported being dissatisfied with the work or deny it took place at all.

7. Equity

Key findings

Per capita resource allocation

- The survey investigates the variation in *per capita* allocation of different categories of resources between upazilas. The high-to-low ratios for budgetary allotments are around two and higher for expenditure levels, particularly for MSR. Ratios of population-to-key workers between the best- and worst-staffed upazilas are often higher still—up to 4.9 for MOs stationed at the UHC. There is some evidence that family planning workers are slightly more evenly deployed due to their lower ratios.

- These discrepancies are often due to the supply-driven resource allocation system in Bangladesh, where for many resource types (MSR, maintenance, worker posts) all facilities receive the same absolute level of resources. Unless facilities are optimally placed to serve even amounts of catchment populations, there will be large *per capita* variations in supply.

- However, the *per capita* resource variations will also be affected by the failure of the facility-based resource allocation system to function properly. In practice there are wide variations in the resources allocated to facilities of the same type, particularly in health and family planning worker postings, union-level MSR and maintenance allotments.

- Whichever the driving factor, the discrepancies in *per capita* resource allocation are very high and possibly beyond those associated with a systematic needs-based resource allocation system, even one refined to take account of other variables, such as poverty levels, as well as population alone.

Beneficiary analysis

- As expected, DGFP services are used predominantly by adult women. DGHS services also favour adult females slightly.

- On average, the socioeconomic status of service users is of a level similar to that of the *2001 Household Income and Expenditure Surveys* (HIES), which in turn implies users have a similar socioeconomic status to that of the general rural population. Since this population is slightly poorer than the national average (including metropolitan areas and sadar upazilas), this implies MoHFW upazila and union services are moderately pro-poor.

- Users of DGHS services are slightly poorer on average than users of DGFP services, and users of union services are slightly poorer on average than those of UHC services. Upazilas with higher *per capita* allotments tend to have better-off users than upazila with lower *per capita* allotments. This adds to concerns over the equity of resource allocation.

- However, upazilas with higher service uptake tend to have users that are poorer than upazilas with low service uptake. Finally, users of facilities where communities report making payments for services are better off than users of facilities where no payment is reported.

One of the objectives of the Bangladesh health and family planning sectors is to reach the needy parts of the population with free, high-quality services. Historical and comparative evidence illustrates the levels of inequality in service outputs and health outcomes (Table 7.1).

Table 7.1   Inequality in health outcomes and service outputs

	Bangladesh 1996/97		India 1992/93		Nepal 1996	
	Poor	Wealthy	Poor	Wealthy	Poor	Wealthy
Infant mortality per 1000 children under-one-year old	96	57	109	44	96	64
Child stunting (%)	50	24	65	31	59	32
Total fertility rate per woman	3.8	2.2	4.1	2.1	6.2	2.9
Full immunisation (% of children under-five-years of age)	47	67	17	65	32	71
Attended delivery (%)	2	30	12	79	3	34

Source: adapted from table 1.2 in World Bank (2003) *Health Policy Research in South Asia*

This survey investigated to what extent resources are equitably allocated, and to what extent they are targeted towards the poor and other disadvantaged parts of the population. It has done this through analyses of the allocation of resources on a *per capita* basis, user beneficiaries' gender and age, and whether output, uptake and input levels vary by differences in the average users' socioeconomic status.

Per capita resource allocation

A simple rule-of-thumb in the allocation of resources for health and family planning services is for the volume of resources to be roughly proportional to some proxy of 'need'— often the number of people in the catchment population that will use those services[32]. In other words, from one service delivery unit to another, the amount of *per capita* resources should be similar. In previous chapters, the report has presented a range of *per capita* resource allocation figures, across finance, human resources, drugs, and maintenance provision. It has done this using the relevant populations served by each facility, using census data inflated for population growth.

The results often point towards large variations across upazilas or union facilities. One of the easiest ways to measure variation is to divide the *per capita* resources of the best-resourced 10% of upazilas by that of the worst-resourced 10%. This creates a high-to-low ratio (strictly speaking, a ratio of the 90th to 10th decile).

Some of the main results are brought together here for ease of comparison, first for budget variations and in the second table for human resource levels.

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[32] There are many other potential factors to take into account when allocating resources for health and family planning services. Demand-side variables could include: the number of people in a catchment population, and of different ages and gender; the epidemiological profile, and so forth. Supply-side variables can also be included to take account of the cost of delivering services, the number and type of different health facilities, the distance between facilities, and so forth.

Table 7.2   *Per capita* budget variations

Non-sadar upazilas	Allotment				Expenditure			
	Low (Tk)	High (Tk)	Ratio	n	Low (Tk)	High (Tk)	Ratio	n
DGHS total	32.4	65.7	2.0	59	27.2	63.0	2.3	53
DGFP total	22.4	38.9	1.7	60	15.8	37.9	2.4	60
Drugs (MSR) total	2.0	4.0	2.0	59	0.9	5.4	6.1	53
Drugs (CMSD) total					0.1	4.4	>44	52
Maintenance (CMMU) total	0.4	1.1	2.6	54	0.0	1.3	∞	61

Source: OPM facility, civil surgeon and CMMU questionnaires.

Table 7.3   Population / key worker variations

Non-sadar upazilas	Key worker	Low	High	Ratio	n
Key workers at the UHC	MOs at UHC (all types)	31,185	152,820	4.9	61
	Total nurses (all types)	14,146	51,093	3.6	61
Key workers at the union level	MOs at union level	68,739	262,956	3.8	61
	MAs at union level	50,051	178,163	3.6	61
	HAs	5,300	10,587	2.0	61
	SACMO	35,251	112,620	3.2	42
	FWVs at union level	21,370	44,541	2.1	77
	FWAs at union level	4,471	7,140	1.6	83

Source: OPM facility questionnaires.

Table 7.2 shows that the high-to-low ratios between different categories of allotment are around two. For actual expenditure, these ratios increase, particularly for drug (MSR) expenditures. Table 7.3 shows ratios of population-to-key workers between the best-and worst-staffed Upazilas, are often higher—up to 4.9 for MOs stationed at the UHC for instance. There is some evidence that family planning workers are slightly more evenly deployed.

These large discrepancies in resource allocation are beyond what would be associated with a systematic needs-based resource allocation system, even one refined to take account of other variables, such as poverty levels, as well as population. These discrepancies are partially driven by the MoHFW resource allocation system. Most resources are earmarked on a per facility basis. There are set standards for the numbers of worker at each facility (see Table 4.1 and Table 4.2); there are fixed MSR budgets (at the time of survey each UHC received 15,000 Tk worth of supply per bed per year; each union facility receives 75,000 Tk per year) and of course (and not unreasonably) maintenance budgets are linked to facilities. Therefore, unless facilities are optimally placed to serve evenly sized populations, there will be large *per capita* variations in supply.

It important to realise, however, that not all the variation in *per capita* resources are driven by differences in catchment population. Even though a norm-based resource allocation system exists and absolute allocations per facility should be expected to be the same, in practice these also vary widely. The table below presents some of the input categories per facility and also shows the MoHFW norms.

Table 7.4   Per facility allotment variations

	Norm / Standard	Low	High	High to low ratio	n
UHC					
MSR allotment (Tk)	465,000	342,720	568,185	1.7	34
Maintenance allotment (Tk)	100,000	90,143	364,000	4.0	17
No. DGHS MOs at UHC (all types)	7	1	6	6.0	61
No. Nurses (all types)	10	7	12	1.7	61
No. MA	2	1	2	2.0	61
No. MO-MCH	1	0	2	∞	61
No. FWVs at UHC	1	1	3	3.0	61
Union					
MSR allotments (Tk)	75,000	0	92,760	∞	73
Maintenance allotments (Tk)	10,000	9,231	38,714	4.2	18 (district level data)

Source: OPM facility questionnaires.

Table 7.4 illustrates that the facility-based resource allocation system itself is not functioning properly, and in practice there are wide variations in the resources allocated to facilities of the same type. Further testing would be necessary to see whether this diminishes or exacerbates overall *per capita* resource variation.

In conclusion, there is strong evidence that the design of the MoHFW resource allocation system could be improved, and in any case that the system is not working as intended. The net results are the wide *per capita* variations shown in Table 7.2 and Table 7.3. This in turn raises equity concerns around the distribution of scarce MoHFW resources.

Beneficiaries analysis

The evidence so far suggests that resource allocation is inequitable as measured on a *per capita* basis. The remainder of this section investigates in more depth whether this is reflected in the profile of service beneficiaries, as measured by their gender and socioeconomic status.

Figure 7.2 shows the beneficiaries of MoHFW services disaggregated by gender.

Figure 7.2   Beneficiaries by gender and age
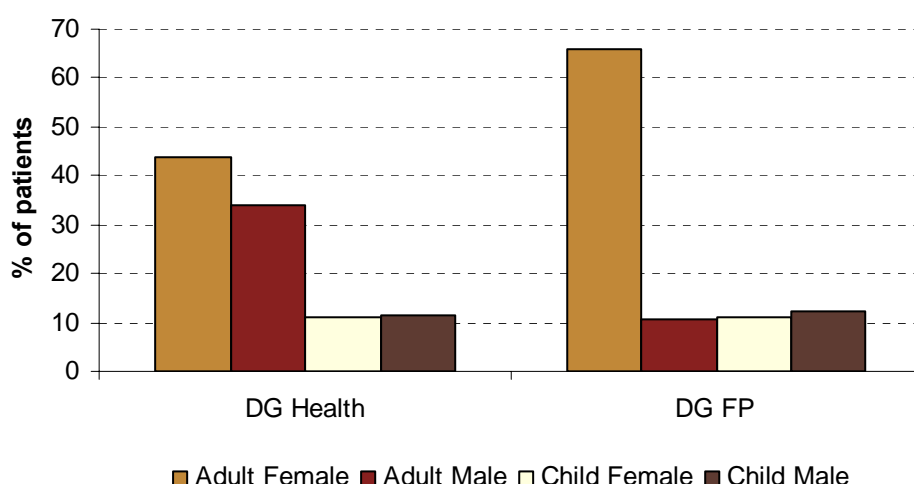
Legend: ■ Adult Female ■ Adult Male □ Child Female ■ Child Male

As expected, DGFP services are used predominantly by adult women. DGHS services also slightly favour adult females. The results are fairly consistent with analysis from the MIS system in sampled facilities, which suggests the DGHS beneficiaries are around 39% adult female, 32% adult male and 28% children. When considering the type of services provided by the MoHFW at upazila level, it is not itself inequitable that women and children account for a higher proportion of users than they represent in the general population.

The survey also investigated extensively the poverty levels of MoHFW users, both directly via a household survey and indirectly through the larger number of patient interviews. The instruments were designed carefully to be comparable with the most recent and much larger national household income and expenditure survey, the 2000 HIES. Further checks and adjustments were made for three potentially important factors: the July–August 2004 floods; economic growth between the time of the HIES and these surveys; and commodity price changes. SSPS data was then compared with HIES data from users sampled from outside these metropolitan areas and the sadar upazilas. The results of these comparisons in terms of the different estimates of users' socioeconomic status are shown in Table 7.5 (a more comprehensive set of results is given in Table A3.1).

Table 7.5   HIES and SSPS estimates of socioeconomic status

	HIES (non-sadar)	SSPS (household visit) [1]	SSPS (patient interview)[2]
	n = 5020	n = 375	n = 2625
Below lower poverty line (%)	40.1	35.0	39.1
Below upper poverty line (%)	56.4	51.5	54.6
Household size (median)	5	5	5
Housing conditions			
Number of rooms (median)	2	2	2
Households with electricity (%)	21.8	30.7	29.4
With brick / cement walls (%)	9.35	9.6	9.6
Education and productive assets			
Household heads without education (%)	63.4	57.5	64.7
Households with land (%)	46.8	39.8	43.2
Households who own			
Watch (%)	40.3	50.8	45.4
TV (%)	9.2	15.1	16.1

Source: OPM patient and household questionnaires, Bangladesh Bureau of Statistics HIES.
Notes: (1) Poverty estimates in SSPS household survey are obtained using direct estimates of consumption expenditure. (2) Poverty estimates in SSPS patient survey are estimated using regression analysis.

The main conclusion of this table is that the socioeconomic profile of users is similar to that of the non-sadar population in the HIES, particularly as measured from the SSPS patient interview. HIES data shows that this population is slightly poorer than the national average (including metropolitan areas and sadar upazilas). Hence, it is possible to say that users of MoHFW upazila level services are representative of the rural population at large, and therefore poorer than the national average.

In order to delve deeper into whether the MoHFW services are 'pro-poor', several key input and output measures have been ranked, and upazilas separated into 'high and low' categories of roughly equal proportions. The mean welfare level (as measured by the lower and upper poverty line) of users, has then been calculated for each sub-sample. The results are shown in Table 7.6.

Table 7.6   Inputs, outputs, performance and users' socioeconomic status

Dimension		Households (%)				n
		Below the lower poverty line	Below the upper poverty line	With electricity	Head has no education	
Level	UHC	37.6	52.3	31.3	65.6	907
	union	39.4	55.0	29.1	64.5	1,718
Directorate	DGHS	40.6	55.3	32.3	65.4	1,236
	DGFP	38.1	54.1	27.4	64.1	1,389
Community reporting payment	Yes	32.8	48.8	43.8	63.1	645
	No	40.8	56.5	27.1	65.3	1,709
Efficiency	High	37.8	51.2	35.0	63.1	375
	Low	43.1	58.7	28.7	65.3	570
DGHS allotment *per capita* (Tk)	High	36.5	52.8	34.5	65.6	1,103
	Low	41.8	56.8	25.8	64.1	1,293
DGFP allotment *per capita* (Tk)	High	36.9	52.3	35.9	63.6	1,119
	Low	41.2	57.2	25.4	66.1	1,339
MoHFW *per capita* expenditure (Tk)	High	39.4	56.3	31.5	63.1	799
	Low	38.8	54.4	34.9	68.6	975
DGHS uptake outpatient consultations/ population	High	41.0	55.1	33.5	62.8	374
	Low	37.9	52.9	33.4	67.0	548
DGFP uptake outpatient consultations/ population	High	39.5	52.0	30.5	64.3	206
	Low	33.1	48.3	37.0	57.3	234

Source: OPM patient questionnaire.

On average, users seem to be slightly worse-off if they are DGHS users and if they are union users. An interesting finding concerns facilities with communities that report having to make payments for patient consultations. The mean user of these facilities is better off than the mean user of facilities where no payment is reported.

Upazilas in which *per capita* allotments are high tend to have better-off users than upazilas where *per capita* allotments are low. This adds to the evidence that current resource allocation systems are inequitable. Uptake results, however, are more 'pro-poor'—upazilas with higher uptake levels have, on average, poorer users than upazilas with lower uptake levels.

8. Performance

8.1 INTRODUCTION

Key findings

Efficiency analysis

- Twenty-four percent of UHCs and 15% of union facilities are efficient relative to their peer group.

- The variation in efficiency, probably because of 'slack time', is much greater for union facilities. Facilities that require more than a doubling in output to become efficient relative to their peer group represent 20% of UHCs, but 41% at the union level.

- There is some evidence (with important methodological caveats) that efficient UHCs are driven by drug availability, whereas inefficient UHCs place more emphasis on key worker numbers.

- Community reports of payments for service are, on average, associated with a 56% lower level of efficiency. UHCs with a full set of operational equipment will be 136% more efficient than those with none.

- At union level, the presence of functioning equipment is associated with a very large efficiency gain. Community reports of payments for services are associated with 46% lower levels of efficiency.

- Overall, the findings of the efficiency modelling identify equipment availability in both UHC and union facilities to be strongly associated with variations in efficiency. There are additional associations with community reports of patient charges (UHCs) and recent management supervision (union facilities).

- Health and family planning workers most frequently identify lack of medicines as the main constraint to service delivery. These perception-based findings to some extent support the econometric analysis, but are in contrast to relatively good medicine availability as reported in Table 5.1.

Productivity analysis

- At the UHC, output-per-worker is high for outpatient services (a mean of 707 a month at the UHC or over 37 outpatients per day), and low for inpatient admissions and deliveries (20 and 1 a month, respectively).

- Health workers at union facilities see the most outpatients per worker—more than double that of family planning workers at union level facilities.

- At the union level, the output per family planning worker is lower in facilities containing health workers. Conversely, output per health worker at union level is not influenced by the presence of family planning workers.

- The mean unit expenditure per DGHS outpatient is around 62 Tk. There are wide variations in unit expenditure. For DGHS outpatients the high-to-low decile ratio is over 2:1, and the ratio for DGFP services is similar.

- There is some evidence that the MoHFW's services are getting less expensive and are now amongst the least costly in developing countries, although it is not possible to make comparisons of service quality.

8.2   SERVICE DELIVERY PERFORMANCE

What is meant by the term 'performance' in the health sector might depend on the health sector's objectives. Therefore, in Bangladesh some relevant measures of performance might be:

- Output: for instance, the number of patients seen and the volume of other services provided by a facility (output can be adjusted for quality or left as a raw measure). Output measurements have been investigated in Chapter 2.

