Selected maternal health indicators obtained by geographical reconnaissance

We calculated maternal mortality ratio estimates and proportion of facility-based deliveries using large-scale population-based data collected by the fieldworkers of the Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh under an activity termed geographical reconnaissance. We then compared these estimates with those from the Bangladesh Maternal Health Services and Mortality Survey, and the results obtained through the sample vital registration system of the Bangladesh Bureau of Statistics. The national estimate of the maternal mortality ratio using geographical reconnaissance was 50% lower than the other estimates, but divisional estimates vary greatly and the number of facility-based deliveries is increasing in some areas. We also assessed whether annual changes in maternal mortality can be monitored at the sub-district level. Substantial yearly variation in the number of maternal deaths and large confidence intervals characterize sub-district maternal mortality ratio estimates. The government commits substantial resources for the geographical reconnaissance and the quality of the mortality data it collects deserves critical examination that will support important decision-making about the future of geographical reconnaissance.

The maternal mortality ratio and the proportion of deliveries attended by skilled personnel are key performance indicators for assessing the functioning of a wider health system and monitoring progress made towards achieving the Millennium Development Goals. We calculated national estimates of these two indicators using large-scale population-based sub-district level data collected by the fieldworkers of the Ministry of Health and Family Welfare under an activity termed geographical reconnaissance (1). These were compared to results obtained from Bangladesh Maternal Health Services and Mortality Survey (2) and from the sample vital registration system of the Bangladesh Bureau of Statistics (3).

Geographical reconnaissance does not sample the population but annually attempts to enumerate all household members, births, and deaths, including pregnancy related deaths, stratified by age and sex. To identify deaths that were maternal, the field workers were instructed to ask about "deaths of a married woman of reproductive age while pregnant or within 42 days termination of pregnancy, irrespective of duration and location, from any cause related to or aggravated by the pregnancy or its management, but not accidental or incidental causes" (1). This reporting is not validated by verbal autopsy. In the Bangladesh Maternal Health Services and Mortality Survey interviewers inquired about the deaths among women of reproductive age in the previous three years from a nationally representative sample. Reported deaths were then followed by verbal autopsy to identify deaths from maternal causes. For the sample vital registration system, the Bangladesh Bureau of Statistics used a nationally representative sample of 1,000 primary sampling

units. Each primary sampling unit consisted of 250 households that are monitored by a local registrar to record all vital events. The local registrars are instructed to use the definition of maternal death recommended in the tenth revision of the international classification of diseases by World Health Organization (3). The supervisors of the local registrar then checked the quality of data collected.

The geographical reconnaissance data for this report comes from two rural sub-districts in each of the six administrative divisions in Bangladesh. The two sub-districts were selected by the Unified Management Information System Unit of the ministry for joint monitoring with ICDDR,B as part of the implementation of a new information system for the five-year (1998-2003) Health and Population Sector Programme (4). The sub-districts had socio-economic characteristics and health care service delivery infrastructures that were judged typical for the division. Maternal mortality ratio estimates were calculated using three years of aggregated data from geographic reconnaissance from two rural sub-districts in each division and were then projected for the whole division. These estimates vary markedly from those reported in the Bangladesh Maternal Health Services and Mortality Survey (Table 1), except in one division. These discrepancies raise concern about the accuracy, and thus utility, of the geographical reconnaissance estimates.

Table 1: Total population, married women, live births, maternal deaths and maternal mortality ratios* by division according to geographical reconnaissance during 2000-2002

Divisions	Total population	Total married women	Total live births	Total maternal deaths	Maternal mortality ratio		
					Geographic reconnaissance**	BMHSMS	Difference (%)
Barisal	908,129	144,347	21,042	9	43	387	89 (-)
Chittagong	1,360,443	211,157	33,866	23	68	325	79 (-)
Dhaka	1,885,998	323,385	47,600	90	189	320	41 (-)
Khulna	1,242,447	236,685	24,723	32	129	351	63 (-)
Rajshahi	1,470,269	256,287	38,514	102	265	223	19 (+)
Sylhet	1,215,310	323,385	30,396	52	171	471	64 (-)
All divisions	8,082,596	1,495,246	196,141	308	159	322	51 (-)

* Per 100,000 live births
** Division rates are projected from 2 sub-districts per division
(-) Lower (+) Higher

Neither the Bangladesh Maternal Health Services and Mortality Survey nor the Bangladesh Bureau of Statistics sample vital registration system produce sub-district level maternal mortality ratio estimates; the only estimates available to sub-district managers are those from geographical reconnaissance. We compared geographical reconnaissance estimates for Mirsarai and Abhoynagar sub-districts with estimates from Matlab where ICDDR,B maintains a large-scale surveillance system (5). The Matlab data were used for comparison because they represent the only sub-district level maternal mortality ratio estimates outside of geographical reconnaissance.The numbers

varied substantially each year and confidence intervals are large in both systems (Table 2). Maternal mortality ratio estimates from the Bangladesh Bureau of Statistics during the corresponding years show an upward trend.

