



Maternal mortality in Bangladesh: a Countdown to 2015 country case study

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Summary

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Background Bangladesh is one of the only nine Countdown countries that are on track to achieve the primary target of Millennium Development Goal (MDG) 5 by 2015. It is also the only low-income or middle-income country with two large, nationally-representative, high-quality household surveys focused on the measurement of maternal mortality and service use.

Methods We use data from the 2001 and 2010 Bangladesh Maternal Mortality Surveys to measure change in the maternal mortality ratio (MMR) and from these and six Bangladesh Demographic and Health Surveys to measure changes in factors potentially related to such change. We estimate the changes in risk of maternal death between the two surveys using Poisson regression.

Findings The MMR fell from 322 deaths per 100 000 livebirths (95% CI 253–391) in 1998–2001 to 194 deaths per 100 000 livebirths (149–238) in 2007–10, an annual rate of decrease of 5·6%. This decrease rate is slightly higher than that required (5·5%) to achieve the MDG target between 1990 and 2015. The key contribution to this decrease was a drop in mortality risk mainly due to improved access to and use of health facilities. Additionally, a number of favourable changes occurred during this period: fertility decreased and the proportion of births associated with high risk to the mother fell; income per head increased sharply and the poverty rate fell; and the education levels of women of reproductive age improved substantially. We estimate that 52% of maternal deaths that would have occurred in 2010 in view of 2001 rates were averted because of decreases in fertility and risk of maternal death.

Interpretation The decrease in MMR in Bangladesh seems to have been the result of factors both within and outside the health sector. This finding holds important lessons for other countries as the world discusses and decides on the post-MDG goals and strategies. For Bangladesh, this case study provides a strong rationale for the pursuit of a broader developmental agenda alongside increased and accelerated investments in improving access to and quality of public and private health-care facilities providing maternal health in Bangladesh.

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Introduction

The Countdown to 2015 for maternal, newborn, and child survival in its 2012 cycle reports that only nine of the 75 Countdown countries are on track to achieve the Millennium Development Goal (MDG) 5 target to reduce the maternal mortality ratio (MMR, maternal deaths per 100 000 livebirths) by three-quarters between 1990 and 2015.¹ We reviewed the experience of Bangladesh, one of the nine countries on track, in the improvement of maternal health as part of a series of in-depth country case studies commissioned by Countdown.

Bangladesh has one of the highest population densities in the world, with a population of more than 150 million and a land size of 144 000 km². Situated at the top of the Bay of Bengal, it is largely surrounded by India. Administratively, the country is divided into divisions (seven), districts (64), Thanas and Upazilas (485) or Municipalities and City Corporations (324), and unions (4546).²

Recent economic growth in Bangladesh has been robust, averaging 6% annually between 2001 and 2012 despite periods of political turmoil and frequent natural

disasters; income per head reached US\$848 per year in 2012. Progress has also been rapid in the social sector with increasing educational levels, especially for women.³ However, Bangladesh remains one of the poorest countries in the world, with nearly a third (32%) of the population living below poverty and 29% underemployed.^{4,5} Total health expenditure has remained low, representing only 3% of gross domestic product (GDP), with only a quarter of health spending coming from the public sector.⁶

Several factors influenced Countdown's decision to invite Bangladesh to undertake this in-depth analysis of the country's progress in improvement of maternal health. First, Bangladesh is one of the very few countries that are on track to achieve the MDG 5 target.⁷ Second, Bangladesh is unique among low-income and middle-income countries in having valid, nationally-representative household survey-based statistical evidence of progress towards MDG 5. Third, the reduction in maternal mortality has been accompanied by important changes in other indicators of maternal health and socioeconomic development. These factors render Bangladesh an ideal real-world setting for the study of the

driving forces behind large changes in risk of maternal mortality at a population level.

We explored how Bangladesh achieved these reductions in maternal mortality. We focused on change between 1998–2001 and 2007–10, on the basis of the reference periods of the 2001 and 2010 Bangladesh Maternal Mortality Surveys (BMMS).