- Uptake: for instance, what proportion of the population utilises government health services, or what proportion of expected cases for a specific disease / condition are seen by government health workers? Uptake measures can be further disaggregated into different target groups (wealthy or poor, by gender, etc.) to add an equity dimension. Uptake measurements have been investigated in Chapters 2 and 7.

- Efficiency: do health services use the correct combination of inputs in order to maximise output?

- Productivity: particularly measures such as the average output per worker (which illustrates labour productivity) and expenditure per patient / client (or unit expenditures for different services).

Previous chapters have shown wide variations in output and uptake. The rest of this chapter investigates measures of efficiency and productivity.

Health service efficiency

The survey has generated a set of data that allows the analysis of health facility efficiency (no analysis has been performed for DGFP facilities). Efficiency will not be the only objective of most health systems. Quality of services and equity of access may be other important considerations. However, efficiency is a vital concept in understanding how and at what rate resources turn into health services, and in highlighting where health systems might be under-performing.

Efficiency may be defined as maximising a facility's output (e.g. patient consultations) given a set of inputs (e.g. human resources, finance, drugs), although it can also be thought of as minimising the input requirements given a fixed output. In the context of this analysis, it is helpful to talk more specifically of technical efficiency. Technical efficiency is achieved when the marginal products of all input types are equal to each other. In other words it is the point where no trade-offs between input types remain that can result in a gain in output[33].

In order to model efficiency, a technique called Data Envelope Analysis (DEA) is used. Some of the benefits of DEA over other modelling techniques include:

- a range of output measurements can be considered simultaneously with DEA—this is more realistic for a health facility such as the UHC which offers a range of services;

- DEA is non-parametric—i.e. it does not assume a specific technology across the sample as a whole, and DEA models therefore have no single functional form. Again,

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[33] The concept of allocative efficiency takes this a step further by asking whether health services use the right combination of inputs taking into account the relative prices of inputs. In other words, does it make more sense to spend the next available Tk on human resource inputs, or drug inputs? When the next Tk results in the same rate of increase of output across all inputs types, allocative efficiency has been reached.

this is less restrictive for a health service, which in practice has quite different supply of health workers, drugs and equipment from one facility and another;

- DEA generates a production possibility frontier that 'envelopes' the data points in input-output space and identifies a point of maximum output for any level of input. This is tantamount to an efficiency frontier. In other words, it helps to identify the best-performing facilities in the sample and then uses them as a benchmark against which all under-performing facilities are compared;

- it generates an individual 'efficiency score' for each facility by measuring the distance each facility is from the production possibility frontier;

- this 'efficiency score' is useful to show the level and variation in efficiency across the sample, and is also a good dependent variable for econometric models that aim to explain variations in efficiency.

Although there is a detailed description of DEA techniques in Annex 2, the analysis may be considered as following two distinct stages. The first stage involves the generation of efficiency scores. The second stage models some potential factors that seek to explain variations in the efficiency scores. The input and output variables selected for generating the DEA efficiency scores, as well as the environmental variables used in the subsequent models, are all shown in Table 8.1.

Table 8.1   Input, output and explanatory variables used in efficiency analysis

	UHC (DGHS)	Union (DGHS)
Input variables	Value of annual DGHS upazila expenditure [1] Number of key workers[3] Drug availability[5]	Drug availability[2] Number of key workers[4]
Output variables[6]	Inpatient admissions Deliveries Outpatient contacts Vaccination contacts Under-5 ARI contacts	Outpatient contacts Under-5 ARI contacts

	UHC (DGHS)	Union (DGHS)
Explanatory / Environmental variables	Proportion of equipment missing or not functioning[7]	Proportion of equipment present and functioning
	Audit prevalence (yes / no)	Supervised within month (yes / no)
	Reports of speed payments (yes / no)	Building physical condition score
	Indebtedness (yes / no)	Reports by community of patient payment (yes / no)
	Building physical condition score[8]	Proportion of workers with houses
	Proportion of workers with houses[9]	Satellite clinic operated in last month? (yes / no)
	Reports by community of patient payment (yes / no)	Drug supply system (direct / indirect)?
	Proportion of MOs that are male	Duration of staff posting in months
	Duration of staff posting in months	
	Rate of key worker turnover within year	

Source: OPM various questionnaires.

Notes: (1) Defined as total annual expenditure; see Table 3.3. (2) Defined as the average proportion of drugs listed in Table 5.1 that is in stock. (3) Defined as all MOs, nurses and MAs. (4) Defined as all MOs or MAs at the union level facility. (5) Defined as the average proportion of drugs listed in Table 5.1 that are in stock. (6) All output variables are measured in per month and in absolute terms; see Table 2.1 and Table 2.2. (7) Defined as the average proportion of equipment listed in Table 6.2 and Table 6.3 that are not available or not functioning. (8) As defined in Figure 6.2. (9) As defined in Figure 4.6.

Efficiency scores are presented below as target increases in output[34]. Any facility that is under-performing receives a score based on the efficiency gain or target output increase required for it to become as efficient as the best-performing facilities in the sample.[35] A higher target score means that a facility is less efficient. The distribution of these scores is presented in Figure 8.1 for UHCs and DGHS union facilities.

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[34] Although output-orientated efficiency scores, as generated by DEA linear programming, are always over 100% (with a score of 100% representing the most efficiency units), for the purposes of this figure the results have been translated into target increases in output: e.g. a facility with a 150% score is presented as requiring a 50% increase in output to become efficient. See Annex 2 for more details.

[35] For simplicity a radial efficiency measure has been used which indicates the necessary improvements in output when all relevant outputs are improved in equal proportion.

Figure 8.1   Distribution of facility efficiency scores

% output gains required to become efficient
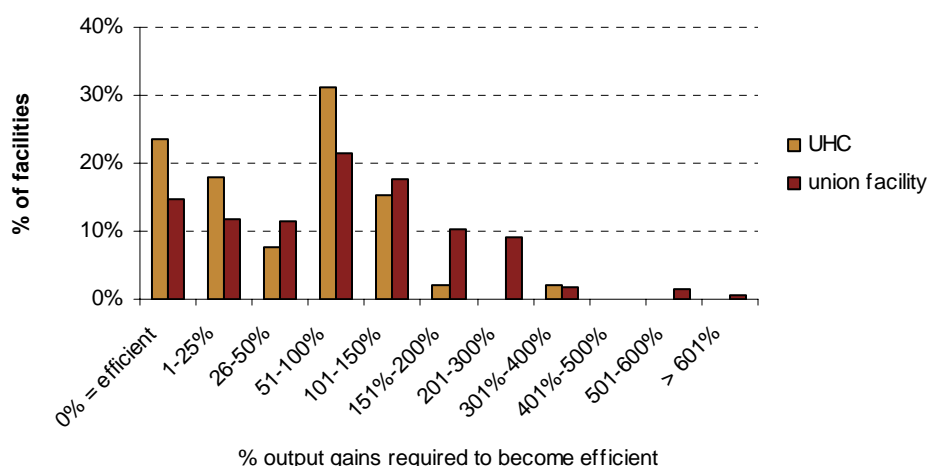
Union facilities have a much greater variation in efficiency relative to best performing units than UHCs. Twenty-four percent of UHCs and 15% of union facilities are optimally efficient relative to their peer group. The facilities that require more than a doubling in output (those in categories of over 101%) to become efficient represent 20% of UHCs but 41% of unions. One explanation for the wider variation of union efficiency is that the degree of output variation at the union level is greater than in some union facilities and their workers may have a degree of 'slack' time, whereas UHCs operate closer to their maximum capacity levels.

It is worthwhile investigating whether the efficiency scores reveal anything about optimal resource mix. During the generation of the efficiency scores, the input variables (expenditure, key worker numbers and drug availability in the case of the UHCs) are assigned weights.[36] Although there are some methodological caveats involved[37], these weights can be used to draw tentative conclusions about the changes in production structure that the units should adopt. This has been done by comparing the production structure of the inefficient facilities with that of the efficient facilities (Table 8.2).

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[36] Technically speaking, these weights are computed so that the facility under evaluation is placed in the best light possible relative to the other facilities in the data set. In other words, the best-performing facilities are given weights that yield maximum efficiency scores. All other facilities are assessed relative to this. It should be noted that this approach does not give any information about the absolute efficiency of the best performing units.

[37] That is, all deviations from the frontier are assumed to be inefficiency. Strictly speaking this type of analysis should be done between specific benchmarks only, e.g. the mean production weights of facilities that share a specific benchmark facility should be compared with the production weight of only that benchmark facility. However, this would lead to a problem of insufficient numbers of observations, and in addition, as an inefficient facility may be referenced to several benchmarks; there may be many dimensions in which it can move towards the efficiency frontier.

Table 8.2   Production structure in efficient and inefficient UHCs

	Expenditure	Key workers	Drug availability
Mean production weights: efficient UHC (%)	16	26	58
Mean production weights: inefficient UHC (%)	10	67	22
n (efficient UHCs)	14	14	14
n (inefficient UHCs)	41	41	41
Variance (efficient UHCs)	0.08	0.12	0.13
Variance (inefficient UHCs)	0.05	0.11	0.07
T value	0.66	–3.81	3.39

Source: OPM.

The results show that efficient facilities place a lower emphasis on the number of key workers, and a greater emphasis on drug availability, than non-efficient units[38]. It should be stressed again that this result should be treated with a degree of caution given the methodological caveats. However, if robust, this result suggests a possible virement of resources away from key worker provision (the salaries and allowance budget lines), and towards drug availability (the MSR budget line), will increase facility efficiency. This is consistent with the analysis of expenditure, which also suggested that salary share was too high (see, for instance, Table 3.2).

The second stage of DEA attempts to provide explanatory factors that might be associated with some of the variation in efficiency scores. To do this, the efficiency scores are regressed on a set of environmental variables. These variables try to capture the external influence of explanatory variables on the efficiency of the facilities and are displayed in Table 8.1[39]. Initially all explanatory variables displayed in Table 8.1 were considered for the models, which was then 'tested-down' to the models discussed below. This process is discussed in more detail in Annex 2.

The final results of the modelling for UHCs are shown in Table 8.3[40]. Negative coefficients should be interpreted as an explanation of a more efficient facility. For example, a coefficient of minus 0.2 means that for every marginal unit of the explanatory variable (or for a binary variable the one-off efficiency difference between 'yes' and 'no'[41]), the facility will become 20% more efficient.

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[38] The t-values of the difference in mean production weights between the efficient and non-efficient sample are high for the number of key workers and for drug availability.

[39] Some of the environmental variables may not appear to be independent of the input variables—for instance in many health systems, equipment availability and building conditions would be a function of expenditure. However in the MoHFW, and as explained in section 6.1 and elsewhere, in practise UHCs and union facilities have practically no control over equipment supply or the maintenance of equipment and buildings. A similar situation exists for human resource positing duration and turnover.

[40] One initial model including all explanatory variables noted in Table 8.1 was rejected initially in favour of the model presented in Table 8.3.

[41] It should be noted with binary (yes/no) explanatory variables, that the coefficient can only be interpreted as a one-off efficiency gain. For instance, if a co-efficient of minus 0.2 is found on the audit variable (which is a yes/ no variable), it would imply that facilities where an audit has been undertaken are on average 20% more efficient than those where no audit has been undertaken. It does not imply that every additional audit will result in a 20% efficiency gain.

Table 8.3   Explanatory factors associated with UHC efficiency

n = 53	Constant	Received Audit?	Workers with houses?	Do communities report payment?	Key equipment missing or not functioning ?
Coefficient	1.438	–0.213	–0.006	0.557	1.362
z-statistic	4.028	–0.842	–2.454	2.416	1.917
Probability	0.0001	0.399	0.0141	0.0157	0.0552
Log-likelihood value –53.0		Akaike information criterion 2.22			

Source: OPM.

There are some interesting results. First, the coefficient on the audit variable suggests a positive relationship with efficiency, although this result is not significant.

The second variable—the proportion of workers with accommodation—did not have a conclusive result. In theory, the coefficient implies the difference between 'no' and 'all workers housed', would be a productivity gain of just 0.6%. This is statistically significant at the 5% level (p = 0.0141).

Third, reports (from the community questionnaires) of the need for patient payment for normal consultations were investigated and found to adversely influence efficiency. On average UHCs reported as levying patient charges, were 55.7% less efficient than those that did not. This might be an indication of general management malaise at those facilities. Alternatively, it could be an indication that wealthier communities are more likely to support private services offered by doctors from the UHC (see p. 20 onwards for a discussion of the different consultation processes that exist).

Finally, the proportion of key equipment that is either missing or not functioning (see Table 6.2) strongly influences efficiency. For every additional 10% of equipment that is in place and functioning, UHC efficiency will rise by 13.6%, although this result is only significant at the 10% level (p = 0.0552).

The final results from modelling efficiency at the union level are now investigated (Table 8.4). The model has less overall explanatory power than the UHC model[42].

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[42] The higher absolute values for the log-likelihood values and Akaike information criterion in the union model demonstrate its weaker overall explanatory power compared with that of the UHC model.

Table 8.4   Explanatory factors associated with union facility efficiency

n = 46	Constant	Equipment functioning?	Supervised last month?	Infrastructure score	Workers with houses	Do communities report payment?
Coefficient	4.054	–4.596	–1.554	0.137	0.003	0.465
z-statistic	4.0505	–2.594	–1.715	1.1787	1.032	1.0797
Probability	0.0001	0.0095	0.0863	0.2385	0.302	0.283
Log-likelihood value –70.23		Akaike information criterion		3.358		

Source: OPM.

There is a strong relationship implied by the coefficient on functioning equipment at the union level. The results imply that for every additional 10% of equipment that is in place and functioning, union facility efficiency will rise by 45%. This result is significant at the 1% level (p = 0.0095).

The presence of supervision within a month again has a strong positive relationship with efficiency, but the relationship is only significant at the 10% level (p = 0.0863).

Other relationships are not statistically significant. Moreover, the facility's infrastructure score (out of seven possible attributes, see Figure 6.2) and percentage of workers with housing, have counterintuitive relationships (positive signs on the coefficient).

Overall, the findings of the efficiency modelling identify most strongly equipment availability to be associated with efficiency. There are additional relationships between efficiency and recent management supervision (union level) and community reports of payment (UHC). In the case of the latter, it could be that a UHC charging patients for consultations is suffering from generally poor management and governance problems, and this variable merely acts as a proxy.

The econometric modelling that has been presented is interesting and a potentially useful tool for analysing health service performance. However, it is of critical importance that some of the methodological shortcomings of this modelling work are recognised.

First and foremost, modelling estimates are not adjusted for the quality of the service provided by different workers. A unit that maximises only patient throughput may be doing so only at the expense of adequate consultation times, thus jeopardising service quality. Unfortunately there are no easy ways to incorporate this constraint into the analysis. That the apparently most efficient and productive units might in fact be providing a very poor service is a limitation to econometric modelling that must be recognised.

A second major caveat concerns the interpretation of variables that 'explain' differences in efficiency, such as equipment or community reports of payment. The coefficients on these variables point to the degree of efficiency gain that can be associated with a favourable change in these variables. However, it should not be assumed that these efficiency gains can be attained at no cost. For instance, purchasing equipment requires investment funds to be in place, the tender to be specified, and distribution to take place and training and maintenance programmes to be available. These activities will all incur costs that may lower the net efficiency gain.

Econometric modelling is but one analytical tool available and is most useful if cross-checked with results from another evaluation methodology, such as qualitative analysis. The surveys asked upazila level managers (the Upazila Health and Family Planning Officer (UHFPO) and Upazila Family Planning Officer (UFPO)) as well as other health and family planning workers and heads of facilities, what they perceived to be the major constraints to providing a better service. The results are shown in Figure 8.2 (ranked by the UHFPO's responses)

Figure 8.2 Health worker's perceptions of constraints

What are the most important constraints limiting service delivery in this upazila/ facility?

