RESEARCH ARTICLE

Maternal mortality and fertility in Myanmar: State of the art

Myint Myint Wai[1,2]*, Espen Bjertness[2], Thein Thein Htay[1], Tippawan Liabsuetrakul[3], Johanne Sundby[2]

[1]Ministry of Health and Sports, Myanmar
[2]Department of Community Medicine and Global Health, University of Oslo, Norway
[3]Epidemiology Unit, Faculty of Medicine, Prince of Songkla University, Thailand

Abstract: Many women in developing countries are dying from preventable causes related to pregnancy and childbirth. These maternal deaths are attributed to the poor coverage of reproductive health services and high fertility levels. A holistic review of the reproductive health is necessary to reflect the country's situation and progress of reproductive health and provide recommendations for areas that need an improvement. The aim of this paper is to provide an overview of the historic development of maternal mortality and fertility in Myanmar during the past 25 years, focusing on the antenatal care (ANC) coverage, deliveries attended by skilled persons, and contraceptive use. All published nationally representative data were compiled, and trend analysis was performed. The maternal mortality ratio declined significantly by 9.1 (95%CI: 4.0-14.1) maternal deaths per 100,000 live births/year between 1990 and 2015, but it failed to achieve the target of Millennium Development Goals 5. There was no significant improvement in ANC coverage and care during delivery. Contraceptive use increased significantly, leading to a reduction in the total fertility rate. Nevertheless, overall reproductive health failed to reach a satisfactory level. Maternal mortality still remains high. Thus, there is a need to improve service coverage and more so in the regions with poor performance to reduce the high maternal mortality.

Keywords: Maternal mortality ratio; Total fertility rate; Reproductive health services; Millennium Development Goals; Myanmar; Antenatal care; Skilled birth attendants

*CORRESPONDING AUTHOR

Myint Myint Wai,
Department of Medical Services, Ministry of Health and Sports, NayPyiTaw, Myanmar.
m.m.wai@medisin.uio.no,
mmwai2011@gmail.com

1. Introduction

Maternal mortality is considered as an indicator representing the status of women in society and the overall health of the population and also reflects the functioning of the health system (World Health Organization [WHO], 2006). The most common indicator used to measure maternal mortality is the maternal mortality ratio (MMR); the number of maternal deaths per 100,000 live births (WHO, 2006). Total fertility rate (TFR) is an important demographic indicator closely associated with maternal mortality (WHO, 2006), as high levels of fertility increase the lifetime risk of dying from maternal causes (WHO, 2015a). TFR refers to the average number of births a woman would have if she lives all her reproductive years; age 15-50 (WHO, 2006). TFR is a good summary measure for comparison between countries, population subgroups, or trends over time (WHO, 2006).

Globally, many women die from preventable causes related to pregnancy and childbirth (WHO, 2018a). Majority of these maternal deaths occur in developing countries, and about one-third of global maternal deaths are in the Southern Asia region (WHO, 2018a). Global movements to combat high maternal mortality in developing countries were formally established at the time of launching of the safe motherhood initiatives in the 1980s (AbouZahr, 2003). The program of action adopted at the International Conference on Population and Development (ICPD) in 1994 reinforced safe motherhood activities to promote the women's health (United Nations Population Fund [UNFPA], 2014). Reduction of maternal mortality was also stipulated in the Millennium Development

Goals (MDGs), which later encompassed reproductive health rights by affirming universal access to reproductive health services (WHO, 2015a).

Despite global initiatives and country-led activities to reduce maternal deaths by improving antenatal care (ANC) coverage, deliveries attended by skilled persons and contraceptive use, maternal mortality is still a leading cause of death in women of reproductive age worldwide (WHO, 2015a). Although the global coverage of deliveries by skilled birth attendants (SBA) has increased; more than 40% of deliveries in the WHO African and Southeast Asia regions were not attended by a skilled person (WHO, 2016a). In 2015, only 40% of all pregnant women in low-income countries had the recommended ANC visits (WHO, 2018a). Although the global contraceptive prevalence rate (CPR) increased, 214 million of women of reproductive age in developing countries who want to avoid pregnancy are not using modern contraceptives (WHO, 2018b).

Since the onset of the primary health-care concept, Myanmar has paid attention to maternal and child health as an essential component of the health-care system (Ministry of Health, 2014). The very first objective of the Myanmar National Population Policy, which was drafted in 1992, is to improve the health status of women and children (MCH section, 2014). With the National Population Policy acting as a guiding framework, the Myanmar Reproductive Health Policy was established in 2002. That policy was developed in line with stipulations outlined in the ICPD program of action and targets of the MDGs (MCH section, 2014). These political commitments led to the formulation of Strategic Plans on Reproductive Health (2004-2008, 2009-2013, and 2014-2018) (MCH section, 2014). Myanmar is also one of the family planning (FP) 2020 focused countries, and as such a costed implementation plan to FP 2020 commitments was adopted in 2014 (Department of Public Health, 2015a) and implemented. Nonetheless, Myanmar is one of the countries in the WHO Southeast Asia region, which failed to attain the MDG 5 target.

