Health system costs of menstrual regulation, abortion, and post-abortion care: the case of Bangladesh

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Abstract

To support activities to reduce mortality from unsafe abortion, governments at the Special Session of the United Nations General Assembly in June 1999 agreed that where abortion is legal it should be "safe and accessible". In 2003 the World Health Organization published a guidance of best practices to support this 1999 agreement. Recommendations include: providing services at primary care level outpatient facilities; task shifting for provision of uterine evacuation; use of manual vacuum aspiration (MVA) technology; and providing contraceptive counseling and services before the woman leaves the health care facility.

While equitable access to safe care should be the primary goal, in countries with scarce heath system resources, demonstrated efficiency of cost would likely motivate policy makers to adopt innovations. Bangladesh is globally unique in having these WHO-recommended practices gradually scaled-up over a period of almost 30 years in the National Menstrual Regulation Program. Cost data from Bangladesh were applied to Savings, *an abortion-oriented costing spreadsheet developed by Ipas to estimate and compare costs to the health system of different strategies of menstrual regulation and abortion care. Information on costs of essential medications (i.e. general anesthesia, light sedation), supplies (i.e. for dilation and curettage, manual vacuum aspiration, electric vacuum aspiration), provider salaries (i.e. paramedic, doctor), benefits, etc were collected using a detailed survey of menstrual regulation providers at primary, secondary, and tertiary level public sector facilities in Bangladesh.*

The application of Bangladesh data to the model demonstrates that the costs of providing MR care are much less than the costs of providing care for complications of unsafe abortion; the task shifting associated with paramedic provision of MR may not yield significant savings in resources; and updating and systematically implementing MR and PAC standards and guidelines likely would yield further savings of scarce health system financial resources. Internationally, the results provide compelling economic evidence to prompt governments to adopt WHO-recommended best practices of making safe abortion care accessible to the fullest extent of the law and having high quality contraceptive service delivery associated with safe abortion care programs. Such actions would cut health system expenditures while reducing abortion-related mortality, expanding women's reproductive rights and promoting global health equity.

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INTRODUCTION

Approximately 42 million induced abortions occur each year, of which an estimated 20 million are terminated under unsafe conditions(1), i.e. performed by an unqualified provider, in unsanitary conditions, or both. An estimated 68,000 women die every year from complications of unsafe abortion, making abortion related mortality one of the five leading causes of maternal mortality, accounting for 13% of all pregnancy-related deaths (2). In addition, countless women suffer complications from unsafe abortion including bowel failure, acute renal injury, and tetanus. At the same time, abortion related mortality and morbidity (ARMM) are easily preventable through methods that prevent unwanted pregnancy (like contraception) and through the provision of safe abortion services (3). Recent, rapid declines in maternal mortality in Nepal have been attributed to the legalization of abortion there (4).

ARMM results in significant costs to health care systems. A recent analysis suggests that globally the costs to health systems of caring for women with complications of unsafe abortion range from US$509 million to US$ 1.08 billion (5). Costs of AARM have been highlighted in studies since the 1970s (6). Studies from a number of countries around the world with high incidences of unsafe abortion have shown that treatment of abortion complications can account for as much as 50% of hospital budgets for obstetrics and gynecology (7).

It is widely agreed that, given the scarcity of health care resources, it is important that services be produced efficiently. Here we are referring to technical efficiency – i.e. doing things right – getting the most output from a given level of input or using the least amount of input to achieve a certain level of output. Specific technical interventions needed to improve efficiency (i.e. improve quality and reduce costs) for MR and postabortion care have been demonstrated in clinical settings. These include replacing dilation and curettage (D&C) for uterine evacuation with vacuum aspiration (electric or manual vacuum aspiration depending on the health system level and resources available); using outpatient facilities rather than operating theaters; and using midlevel providers instead of specialists to provide care (8-19). However, the research conducted on the costs of providing abortion and postabortion care in the public sector generally has been directed toward estimating intervention-specific facility level costs rather than estimating costs for the combination of interventions in the broader health system (9, 16, 20).