■ UHFPO (DG Health) ■ UHFPO (DG FP) □ Other health and FP workers
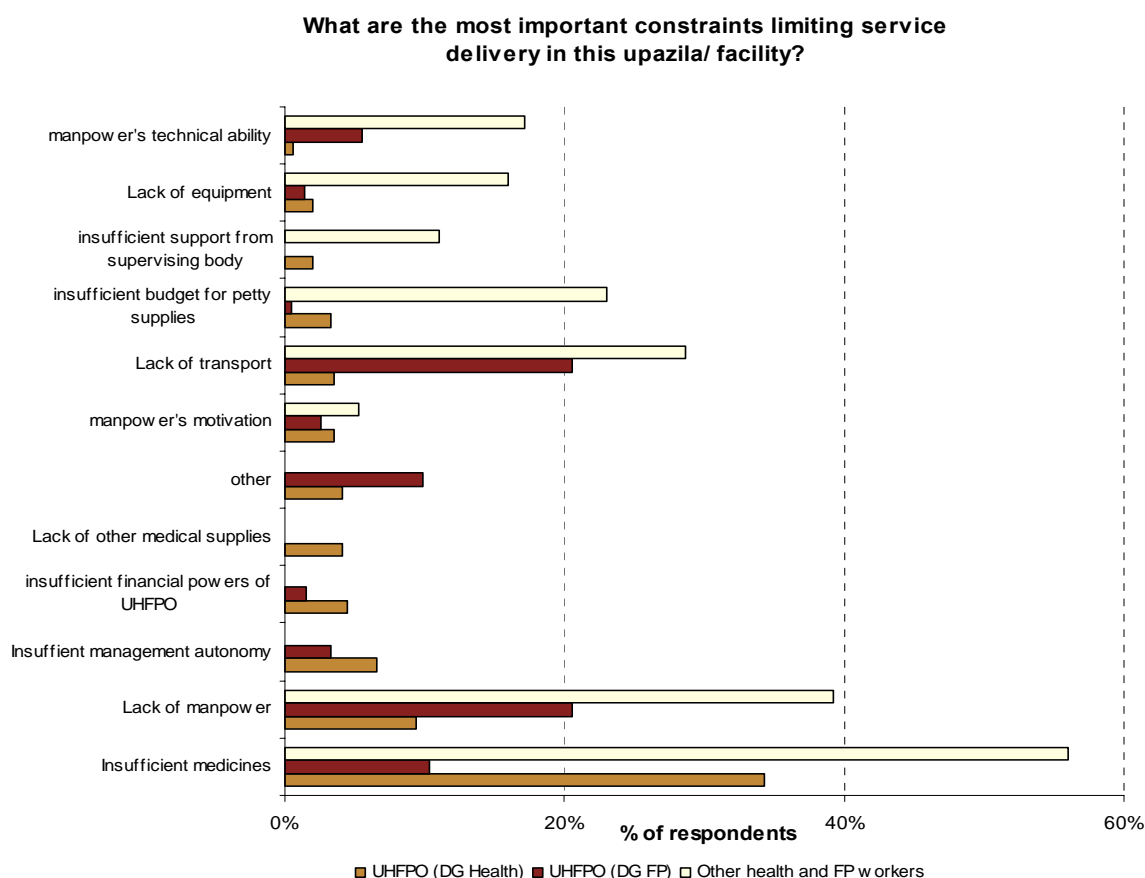
Notes: Respondents were not limited to one answer, hence the sums of responses will add up to more than 100%.

Figure 8.2 shows that the clearest perceived constraints relate to the availability of medicines, followed by lack of manpower. Transport is an important constraint identified by UFPO's and health and family planning workers. A budget for petty supplies, lack of equipment, and the level of worker's technical competence, are other identified constraints from the front-line workers' perspective. These results are similar to those from the *2000 Service Delivery Survey* (CIET, 2001), which identified the main difficulties as inadequate supplies / logistics (39%), inadequate human resources (24%), as well as variables which this survey did not capture such as access and bad behaviour of 'people' (28% in both cases).

Although the set of variables used in this simple perception analysis do not perfectly overlap with those used in the formal modelling of efficiency, there are some similarities. The subjective identification of medicines and supplies could be some support for a greater emphasis on drug availability in the production process suggested by Table 8.2, and could help to reinforce both sets of results. However, these results do contrast with quite high levels of medicine availability (see Table 5.1) so this might imply workers are frustrated by the rationing of medicines (supported by the analysis in Table 2.7 on drug regimens) as opposed to their unavailability as such. Key workers fairly frequently also identify lack of equipment as a constraint. Nevertheless, it is useful to consider information yielded by both qualitative and quantitative approaches, and pay attention to the differences in results, as well as the similarities.

Productivity analysis

Using key worker availability and service delivery information, the survey is able to impute a number of simple productivity measures giving output per key-health-worker. These estimates should be considered with two provisos. The first is that these figures cannot adjust for the quality of the service provided by different workers. Very high patient volumes per health worker might begin to imply an inadequate consultation, but this has not been adjusted for in these figures. Secondly, there are differences in the types of patients seen that may affect the comparability of the figures.

The crude output per key-health-worker is shown in Table 8.5.

Table 8.5   Key worker productivity

	Monthly output per relevant key worker [1]			
	Low	Mean	High	n
Non-sadar UHC				
Outpatient per key worker (DGHS)	237	707	1,236	61
Outpatient per worker[2] (DGHP)	55	186	335	51
Inpatient admissions per worker	9	20	35	60
Deliveries per worker	0	1	2	61
Union facilities				
Outpatient per worker (DGHS)	376	1,144	2,282	68
Outpatient per worker (DGFP)	78	511	1,066	80
Family planning and ANC contacts per FVW	4	116	423	76

Source: OPM facility questionnaires.
Notes: (1) The output per health-worker figures are calculated in a number of ways. Output information is collected as follows: for the outpatients and family planning and ANC contacts, information from the patient register from one calendar month before the data of interview was used; monthly inpatients and deliveries are calculated as the monthly mean between July 2003 and June 2004 using MIS data. The number of health workers counted in relation to each service ('relevant health worker') are as follows: inpatient and deliveries include MOs (excluding UHFPO and RMOs) and nurses (all types); outpatients use MOs (excluding UHFPO and RMOs) and MAs; family planning outpatients use MO-MCH and FVWs at the UHC and FWVs and SACMOs at the

union level. (2) This is measured as the sum of adult general patient management and child care. It does not include family planning or ANC contacts.

One immediate finding is that DGHS workers see more patients / clients than do their equivalents in DGFP. At the UHC, the health-side outpatient consultations per worker is high, implying MAs and MOs see, on average, more than 35 patients per day (assuming a 26 day working month). By comparison, the 2000/01 public expenditure review (HEU, 2002) calculated outpatients per MO to be only 12.8 a day. The high output-per-worker figures found in this survey may partially reflect patient register inflation, as highlighted in Table 2.9, and also evidence that MoHFW services are becoming busier, see Table 2.3.

By contrast, inpatients work out at around one admission per worker per month and deliveries per worker are extremely low. Family planning workers undertaking normal outpatient consultations see around one-fifth as many patients per worker as those on the health side. In a unified system, there may be some justification for transferring some family planning personnel to DGHS outpatient services, so as to allow a more balanced workload and hopefully to increase patient consultation times (which are shorter in the DGHS, see Table 2.8).

At union level, output per DGHS worker is even higher than at the UHC, and at levels that best characterise the service offered as a patient 'walk-through'. Output per DGHS worker is more than twice the output per DGFP worker. This result is likely to be driven by the better availability of drugs in DGHS facilities during most of FY 2003/04. Availability of drugs might also explain the very high variability of output per worker at union DGFP facilities. In any case, there again might be justification of a transfer of human resources from UHC to union level to create a more balanced workload.

At union level it is possible to disaggregate the results further between different types of facility (Table 8.6).

Table 8.6   Key worker productivity—different types of union facility

Mean monthly output per worker[1]	DGHS worker	DGFP worker	FWV (ANC and family planning contacts)
'Stand alone' facility	1,189	530	130
n	29	47	43
'Combined' facility	1,117	422	54
n	39	33	33

Source: OPM facility questionnaire.
Notes: (1) Workers compared with outpatients include MO (if present) and MA. For family planning outpatients, they include SACMO and FWVs, where maternal and child health cases are the outpatients.

It appears that the output of DGHS workers is little influenced by whether the facility contains family planning staff. However, family planning worker's output is lower in facilities containing health staff. Again, this may be driven by the more constant drug supply through DGHS in FY 2003/04 and the fact that in combined facilities, patients were therefore diverted to DGHS workers so that they could receive drugs.

Top-down unit expenditure analysis has also been conducted at an upazila level. Using the MoHFW expenditure figures presented in the chapter on finance, and taking the service

statistics across an upazila as whole (as presented in the chapter on service delivery), the following unit expenditures are produced (Table 8.7)[43].

Table 8.7   Unit expenditure (Tk)

Non-sadar upazilas	Low	Mean	High	n
DGHS				
Inpatient	1,181	1,837	2,574	34
Outpatient	40	62	87	34
DGFP				
Child care	42	67	92	33
Limited curative care (outpatient care)	31	48	67	34
Maternal care	150	233	327	34
Family planning	20	31	43	34

Source: OPM facility questionnaire.

These results are for guidance only as they do not rely on a new unit-cost survey to assign weights between services and hence will replicate the cost structure implied in previous studies. However, the nominal (not-inflation adjusted) mean expenditures are comparable with those of previous studies. A 1997 study (HEU 1999) found mean unit costs to be 1,957 Tk per inpatient and 65 Tk per outpatient. With suitable adjustments for inflation over the intervening seven years, it may well be that the real cost of upazila services is lower than it was. This is an indication of productivity growth, and in turn is probably driven by increases in patient numbers over time (see for instance Table 2.3). The range of unit costs suggest wide and growing variation in the unit expenditures of MoHFW services. (High and low figures are 87 to 40 Tk in this survey. Comparable nominal figures in the 1997 study are 89 to 52 Tk) between facilities.

The unit expenditure results can be very crudely compared with costing results from the sub-region. A range of costing studies for outpatient services in Indian public hospitals are cited in Mahal (2000). In 1995/96 rupees, the cost of these services ranged from 25 to 91, which was equivalent to US$0.75–2.75[44]. Bearing in mind that these figures would need to be adjusted upwards for nearly a decade's inflation, the range of DGHS outpatient costs presented in Table 8.7 (the low and high deciles represent approximately US¢70 to $1.61), look, if anything, to be lower than for equivalent services in India.

For a final comparison of international costs, a table from the 1997 HEU study (HEU 1999) has been updated to reflect current unit expenditures in Bangladesh (Table 8.8).

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[43] Expenditures were attributed to different services according to the relative volume of services. For DGHS services, volumes were weighted by the ratio of inpatient and outpatient unit costs as produced in the: *Bangladesh Facility Efficiency Study*; Health Economics Unit Working Paper 16; November 1999 (table 16). For DGFP, volumes were weighted by the ratio of unit costs as produced in: *'Projecting the costs of the Essential Health Package*, Health Economics Unit, Research Paper 26, June 2001', and with reference to annex A1 of that paper.

[44] At an average 1995/6 interbank exchange rate of 1 US$ = 33 Indian rupees.

Table 8.8   International cost comparisons (adapted from HEU 1999)

	Inpatient admission[1]			Outpatient visit	
	Date of study	Cost (as % of *per capita* GNP)		Date of study	Cost (as % of *per capita* GNP)
Sri Lanka	1991	5	Sri Lanka	1991	0.10
Indonesia	1985	7	Bangladesh (SSPS)	2004	0.27
Bangladesh (SSPS)	2004	8	Indonesia	1985	0.30
Belize	1985	13	Zimbabwe	1985	0.30
Malawi	1987-88	17	Malawi	1987	0.40
Zimbabwe	1987	17	China (Barnum and Kutzin 1993)	1997	0.50
Jamaica	1985-86	18	Papua New Guinea	1986	0.50
St Lucia	1986-87	21	Indonesia	1987	0.60
China (Barnum and Kutzin 1993)	1986	30	Rwanda	1984	0.60
China	1986	30	Jamaica	1985-86	1.10
Papua New Guinea	1988	39	St Lucia	1986-87	1.30

Source: OPM and HEU (1999)

Notes: In the HEU's 1999 paper, hospitals were grouped into categories to aid international comparison. The results presented here are for Level II and Level III facilities only, which are defined as non-tertiary hospitals that have 'some functional differentiation by clinical speciality' and 'most basic level facilities, with few specialists, and limited laboratory services'. These are generally referred to as 'district' of 'first-level referral' hospitals, respectively. UHCs are classed as type III facilities.

It appears that the unit expenditures of the MoHFW's core services at upazila level are now amongst the cheapest in developing countries. This analysis needs to be interpreted with a degree of caution, as the results do not adjust for differences in case mix and quality, which could have a sizeable impact on service costs.

In all of the productivity analysis presented in this chapter, it should also be remembered that Table 2.9 has presented evidence of register inflation, of up to 69% by some measures. If this is the case, the levels of productivity per worker will be exaggerated, and unit expenditures under-estimated, as they are based on output levels taken from MIS reports.

9.   Conclusions

This report first investigated service delivery, both in terms of outputs and quality of services, in Chapter 2. The next four chapters examined the volume, distribution and management of essential inputs behind service delivery. Chapter 7 discussed outputs and inputs from an equity perspective. Chapter 8 discussed some measures of service performance. The conclusions of the report are given below.

The MoHFW is providing important primary services quite extensively. The volume of outpatient services is impressive in terms of absolute numbers and reaches a reasonable proportion of the population that facilities serve. Inpatient services, immunisation and family planning services are also well-utilised. Comparisons with previous surveys indicate that: UHC service volumes have increased quite markedly over the last five to seven years; unit expenditures may have fallen; and that the cost of MoHFW services in general is one of the lowest amongst developing countries. A good number of DGHS facilities—nearly one-quarter of UHCs and 15% of union facilities—can be said to be 'efficient' or 'high performing' relative to their peer group.

All facilities sampled were found to be open and functioning, with some key workers and a fairly extensive stock of key drugs available (apart from obstetric services). Satellite services are operating and are used by communities. Whilst some services—notably facility-based deliveries and ANC—are under-used, the overall picture is one of considerable achievement when it is considered that the average MoHFW allotment at the upazila level is only 80 Tk *per capita*.

The quality of health services, however, raises some concerns. A test of clinical knowledge taken by key workers shows both a low average level of knowledge, and considerable variation in knowledge between different individuals of the same designation. Only around one-third of patients were prescribed both a potentially appropriate choice of a drug and in appropriate dosage, frequency and duration, given their medical condition. The efficacy of drugs dispensed might in any case be compromised by poor storeroom conditions (only 2% meet WHO storage guidelines). Most consultations are only a few minutes long and rarely involve either a physical examination or written prescription. The condition of buildings is often poor and the lack of medical equipment raises real concerns over how UHCs can undertake essential activities, such as transfusing blood, sterilising equipment, providing back-up power and incinerating medical waste. Interestingly, econometric modelling shows the availability of functioning equipment to be a key driver of efficiency.

Resource availability puts the concerns over service quality into context. A budgetary allotment of only 80 Tk or US$1.4 *per capita* is insufficient comprehensively to deliver the Essential Service Package. Development budget allotments recorded to upazila level are negligible on a *per capita* basis. Health worker vacancies are high, with nearly 40% of UHCs missing a RMO, nearly 60% of DGHS union facilities missing a MO, and 46% of DGFP union facilities missing a SACMO. Some of these vacancy rates should raise questions concerning the realism of the staffing norms and mix.

Nevertheless, even given this low absolute level of resources, there are opportunities to improve the **allocation of resources between inputs** to provide services more efficiently. A full 83% of the DGHS' and 91% of DGFP' upazila-level allotment is earmarked for human resources—a level that is certain to crowd out other complementary inputs. For instance, the proportion of resources allotted to maintenance is estimated at less than 1%, despite the poor state of many facilities. As human resource allocations, maintenance, and drugs

and supplies budgets, are all controlled by higher levels, upazila level managers have discretionary control over as little of 9% of resources earmarked for their services.

There is evidence that the geographical allocation of resources could also be improved. The variations *per capita* between best- and worst-resourced upazilas are high: 2:1 for budgetary allotment, over 3:1 for key health workers such as MOs or nurses, and 4:1 for drug supplies. These discrepancies are due both to the supply-based resource allocation system itself (whereby for many input groups all facilities receive the same absolute level of resources), and the failure of this system to work as intended. (In practice there are wide variations in the absolute resources allocated to facilities of the same type, in particular in worker postings, union-level MSR and maintenance allotments). Whichever the driving factor, the discrepancies in *per capita* resource allocation are beyond what would be associated with a systematic needs-based system. One result of the current allocation system is evidence that *per capita* budget allocation is lower in upazilas where the average user is poorer.

Despite these resource allocation issues, there is some good news on the equity of uptake as measured by socioeconomic status of the average user. Facilities that have relatively high levels of uptake tend to serve poorer patients than those with lower levels of uptake. Overall, the socioeconomic status of the average user in this survey is similar to the average for non-sadar populations in the *2001 Household Income and Expenditure Surveys* (HIES), which in turn implies users are somewhat poorer than the overall national average.

On another positive note, the management and accounting systems that can be used to strengthen service delivery are in place and largely operating. Budgetary allotments arrive at spending units, audits take place, salaries are paid, drugs are procured and supplied, and maintenance is requisitioned. Some of the systems are performing reasonably well: most health workers in DGHS are paid on time throughout the year; supervision appears to be reasonably regular; much of the local drug and food procurement appears to be at reasonable prices; and there is limited evidence of drug loss from investigation of drug records. This is a good foundation upon which to strengthen systems for management and governance.

Financial management does raise some concerns however. Disbursement sees a shift away from the field level; union facilities receive fewer drugs than allotted; and maintenance expenditure appears to lag some way behind allotment levels, although this may be influenced by posting of routine expenditure works after the end of the FY. Some line-items see a significant proportion of allotment arrive through emergency allotments. The first and third routine allotment arrives up to two months late for a good proportion of facilities. Seventy-seven percent of upazila DGHS offices are in debt. There is a widespread discrepancy (of 56% for the field level) between the value of expenditure recorded by the CGA from upazila accounts offices and that registered by the DGHS finance department.