Table 2: Total maternal deaths, live births and estimated maternal mortality ratios* in Mirsarai, Abhoynagar and Matlab (intervention and comparison areas) and national maternal mortility ratio estimates from the Bangladesh Bureau of Statistics

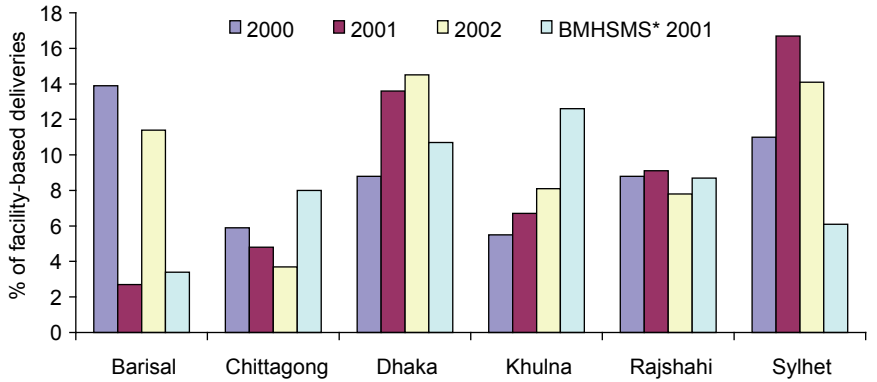
Area\Year	2000	2001	2002	2003	2005	Total
Mirsarai						
Maternal deaths	15	13	23	11	20	82
Live births	8,621	8,744	9,083	8,906	9,148	44,502
Maternal mortality ratio	**174**	**149**	**253**	**124**	**219**	**184**
(CI at 95%)	(94-277)	(77-247)	(156-369)	(60-215)	(133-337)	(143-223)
Abhoynagar						
Maternal deaths	1	8	12	3	6	30
Live births	4,619	4,920	5,156	5,022	5,036	24,825
Maternal mortality ratio	**22**	**163**	**223**	**60**	**119**	**121**
(CI at 95%)	(5-116)	(68-313)	(116-394)	(13-187)	(36-214)	(78-165)
Matlab (Comparison)						
Maternal deaths	13	3	**	**	**	131
Live births	3,086	3,001	**	**	**	36248
Maternal mortality ratio	**421**	**100**	****	****	****	**361+**
(CI at 95%)	(224-720)	(21-292)	**	**	**	(300-423)
Matlab (Intervention)						
Maternal deaths	6	2	**	**	**	76
Live births	2,612	2,809	**	**	**	31890
Maternal mortality ratio	**232**	**71**	****	****	****	**238**
(CI at 95%)	(85-504)	(9-257)	**	**	**	(188-298)
Bangladesh Bureau of Statistics						
Maternal mortality ratio	**329**	**326**	**417**	**402**	****	****

* Per 100,000 live births + Rate for 1991-200 ** Not available

We also examined yearly trends in facility-based deliveries by division as collected through geographical reconnaissance and compared them with data from the Bangladesh Maternal Health Services and Mortality Survey. Home and hospital/clinic is used to denote place of delivery in the geographical reconnaissance. The results, highly variable by division, are presented in Figure 1.