More data on the costs of providing care for both safe and unsafe abortion are needed to better understand the efficiency of different abortion and postabortion care service delivery strategies. The *Savings* model was developed to help predict and compare health system costs associated with different strategies of abortion and postabortion care service delivery. A recent application of the *Savings* model to data from

Uganda showed that financial savings could be accrued by employing recommended interventions (21). However in the Uganda application, for several indicators proxy data had to be collected from other African countries.

The present paper reports estimates of the cost of pregnancy termination care (vacuum aspiration, D&C and postabortion care) to the public sector in Bangladesh. We use a "bottom-up" approach, meaning that system costs have been generated based on estimates of actual service delivery costs. This approach has been used for estimating costs of numerous reproductive health interventions or services, but *Savings,* developed by Ipas, is the first such tool that allows estimations of costs of safe abortion services. Similar cost estimation models include the Cost Analysis Tool (CAT) by EngenderHealth, the Cost and Revenue Analysis Tool (CORE) and the Cost-Estimate Strategy (CES) by Management Sciences for Health (22, 23) SPECTRUM by The Policy II Project(24), and the Mother-Baby Package by the World Health Organization (25-28).

In the *Savings* model, treatment costs are calculated as the sum of abortion care services for each health care system level. Costed services include: physical examination, restoration of fluids, administration of antibiotics, different methods of uterine evacuation, cervical and vaginal laceration repair, uterine laceration repair and hysterectomy, laboratory tests, counseling and contraceptive supplies. Costs also account for provider time (based on salary, benefits and length of time needed for each procedure) and essential medical supplies (e.g., gloves, antibiotics, medication for pain relief and cleaning materials). The model includes recurrent costs, but not overhead and capital costs such as buildings, large equipment, and essential durable equipment including specula, forceps, and autoclaves, because recurrent costs tend to be the majority of total cost and are most affected by changes in clinical practice. This application of Bangladesh data to an adapted *Savings* model is the first comprehensive application to a single health system.

METHODS
To estimate the cost to the healthcare system of different strategies for MR and postabortion care in the public sector first we collected information about current treatment practices, estimates of volume of different types of services, and the cost of supplies, equipment, salaries, *et cetera* necessary to perform these services. Subsequently we adapted the *Savings* model to make it more relevant to the Bangladesh MR service delivery context. Finally we applied the newly-collected data to the adapted *Savings* model.

Data collection
Information about current treatment practices were compiled from originally collected clinic-based data and government records, with supplementary drug cost data from the *International Drug Price Indicator Guide.*

Study population: Facility-based data collection.

We collected cost data from government health facilities that provide MR, D&C, or PAC services. Selection of facilities was purposive, with urban and rural, primary, secondary and tertiary level facilities, and high and low performing clinics represented.

The DGFP 2006 MIS Annual Report provides the number of MR by division but not by district. The annual report does however report contraceptive acceptance rates (CAR) by district. We use CAR to select high and low performing districts. While the association between the MR rate (calculated by dividing the number of MR reported per division by the number of eligible couples per division) and CAR is not very strong, CAR is probably the best proxy available. The table below shows higher rates of MR are associated with higher rates of contraceptive acceptance and the lowest MR rate is associated with the lowest CAR.

Table 1. MR and contraceptive acceptance by division.

Division	MR (#)	Eligible couples	MR rate (%)	CAR(%)	Oral pill acceptance rate (%)
Dhaka	49381	6747512	0.73	70.2	39.6
Barisal	9126	1487407	0.61	70.1	34.9
Chittagong	23160	4054063	0.57	63.2	32.4
Khulna	14679	3106297	0.47	76.2	39.4
Rajshahi	24854	6653345	0.37	74.5	41.7
Sylhet	2845	1284503	0.22	60.0	30.1
Total	124045	23333127			

Source: MIS Directorate General of Family Planning, Bangladesh Ministry of Health and Family Welfare. 2006.