Human resource management aims to ensure workers are in post and delivering services. However there are a number of shortcomings. The incentive framework for workers has problems in terms of compressed salary scales, poor availability of housing, variable levels of training, and supervision that focuses mainly on administrative matters. These incentive shortfalls manifest themselves in a number of ways and in particular for MOs and paramedical staff at union level. For instance for MOs at the union level, vacancy rates are nearly 60%, additional incomes when earned are higher than official MoHFW incomes, tenures of post are short, and there is the most severe problem of unexplained absences (22%) found in the survey. Absenteeism in general is quite high across several designations of staff, although the survey methodology is careful to distinguish between explained and unexplained absenteeism.

Drug and supplies systems vary from district to district. In expenditure terms UHCs receive their allotment but union facilities are 14% under-supplied. The requisition process is largely meaningless, as facilities normally receive less than 50% of the volume of drugs requested. Record keeping is relatively complete and, as mentioned, there is little evidence of drug loss between levels using this system, although the proportion of CMSD supply notes without values (27%) make tracking these resource flows difficult.

The maintenance system, run by the Central Medical Maintenance Unit (CMMU), receives limited resources—around 1% of the MoHFW's overall upazila level allotment. Survey data suggests that despite inadequate funding, expenditure at upazila level is around 55% of allotments. This is in contrast to national-level figures, which show a healthy disbursement rate, so it is possible that expenditure records are incomplete at the district level, and / or routine work expenditures are posted after the end of the FY. Final recipients of maintenance are kept in the dark about maintenance budgets, with only 10% of upazila offices receiving a copy of the maintenance allotment from their district supervisors. Many upazilas request but do not receive maintenance; and only one-third of maintenance work lots were reported by RMOs to be completed satisfactorily (despite every maintenance work at the time being signed off by the user).

Finally, there are some pressing governance concerns facing the sector. Modelling suggests that UHC inefficiency could be closely linked with community reports of payment for services. The mechanism for this apparent effect needs to be investigated further. There are extensive reports by accounting staff of 'speed payments' being required to receive allotment letters and to get expenditure bills passed. The value of these payments is often specified as a proportion of the allotment or bill concerned. Other concerns include evidence of quite high discrepancies between drug issues recorded by facilities and those reported by patients. There is also evidence of patient inflation in patient registers and complaints by upazila managers over the quality of maintenance and the amount that has actually taken place. One of the important findings of this report is that the tracking resources needs to be done, not just through formal channels (e.g. reconciliation of expenditure records or drug issues between levels), but also through capturing the experience of end users (e.g. accountants and patients).

Overall, the MoHFW should be commended for providing a high volume of services with limited resources. This report has demonstrated, however, that there are variations in performance that mean more can be done with what is currently available. As the MoHFW is planned to be one of the first ministries in Bangladesh to operate a Medium Term Budgetary Framework, it is hoped that this survey provides timely information for policy makers and senior managers that can be used to improve the performance of service delivery.

Annex 1   Glossary

A list of standard abbreviations and a glossary of some key terms used in the report is given below.

Abbreviation		
AHI	Assistant Health Inspector	DGHS field staff who supervise HAs, who provide mainly immunisation, environmental and public health services.
	Allotment (letter)	An allotment is the budget authorisation or authority to spend. Three routine letters are normally sent out each year: one for the first two quarters of the FY, one for the third quarter, and one for the final quarter. There are also often 'special' allotments at any point in the FY.
ANC	Antenatal care	Care provided to pregnant women—normally two to three episodes during pregnancy. ANC involves immunisation, education, examination for danger signs, etc.
ARI	Acute respiratory infection	Acute respiratory infections can affect one or both of the upper and lower respiratory systems. An upper respiratory infection (URI) involves the ears, nose, throat or sinuses. Lower respiratory infections (LRI) involve the trachea (windpipe), bronchial tubes (which bring air into the lungs) and lungs. ARI services in Bangladesh are delivered through a vertical disease programme with separate MIS and drug procurement, targeted mainly at ARI cases in children under-five-years-old.
ATP	Advanced Tour Programme	Submitted by field officers / staff in advance of the calendar month concerned, and used to indicate their planned travel programmes, organised by day and location.
AUFPO	Assistant Upazila Family Planning Officer	Deputy to the UFPO. A Class II officer. Does not have to be a medical officer.
BCC	Behavioural Change Communication	Educational services that are intended to change health consumer's behaviour: often target at specific diseases such as HIV / Aids or pregnancy.
BOC	Bangladesh Oxygen Company	The supplier of oxygen to MoHFW facilities (paid for out of MSR budgets).
	Bill	The payment voucher drawn up by the DDO's office, after following any necessary pre-audit checks including authorisation by the DDO himself, for onwards transmission to the CGA's office (UAO or DAO) for approval and payment. Each bill has to be for a separate budget head (apart from pay and allowances).
BP	Blood pressure	
CAR	Contraceptive Acceptance Report	The monthly report from UFPO offices to the DD FP containing details of contraceptive acceptance of different FP methods. The CAR is compiled from monthly MIS reports from unions.
CDD	Control of Diarrhoeal Diseases	A disease programme to control diarrhoea, cholera, dysentery, etc.

CGA	Controller General of Accounts	Accounting arm of the Ministry of Finance, which has bill payment and accounting functions.
CMMU	Central Medical Maintenance Unit	CMMU is the department that deals with maintenance and construction of public health facilities. CMMU's budget is captured under the 'Autonomous Bodies and Other Facilities' operational level under 'administration'. It therefore reports to the MoHFW and not the directorates.
CMSD	Central Medical Supplies Department	CMSD is the procurement agency for all imported medicines and equipment, whether revenue or development budget financed.
CS	Civil Surgeon	DGHS representative at the district level. The civil surgeon is always a medical officer.
DAO	District Accounting Officer	CGA representative at the district level.
DD FP	Deputy Director Family Planning	DGFP representative at the district level.
DDO	Drawing and Disbursement Officer	Any officer who has the power to raise and authorise bills (for onward transmission to the CGA for approval and payment).
	Diet	Inpatient catering services.
DGFP	Directorate General Family Planning	The directorate of the MoHFW responsible for family planning services.
DGHS	Directorate General Health Services	The directorate of the MoHFW responsible for health services.
	District	An administrative unit beneath the divisional level. There are six divisions and approximately 64 districts in Bangladesh.
DH	District Hospital	DHs Provide outpatient, inpatient, maternal and some specialist services and are located in the sadar upazila of each district.
DRS	District Reserve Stores	District-level stores for the DGHS. Run by the district storekeeper (reports to the CS). Normally supplies all UHCs and union facilities in the district.
EDCL	Essential Drug Company Ltd	Parastatal company that manufactures basic medicine for the GoB. GoB facilities are obliged to spend a proportion of their drug budgets at EDCL.
EOC	Emergency Obstetric Care	Health services for women experiencing complications during pregnancy, childbirth and the weeks immediately after delivery. EOC services can encompass provision of transport, drug availability, professional skill improvement, logistics management, and blood bank management.
EPI	Expanded Programme of Immunisation	A global programme, launched in 1974 by the World Health Organization (WHO). Focuses on six initial target diseases—diphtheria, tetanus, pertussis (whooping cough), polio, measles, and tuberculosis—during the first year of a child's life. In Bangladesh EPI is provided through a vertical disease programme with separate procurement, MIS, etc., although provision at the field level is undertaken by FWAs (and HAs), under supervision.

ESP	Essential Service Package	Bangladesh's package of essential primary health services. The ESP covers: limited curative care; control of communicable diseases; child health; maternal health; and family planning.
Facilities	Facilities	This refers to an individual health institution of any kind, for example an Upazila Health Centre (UHC) or union-level facility.
FAPA	Foreign Aid Project Audit	Audit undertaken by a separate office of the AG dealing with externally financed development projects.
FPI	Family Planning Inspector	The FPI supervises FWAs. The FPI spends the majority of time in the field supervising anything between three and eight FWAs per union.
FTL	Field team leader	The leader of each SSPS field team.
FWA	Family welfare assistant	FWAs are the low-level field workers in the DGFP and provide condom and oral contraceptives direct to the community and refer up to the UHFWC for other family planning needs. They also work with supervisors to provide EPI services.
FWV	Family welfare visitor	FWVs (DGFP)—are essentially family planning providers with six-months midwifery training. They should spend eight days a month in the field supervising satellite clinics.
FY	Financial year	1st July–30th June
HA	Health assistant	Has work for the DGHS and provide EPI and general counselling / referral services. They are supervised by the assistant health inspector (AHI).
HI	Health Inspector	Supervisor of the AHI.
HNPSP	Health, Nutrition and Population Sector Programme	The second sector-wide programme for the heath sector that began in 2003 and will run until 2006.
HPSP	Health and Population Sector Programme	The first sector-wide programme for the health sector that ran from 1999 to 2003.
ICR	Internal Control Register	Register detailing receipt, issue and stock for medicine and other commodities.
IM	Intramuscular	Injections given into the muscle.
	Indent	Literally a form sent to request a supply of a good or commodity. Often used in the case of medicine or MSR supply. Indents are sent from USCs and / or UHCs to the DRS, requesting the supply of a certain volume and mix of medicines. Indent supply systems normally occur below the lowest level of the budgetary systems (e.g. for MSR the budgetary system stops at district / CS level).
IPHN	Institute of Public Health and Nutrition	Dhaka based institute, supplies some MSR materials (like plasma fluid).
IUD	Intrauterine device	Contraceptive device placed in the woman's uterus: a semi-permanent family planning method.

IV	Intravenous	Injection into the vein.
	Lakh	10,000
LCA	Leprosy Control Assistant	A field worker provided by the Leprosy Control Programme.
LD	Line Director	Officers who have DDO-powers for the development budget. Normally senior officials of the MoHFW or DGHS or DGFP. There are only around 20–25 Line Directors.
LLP	Local Level Plan	A local-level planning process, instigated in 2002 at the UHC level, intended to feed into activity-based budgeting.
LMIS	Logistics and Management Information System	DGFP's logistic (medicine and family planning commodity) management information system. Run by JSI.
LPR	Leave Pending Retirement	At the end of a career, staff and officers beyond a prescribed quantity of service are entitled to a period of paid leave pending retirement.
MA	Medical assistant	DGHS paramedical staff. Similar training to SACMOs on the family planning side.
MCH	Maternal and child health	Refers particularly to non-family planning services provided by the DGFP (e.g. under-fives curative care, ANC, PNC, etc.).
MCWC	Maternal and Child Welfare Centre	A dedicated EOC centre, found mainly in the district towns.
MIS	Management Information System	Generic term for the service statistic reporting system that now exists separately for both DGHS and DGFP, but was unified (UMIS) under the HPSP.
MO	Medical officer	A doctor (MBBS qualification).
MO (FW)	Medical officer (family welfare)	A DGFP medical officer.
MO (SC)	Medical officer (sub centre)	A DGHS medical officer who is posted to a Union Sub Centre.
MR	Menstrual Regulation	An abortion (technically illegal).
MSR	Medical and Surgical Requisites	Medicine and medical supplies budget line in the DGHS.
OCP	Oral contraceptive pill	One of the most common forms of contraception.
	Operational Code	That part of the 13-digit budget code that relates to the operational level of the spending unit. In SSPS, the three codes that will be used are CS's office (2713), DH (2742) and UHC (2744).
ORS	Oral rehydration salts (ORS)	A simple salt and sugar solution given by mouth. The most effective, least expensive way to manage diarrhoeal dehydration.
PHD	Public Health Department	Dhaka-based institute, supplies some MSR materials (like plasma fluid).
PNC	Postnatal care	Care provided to women who have recently given birth.
QA	Quality Assurance	A development programme (with its own Line Director) under the HPSP.

RMO	Resident medical officer	The in-charge of the UHC (health-side).
	Sadar	The central part of an administrative unit. The sadar upazila in a district is the area around a district capital, often encompassing the main town / city. A sadar union is the centre of an upazila where GoB administrative offices for the upazila (e.g. DGHS offices, upazila account offices) are based.
SACMO	Sub-Assistant Community Medical Officer	DGFP paramedical staff. Similar training and qualifications to MAs on the health side.
SoE	Statement of Expenditure	A monthly or quarterly consolidation of expenditure figures. Compiled separately by both the CGA representatives (UAO and DAO), as well as the accounting staff in the UHC for forwarding to the relevant finance departments.
	Spending Unit	This refers to each DDO and the budget s/he manages. An example of an individual spending unit is an upazila.
TB	Tuberculosis	A disease caused by bacteria, which normally affects the lungs, and is spread through the air from one person to another. In Bangladesh TB services are often provided through dedicated TB clinics, located in district towns.
TTBA	Traditional birth attendant	Non-MoHFW (e.g. private) community worker, some of whom have had limited midwifery training to enable them to refer at risk women to MoHFW staff.
UAO	Upazila Accounting Officer	CGA representative at the upazila level.
UFPO	Upazila Family Planning Officer	DGFP representative at the upazila level. Does not have to be a medical officer.
UFWC	Union Family Welfare Centre (sometimes FWC)	DGFP union level facility. Normally staffed by one SACMO, two FWVs, and sometimes a pharmacist, as well as MLSS and aya.
UHC	Upazila Health Complex	First-level referral hospital, normally one per upazila, normally 31 inpatient beds.
UHFPO	Upazila Health and Family Planning Officer	DGHS representative at the upazila level. Always a medical officer.
UHFWC	Union Health and Family Welfare Centre	Upgraded union level facility. Often featuring both DGHS and FP services.
	Upazila	An administrative unit beneath the district level. There are over 640 upazilas in Bangladesh. Upazila population ranges from below 100,000 to over 750,000.
USC	Union Sub-Centre	DGHS union-level facility. Normally staffed by one MA and one pharmacist; sometimes also a MO (sub-centre).

Annex 2   Additional methodological information

Data quality issues

Flooding: in July 2004, Bangladesh experienced extensive flooding in most districts. The survey re-scheduled fieldwork according to severity of the floods in the sampled districts, prioritising those districts that were not affected. Those sampled districts that were severely affected were visited towards the end of the fieldwork. An additional questionnaire was developed to determine the impact of flood on the community and on the health facilities. The results are presented in Annex 6.

Record availability: in one sampled district, there was a theft from the DRS shortly before survey teams arrived. The district storekeeper was taken into custody. Police seized relevant documents and sealed the district storeroom. For this reason, much of the district-level tracking information for drugs could not be collected. Repeated attempts were made to gather the information up to the end of the fieldwork, but the documentation was not released by the police.

Non-cooperation: survey teams carried a number of permission letters from the MoHFW and different directorates, and from the FMRP. In addition, the district representatives of DGHS and DGFP (CS and DD FP, respectively) forwarded permission letters from the administration department of directorate headquarters to their subordinates in the upazilas. The permission letters were helpful for the fieldwork, although in most cases personnel and patients were cooperative.

Quality of records: difficulties were occasionally encountered as data recording systems were not uniform between the districts. Similar data is often kept in different record files or aggregated in a different manner, and this required extra time to unearth all of the required data. Recent de-unification of the MoHFW at upazila level and below also caused difficulties as some facilities had not fully adapted to the new systems. Finally, records were occasionally missing.

Field work

Field work team composition: a field team comprised one team leader, one assistant team leader and two enumerators. The team leader was an MBBS doctor and other members were of minimum graduate-level education. The team leader and the assistant team leader mainly guided the team and at the same time helped in the data collection. Most of the team members, specially the assistant team leader and the enumerators, had previous experience in data collection.

Facility level questionnaires: records at the district level and at UHC and union facilities were collected from storekeepers, accountants, statisticians, head assistant clerks and CMMU engineers. At the start of each interview, respondents were asked to provide the necessary records / copies of records or files from their office. Occasionally revisits were required, as were visits to the UAO (Upazila Accounts Office) if facilities had not kept a copy of the required information.

Patient questionnaires: Patients were sampled during the field work. There was normally an enumerator dedicated to patient sampling. The process was done in a suitable place, usually the ticket booth (where the patients are given a ticket from the health facility for

consultation). Initially, enumerators recorded patients' arrival time and date, asked their purpose for coming (to determine between health and family planning patient) and then each patient was given a card containing the same ID number as it is recorded in the patient sampling frame. Every patient was told to return the card after their consultation. When patients returned the card, the return time was again recorded and the selected patient interviewed in a separate room, where privacy was maintained.

Household questionnaire: for a sub-set of patients interviewed, detailed and accurate information was taken on their household location, including household head name (both the actual name and any other name by which he or she is known to the village was taken), name of the respondent (both the actual name and any other name by which he or she is known to the village), location of the household (important landmarks were included), village, union and upazila name. Moreover, all the field teams were provided local area maps to facilitate finding the households.

