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Maternal Mortality Levels and Trends in Nepal: A Brief Update

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ABSTRACT

Recently revised estimates of levels and trends of maternal mortality based on three sources are reviewed and the trajectory for reaching the mortality reducing target by 2030 is assessed. According to the estimates provided by the UN Maternal Mortality Inter-agency Group (MMEIG), the maternal mortality ratio (MMR) started from a high of 901 in 1990 declined to 258 in 2015, or a reduction of 71% over the 25 year period. Between 2000 and 2015, MMEIG estimates showed a reduction of 53%. The MMR is targeted to be reduced to at least 70 by 2030. This implies a reduction of 73%, which is considerably higher than the reduction recorded during the earlier (2000-2015) period (which was 53%), or annualized rate of decline of 8.7% v 5.0%. Therefore, achieving the future trajectory warrants undertaking strategic interventions more intensively than what may have been hitherto. Concurrently, more attention also needs to be given to strengthening the recording and reporting of maternal deaths.

Keywords: levels and trends; maternal mortality; Nepal; projections

INTRODUCTION

Tracking progress in maternal mortality remains a high priority both globally and nationally. Following the end of the Millennium Development Goals (MDG) in 2015, Nepal set the target of reducing its maternal mortality ratio (MMR) to at least 70 by 2030, as part of the Sustainable Development Goals (SDG).[1] Therefore, it is critical to review the levels and trends in maternal mortality in Nepal, particularly when new estimates become available.

In recent years, MMR estimates for Nepal have been revised, based both on Nepal specific surveys and global multiple data sources. The purpose of this note is to review these recent updates, particularly in view of Nepal's trajectory towards meeting the SDG target by 2030.

DATA SOURCE

The levels and trends in MMR estimates for Nepal vary widely. At present, no reliable recording and reporting system currently exists in the country. The vital registration system still has a long way to go before becoming fully functional and robust.[2] The two other main sources for the MMR estimates in Nepal have been cross-sectional surveys (some with retrospective information) and model estimates (using multiple data sources). Depending on the assumptions and estimation techniques, the model (indirect) estimates also vary considerably. The challenges inherent in both the direct and indirect estimates generate uncertainty when attempting to discern the actual MMR levels and trends in Nepal.

One reason for the uncertainly regarding MMR estimates is the fact that maternal deaths are a relatively rare occurrence, and as such, small differences in the numbers of maternal deaths affect the estimates considerably. MMR estimates, even those based on large surveys such as the Nepal Demographic Health Surveys (NDHSs), are typically based on less than 100 cases aggregated over several years.[3,4] Regardless, NDHSs remain the main source of the data used by the Government of Nepal (GoN) for planning purposes. Further, the NDHSs have used comparative instruments, and several rounds of these surveys have been completed already. The NDHSs data are also used as input for modelling the MMR estimates, levels, and trends globally. For these reasons, the NDHS data remain a primary source for direct estimates of the levels and trends in Nepal's MMR.

In addition to the direct estimates, two other recent estimates are reviewed here: one undertaken by the UN Maternal Mortality Estimation Inter-agency Group (MMEIG) led by the World Health Organization (WHO), and

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another based on the Global Burden of Diseases group. Governments, particularly ministries of health, use the MMEIG source in the absence of their own country-specific sources, or to supplement their own country-specific sources. More importantly, these estimates are also used as the reference for assessing progress across countries globally. This underscores the importance of paying particular attention to the estimates made by the MMEIG. For instance, the assessment that Nepal was "making progress" towards the MGD 5A was based on the MMEIG estimates.[5] This same source of estimates will undoubtedly be used to assess future progress as well.

REVISED ESTIMATES

After the completion of the fifth round of the NDHS in 2016, the previous MMR estimates were revisited and new estimates were made covering a 20-year period, based on three rounds of NDHSs — 1996, 2006, and 2016. The estimates with upper and lower bound estimates (i.e., confidence intervals) are presented in Table 1.

The estimates based on the three rounds of NDHSs indicate that the MMR declined from 543 (circa 1993, spanning the period 1989-1996) to 259 (circa 2013, covering the most recent period, 2009-2016). Thus, there was a decline of 284 points during the 20-year period, or 3.7% annually. The MMR of 543 could range from 400 to 695. Similarly, the ratio of 284 could range from 151 to 366. In 2017, an estimated 630,000 births occurred in Nepal.[6-8] If we apply the MMR of 259, it suggests that approximately 1,600 women died during childbirth in that year, or 8,000 maternal deaths every five years.