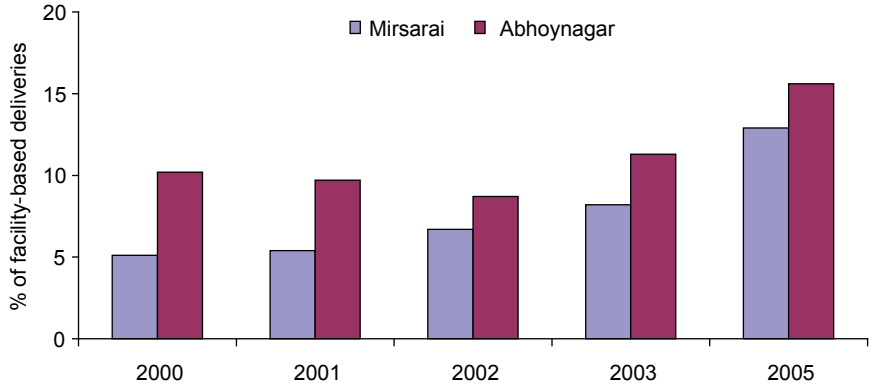
We examined data on facility-based deliveries in the geographical reconnaissance to determine whether the local sub-district managers can monitor annual changes. Similar to the divisional level trends, home deliveries continue to predominate, but facility-based deliveries are consistently increasing in Mirsarai and in Abhoynagar (Figure 2).

Figure 1: Yearly trend in facility-based deliveries by division by geographical reconnaissance from 2000 to 2002 and Bangladesh Maternal Health Services and Mortality Survey in 2001



* Bangladesh Maternal Health Services and Mortality Survey.

Figure 2: Yearly trend in facility-based deliveries by year in Mirsarai and Abhoynagar as estimated by geographical reconnaissance*



* No geographical reconnaissance was undertaken in 2004

During the past several years considerable effort has been made to improve the coverage of comprehensive emergency obstetric care services in Bangladesh. This resulted in improvement of many of the existing facilities in the public sector and growth of new facilities with appropriate maternity care service providers at the sub-district level. This was done to encourage facility-based deliveries and increase caesarean section rates. We evaluated data from Mirsarai and Abhoynagar sub-districts to determine the feasibility of providing the local sub-district level managers data on annual changes in the utilization of maternal heath services.

All live births reported in the geographical reconnaissance have been used as the denominator in calculating these local utilization rates. The percentage of pregnant women seeking care at any facility was 14% in Mirsarai and 24% in Abhoynagar, which is higher than national estimates. Among women who sought care at any facility for a delivery, 48% in Mirsarai and 35% in Abhoynagar had normal vaginal deliveries. The majority of all facility-based normal vaginal deliveries occurred in public facilities (>85%) and the majority of all cesarean births occurred in private facilities (>90%) within both sub-districts.

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Comments

The inaccuracy of demographic indicators such as the neonatal and post- neonatal mortality rate estimated thorough geographical reconnaissance has been documented elsewhere (6). This analysis suggests that maternal mortality data from the same source also has a problem with validity. The collection of maternal mortality data without a follow-up verbal autopsy, insufficient professional supervision and lack of critical review produces results that are difficult to interpret. The field workers of the ministry use a uniform definition of maternal deaths, yet recorded levels of mortality vary greatly with those from alternative sources. Aside from the expected fluctuation in the maternal mortality ratio in sub-district populations, variances in geographical reconnaissance may be due to misclassification of maternal deaths, recall bias with limited probing, and inadequate critical systematic review of the quality of the data collected at all levels. By targeting selected outcomes such as maternal deaths, representative data could be provided more quickly and at lower costs for the local managers. For example, all maternal deaths identified should be validated at the household level and supported by independent review of data quality. The government field workers, being local residents, can provide added value in conducting household level validation of all adult female deaths.

One advantage of geographical reconnaissance is the large sample size which enables a more stable calculation of maternal mortality ratios. However, it is this same large sample size that presents technical and logistical challenges to collecting valid mortality data. The government should consider redirecting resources dedicated to geographical reconnaissance to more efficient data collection activities. Annually conducting geographical reconnaissance in areas where the Bangladesh Bureau of Statistics conducts the sample vital registration system would provide an opportunity to assess the quality of data produced by both systems.

Considering the absence of sub-district estimates for key demographic and health indicators in the Bangladesh Demographic and Health Survey and the Bangladesh Maternal Health Services and Mortality Survey, the need for data by sub-district managers to plan and monitor their programmes should be addressed. Generating key demographic and health indicators through annually conducted geographical reconnaissance in the sample areas where the Bangladesh Bureau of Statistics collects data would enhance both systems and provide sub-district managers with data to assist in their decision making.

In view of the increase in facility-based deliveries and the rapid rise in caesarean section rates, especially in the private sector, the possibility of incorporating data on caesarean sections in the private sector into the government's management information system should be carefully considered. Increased facility-based deliveries and caesarean sections in either the public or private sector can have an impact on the opportunity for Bangladesh to achieve the Millennium Development Goals of reducing maternal mortality.

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