To select divisions and districts we included Dhaka Division and Dhaka District as important outliers. For example in Dhaka Division 40% of MRs nationally take place. We selected the highest and lowest performing divisions other than Dhaka using MR rate data, yielding Barisal and Sylhet. Within Dhaka, Barisal and Sylhet Divisions we selected the districts with the highest and lowest CAR. In Dhaka Division the highest, median and lowest performing districts (respectively) are: Manikganj, Dhaka[5] and Madaripur; in Barisal: Pirojpur, Barguna and Bhola; in Sylhet: Moulvi Bazar, Habiganj and Sunamganj.

Table 2. District Selection

Division	District	CAR
Dhaka	Manikganj	76.7
	Dhaka	70.7
	Madaripur	65.9
Barisal	Pirojpur	74.0
	Barguna	71.1
	Bhola	65.6
Sylhet	Moulvi Bazar	65.2

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[5] Dhaka district is not the true median, but well within the range of median. It is included because of the high recorded rates of MR, and because public sector MR service delivery in Dhaka district is thought to have important characteristics different from elsewhere in the country.

Habiganj	60.0	
Sunamganj	57.3	

Within each selected division, we included the tertiary teaching hospital facility. Within each selected district we purposively chose one district level facility (a district hospital or Maternal-Child Welfare Complex) and one upazila or union level facility that provides MR and or postabortion care services. Government counterparts assisted us in selecting high, median and low performing facilities. In total we included 21 facilities in the study (see table below).

Table 3. Types of facilities included in study

Division	Tertiary / Division	Secondary / district		Primary		Total
		District Hospital	MCWC	UHC	UHFWC	
Dhaka	1	2	1	1	2	7
Barisal	1	2	1	1	2	7
Sylhet	1	2	1	2	1	7
Total	3	6	3	4	5	21

In each facility we interviewed practicing clinicians (MBBS, FWVs, counselors, etc) and clinic administrators in wards providing uterine evacuation for MR, postabortion care, and other indications. At the each facility we conducted detailed interviews with one key clinician and conduct short interviews with several supporting staff. The staff selected for interview were selected based on their regular participation in activities surrounding MR and/or postabortion care.

HBJ: add table showing number of different types of clinical staff interviewed at the different types of facilities

Study tools
We used questionnaires specifically designed for this study to interview clinicians, clinic administrators, and supporting staff about the MR, D&C and PAC provided at the facility. We collected information about the drugs administered, the amount of time each clinic staff spends with clients, and other supplies used for MR, D&C, and PAC services. We also documented the total number of clients presenting, and key equipment used for MR, D&C, and PAC. Where the MR, D&C, and care for complication wards were separate, for example in the tertiary level facilities, multiple wards were included.

Four experienced female interviewers conducted interviews under the supervision of a co-investigator, a female Bangladeshi medical doctor who is skilled at developing rapport with government and medical doctor counterparts. Interviewers participated in a 7-day training including a field test at a tertiary level facility, and several pretests. Data were collected June-August 2008.

The original tools for data collection were developed to meet the data requirements of the *Savings* model. The *Savings* model and the data collection tools draw from other commonly used health system cost assessment tools such as the World Health Organization's Mother Baby Package Costing Strategy and EngenderHealth's Cost Assessment Tool, both of which allow program planners to estimate the local costs of implementing existing, new or different strategies of service delivery.

Cost data for drugs and supplies were accessed from the *International Drug Price Indicator Guide* - an internet resource containing drug prices from pharmaceutical suppliers, international development organizations, and government agencies (http://erc.msh.org/mainpage.cfm?file=1.0.htm&module=DMP&language=english). Clinic staff salary data and cost of supplies not included in the *International Drug Price Indicator Guide* were collected at a leading Dhaka-based public sector facility.

Issue: all providers receive same salary and benefits regardless of level of care. The same situation is suggested in the dePinho South Africa study
Assumption: 22 working days per month, 8 working hours per day

HBJ: Table of provider salaries.
HBJ: Table showing per unit supply costs.