The MMR for the period between the 1996 and 2016 NDHSs was 281 (with a CI range of 178 to 384). However, because the CI overlapped with the estimates based on the 2016 round of the survey, the apparent decline from 281 to 259 could really be a statistical artifact in that the apparent differences may be due to sampling variability. These estimates essentially suggest a lull in the decline in MMR in the first part of the 2000s. Obviously, one may ask if this was actually the case. Although no direct evidence is available to support this assertion, some indirect evidence indicates otherwise.

The utilization of various indicators of maternal health services known to influence maternal mortality have shown continued improvement over the years. Some of these indicators include — assistance by a skilled birth attendant during delivery, health facility as the place of delivery, caesarean section, antenatal care (ANC) provided by skilled health personnel, at least four ANC visits, and an ANC check-up during first trimester of pregnancy. Significant improvement in these various indicators has been confirmed based on the 2001, 2006, 2011, and 2016 rounds of the NDHS data, although the rate of improvement in the use of specific services varied.[9] Similar results have been reported by others who have looked at selected indicators.[3,10] The increased use of services necessarily implies higher demand for service and changes in attitudinal and behavioral factors. Additionally, other synergistic and reinforcing factors have been pointed out, including the formulation and enactment of policies, expansion of service facilities (hence, improved access), and increasing health expenditures.[11] It would be an anomaly to find a continued rise in the use of maternal health services on the one hand, and no change in maternal deaths, on the other. Moreover, the estimates based on indirect techniques (discussed below) do not imply any such lull in the trend.

Table 1 also shows the estimates made by the Institute for Health Metrics and Evaluation (IHME) based on the Global Burden of Diseases (GBD) 2013 cause of death database.[7] The model estimates indicate that MMR in Nepal declined from 417 (296-541) in 1990 to 272 (191-364) in 2013, or a reduction of 35% over the 23-year period. The decline was slower during the 1990 to 2003 period than during the period from 2003 to 2013 (1.9% v. 2.9%).

In contrast, the MMEIG estimates implied a much faster rate of decline.[4] MMEIG estimates started from as high as 901 in 1990 and declined to 258 in 2015, or a reduction of 71% over the 25-year period. Between 2000 and 2015, MMEIG estimates showed a reduction of 53%. It should also be noted that the MMR for the year 1990 is considerably higher than those implied by the direct estimates. The levels based on recent time periods vary less across the three estimates, as compared to the past. Although the estimates of the rate of decline vary considerably, even between these two indirect estimates, there is less evidence suggesting a lull in the decline. In this context, it should also be noted that the data based on the 2006 survey also showed a considerable under-estimation of infant and child mortality. Thus, the probable under-reporting is not limited only to maternal mortality. The years 2005 and 2006 (up to mid-year) were the peak of the ongoing insurgency and political turmoil that resulted in a continued environment of insecurity and fear in the country.[12] This factor may well have resulted in compromises in the field modality of data collection and reporting in the 2006 survey.

Table 1. Levels and trends of maternal mortality ratio (per 100,000 live births) and rate of change, Nepal, 1989-2030.

Time Period	MMR	Confidence Intervals (CI)	% change in MMR†	Annualized Rate of Change (%)†	Data Source
Nepal Demographic and Health Surveys[6]					
1989-1996	543	695-400	-	-	Survey 1996
1999-2006	281	384-178	-48.3	-6.6	Survey 2006
2009-2016	259	366-151	-7.8	-0.8	Survey 2016
1993, 2013	543, 259	-	-52.3	-3.7	
Institute for Health Metrics and Evaluation[7]					
1990	417	296-541	-	-	GBD
2003	365	263-464	-12.5	-1.0	GBD
2013	272	191-364	-25.5	-2.9	GBD
1990, 2013	417, 272	-	-34.8	-1.9	
UN Maternal Mortality Estimation Inter-agency[5]					
1990	901	na	-	-	MMEIG
1995	660	na	-26.7	-6.2	MMEIG
2000	548	na	-17.0	-3.7	MMEIG
2005	444	na	-19.0	-4.2	MMEIG
2010	349	na	-21.4	-4.8	MMEIG
2015	258	na	-26.1	-6.0	MMEIG
2020	172	na	-33.3	-8.1	Interpolated
2025	106	na	-38.4	-3.2	Interpolated
2030	70	na	-33.4	-8.3	GoN target[1]
1990, 2015	901, 258	-	-71.4	-5.0	
1990, 2030	901, 70	-	-92.2	-6.4	
2000, 2015	548, 258	-	-52.9	-5.0	
2015, 2030	258, 70	-	-72.7	-8.7	