Community questionnaire: a selected female respondent from the health facility was asked whether it would be possible for her to organise a group of women to discuss health problems from her community. If she agreed, then two members from the field team went to that community, usually in the afternoon. The enumerators attempted to ensure respondents' age was 15 years and above, with at least one elderly woman in the group, and that total numbers did not amount to much more than seven to eight discussants. One or two men were also allowed to be in the team, but only for helping with some information such as price of food items, and not to dominate in the discussion. No health or family planning workers (regardless of whether from government, non-governmental organisation (NGO) or private sector) were allowed in the discussion. Where there were initial disagreements within the group, the enumerators sought to find a consensual answer to record.

Personnel questionnaire: staff based in the facilities were relatively easy to find for interview. If they could not be found, enumerators tried to contact them and make an appointment for later interview. For field-based staff (FWAs, HAs), it was sometimes difficult to contact them. Usually their supervisors requested them to come to the facility under which they are posted, then they were interviewed. It usually took more than a day to complete the whole interview process for the field-based staff.

Data envelope analysis

Chapter 8 uses data envelope analysis to model health service efficiency. A detailed technical description of how the DEA model works is given here, based on Wooldridge (2003).

DEA is a mathematical method that enables the investigation of the efficiency of Decision Making Units (DMUs) by calculating how efficient each unit is with respect to an underlying but unobserved efficiency frontier, which describes the set of all efficient units. The performance of a unit is evaluated by comparing its performance with the best-performing units of the sample (its 'benchmarks'). Best-performing units form the efficiency frontier. Compared with others, these units are already efficient in the sense that they can produce an output mix given some input structure, which other units can only re-produce by using more inputs. If the unit is not on the efficiency frontier it is considered to be inefficient. Hence, DEA is called frontier analysis. The DEA efficiency score quantifies this distance to the efficient frontier for every DMU.

Efficiency scores are formally obtained by the following linear programming problem. Defining the efficiency score for unit *i* as:

$$\theta = \frac{\sum_{l=1}^{m} v_l x_{l,j}}{\sum_{i=1}^{s} u_i y_{i,j}}$$

where *v* and *u* are 'virtual' input and output weights that remain to be determined. These weights are found as part of the optimisation problem (they are optimal weights). The input and output measurements themselves are given by *x* and *y*, respectively. It is immediately evident that output-oriented efficiency scores must lie above 100%.

The linear programming problem is then to find the u_i, v_i and λ_i that minimise the DEA score (i.e. maximise efficiency):

$$\min_{u,v,\lambda} \theta = \frac{\sum_{l=1}^{m} v_l x_{l,j}}{\sum_{i=1}^{s} u_i y_{i,j}}$$

such that[45] $\theta x_{i,k} \geq \sum_{j=1}^{n} \lambda_j x_{i,j}$ and $y_{r,k} \leq \sum_{j=1}^{n} \lambda_j y_{r,j}$ and $\sum_{j=1}^{n} \lambda_j = 1$

Once the efficiency scores for each DMU are calculated using DEA, they are regressed on a set of environmental variables, or non-controllable factors by the DMUs. These variables try to capture the external influence of explanatory variables on the efficiency of the facilities.

The key observation for the regression analysis is to realise that the DEA scored are censored limited dependent variables. This means that the efficiency scores (call them *y*) are essentially continuous over values above 100%, but take on the value 100% with a positive probability. As shown above, output-oriented DEA scores are bounded from below by 1, i.e. by definition of our efficiency measure: it is not possible to observe UHCs with efficiency scores below 100%. Also, more than one unit is exactly efficient—these are the benchmark units in the sample—and hence there is a positive probability mass at the efficient point, which is a score of 100%.

Standard linear regression models using OLS would produce biased and inconsistent estimators of the parameters of interest. Instead it is necessary to perform the estimations using a Tobit model that accounts for these complications.

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[45] The last condition imposes Variable Returns to Scale (VRTS)—i.e. when doubling inputs, outputs can increase or decrease, which seems less restrictive and more realistic for the health sector. The interpretation of this equation is that virtual input will be maximised relative to virtual output (which are defined by the input and output weights) subject to maintaining the condition that virtual output cannot exceed virtual input for any DMU.

A Tobit Model:[46] the dependent variable for a Tobit model is zero for a non-trivial fraction of the population, but is roughly continuously distributed over positive values. The Tobit model expresses the observed variable (y) in terms of an underlying latent (unobserved) variable (y*) that satisfies the standard classical assumptions and is determined by a vector of explanatory variables (*x*)—that is a list of explanatory variables each of which is thought to affect the efficiency score. The effects of the explanatory variables (e.g. the % of equipment functioning in a hospital, or the duration of staff postings) affect the efficiency score through the regression coefficient, call it *β*. The Tobit model assumes that y* has a normal distribution and hence y has a continuous distribution over values above 100%. In particular, the density of y given x is the same as the density of *y** given *x* for these values.

Assuming normality of the regression errors, and calculating the expected values of *y* conditional on the explanatory variables, and summing these over all observations, it is possible to obtain the likelihood function. The maximum likelihood estimates of the coefficients (*β*) and equation standard errors (*σ*) are obtained by maximising the likelihood by numerical techniques. Then significance tests of the estimates of interest can be performed by looking at the *t*-test statistic (the estimated coefficient value divided by its estimated standard error). These *t*-values are then compared with their critical values under the null hypothesis that the estimated coefficient is zero. A large *t*-value suggests that the coefficient is non-zero (for example, for under a normal distribution and a significance level of 95% the *t*-value would need to exceed 1.96)[47].

Problems with the Tobit Approach in DEA: a first problem is that because Tobit models do not allow missing values, the number of observations used in the estimation is small (53 and 46 for hospitals and clinics, respectively). This involves a loss of efficiency and possibly small variable bias. Second, the hospitals' efficiency scores display much less variation than the clinics. Explaining these differences by explanatory variables is hence likely to be more difficult. Third, the exogenous explanatory variables are potentially correlated with the inputs used to calculate the efficiency scores and hence the regression results have to be interpreted with care. Finally, a technical problem with the Tobit approach to DEA scores is that the efficiency scores display serial correlation of an unknown form. The reason is that every efficiency score depends on all other observation via the production possibilities frontier. If one unit is perturbed it will affect all other units because the efficiency frontier is shifted. As a result, the resulting confidence intervals may be incorrect (Simar and Wilson, 1999) as, strictly speaking, it is not possible to factorise the likelihood function. However, as this serial correlation is of unknown form, Generalised Least Squares estimation is not feasible. Simar and Wilson (2003) develop a double bootstrapping technique that can overcome this problem. Therefore, reported t-values are of limited use only.

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[46] This section is based on Wooldridge (2003) *Introductory Econometrics*, Thomson South-West.

[47] Care must be taken when interpreting the output from a Tobit model. In particular, it is necessary to find the partial effect on the efficiency scores induced by changes in one of the explanatory variables. This partial effect, formally of *x* on *E(y|x)*, has the same sign as the coefficients of interest (the *β*), but the effect depends on the values of all the explanatory variables and parameters (and also σ, the standard error of the estimated equation). To obtain the quantitative partial effect of explanatory variable *i (x*$_i$*)* on *y*, it is therefore necessary to take into account an adjustment factor that depends on *σ*.

$$PartialEffect_i = \frac{\partial E(y/\mathbf{x})}{\partial x_i} = \beta_i \Phi(\frac{\mathbf{x\beta}}{\sigma})$$

where *Φ*() again denotes the normal cumulative distribution function. This adjustment factor can be evaluated by the sample mean of *x* and the estimated coefficients and obtain its value from the normal distribution tables.

Note that the *R*-squared of the regression does not have the same interpretation as in OLS, because the Tobit model is not set up to maximise it. It is hence more instructive to look at the equation standard error (*σ*).

Testing-down the initial explanatory model: Table 8.1 shows that ten environmental variables were considered initially for the UHC efficiency model and eight for the union-level model. The final models presented in Table 8.3 and Table 8.4 have fewer variables. The process of arriving at the final models is now discussed.

First, variables with excessive numbers of missing observations were dropped. This table is shown below for UHC variables, together with single variable regression results, which were used for general guidance.

Table A2.1   Single variable regressions on efficiency scores—UHC level

	n	Coefficient	Standard error	*z*-statistic	Probability
Duration of staff posting (months)	45	0.00	0.01	–0.08	0.93
Proportion of equipment missing or not functioning	55	0.60	0.60	1.00	0.32
Audit prevalence (yes / no)	57	–0.04	0.23	–0.16	0.88
Reports of speed payments (yes / no)	57	0.11	0.19	0.57	0.57
Indebtedness (yes / no)	57	–0.05	0.25	–0.20	0.84
Key worker turnover within year	51	0.00	0.00	0.76	0.45
Building physical condition score	55	0.03	0.06	0.53	0.59
Proportion of workers with houses	55	0.00	0.00	–0.97	0.33
Reports by community of patient payment	57	0.29	0.21	1.40	0.16
Proportion of MOs that are male	57	0.23	0.20	1.14	0.26

Source: OPM.

For the UHC model, staff duration and rate of key worker turnover were initially excluded from the model due to insufficient observations, leaving eight remaining variables. For the union model, a similar processes resulted in satellite clinics, drug supply system and staff duration variables being excluded, leaving five remaining variables.

Then the remaining variables in the UHC model were 'tested down' using standard tests of significance (*t*-tests and *F*-tests). Table A2.2 shows the interim model for the UHC featuring eight variables. The union-level model was not tested down further than the five variables as they all had a reasonable degree of significance (see Table 8.4).

Table A2.2   Interim model—UHC level

	Coefficient	Standard error	z-statistic	Probability
Constant	0.876305	0.437193	2.004389	0.045
Proportion of equipment missing or not functioning	0.619001	0.581858	1.063835	0.2874
Audit prevalence (yes / no)	0.067261	0.220356	0.305238	0.7602
Reports of speed payments (yes / no)	0.044715	0.183657	0.243471	0.8076
Indebtedness (yes / no)	–0.07241	0.244147	–0.29659	0.7668
Building physical condition score	0.04927	0.057396	0.858414	0.3907
Proportion of workers with houses	–0.00253	0.002385	–1.06148	0.2885
Reports by community of patient payment	0.314113	0.210708	1.49075	0.136
Proportion of medical officers that are male	0.184223	0.198927	0.926085	0.3544
Log likelihood value:	–52.6743	Akaike info criterion		3.35803

Source: OPM.

From the results of Table A2.2, speed payments, indebtedness, infrastructure score and proportion of male MOs were excluded from the UHC model. It is important to understand the methodological limitations to the precision with which variables can be selected for exclusion. Principally, these methodological limitations are that the standard errors cannot be interpreted in the classical sense due to the serial correlation amongst the efficiency scores (see 'Problems with Tobit approach'). As such, a 'rule-of-thumb' was applied to selecting the final model with the best fit and this was to exclude variables which were 'very insignificant' in the initial model, i.e. with *t*-values below 1[48].

Further refinements to econometric testing. The results presented in section 8.2 represent one attempt to assess and explain aspects of health sector performance. There are more refinements that further modelling might attempt to bring to the analysis.

Alternative combinations of input and output variables could be used to generate DEA efficiency scores. The input variables presented in Table 8.1 do not include a measure of capital investment, for instance, which is arguably a critical factor in the production of health services. Existing variables might be further refined. For instance, the value of annual DGHS upazila-wide expenditure that is used as in an input variable, might be broken down only into components that apply to the UHC (in practise this is difficult as the 'clinic' level of the budget still includes expenditure at union level) and, furthermore, do not relate to other explanatory variables such as key workers and drug availability (e.g. omit salary and allowance land and MSR line-items).

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[48] Even this 'rule-of-thumb' was pragmatically applied: for instance the audit variable was left in the final model as its significance rises in the final representation (Table 8.3). The F-test was rejected for dropping the audit variable, most likely as it is correlated with other variables that are retained in the final representation, although on its own it had a low z-value.

Refinements might also be made to the selection of environmental variables. Ideally, environmental variables will describe those structural aspects of the health sector that may influence facility performance, but which the facility itself has no control over. In other words, in a managerial sense these variables will be exogenous to the facility. A good example of this may be any staffing norms imposed by central MoHFW departments and directorates that are imposed on facilities. In practise it is less easy to be conclusive about whether some of the selected explanatory variables are endogenous or exogenous to the facility. An example might be speed payment reports. It is likely that demands for such payments might be determined by the DGHS finance department (in the case of payments for allotments) or local CGA office (in the case of payments for passing expenditure bills) and hence are exogenous to the facility concerned. However, the refusal to make such payments may be within the control of the facility and thus introduce an element of endogeneity to the variable.

There are also many potential alternative environmental or explanatory variables that might be investigated. An alternative variable that proxies the incentives conditioning factor inputs might also be important (for instance, a measure of the incentives for use of human resource inputs might be housing availability (i.e. results from Figure 4.6) or timeliness of salary payments (i.e. Figure 4.3).

Annex 3   Assessing the socioeconomic status of service users

The simplest way to assess the socioeconomic status of households that use particular services, and compare them with national distributions, is usually to ask about service use in a national household survey that measures socioeconomic status. The most recent nationally representative survey is the HIES conducted in 2000. Information on service use was collected in that survey. However, the numbers of individuals reporting using public health services is quite low. The HIES estimates that only 6.7% of households use public services for general illnesses and injuries, and only 2.2% get medicines from government facilities. This makes estimates of socioeconomic status for the sub-population of users less accurate, since the number of observations is low. However, the survey data suggest that users in urban areas tend to have a similar consumption level to all urban dwellers, while in rural areas they tend to be somewhat better off than the rural population as a whole (see Figure A3.1).

Figure A3.1 Density distribution functions for *per capita* consumption distribution of users of public health facilities

Public health facilities

Rural   **Urban**
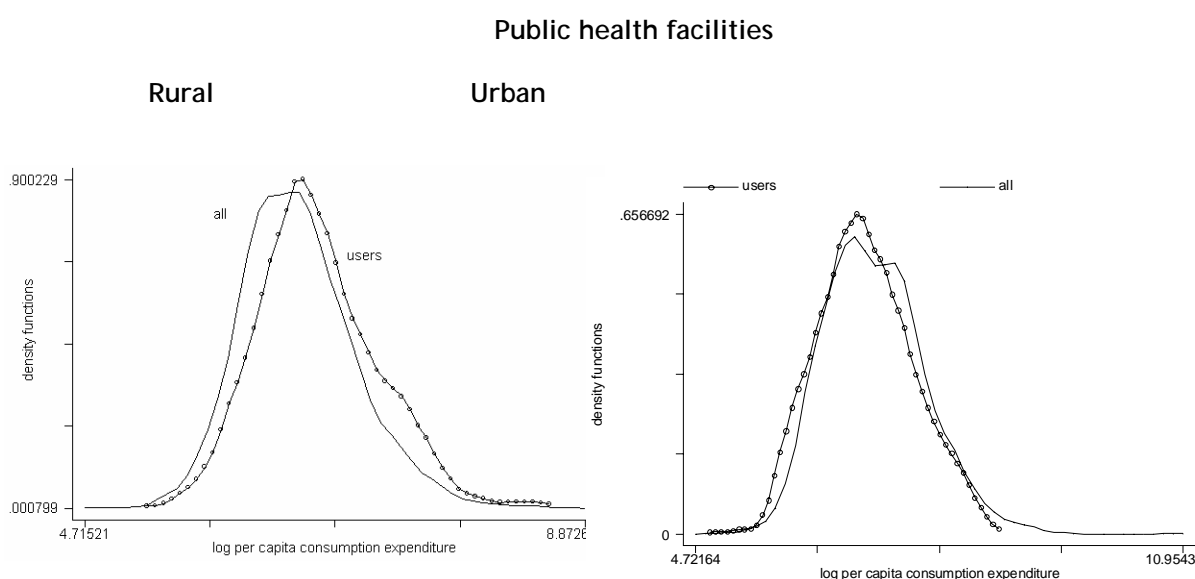
The SSPS also sought to examine the socioeconomic status of users. While comparability between surveys must always be a concern, every effort was made to maximise the comparability of the data collected with the HIES. The team made use of the HIES questionnaire and data to ensure that, wherever possible, the questionnaires collected information on household consumption and other socioeconomic variables in a similar format to the HIES.

In the SSPS, all patients reported on some basic household characteristics, including the education of the household head, the construction materials and amenities of the dwelling (such as the source of drinking water and the type of toilet used), the ownership of selected consumer goods and agricultural assets, and questions designed to measure

attitudes towards female autonomy. This information provides useful measures of socioeconomic status.

More extensive information was collected on the sub-sample of users whose households were visited. They reported on their household's consumption and expenditure. This information is used to estimate household consumption levels and income poverty, as is done in the HIES.

The socioeconomic information was used to compare users of services with the general population, to compare different groups of users (e.g. of various services) and in modelling. A similar approach was taken in the SSPS survey of secondary education.

Background socioeconomic characteristics

The sample of users was drawn from all union-level facilities (including in the sadar upazila) and from non-sadar UHCs; metropolitan areas of Dhaka and Chittagong were excluded. Users are probably most comparable, therefore, to the households in the HIES data sampled from outside these metropolitan areas and the sadar upazilas. Households from these areas in the HIES data are excluded throughout the analysis. The table shows that the SSPS survey data and the comparable HIES population have similar socioeconomic characteristics.