Methods

Data sources

We used data from two high-quality and highly comparable household surveys, the 2001 and 2010 BMMSs, for the primary analyses in this study. The BMMSs were designed to assess the situation of the country with respect to maternal health, and particularly to provide national estimates of MMR. Both surveys were large, covering about 100 000 households in 2001 and 174 000 households in 2010, and nationally representative, using a three-stage sampling design.^{8,9} Deaths of women of reproductive age (aged 13–49 years) were followed up for verbal autopsy during roughly 4 years before the surveys with an adapted version of the WHO structured questionnaire.¹⁰ Two independent physicians reviewed data from verbal autopsies to assign cause of death, including maternal causes (with a third physician reviewing the data if they disagreed on the cause of death). Both surveys also obtained information about selected background characteristics, a full birth history from ever-married women aged 13–49 years to provide denominators for calculating the MMR, and about several indicators of maternal health, such as the frequency of problems encountered during the index pregnancy and childbirth, health-seeking behaviours, and intervention coverage (appendix).

We also obtained data for coverage of maternal health and other interventions and for contextual factors from published data from the six Bangladesh demographic and health surveys done between 1993 and 2011.¹¹ We obtained

information about policies and programmes in maternal and reproductive health through a rigorous desk review, which primarily drew on policy documents and technical reports from the government, non-governmental organisations (NGOs), and development partners working in the health sector in Bangladesh.

Statistical analysis

The analysis focused on a comparison of the 3-year periods preceding the 2001 and 2010 surveys. Overall estimates of maternal mortality were obtained as follows. We calculated maternal mortality rates for each period by dividing the number of maternal deaths in a particular age category by the exposure time (women-years) in that age category. We then calculated the MMRs by dividing each age-specific maternal mortality rate by the corresponding age-specific fertility rate. We computed standard errors using the Jackknife repeated replications procedure.¹² We decided to focus on obstetric risk, or risk per birth, as measured by MMR, rather than risk per woman-year of exposure, as measured by the maternal mortality rate; a dominant influence on the maternal mortality rate is the level of fertility, whereas our interest was in risk per risky event. Accordingly, we created a pooled dataset of births (for women who survived) or pregnancies (for women who died from maternal causes) in the 3 years before each survey, with characteristics of the mother whether she survived or died, using the two BMMS rounds. The variables included in the pooled dataset were whether the mother died, if so whether the cause of death was maternal, socioeconomic and demographic characteristics, and maternal care-seeking behaviours. Our pooled data set excluded previous livebirths in the 3-year windows to women who subsequently died, but any bias from this exclusion was likely to be small.

We did a Poisson regression analysis on the combined data file at the individual pregnancy or birth level to explore relations between the change in risk of a maternal

See Online for appendix

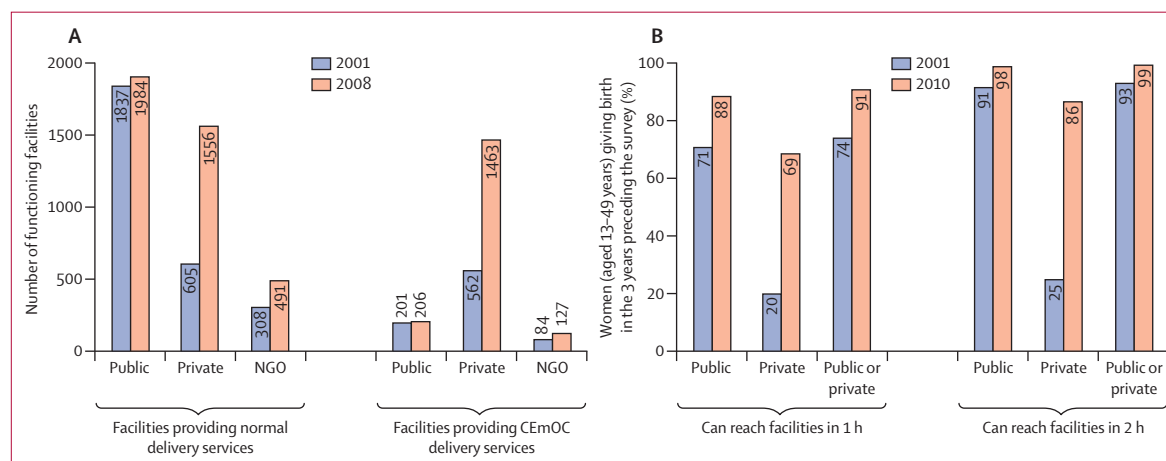


Figure 1: Access to health facilities, 2001 and 2010

(A) Number of functioning facilities providing delivery services.¹⁸ (B) Number of individuals able to reach facilities. NGO=non-governmental organisation.

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