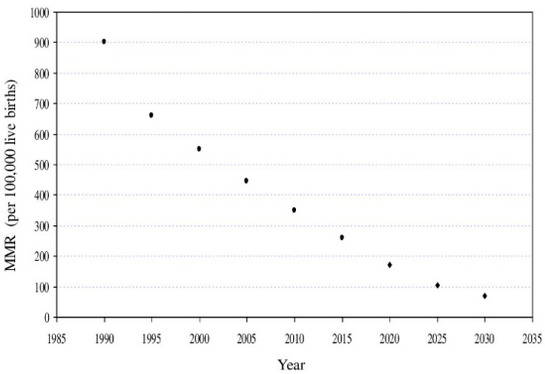
†refers to between two successive data points or two end points, as specified in the first column.
na=not available, GBD=Global Burden of Disease database, MMEIG=Maternal Mortality Inter-agency Group, GoN=Government of Nepal.
Note: The MMR and CI values are from the respective sources, and % change and annualized rate of change are computed by the author.

FUTURE TRAJECTORY

As noted earlier, the Government of Nepal (GoN) has set the target of achieving an MMR of at least 70 by the year 2030. Achieving this goal implies reducing the MMR by 73%, based on the MMR of 258 for 2015, as per the MMEIG estimates. Accordingly, the annual rate of decline implied by this rate of reduction is 8.7% (vs. 5.0% for the 15-year period immediately preceding). Through interpolation between the MMR of 258 and the target of 70, the MMR could further decline to 172 and 106 in 2020 and 2025, respectively (Graph 1).

There are only 12 years left for Nepal to reach this SDG target for maternal mortality. This timeframe underscores the urgent need to "accelerate" the progress, as it has been pointed out for reaching the SDG goal both regionally and globally.[13] A systematic analysis of the data, based on the studies conducted between 2003 and 2009 by Say et al., showed that in the Southern Asia region direct causes accounted for 71% of all causes of maternal mortality, while indirect causes accounted 29%.[14] In the former category, hemorrhage was the leading cause (30%), followed by sepsis (14%), hypertension (10%), and abortion (6%). Similar patterns were noted from the Global Burden of Diseases (GBD) database.[7] The GBD-based study also revealed that the vast majority (40%) of the deaths occurred in postpartum, followed by intrapartum (22%), and then antepartum (20%). Indirect causes of maternal death (including the effects of pre-existing disorders, such as HIV infection, mental disease, and diabetes, when

aggravated by pregnancy) are much higher in South Asia and Africa than in other regions of the world.[7,13]



The estimates for 1990-2015 are those made by the UN Maternal Mortality Estimation Inter-agency Group and as reported in WHO et al.[5] The value for 2030 refers to the target set by the Government of Nepal.[1] The estimates for 2020 and 2025 are interpolated based on curve fitting to the other data points. More details are also provided in Table 1.

Graph 1. Estimated levels and trends of maternal mortality ratio (MMR), Nepal, 1990-2030.

This evidence provides a guide as to which specific areas should be given particular attention for orienting policies, in addition to program and human resources development and funding towards reducing mortality. More specific to Nepal, the ongoing surveillance and auditing of maternal and perinatal deaths in many districts in the country (a joint collaboration between the Ministry of Health and WHO/Nepal[15]) may provide the much-needed insights necessary to formulate strategic interventions needed to march towards greater improvements in maternal mortality. Given the large heterogeneity in geography and availability and access to health care services, the national-level results and trends reviewed in this note conceal variations in MMR across the country.[16,17] A concentrated effort, particularly in the districts and provinces prone to experiencing a higher number of maternal deaths, would have a larger influence on lowering the aggregate level of MMR.

The MMR data reviewed here also point to a familiar problem with regard to the estimates - the direct estimates are typically lower than those based on the model estimates. In a recent commentary, Boerma, Victora, and Abouzahr[18] have elucidated this issue and called for serious efforts towards not only more estimates at the global level, but also finding practical ways to ensure that data collection, reporting, and analysis aspects are also strengthened within each country. The authors pointed out that this particular issue seems to have been sidelined with all the enthusiasm for producing more MMR estimates at the global level.

CONCLUSIONS

The newly revised estimates of MMR for Nepal, obtained from three sources through the use of different methodologies (and data sources), show considerable variation. The estimates provided by the UN Maternal Mortality Inter-agency Group (MMEIG) are also used for global assessments of the progress in MMR. Accordingly, the MMR of 258 in 2015 is targeted to be reduced to at least to 70 by 2030. This implies a reduction of 73%, which is considerably higher than the reduction recorded during the earlier period (2000-2015), which was 53%, or an annualized rate of decline of 8.7% v 5.0%. Therefore, the future trajectory warrants undertaking existing and new strategic interventions more intensively than in the past.

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