Table A3.1   Comparison between HIES and SSPS (household and patient surveys)

	HIES (non-sadar)	SSPS household visit	SSPS patient interview
Below lower poverty line (%)	40.1	35.0	39.1
Below upper poverty line (%)	56.4	51.5	54.6
Household size (median)	5	5	5
Housing conditions			
Number of rooms (median)	2	2	2
Households with electricity (%)	21.8	30.5	29.4
With brick / cement walls (%)	9.35	9.6	9.6
With mud walls (%)	24.5	21.9	21.6
With cement roof (%)	2.3	0.7	1.1
Education and productive assets			
Household heads without education (%)	63.4	58.0	64.7
Literate household heads (%)	36.9	33.6	36.2
Households with land (%)	46.8	39.1	43.2
Households with cattle (%)	34.2	39.3	41.5

	HIES (non-sadar)	SSPS household visit	SSPS patient interview
Households who own:			
Watch (%)	40.3	49.9	45.4
Camera (%)	1.7	0.8	2.0
TV (%)	9.2	14.4	16.1
Refrigerator (%)	1.2	0.2	0.7

Source: OPM patient and household questionnaires, Bangladesh Bureau of Statistics HIES.

Household consumption levels measured directly

An analysis of the HIES data identified which of the many elements of consumption were the most important. This was used to develop a simplified household consumption module, which was administered to the sub-sample of users' households.[49] For these households, it was possible to construct a comprehensive consumption aggregate, containing the main components included in the HIES—food, housing (including imputed rents), education, health and other non-food expenditure.[50] This was expressed in monthly *per capita* values. It is used to define a monetary measure of standard of living and income poverty, as is done in the HIES.

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[49] While the HIES collects information for about 350 expenditure items with multiple visits to the household, in SSPS expenditure items were reduced to 60 with only one visit to the household.

[50] Some lumpy and infrequent expenditure items have been excluded and also consumption flows from durable items could not be estimated.

Table A3.2   Consumption expenditure in HIES and SSPS

	HIES (2000)	SSPS (2004)
Food grains	25.57	24.75
Pulses	1.76	2.36
Fish	7.50	8.79
Eggs	0.79	1.25
Meat	3.62	5.43
Vegetables	5.82	5.35
Milk & Diary	1.92	2.64
Oil & fats	2.23	3.29
Fruits	1.58	1.92
Sugar & molasses	0.93	1.13
Spices	4.50	3.40
Miscellaneous food	0.60	0.41
Eating out	1.86	0.92
Tobacco	3.22	1.42
Fuel and lighting	7.67	8.25
Cosmetics	1.87	1.72
Washing	1.43	1.78
Transport	4.44	3.23
Clothes	5.70	4.37
Cloth	0.49	0.53
Footwear	0.78	0.74
Textiles	0.68	0.62
Rent	6.52	6.72
Health (male)	1.57	2.40
Health (female)	1.55	2.31
Education (male)	2.20	1.49
Education (female)	1.54	0.96
Recreation	0.16	0.22
Other	1.52	1.61
Overall	100.00	100.00
Monthly per capita expenditure (Taka)	721	869

Source: Author analysis of HIES and SSPS data

Table A3.2 shows that the consumption patterns for HIES and SSPS are similar (Table 2). Average *per capita* consumption levels are also similar, taking into account inflation between the two surveys (20.7%, according to the consumer price index). Although the consumption module in the SSPS survey was considerably smaller, it seems to have worked well in capturing the relevant expenditure.

In order to compare the SSPS information more directly with the HIES, checks and adjustments must be made for three potentially important factors. These are: the possible effect of the floods that occurred in Bangladesh when the survey was taking place; the effect of sustained economic growth between the two surveys; and price differences.

Floods: although the floods of July–August 2004 had some widespread effects, the analysis of the data collected about the floods in the SSPS indicates that the sampled areas were only marginally affected. Less than 5% of households declared that their income was negatively affected by the floods or that they received some food / aid assistance due to

the floods. Moreover, such variables are not significantly correlated with consumption levels.

Economic growth: between 2000 and 2004 GDP growth at constant prices was 22%. An estimate of the impact of economic growth on consumption expenditure between 2000 and 2004 was developed using the Poverty Projections toolkit designed by the World Bank[51]. It uses country-specific data from household surveys, together with a set of macroeconomic parameters that capture sector performance, changes in employment by sectors and population growth.[52] The assumption is that consumption changes are driven by sector performance, taking into account the level of inequality in each sector found in the household survey data. The results of such modelling suggest an increase in real *per capita* household consumption of 7%. Assuming no significant changes in the level of inequality, the consumption data of the 2000 HIES can be adjusted with this figure in order to compare the SSPS and HIES distributions.

Prices: for both the HIES and the SSPS data, nominal consumption levels were corrected for spatial price differences using information on household budget shares and unit values collected in the surveys. A Paasche price index was computed using the 14 main sub-aggregates, as is done by the Bangladesh Bureau of Statistics. Geographical differences were found to be similar in the two surveys. The consumption measures were also corrected for inflation between 2000 and 2004, using a survey based Tornqvist index (which gave similar values to the official CPI: 22.9% compared with 20.7%).

Predicting consumption expenditure for households where it was not collected

The total number of household interviews was 375. Most users answered only the user questionnaire and did not provide detailed information on consumption. For these users, the analysis used estimates of their consumption level based on the simpler socioeconomic information that they provided and predictive models developed from the HIES data. These models excluded non-sadar households and the metropolitan areas of Dhaka and Chittagong.

The following relationship was estimated:

$$\ln c = X\beta + \varepsilon$$

where the vector X contains a number of variables that are correlated with *per capita* consumption (household size, ownership of land, etc.).[53] The vector ß captures the correlation of each explanatory variable with consumption levels.[54] The comparability of the predictive variables in the two surveys was first assessed and any variable showing substantially different levels was excluded. The variables included in the model are

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[51] The World Bank poverty projections toolkit was designed by Datt and Walker and it is available at: www.worldbank.org/poverty/psia/tools.htm, where it is also possible to find more details on the methodology used to make the projections.

[52] This information was taken from the World Development Indicators. See www.worldbank.org/data/wdi2005

[53] This is based on the methodology proposed by Elbers, Lanjouw, Lanjouw (2002), proposed for survey-to-census rather than survey-to-survey estimation, in which we obtain GLS estimates after allowing for location effects and heteroskedasticity.

[54] Such a model does not intend to capture the determinants of consumption, but simply to identify variables that can predict consumption levels as well as possible.

reported in Table A3.3, together with the GLS coefficients[55]. For each household where information about the predictor variables from the patient survey exists, it is possible to estimate *per capita* consumption levels and calculate summary indicators of socioeconomic status for various groups.

Table A3.3   GLS coefficients of consumption model

Variables	GLS coeff
Divisions of Chittagong and Sylhet	0.187
Division of Rajshahi	-0.192
Household size	-0.185
Squared household size	0.008
Literacy of household head	0.001
number of rooms (log)	0.214
Whether the household owns any cattle	0.001
Whether the household owns land	0.001
Whether the household has a radio	0.001
Whether the household has a camera	0.002
Whether the household has a fridge	0.003
Whether the household has a tv	0.001
Whether the household has a watch	0.002
Whether the household has electricity	0.001
House has brick/cement walls	0.136
House has mud walls	-0.020
House has cement roof	0.054
Presence of fertilizer shop in the area	0.064
Interaction (Chittagong & watch)	-0.001
Interaction (Rajshhi and land)	0.001
Constant	6.793

Source: OPM.

Since the model was estimated using data from the HIES, predicted consumption levels are expressed in 2000 prices and consumption levels are directly compared with 2000 poverty lines and 2000 national tercile cut-off points. Although it is not possible to adjust for the impact of economic growth in this approach, it is encouraging to know that Wodon (1999) finds that gains in *per capita* consumption associated with many household characteristics tend to be stable over time.

A comparison of poverty levels between the HIES (non-sadar households), consumption measured directly in the household survey, and the predicted levels from the user survey, is shown in Table A3.4. Levels are similar, although poverty estimates from the household data are lower, probably because they reflect the impact of economic growth.

Overall, such comparison suggests that users of public health services have socioeconomic characteristics similar to the total population that they serve.

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[55] The initial OLS regression model had a R^2 of 0.54 with about 5000 observations and all variables were highly significant. The robustness of the model was tested looking at the sensitivity of the variables using three alternative random sub-samples.

Table A3.4   Comparison of income poverty levels in HIES and SSPS surveys

	HIES (non-sadar)	SSPS household visit	SSPS patients interview
Below lower poverty line (%)	37.0	35.3	39.1
Below upper poverty line (%)	53.6	51.7	54.6

Source: OPM patient and household questionnaires, Bangladesh Bureau of Statistics HIES.

Given the assumptions that have to be made, the comparison with national HIES data is less robust than the comparison between different groups of users in the SSPS. The estimation of consumption levels through such a modelling approach was developed for use with censuses and the accuracy of predicted consumption levels is low for individual households.

Annex 4   Service quality

Health and family planning worker knowledge tests

The survey commissioned a custom-designed clinical knowledge test to assess the level and variance of clinical knowledge amongst key personnel. The findings have been presented in section 2.3.

The case-based questions used to compile the knowledge test score statistics (as detailed in Table 2.6) are listed below. There are different sections for different designations.

SKILLS SECTION FOR MA, SACMO, MOs
(*marked additional questions and rows for MOs only)

Under-five (U5) DIARROHEA

Read: A mother brings her two-year-old child to outpatients. The main complaint is diarrhoea.

What questions will you ask about the stool?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Number of stools in the last time period	1 2
	Blood or not	1 2
	Mucus or not	1 2
	Is it watery?	1 2
What other questions would you ask—to decide how sick the patient is?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Any vomiting	1 2
	Fluid intake	1 2
	Urine output	1 2
What would you look for on examination to determine the severity of illness?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Mucous membrane moist	1 2
	Skin pinch goes back slow or fast	1 2
	BP and / or pulse	1 2
	Eyes sunken.	1 2

Read: The child has moist mucous membranes and a skin pinch goes back a little more slowly than normal. The eyes are slightly sunken. He is thirsty.

What severity of dehydration does he have?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Moderate Accept if answer is 'mild to moderate'		1	2
How should he be managed?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	ORS		1	2
	Breastfeeding*		1	2
	Refer or admit if any clinical signs are getting worse		1	2

U5 FEVER

Read: A three-year-old girl comes with fever and cough for one day.

What would you ask the mother?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Respiratory history		1	2
What exams would you do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Respiratory rate		1	2
	Temperature		1	2
	Examine upper respiratory tract (URT) and chest*		1	2
	Examine chest		1	2
Temperature 99.8 F (axillary). Respiratory rate is 50/minute with mild recession and no grunting or nasal flaring. The chest is clear but she has a moist cough and runny nose. Mucous membranes are moist. What treatment and advice would you give?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Co-trimoxazole or Amoxcillin		1	2
	Paracetamol		1	2
	Send home—advise to return if worse		1	2
	Other	11	12	22
	Code as follows Acceptable answer = 11 (specify) Not acceptable answer = 12 (specify) No other = 22			

She has a convulsion just as the family is leaving the outpatient area. What would you look for?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Stiff neck	1 2
What other history would you like to know?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	History of febrile convulsions	1 2
	History of non-febrile convulsions	1 2
There is no neck stiffness and the convulsions stop within one minute. There is no other history of convulsions. How would you manage this patient?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Refer to hospital / admit to inpatients	1 2
	Observe	1 2
She recovers without any further fits. What would you tell the family?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Reassure then about febrile convulsions	1 2
	Advise on fever control measures	1 2
	Advise on clinic or hospital visit for future fevers	1 2

U5 ACUTE RESPIRATORY INFECTIONS

Read: A six-month-old boy is brought to you with the complaint of breathing difficulty.

What else do you want to know?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Duration of complaint?	1 2
	Cough?	1 2
	Running nose?	1 2
	Fever?	1 2
There is a history of running nose at the beginning of the illness. *On examination you find: respiratory rate 60/minute, with a brief episode of cough during which the baby's colour becomes darker. Chest examination shows rib recession and there are harsh breath sounds (fine crackles and wheezes) on listening with a stethoscope. What are the possible diagnoses?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Bronchiolitis or pneumonia or severe disease	1 2

*There is a raised rash on the trunk and the baby has conjunctivitis. What other cause could there be for the cough and breathing difficulty?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Measles pneumonia.	1 2

Read: A 34-year-old male has sudden onset watery diarrhoea for 24 hours. He has no appetite.

What questions would you ask?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Ask about fever*	1 2
	Ask about blood in stool	1 2
	Ask about abdominal pain	1 2
	Ask about frequency of stool	1 2
	Ask about nausea and vomiting	1 2
What physical examination would you do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Tongue / oropharynx (for dehydration)	1 2
	Skin turgor (for dehydration)	1 2
	Vital signs, especially blood pressure	1 2
The patient's abdominal exam is non-tender. His tongue is very dry. He had five loose motions today and is able to drink. His blood pressure is 110/75. What treatment and advice would give?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Give ORS / drink plenty of fluids	1 2
*Case continued: the patient returns after two days. The diarrhoea now has blood in it for two days. He feels faint and is not eating well, with some vomiting. His blood pressure is 85/60. His abdominal exam is mildly tender. What tests do you order?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Stool test	1 2
	TC / DC	1 2
*What treatment would you give?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Advise hospital admission	1 2
	Give IV fluids	1 2

ADULT RESPIRATORY DIFFICULTIES

Read: A 45-year-old man feels short of breath for two weeks. He is coughing for one month and can not work for the last three days.

What questions would you ask?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Ask about TB exposure / history	1 2
	Ask about fever	1 2
	Ask about medical history regarding COPD	1 2
	Ask about medical history regarding heart diseases	1 2
What kind of physical exam would you do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Chest examination	1 2
	Cardiac examination	1 2
	Check for pedal oedema*	1 2
What laboratory tests might help you make a diagnosis?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Sputum for TB	1 2
	Chest X-ray	1 2
	TC / DC *	1 2
Case continued: the patient looks well, has had fever for three days, and his first sputum for TB is negative. What advice would you give?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Return for additional sputum for TB X 2	1 2
	Return right away if feeling worse	1 2
*Case continued: the patient returns after two days. His sputum for TB is all negative. He has fevers every day and feels dizzy. His blood pressure is 85/60. He looks mildly short of breath. Would you treat him and send him home or refer for admission?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2

SKILLS SECTION FOR FWA, FWV / Senior FWV, MO-MCH
(* marked questions and rows are additional for MO-MCHs only)
(″ marked questions and rows are additional for MO-MCH and FWV / Sn FWVs only)
(° marked questions and rows are additional for FWV / Sn FWVs and FWA only)

ANTENATAL CARE—SCENARIO 1

Read: A 32-year-old woman comes in her fourth pregnancy. She has three living children, all born at home. She comes for her first visit at 32 weeks gestation. She complains that she has had bleeding since last night. When asked she answers that the baby is still moving

What do you think her problem is?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Antepartum haemorrhage or previa or accidental	1 2
What else would you ask the woman?	(Probe to get ALL responses but do NOT read out the responses)	Code as follows: Yes = 1 No = 2
	How much blood has she lost	1 2
	Has she had any bleeding or spotting previously in this pregnancy	1 2
	Does she have any pain / contraction with the bleeding? '	1 2
What else would you examine?	(Probe to get ALL responses but do NOT read out the responses)	Code as follows: Yes = 1 No = 2
	Look at cloth / perineum to see how much she is bleeding now	1 2
	Take blood pressure	1 2
	Listen to the foetal heart	1 2
	Abdominal exam for foetal position*	1 2
Are there any exams you would NOT do?	(Probe to get ALL responses but do NOT read out the responses)	Code as follows: Yes = 1 No = 2
	Vaginal exam	1 2
What treatment or advice would you give?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Refer to MO or MO-MCH	
	Refer to hospital with comprehensive EOC* If the facility where the interview is taking place is a comprehensive EOC centre—probe to see whether the respondent would refer to the operating theatre / relevant MO	1 2
	Start IV with saline if bleeding	1 2

ANTENATAL CARE—SCENARIO 2

Read: A 20-year-old woman comes in her first pregnancy. She is 36 weeks by dates and this is her fourth check-up. Her first check up was at 12 weeks. Her fundal height has been large for dates since her second check up, but everything else has been normal. Her fundal height is now 38 cm. Today she complains that she has had dizziness and headaches for the last week. You notice that her legs are swollen and when you measure her fundal height you notice that there is some oedema there as well.

What do you think her problem is?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Pre-eclampsia		1	2
What other questions would you ask?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Have you had blurring of vision? / vomiting?		1	2
	Is there any bleeding?		1	2
Interviewer: what is the designation of the respondent?	Code as follows Mo-MCH = 21 Senior FWV = 22 FWV = 23 FWA = 25→ Q134			
What other physical exams would you want to do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Abdominal exam to check for position / twins'		1	2
	Blood pressure		1	2
	Check for anaemia		1	2
What tests you want to do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Urine albumin*		1	2
	Send for abdominal ultrasonography		1	2
What advice would you give?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Advise being seen at health centre / hospital		1	2
	Advise immediate admission in hospital if there is severe headache, blurring of vision, or vomiting		1	2

POSTNATAL CARE—SCENARIO 1

Read: A woman delivered at home this morning. This is her first baby. It took quite a while for the baby to be born once the head was visible but both mother and baby are fine. The delivery was done by a TTBA.