Application of data to model
We revised the *Savings* model to allow it to capture the specifics of the Bangladesh health care system. For example, we included the specific types of facilities that offer MR and abortion care: Teaching Hospitals, Maternal and Child Welfare Centres, District Hospitals, Upazila Health Complexes, and Union Health and Family Welfare Clinics. We also included the range of providers who participate in providing MR and abortion care from obstetrician / gynecologists, MBBS doctors, interns, anesthetists, family welfare visitors, counselors, nurses, lab technicians, ayahs, cleaners, and ward boys. We applied the newly-collected data to the model and estimated the per case costs to the public sector of the current strategy of providing MR and abortion care services.

RESULTS
The primary outcomes are the costs of providing MR and PAC at different levels of the health care system under the current system.

HBJ: Definitions
Menstrual Regulation
Incomplete abortion
Care for complications of unsafe abortion

HBJ: Add table showing average number of clients/patients presenting over specified 3-month period to different types of facilities for specific procedures

Figure 1. Average health system cost per case for MR and postabortion care, by level. Bangladesh 2008
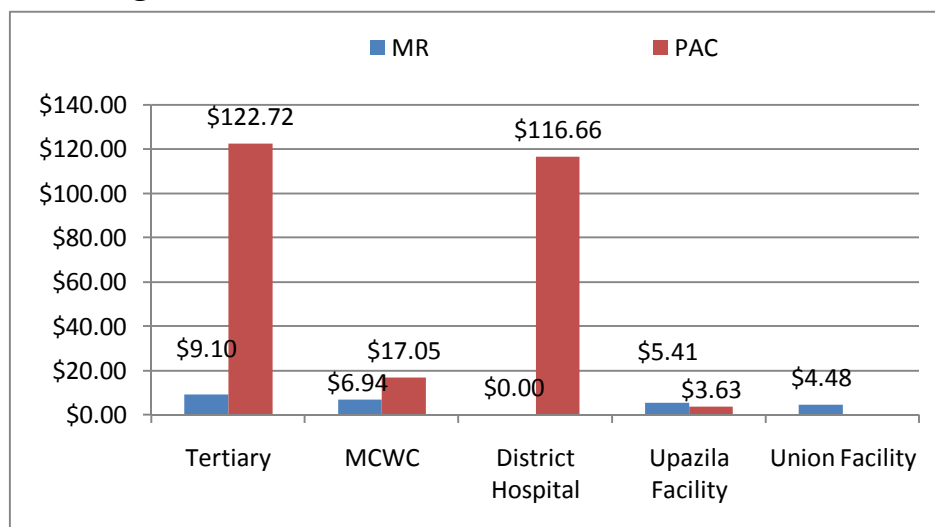
Different facilities in the Bangladesh health care system are tasked with different aspects of MR and postabortion care. Tertiary care facilities, Maternal and Child Welfare Clinics, and Upazila Health Complexes provide both, however MCWC and Upazila facilities only provide care for incomplete abortion, and not care for more severe complications of unsafe abortion. District Hospitals provide only postabortion care, and Union Health and Family Welfare Complexes provide only MR care.

The data show that on a per case basis it is much less expensive to provide MR care than to provide care for complications of unsafe abortion and incomplete abortion. Figure 1 shows that at the tertiary care level, where MR is provided for an average of US$9.10 per case, the cost of MR care is 7% of the cost of care for complications of unsafe abortion and incomplete abortion (US$122.72 per case). At the Union level, at US$4.48 per case, the cost of MR care is 4% of the cost of care for complications of unsafe abortion and incomplete abortion.

Separating the costs of MR care into provider salary for peri-abortion care (this includes preparing the procedure room, conducting the exam, lab tests, preservice counseling, administering pain medication, post procedure monitoring, reproductive health and contraceptive counseling, and follow-up care) and uterine evacuation, and supply costs shows that 70% or more of costs at all levels are for supplies, and 30% or less are for provider salaries. At the majority of facilities supplies for patient follow-up care such as antibiotics, iron supplements, vitamins and sanitary pads composed the greatest supply costs.