The implementation status and progress of health services including the aforementioned plans and commitments are routinely assessed by a monitoring system. A Health Management Information System (HMIS) was established since 1995 for routine monitoring, which started with an essential set of indicators and reviewed and revised according to the country's needs (Ministry of Health and Sports, 2017a). Service coverage indicators for reproductive health such as ANC and SBA and contraceptive prevalence are encompassed within this HMIS. While MMR and TFR are routinely stated in the statistical yearbooks of Central Statistical Organization (CSO), some other distinct surveys have also been conducted in the field of reproductive health, which provides estimates that reflect the reproductive health status of women at specific time periods and enabling the policymakers to evaluate the progress.

Although the reproductive health data are available from various sources, a holistic and comparative review of all the available data to reflect the country's overall situation and progress has yet to be done. An analysis of data sources and gaps published in 2010 compiled the data from different surveys (Ministry of National Planning and Economic Development and UNDP, 2010), but did not include the routine administrative data. Thus, this paper aims to provide a comprehensive overview of the historic trends of maternal mortality and fertility in Myanmar from 1990 to 2015/2016, focusing on the coverages of ANC and SBA and CPR. We aim to review the progress made in the past decades by critically exploring and comparing all the available national representative data, which are nationally or internationally published.

2. Method

The variables, MMR, TFR, total marital fertility rate (TMFR), ANC coverage, percentage of deliveries assisted by SBA, and CPR, were selected for presentation in this paper. These maternal and reproductive health (MRH) indicators were accessed through the online sources of MOHS and the Department of Population, and CSO Myanmar. The online sources of the United Nations Organizations: The WHO, UNFPA, United Nations Children Fund (UNICEF), United Nations Population Division (UNPD), and United Nations Development Programme (UNDP) were also reviewed to gather the Myanmar country data. Nationally representative published data of the selected indicators in the past three decades were compiled to present the trends in maternal mortality and fertility through analysis of service coverage indicators in Myanmar.

First, the MMR of Myanmar was assessed from "Health in Myanmar 2014," which was published by the Ministry of Health. Other data sources were followed through the sources and references of Health in Myanmar using a snowball approach. Thus, we visited the websites of the Department of Population and CSO Myanmar to get maternal mortality and fertility data. The online sources of UNFPA, UNICEF, UNPD, and UNDP also provided Myanmar country data from the nationwide surveys which conducted in past decades. United Nations' estimates of maternal mortality for Myanmar were gathered from the Global Health Observatory data: Maternal mortality country profiles on the WHO website.

Second, coverages of ANC and delivery care, prevalence of contraception, and fertility estimates were assessed using data from the 2001 and 2007 reports of Fertility and Reproductive Health Surveys (FRHS) by UNFPA, Integrated

Household Living Condition Assessment (IHLCA) I and II (2005 and 2010) by UNDP and Multiple Indicators Cluster Survey (MICS 2009-2010) by UNICEF. A series of public health statistics reports (2012-2016) of MOHS that provide data from the routine reporting system (HMIS) of the ministry were also used to estimate these indicators.

Finally, the most recent estimates of all these indicators are compiled from the 2014 Myanmar Census (from the Department of Population website) and the Myanmar Demographic and Health Survey 2015-2016 (from the MOHS web page).

To obtain a comprehensive overview of the trend of each indicator, a trend analysis was applied for each indicator, and the statistical significance of the progress was shown with regression analysis (at 95% confidence interval). Correlation between the impact indicators and the service coverage indicators was also tested.

3. Findings

3.1. Maternal Mortality

MMR in Myanmar varied across different data sources. All the MMR data collected were compiled and are presented in Figure 1 with different sub-groupings.

According to the CSO reports, MMR fluctuated from 110 to 165/100,000 live births between 2001 and 2013 (Central Statistical Organization [CSO], 2012; 2016); but it rose to 223 in 2014 (CSO, 2017). As the data are based on the Vital Registration and Statistics (VRS) system, it thus depends on the reporting status. Even though the VRS system covered all the urban and rural areas in 2009, reports were available from only 314 of the 325 urban units and 281 of the 292 rural townships (units) in 2009 (CSO, 2012). The incomplete reporting can be partly attributed to the lower MMR reported in the CSO data.