When would you first plan to visit this mother at home?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Within three days of delivery (accept anything from one to three)	1 2
What questions would you ask the mother?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Was there any problem during delivery?	1 2
	Is the baby breast-feeding well? (any question about how breast-feeding is going)?	1 2
	Has the baby passed urine and stool?	1 2
	What colour is your discharge?	1 2
	Is there a bad odour?	1 2
What examinations would you do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Abdomen for fundal height	1 2
	Abdomen for tenderness	1 2
	Perineum for tear	1 2
	Perineum for amount of bleeding / discharge	1 2
	Smell of discharge	1 2
	Blood pressure	1 2
Where would expect the fundus to be the day after the delivery?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	1 finger below the umbilicus	1 2
On inspection you find there is a perineal tear 1 cm long that isn't bleeding. What would be your treatment / advice?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Keep the tear clean	1 2
	Give warm soaks with clean cloths	1 2
	Paracetamol for pain	1 2

What would you examine in the baby?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Observe breast-feeding	1	2
	Umbilicus	1	2
	Colour of skin / jaundice	1	2
	Fontanelle / skull*	1	2
	Eyes for infection	1	2
	Size and weight	1	2
What would you do if the mother reported that the baby wasn't getting enough milk?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Inspect breasts for inverted nipple / engorgement	1	2
	Watch baby feed to see if mother needs help getting baby attached properly	1	2
	Give education on colostrum and when milk normally comes in*	1	2
	Give education on maternal diet and fluid intake	1	2

POSTNATAL CARE—SCENARIO 2

Read: A woman delivered at home three days ago by a TTBA. Her waters had broken two days before she delivered. The TTBA admits that she did do one or two PV exams during labour. Today the woman feels feverish.

What problem do you think the mother might have?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Puerperal infection (infection in the uterus)	1	2
What else would you want to ask the woman when you see her?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	How long she was in labour?*	1	2
	How long she has felt feverish?	1	2
	What is her discharge like?	1	2

FAMILY PLANNING—SCENARIO 1

Read: A woman comes to you requesting the OCP.

What questions would you ask to see if the pill is suitable for her?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Has she ever had migraine headaches (severe headaches)	1 2
	Has she ever had blood clots*	1 2
	Has she ever had jaundice	1 2
	Does she smoke*	1 2
	Is she breast-feeding a child under 6 months?	1 2
	How old is she (< 35 years)	1 2
	Does she have menstrual problems*	1 2
	When was her LMP*	1 2
	Does she have any lump any in the breasts?	1 2
	Does she have any heart disease?	1 2
Interviewer: what is the designation of the respondent?	Code as follows	
	Mo- MCH = 21 Senior FWV = 22 FWV = 23 FWA = 25➔ Q151	
What would you check before giving her the OCP?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Weight	1 2
	Blood pressure	1 2
What timings should she observe when taking the pill?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Start from day one of her period	1 2
	Take each day at the same time	1 2
What should she do if she misses a pill?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Use condoms until the next packet is started	1 2

FAMILY PLANNING—SCENARIO 2

Read: A 20-year-old woman with a 6-week-old baby comes to you for family planning advice

What methods would be suitable for her?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Injectable	1	2
	Condoms	1	2
	Progesterone-only pill (or mini con)	1	2
She chooses the injectable. What advice would you give her?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Injection every three months	1	2
	May have amenorrhoea or irregular bleeding	1	2

SKILLS SECTION FOR NURSES

SAFE DELIVERY—SCENARIO 1—NORMAL DELIVERY

Read: A 24-year-old in her second pregnancy arrives at your facility complaining of strong contractions for the last four hours. She says her pregnancy is 'full 10 months'. Her first baby was delivered at home with no complications

What other questions would you ask her concerning this labour?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Have her 'waters' broken? What colour fluid?	1	2
	Is the baby moving?	1	2
	Is there any bleeding?	1	2
What examinations would you do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Vital signs (temp and / or pulse and / or respirations)	1	2
	Abdominal exam for presentation and position	1	2
	Foetal heart	1	2
	Frequency and length of contractions	1	2
	Vaginal exam	1	2

What information would you look for in a vaginal exam (PV)?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Cervical dilation	1	2
	Pelvic size and shape	1	2
	Presenting part	1	2
How might you tell that the woman has entered second stage?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	You can see the head on the perineum	1	2
	On examination the cervix is fully dilated	1	2

SAFE DELIVERY—SCENARIO 2—NEWBORN

Read: You have just delivered a full term baby after a normal labour and spontaneous vaginal delivery

What would you do for the baby now?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Wipe the baby dry	1	2
	Tie and cut the cord.	1	2
	Place baby in skin to skin contact with mother	1	2
	Encourage breast-feeding within 30 minutes of delivery	1	2
	Suction the baby's mouth if there is meconium present	1	2
What advice would you give to the mother about breast-feeding?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	She should breast-feed	1	2
	Put to the breast immediately	1	2
	Not to give other foods / fluids until 6 months of age	1	2
	Mother to eat well and take plenty of fluids	1	2

SAFE DELIVERY—SCENARIO 3

Read: A 26-year-old woman in her fourth pregnancy. She is now 36 weeks pregnant. For the last four days she has had a severe headache, and today she has vomited. Her face and fingers have been swollen for a few days.

What investigations would you do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Check her blood pressure	1	2
	Check her urine for protein	1	2

What are the risks to this lady from this disease?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Fits		1	2
	Baby may die in the uterus		1	2
	Bleeding		1	2
	Death of woman		1	2
How would you manage her?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Refer to comprehensive EOC centre If the facility where the interview is taking place is a comprehensive EOC centre—probe to see whether the respondent would refer to the operating theatre / relevant MO		1	2
	Call the doctor		1	2
	Start magnesium sulphate or diazepam IV or PR		1	2

SAFE DELIVERY—SCENARIO 4

Read: An 18-year-old woman in her first pregnancy arrives at your clinic. She is 40 weeks pregnant. She says her waters broke three days ago and that she has had pain for two days. The TBA has examined her several times, and she has had saline and syntocinon at home.

What would you examine?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Pulse		1	2
	Blood pressure		1	2
	Temperature		1	2
	Fundal height		1	2
	Abdominal exam for presentation		1	2
	Abdominal exam for descent of head		1	2
	Foetal heart rate		1	2
	Liquor / meconium		1	2
	Moulding		1	2
	Cervical dilatation		1	2
Her temperature is 39°C, Pulse 130/min, BP 100/70. The head is 3/5 palpable above the symphysis pubis. The foetal heart rate is 170 beats per minute. She has meconium stained liquor draining. What would you do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2		
	Call the doctor		1	2
	Give IV fluids		1	2
	Start antibiotics—ampicillin IV		1	2

SAFE DELIVERY—SCENARIO 5

Read: A 36-year-old mother of 6 arrives at your facility having delivered at home two hours before. She is semi-conscious and the family says she has bled a lot.

What would be your initial assessment?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	BP and pulse	1 2
	Assess for current bleeding	1 2
	See if the cord / placental part is visible at perineum	1 2
	Assess the perineum for tears	
What would be your initial action / treatment?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Call for help / call for a doctor	1 2
	Blood for type and cross-match	
	Start an IV of D5 NS	1 2
What other questions would you ask of the relatives while you are working?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Who did the delivery?	1 2
	What treatment did she get outside?	1 2
	About how much blood did she lose?	1 2
	Do they know if the placenta came out?	1 2
On assessment woman is still bleeding briskly, BP is 60/40, pulse 100 beats per minute, the bladder is full and the cord part of placenta is visible in the vagina. What would you do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2
	Empty the bladder	1 2
	Attempt delivery of the placenta by controlled cord traction	1 2
	Massage the uterus until it contracts firmly if placenta is out	1 2
	Put 20–40 units of oxytocin in 1000 ml D/N/S and run quickly until uterus is contracted firmly (if not done previously)	1 2

SAFE DELIVERY—SCENARIO 6

Read: You are attending a delivery. The labour and delivery progresses normally but when born the baby does not cry. The skin is blue and the baby is breathing at the rate of about 10 per minute

What would you do before starting mouth to mouth or bag and mask resuscitation. Bag and mask resuscitation may be called 'ambubag'	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Dry the baby	1	2
	Stimulate the baby	1	2
	Keep the baby warm	1	2
	Suction if there is meconium in mouth	1	2
	Give oxygen	1	2
What would you evaluate to decide if the baby needs mouth to mouth or bag and mask?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Colour	1	2
	Rate of breathing	1	2
Describe how you would do mouth to mouth resuscitation—step by step.	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Remove any meconium from the baby's mouth	1	2
	Place a piece of gauze over the baby's mouth and nose	1	2
	Breath one time for the baby	1	2
	If so continue to breath for the baby 40 times a minute	1	2
	Continue until the baby is breathing normally	1	2
When the baby is breathing normally and is pink what will you do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Give to mother for skin to skin care	1	2
	Encourage breast-feeding	1	2
	Continue to observe the baby	1	2
	Refer if there is continued breathing problems Either refer to UHC if the respondent is in a union facility or admit if the respondent is in the UHC	1	2

SKILLS SECTION FOR HA

COMMUNITY HEALTH

What are the priority topics you must cover with communities?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	EPI	1	2
	Nutrition, safe food supply	1	2
	Safe water supply	1	2
	Basic sanitation	1	2
	Prevention of common diseases	1	2
	Pregnant mother identification and referral for ANC	1	2
	Family planning	1	2

SANITATION / ENVIRONMENT

You are talking to a neighbourhood group reluctant to build latrines in their area, saying they are too poor. What would you tell the group are reasons they need sanitary latrines?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Prevention of diarrhoea	1	2
	Prevention of worms	1	2
What are other methods of preventing these types of problems?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Washing hands	1	2
	Using soap	1	2
	Covering food	1	2
	Wearing sandals	1	2
	Improving disposal of garbage	1	2
	Drinking clean water	1	2
What substances could contaminate a community's water supply?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Arsenic poisoning	1	2
	Disease-causing germs	1	2
	Pollution or waste	1	2

What diseases could be prevented by spraying to kill mosquitoes or flies?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Kala azar	1	2
	Malaria	1	2
	Diarrhoea	1	2
	Typhoid	1	2
On a growth monitoring chart there is a line connecting weights. Which direction should this line go to show adequate growth?	Code as follows		
	Increasing, going up = 1 *Flat, straight = 2* Decreasing = 3 DK = 7		

NUTRITION

If a mother says they are too poor to buy meat or fish, what other sources of protein or growth-promoting food would you tell them to eat?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Dal	1	2
	Eggs	1	2
	Milk	1	2
What is advantage of having a kitchen garden?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Available vegetables without having to buy in bazaar	1	2

EPI

Can you name the vaccines that are given to infants and children to prevent them contracting diseases?	(Probe to get ALL responses but do NOT read out the responses.)		Code as follows: Yes = 1 No = 2	
	BCG		1	2
	DPT		1	2
	Polio		1	2
	Measles		1	2

During the first year of life, how many doses and at what ages should each of these be given?[56]	*Disease*	Code as follows if stated= 1→ ii) if not = 2 → next line	**Number of doses** Enter no.	*Age in weeks* *if at birth = 0*	
	BCG	1 2			
	DPT	1 2			
	Polio	1 2			
	Measles	1 2			

Is this a correct and complete list of steps to giving vaccines?	Code as follows[57]
Read twice	Yes = 1 → Q191
a) Remove vaccine vial from cold box or refrigerator	No = 2
b) Check expiry date, label for correct vaccine	DK = 8 → Q191
c) Prepare syringe, needle	
d) Open vial and fill syringe	
e) Position person to receive immunisation	
f) Use correct method for each type immunisation	
g) Recording immunisation on card	
h) Reuse same syringe and needle for next child	

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[56] The correct answers for this table are as follows:

Disease	Code	Number of doses	Age in weeks
BCG	1	1	0
DPT	1	3	6
Polio	1	3	6
Measles	1	1	36

[57] For this question, 'No=2' is the correct answer

RECOGNITION AND REFERRAL

What signs in a child with a respiratory problem would cause you to recommend the family takes it to a hospital immediately?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Fast breathing	1	2
	Indrawing of chest	1	2
	Struggles to breath (shash koshto)	1	2
If you had a one-year-old child with diarrhoea who was vomiting, what advice would you give?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	ORS if available	1	2
	Continue to breast-feed	1	2
	Seek help if child doesn't improve	1	2
A 50-year-old man has become thinner than he was a year ago and is coughing up blood. What would you advise him to do?	(Probe to get ALL responses but do NOT read out the responses.)	Code as follows: Yes = 1 No = 2	
	Go to hospital	1	2

Prescription quality

Methodology for the drug summarisation table:

The analysis of patient's prescriptions was made possible by a detailed 'table of medicines and medical items' that was collected from each patient interviewed (this table is in Part I of the patient questionnaire).

The process for assessment of accuracy was done in two stages.

- 'According to the type of drugs': an assessment was made as to whether the prescribed drugs were: appropriate, potentially appropriate or unnecessary for the specific disease condition.
- 'According to the dose': in order to assess whether the dose of the drug is correct or not, consideration was made of: the quantity of drug (unit taken per time), times daily given and total duration given for the specific disease condition.

For both these stages, all available relevant information from patient questionnaire was used, for instance information on the patient's age and the symptom module of the questionnaire. Standard manuals and recognised medical textbooks (see Annex 6) were used as a reference to find the appropriate drugs / doses for specific conditions.

Only specific conditions were analysed. These were: diarrhoea; fever; cough / ARI / respiratory problems; skin diseases; abdominal pain / stomachache; headache; chest pain; nutritional / underweight / poor growth.

Annex 5   Sampling

This annex covers: sampling strategy, sample implementation and calculation of the sampling weights; and sampling errors, confidence intervals and significance tests

Sample design

The survey collected information about a wide variety of entities: administrative units, facilities, key workers, patients and the social and economic conditions of the user households. This required the design of a complex multi-stage sampling design.[58] This annex outlines the sampling strategy and target samples that were defined for each unit of observation. Since the analysis requires the estimation of many indicators for each of the units, the sample had to be selected with rigorous documented procedures giving known selection probabilities.

The selection of some of the units required the application of as many as five stages of sampling. Each of the sampling stages generally utilises some form of stratification, dictated by the need to observe a minimum number of units in each of various kinds of analytical importance. Table A5.1 describes the strata used in each sampling stage and the approximate target sample sizes.

Table A5.1   Outline of sample strategy as planned

Sampling unit	Stage	Domain	Strata	Number of Units Selected	Selection method	Total sample size
Districts	1	Bangladesh	Dhaka and Chittagong	2	Selected with certainty	2
			All other districts	18	Systematic sampling with probability proportional to the 2001 population	18
						20
Upazilas	2	Dhaka and Chittagong	Within the city corporation	0	Excluded from the study	0
			Out of the city corporation	4 per district	Systematic equal-probability sampling	8
		All other 18 selected districts	Sadar (district capital)	1 per district	Selected with certainty	18
						79

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[58] Full details of the sample design can be found in Munoz, J (2004) 'Bangladesh FMRP: Sampling Strategy for the Social Sector Performance Survey' mimeo, available from OPM on request.

Sampling unit	Stage	Domain	Strata	Number of Units Selected	Selection method	Total sample size	
			All other upazilas	Up to three per district	Systematic equal-probability sampling	53	
Health facilities	3	All 79 selected Upazilas	UHCs	1 per upazila	Selected with certainty	79	219
			Union-level health facilities:	~2 per upazila	To be defined	158	
			Union Sub-Centres (USCs), Family Welfare Centres (FWCs) and combined USC / FWCs				
UHC staff	4	All 61 selected non-sadar UHCs	MO / Mother and Child Health (MO / MCH)	1 per UHC	Selected with certainty	61	427
			Other MOs	2 per UHC	Simple random sampling	122	
			(Excluding UHFPOs, RMOs and dental surgeons)				
			FWVs	1 per UHC		61	
			MAs	1 per UHC		61	
			Nurses	2 per UHC		122	
UHC patients	4	All 61 non-sadar UHCs selected	Family planning side	8	Systematic equal probability sampling of patients	488	976
			Health side	8		488	
UHC patient households	5	All interviewed patients in all 61 non-sadar UHCs selected	Family planning side	1 per UHC	Simple random sampling	61	122
			Health side	1 per UHC		61	
USC staff	4	All ~52 selected USCs plus ~52 selected combined union facilities	MO	1 per facility	Selected with certainty	105	316
			MAs	1 per facility	Simple random sampling	105	
			HAs or FWAs	1 per facility		105	
FWC staff	4	All ~52 selected FWCs plus ~52 selected	SACMO	1 per facility	Selected with certainty	105	316

Sampling unit	Stage	Domain	Strata	Number of Units Selected	Selection method	Total sample size
		combined union facilities	FWVs	1 per facility	Simple random sampling	105
			FWAs	1 per facility		105
stand-alone USC and FWC Patients	4	All ~104 selected stand-alone union facilities	All patients	~12 per facility	Systematic equal probability sampling of patients in one day	1,248
Combined USC and FWC Patients	4	All ~52 selected combined union facilities	All patients	~12 per facility	Systematic equal probability sampling of patients in one day	624
USC and FWC patient households	5	All interviewed patients in all ~150 selected union-level health	All patients	2 per facility	Simple random sampling	316

Source: OPM.