Table 4. Cost of MR Care

	Tertiary	MCWC	District	Upazila	Union
Provider salary, peri- abortion care	1.10	0.89	na	1.44	0.94

Provider salary, uterine evacuation	0.12	0.23	na	0.20	0.18
Cost of supplies	7.88	5.83	na	3.77	3.36
Total	*9.10*	*6.94*	*na*	*5.41*	*4.48*
Salary costs as percent of total costs	*13%*	*16%*	*na*	*30%*	*25%*

Separating the costs of postabortion care into costs for care for complications of unsafe abortion and care for incomplete abortion shows that for the facilities that offer care for complications of abortion – Tertiary and District Hospitals – the difference in care costs are significant. At District Hospitals care for incomplete abortion is 45% of the costs of treating complications; at Tertiary Hospitals care for incomplete abortion is 21% of the costs of care for complications. The treatment for complications is more expensive than treatment for incomplete abortion. The cost differentials between district and tertiary hospitals reflect that the more severe complications present at the tertiary level facilities, where care for abortion complications includes reconstructive surgery and hysterectomies. For both types of facilities costs associated with provider salaries are a fraction of costs associated with supplies. Significant supply costs included blood and oxygen. An additional expense was Rh(d) immune globulin, used for preventing Rhesus disease or hemolytic disease of newborn. In some facilities Rh(d) immune globulin is reported to be provided to all patients, which substantially increased the cost per case estimates.

Table 5. Cost of postabortion care

	Tertiary	MCWC	District Hospital	Upazila Facility	Union Facility
Provider salaries: peri-surgical care for incomplete abortion	1.26	2.07	1.77	1.70	Na
Provider salaries: surgical care for incomplete abortion	1.04	1.21	0.54	1.11	Na
Cost of supplies: incomplete abortion	18.97	13.77	34.12	0.82	Na
Total costs of care for incomplete abortion	*21.27*	*17.05*	*36.43*	*3.63*	*na*
Salary costs as percent of total costs	*11%*	*19%*	*6%*	*77%*	*Na*
Provider salaries: peri-surgical care for complications	4.25	na	2.27	na	Na
Provider salaries: surgical care for complications	2.21	na	1.15	na	Na
Cost of supplies: complications	94.99	na	76.81	na	Na
Total costs of care for abortion complications	*101.45*	*na*	*80.23*	*na*	*Na*
Salary costs as percent	*6%*	*na*	*4%*	*na*	*Na*

of total costs				
Total costs for PAC	*122.72*	*17.05*	*116.66*	*3.63*	*Na*

HBJ: for task shifting discussion present table showing main care providers by procedure at different levels of care.

Postabortion contraceptive counseling and services are useful for preventing subsequent unwanted pregnancies. While these services are available at the Tertiary and District Hospitals, they are not provided in the wards where care for complications of unsafe abortion and incomplete abortion are provided. They are however provided with MR at all the types of facilities that provide MR (all but the District Hospitals), however method acceptance is low.

HBJ: present data / table on MR rejection

DISCUSSION

The analysis to this point has three main findings: first the costs of providing MR care are much less than the costs of providing care for complications of unsafe abortion; second the task shifting associated with paramedic provision of MR may not yield significant savings in resources; third the analysis indicates that updating and systematically implementing MR and PAC standards and guidelines could yield savings of scarce financial resources.

The data show that on a per case basis provision of MR care is much less expensive than provision of care for complications of unsafe abortion. The indication is that Bangladesh has saved significant health system resources by having an MR Program, particularly one implemented at the primary care level. Countries where high levels of health system resources are spent treating complications of unsafe abortion might consider implementing a program similar to the Bangladesh MR Program.