Sample implementation and calculation of the sampling weights

This section describes the implementation of the sampling strategy defined in the Table A5.1, and the selection probabilities of the selected units. Table A5.2 shows a summary of the sample that was planned in the original design, the actual number of units sampled and the number interviewed. The distribution of the different types of union-level facility, and the relative scarcity of health-only facilities, meant that the sample could not be implemented exactly as had been hoped. In particular, somewhat more family planning-only facilities, and somewhat fewer combined and health-only facilities, were sampled. The total number was slightly lower than planned. In addition, fieldwork teams found that 18 facilities were of a different type than was believed when they were sampled, largely as a result of inaccurate reports on staff postings provided at the upazilas. These facilities were reclassified and a second listing exercise was undertaken to check the total numbers of facilities of each type in each upazila.

The changes in the union-level sample had a small knock-on effect on the number of key health and family planning workers and users sampled. However, the fraction of sampled units that were interviewed—the important measure as regards possible biases introduced by sample losses—was high for all samples except health and family planning workers. Even amongst these, it was acceptable.

Sample units: intended, selected and interviewed

Table A5.2   Sample units intended, selected and interviewed

Unit	Original intended sample	Actual number selected	Number interviewed	% of selected interviewed
Districts	20	20	20	100
Upazila and UHCs	79	79	79	100
Union facilities—all types	156	150	146	97
—combined	52	46	45	98
—health only	52	40	39	98
—family planning only	52	64	62	97
Health and family planning workers	998	867	730	84
Users	2,848	2,743	2,693	98
Households	438	414	375	91
Community interviews	330	313	304	97

Source: OPM.
Note: the number selected for interview is defined allowing for losses of higher level units.

In the analysis, all estimates were generated applying sample weights, equal to the inverse of the given selection probabilities, to obtain unbiased estimates. These were calculated as described below. Given the number of stages of sampling, a simplifying notation system is used to avoid the use of excessive numbers of subscripts.

Districts

All three sectors shared the same sample of 20 districts. Dhaka and Chittagong constituted a self-represented stratum, whereas another 18 districts were selected from the remaining 62 districts in the country with probability proportional to size (*pps*) using the 2001 population as a measure of size. The pps selection implicitly stratified the districts by division.

The probability of *p(dist)* of selecting district *dist* is given by:

$$P(dist) = \begin{cases} 1 & \text{\textit{for the Dhaka and Chittagong districts}} \\ \dfrac{18 \cdot POP(dist)}{\sum\limits_{i \notin \{Dhaka, Chittagong\}} POP(i)} & \text{\textit{for all other districts}} \end{cases} \quad \text{..[1]}$$

where *POP(i)* is the population of district *i*, according to the 2001 Census.

Upazilas

In Dhaka and Chittagong, four upazilas per district were selected with equal probability from the five non-metropolitan upazilas in Dhaka and the 12 non-metropolitan upazilas in Chittagong.

In each of the other 18 selected districts, four upazilas were selected. The sadar upazila (the district capital) was selected automatically. Up to three additional upazilas were selected with equal probability among the remaining upazilas in each district. Where districts had less than three additional upazilas, all were selected, given a total number of upazilas in the sample of 79.

The probability *p(dist,upaz)* of selecting upazila *upaz* in district *dist* is given by:

$$P(dist, upaz) = \begin{cases} 4/5 & \text{for the health } \sec tor \text{ upazilas in Dhaka} \\ 4/12 & \text{for the health } \sec tor \text{ upazilas in Chittagong} \\ \\ P(dist) & \text{for the sadar upazila in the rest of the districts} \\ P(dist)\dfrac{nup(dist)}{NUP(dist)} & \text{for the non} - sadar \text{ upazilas in the rest of the districts} \end{cases} \quad \text{............................[2]}$$

where *p(dist)* is given by formula [1], *NUP(dist)* is the total number of non-sadar upazilas in district *dist* and *nup(dist)* is the number of non-sadar upazilas selected in the district.

Health facilities

The survey included the UHC in all 79 selected upazilas, although comprehensive information was collected only on the 61 UHCs outside the sadar upazila.

The selection of union-level facilities required a separate facility listing to be undertaken in the sample upazilas, since the name and designation of the facilities is not always a reliable guide to the staff and services present there. Information for all union-level facilities was provided by representatives of both directorates in each upazila, recording whether DGHS and / or DGFP staff were posted to each facility. Facilities were then classified as either health (only DGHS workers), family planning (only DGFP workers), or combined (workers from both directorates).

Because of the need to track resources down the administrative hierarchy, the selection of union facilities needed to ensure that there was one facility administered by each DG in each upazila, while also ensuring a balance of the three types of facility (combined, family planning only, health only) across the sample as whole. For the purpose of fieldwork, it was important that no more than two facilities per upazila are selected. For this reason, upazilas were allocated to a 'sample class', defining which two of the three types of facility would be selected in that upazila (see Table A5.3). In practice, many upazilas had only two types of facility, and eight had only family planning facilities. A total of 54 upazilas are therefore allocated automatically to a class based on the limited types of facilities that they contain. The 25 remaining upazilas were allocated randomly to a sample class using SRS. For each sample class of upazila, sub-strata were defined by upazila and facility type combinations and one facility was sampled with SRS within each sub-stratum.

Distribution of upazilas by sample class

Table A5.3   Distribution of upazilas by sample class

Class	Facilities to be included	Determined	Random	Total
A	Combined and family planning	24	3	27
B	Combined and health	2	18	20
C	Health and family planning	20	4	24
D	Family planning only	8	0	8
	Total	54	25	79

Source: OPM.

The probability *p(dist,upaz,hft)* of selecting a health facility of type *hft* in upazila *upaz* of district *dist* is given by:

$$P(dist,upaz,hft) = \begin{cases} P(dist,upaz) & \textit{for UHC's} \\ P(dist,upaz)/NUU(dist,upaz) & \textit{for union facilities in a determined upazila} \\ P(dist,upaz)\dfrac{nuc\,(dist,upaz)}{(NUC(dist,upaz)*NUU(dist,upaz))} & \textit{for other union-level facilities} \end{cases}$$

....[3]

Where *NUU(dist,upaz)* is the number of union facilities of that type in the selected upazila, *nuc(dist,upaz)* is the number of randomly allocated upazilas in the two classes that allow selection of union facilities of that type, and *NUC(dist, upaz)* is the total number of upazilas allocated randomly.

Health staff

The survey collected some information about the facility from its head. A detailed staff interview was conducted with a sample of the other clinical staff in line with the numbers indicated in Table 1.1. For each upazila, a list of all employees in the UHC and the sampled unions was compiled by the survey field staff. A simple random sample was then selected from each of the strata defined by cadre and location (UHC, unions).

The probability *p(dist,upaz,hft,psg)* of selecting a member of professional staff group *psg* in a facility of type *hft* of upazila *upaz* of district *dist* is given by:

$$P(dist,upaz,hft,psg) = \begin{cases} P(dist,upaz,hft) & \textit{for the head of the facility} \\ P(dist,upaz,hft)\dfrac{npsg(dist,upaz,hft)}{NPSG(dist,upaz,hft)} & \textit{for the rest of the staff} \end{cases}$$

................[4]

where *p(dist,upaz,hft)* is given by formula [3], *NPSG(dist,upaz,hft)* is the total number of professionals of the group in the facility, and *npsg(dist,upaz,hft)* is the number of professionals of the group interviewed in the facility.

User survey

The field teams interviewed a random sample of all the patients visiting the selected health facilities for non-urgent reasons, on two of the days that the team was working at the facility. This gave a target sample of an average of 12 patients—six family planning-side and six health-side patients—in each of the UHCs located in non-sadar upazilas, and an average of 12 patients in each union-level facility.

The selection of the patients to be interviewed had to be done in real time, while the patients were attending the facility. To do this, the field team visited the health facility before patients were present, to explain the procedure to the director and to request an estimate of the number of patients expected. This was used to calculate a sampling step, used to select patient numbers using systematic random sampling. Each patient was given a numbered card on entry and on exit those patients whose number was selected were interviewed. This procedure did not ensure that the exact target number of patients was actually interviewed at each facility but instead produced a random sample of approximately that size on average.

The probability *p(dist,upaz,hft,pk)* of selecting a patient of kind *pk* on the day of the exit poll in facility of type *hft* of upazila *upaz* of district *dist* is given by:

$$P(dist,upaz,hft,pk) = P(dist,upaz,hft)\frac{npk(dist,upaz,hft)}{NPK(dist,upaz,hft)}$$ ....[5]

where *p(dist,upaz,hft)* is given by formula [3], *NPK(dist,upaz,hfac)* is the number of patients of kind *pk* that visited the facility on the day of the exit poll and *npk(dist,upaz,hft)* is the number of patients of that kind interviewed that day. In practice, it was possible to distinguish patients by type at some facilities, particularly UHCs. In others, patients all presented through the same channels. In these circumstances the parameter *k* simply refers to the list on which the patient was listed (day one or day two of fieldwork).

Patient households

Two of the patients interviewed by the exit poll in each facility were visited in their households for a more comprehensive interview. These patients will be selected by the interviewers by simple random sampling. The probability *p'(dist,upaz,hft,pk)* of visiting the household of a patient of kind *pk* in facility of type *hft* of upazila *upaz* of district *dist* is given by:

$$P'(dist,upaz,hft,pk) = P(dist,upaz,hft)\frac{npk'(dist,upaz,hft)}{NPK(dist,upaz,hft)}$$ ....[5b]

where *p(dist,upaz,hft)* is given by formula [3], *NPK(dist,upaz,hfac)* is the number of patients of kind *pk* that visited the facility on the day of the exit poll and *npk'(dist,upaz,hfac)* is the number of patients of that kind visited in their households (generally two.)

For all situations where field staff undertook the sampling of units in the field, procedures were defined to ensure that the selection was indeed random and could be cross-checked by survey managers. This was achieved through the systematic listing of sampling units in numbered order and the provision of random number pads on each questionnaire that were used to undertake the sampling following a standard procedure.

Annex 6   Impact of 2004 floods

Flood Analysis

The floods which hit Bangladesh in the summer of 2004 affected one third of the country. Of the 20 districts which the survey visited, 16 experienced flooding of varying severity. The rivers first started to flood in June and all 16 districts had been affected by the middle of July, but by the end of July/beginning of August, the floods began to recede in most districts. On average the flood lasted a month, but some districts were affected more than others. In one district, for example, the flood lasted only 5 days. 28% of households in the sample were flooded and of these households, were flooded for approximately 20 days. Only 11% left their homes as a result.

> *Flood Stats*
>
> *June - September*
>
> *Mean duration - 27 days*
>
> *22% upazila health complexes in sample flooded*
>
> *10% union health complexes in sample flooded*
>
> *28% households in sample flooded*

However, the SSPS survey was successfully rescheduled so that places that had been hit by the floods were not visited until at least one month after the waters had receded, giving communities time for life to return to normal. The first phase of the survey, which covered 4 districts, was not affected at all. Of the remaining districts, the survey collected additional information to gauge the degree to which these health facilities and the households they serve were affected by the floods. 167 health facilities (105 union health facilities and 62 upazila health complexes) and 267 patient households were interviewed.

Table A6.1   Flood impact on health and family planning facilities

Degree to which facilities were affected by floods	Upazila health facilities, n = 79	Union health facilities, n = 188
Flooding within vicinity (10 km) of facility (%)	58	42
Mean duration of flood (days)	27	26
High (days)	41	38
Low (days)	15	12
Facilities that were flooded (%)	22	10
Mean duration facility flooded (days)	21	25
High (days)	33	40
Low (days)	7	9
Facilities with damage to equipment (%)	0	3
Facilities with damage to supplies (%)	0	1
Facilities that had to close (%)	0	4
Mean duration facility closed (days)	19	21

Degree to which facilities were affected by floods	Upazila health facilities, n = 79	Union health facilities, n = 188
High (days)	31	7
Low (days)	5	33
Facilities with reduced access (%)	47	35
Mean duration of reduced access (days)	26	25
High (days)	42	39
Low (days)	8	8
Facilities with increase in patient numbers due to floods	30	26
Mean duration of increase in patients (days)	26	25
High (days)	47	39
Low (days)	5	8

Source: OPM.

Despite the flooding in the local area, both union and UHCs were not badly affected. No upazila facilities were forced to close and only 4% of union facilities closed. Similarly, there was very little damage to equipment and medical supplies. However, access to upazila facilities was reduced in nearly half of the sample and access to union facilities was reduced in over one-third of the sample. However, more than one-quarter of both types of facility still reported an increase in patient numbers.

Twenty-eight percent of patient households were flooded and due to the fact that much of the surrounding area was flooded, over one-third of households' sources of income were negatively affected, mostly in agriculture.

Table A6.2   Flood impact on households

Degree to which households were affected by floods	
Household vicinity flooded (within 10km) (%)	53
Mean duration of flood (days)	27
High (days)	46
Low (days)	9
Households flooded (%)	28
Mean duration household flooded (days)	20
High (days)	35
Low (days)	7
Household members leaving homes due to flood	11
Sources of income affected by flooding	37

Source: OPM.

Annex 7   Confidence intervals for key estimates

Estimates derived from samples are characterised by sampling errors. In other words, the fact that we do not obtain the information that we want from the entire population but from a random subset, means that the statistical measures of interest, such as the mean, are not calculated with perfect precision but are likely to fall within a certain range of values. Statistics helps us in understanding what sampling errors are likely to be, and standard formulas based on random sampling provide us with the solution on how to compute standard errors associated with our estimates. However, the SSPS sampling process has a complex design, which makes the estimation of standard errors and confidence intervals complex.

Bootstrapping is a non-parametric technique that allows standard errors of estimates obtained from complex surveys to be computed. The idea behind this technique is to extract many different sub-samples from the total sample (paying particular attention to the re-sampling procedures), compute the statistics for each of these sub-samples, and then calculate the standard deviation among these estimates.

The main statistical tests of interest are tests of equality of the mean of two sub-populations (e.g. by type of facility) for a particular indicator, are statistically different. Given the time required for these calculations, they have been attempted for only a limited number of key estimates, which are presented in Table A7.1.

Table A7.1   Confidence intervals for selected key estimates—by facility

	UHC		Union	
	DGHS	DGFP	DGHS	DGFP
No. of monthly inpatient admissions	246–320			
No. of monthly outpatient admissions	6,281–8,823		1,201–1,660	
No. of monthly outpatient visits per 1000 population	25.8–35.3			
No. of family planning cycles (reversible methods)		12,156–19,722		517–1116
Average consultation time (minutes, including 'slack' time)	1.7–9.4	8.9–13.2	1.2–5.0[2]	3.3–22
Outpatient register number as a proportion of survey headcount (same day) (%)	93–103		115–150	
Outpatient register number as a proportion of survey headcount (inferred from monthly totals (%)	92–167		123–164	
Annual allotment (Tk)	96,7 lakh–113,4 lakh	73,7 lakh -87,8 lakh		
Annual expenditure (Tk)	74,6 lakh -99,1 lakh	68,9 lakh –98,1 lakh		
Disbursement rate (%)	87–100			

	UHC		Union	
	DGHS	DGFP	DGHS	DGFP
Facilities with at least one key worker found to be absent (unexplained and explained) (%)	41–78	8–33	0-7[3]	0-5[4]
Equipment items missing (see Table 6.2 and Table 6.3) (%)	33-41		8.5 –18.5[5]	
Equipment items found but not functioning (%)	40.4-48.4		16.5 –22.0[6]	

Source: OPM various questionnaires.
Note: (1) The confidence intervals have been estimated at the 5% level of significance using bootstrapping techniques. (2) For a facility with only DGHS staff. (3) For the DGHS side of a combined union facility. (4) For a facility with only DGFP staff. (5) For a facility with only DGFP staff. (6) For a facility with only DGFP staff.

Table A7.2   Confidence intervals for selected key estimates—by key worker

	MO	Nurse	MA	HA	MO-MCH	FWV	SACMO	FWA
Clinical knowledge test score (%)	56-65	19-31	35-49	41-51	53-66	42-52	34-47	13-20
Difference in salary received from payroll (%)	-5.0 to 0.1	-3.5 to 0.2	-0.6 to 1.6	-2.1 to 6.8	-0.8 to 0.1	-2.3 to 1.0	-2.9 to 1.8	-6.1 to 2.0

Source: OPM facility and personnel questionnaires.
Note: The confidence intervals have been estimated at the 5% level of significance using bootstrapping techniques.

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