The analysis, as conducted to this point, does not show significant resource savings associated with task shifting. The analysis shows that the majority of resources used for MR and PAC cover the costs of supplies, not provider salaries. Nonetheless the MR Program has saved resources by employing paramedic Family Welfare Visitors rather than MBBS doctors at the more decentralized levels of the Bangladesh MR Program, and might save more resources by posting paramedic Family Welfare Visitors to perform uterine evacuation and other aspects of MR care at higher levels of the health care system. Because the resources supporting provider salaries are overshadowed by resources spent on supplies the savings associated with this task-shifting may not be striking. It should be noted that the innovation of having paramedics posted at the primary care level providing uterine evacuation and other aspects of MR care is fundamental to the high level of decentralized services that characterizes the Bangladesh MR Program.

The data collected for this analysis may indicate a need for updated standards and guidelines for MR and PAC. The data showed great variation in types and amounts of supplies used for example for pain management, treatment of sepsis, and restoration of fluid volume. While this might be reflective of individual patient needs or availability of substitute supplies, it could also be suggestive of a need for more systematically implemented standards and guidelines relating to MR and PAC. This need for more systematically implemented, or even revised, standards and guidelines relating to MR and PAC is emphasized by the absence of on-ward contraceptive counseling and services for PAC patients and low levels of contraceptive acceptance among MR clients. Standards and Guidelines might emphasize the importance of providing contraceptive counseling and services to these patient populations. Additionally, high rates of patient rejection for MR services suggests a need for education of the general public of the duration for which MR services are provided (up to 6 weeks since last menstrual period from a Family Welfare Visitor; up to 8 weeks since last menstrual period from an MBBS doctor), and perhaps an extension of these limits. Anecdotally, rejected patients become clients for unskilled illegal abortion providers. If they have an unsafe abortion and subsequent complication for which they seek public sector care, in addition to suffering personal trauma they become a resource drain on the health care system.

This study has limitations. The study models recurrent costs but not capital costs (i.e., costs for resources that last more than one year—buildings, vehicles, pre-service training, computers, other equipment). We focus on recurrent costs as these tend to be the majority of total cost and are most affected by changes in clinical practice. In this analysis recurrent costs are the variable costs directly related to a particular service or clinical procedure being analyzed and include staff time and cost of commodities, expendable supplies, and medications. In some analyses the costs associated with staff time are seen as fixed because staff salaries are the same whether a clinician provides one or, for example, 50 procedures in a day. However, we acknowledge that at a health system level the cost of staff time is variable. For example, the salary of a paramedic such as a Family Welfare Visitor is lower than that of an MBBS doctor, but in Bangladesh both cadre can be trained, equipped and posted to provide safe MR procedures and other types of abortion-related care.

Some potential limitations to this study are that we only consider care provided in the public sector and in conformity with the law; also the model does not include patient costs external to the health care system. In addition, bottom-up approaches to unit cost estimation tend to inflate costs relative to top-down approaches and bottom-up approaches are not affected by the scale of activity. Furthermore, estimating time use through interviews is less reliable than other methods, such as time-motion studies. Despite these important limitations we believe the study findings have merit.

CONCLUSION
This analysis shows that the costs associated with treatment of complications of unsafe abortion are expensive and can be a significant drain on the health system resources. Substantial health system resources can be saved by preventing complications of unsafe abortion. This can be done through a strong family planning program to prevent unwanted pregnancies and a strong MR or safe abortion program. Bangladesh laudably has both. It is likely that the Bangladesh MR Program can further reduce costs by

implementing suggestions outlined above. The analysis identifies a need for increased public health attention to this issue. A careful, multi-phased and evidence-based updating of nationally implemented and monitored standards and guidelines would be excellent next steps.

On an international level the implications provide evidence that health systems can save significant financial resources by increasing efforts to reduce numbers of women presenting to facilities with complications of unsafe abortion. While strong contraceptive programs are critical, abortion or MR-type programs are essential as a back-up for contraceptive failure and are also cost-effective. Governments strengthening abortion or MR programs would not only would be making an investment in their health system's financial resources, they would be investing in their country's human resources.

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