We found two mortality surveys had been conducted during 1999-2005 indicated a higher MMR. A National Mortality Survey was conducted in 1999 by the CSO and reported an MMR of 255: One hundred and seventy-eight for urban areas and 281 for rural areas (CSO, 2012). The second one, a cause-specific maternal mortality survey, undertaken in 2004-2005 by the Ministry of Health in collaboration with UNICEF reported an even higher MMR of 316/100,000 live births (WHO-Myanmar, 2014). After lacking of nationwide maternal mortality survey data for nearly a decade, the 2014 Myanmar Census tried to provide reliable estimates on MMR (Department of Population, 2016a). According to the Thematic Report on Maternal Mortality (2014 Myanmar Census), MMR was 282 per 100,000 live births, with 95% confidence interval (CI)of 176-387 (Department of Population, 2016a).

Another data source, UN estimates of MMR for Myanmar were also presented as the UN inter-agency group produced estimations and calculations based on similar available country's data. Regarding the UN estimates, Myanmar had made a significant progress in reducing maternal mortality as indicated by the downward trend in MMR with 60.7% change between 1990 and 2015 (WHO-SEARO, 2016), revealing annual rate of reduction by 3.7% (95% CI: 1.6-5.3%) (WHO, 2018c).

In this context, trend analysis for MMR was applied to MMR estimates of UN inter-agency group and the 2014 Myanmar census. The surveys data are not included in this trend analysis, because the UN inter-agency estimation already
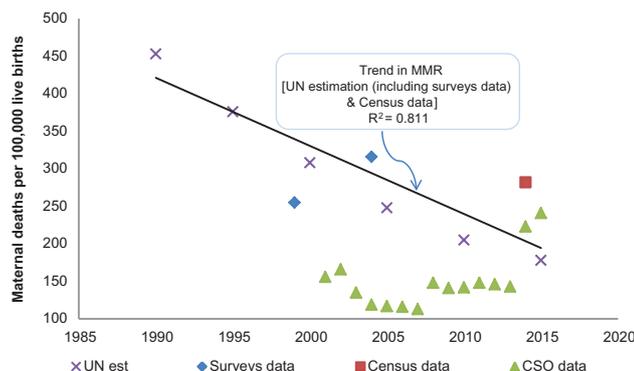

Figure 1. Maternal mortality ratio in Myanmar (1990-2015).

Data Sources: The routine Central Statistical Organization estimates were from the Statistical Yearbook Myanmar 2010, 2016, and 2017; the UN estimates were from the Global Health Observatory data: Maternal mortality country profiles; the survey data were from the Statistical Yearbook Myanmar 2010 and WHO Country Cooperation Strategy (2014-2018); and the census estimate from the Thematic Report on Maternal Mortality of the 2014 Myanmar Census.

incorporated these data in the estimation process (WHO, 2018c). The regression analysis showed that the MMR was significantly reduced by 9.1 maternal deaths/100,000 live births/year (95%CI: 4.0-14.1). Despite a reduction in MMR to reach 178/100,000 live births (uncertainty interval 121-284) in 2015, Myanmar failed to meet the MDG 5 target set at 113/100,000 live births (WHO-SEARO, 2016; WHO, 2015b).

The cause-specific maternal mortality survey conducted in 2005 reported the main causes of maternal deaths in Myanmar as postpartum hemorrhage 31%, hypertensive disorders of pregnancy, including eclampsia 17%, and abortion-related mortality 10% (WHO-Myanmar, 2014). Similarly, a maternal death review in 2013 reported that 38% of maternal deaths were due to postpartum hemorrhage, followed by pregnancy-induced hypertension 21% and abortion 12% (Maternal and Reproductive Health Division, 2014). Majority of these maternal deaths can be prevented by proper care during pregnancy and delivery by a skilled professional, and by timely management and referral.

3.1.1. Care during pregnancy

The ANC coverage data were grouped into two: One from the routine reporting (HMIS data) and the other from various surveys (Figure 2). Country improvements in service coverage, including ANC coverage, have been a success factor for a global reduction in maternal mortality (WHO, 2015a). Similarly, Myanmar shows a negative correlation ($r=-0.66$) between maternal mortalities (MMR of UN estimates) and ANC coverage (survey data).

Although Figure 2 indicates an upward trend in the ANC coverage, the improvement is not statistically significant with the surveys data. Moreover, the ANC coverage indicated in Figure 2 only represented ANC 1, i.e., receiving ANC with a skilled provider at least once during pregnancy.

The FRHS included the proportion of women having three ANC visits and above; the proportion increased from 62% to 73% between 1997 and 2007 (Department of Population and UNFPA, 2002; 2009). The more recent 2015-2016 Myanmar Demographic and Health Survey (MDHS) reported that the ANC coverage with at least one visit (ANC 1) was 80.7%, but the coverage of four ANC visits or above (ANC 4+) was only 58.6% (Ministry of Health and Sports and Inner City Fund (ICF) International, 2016; Ministry of Health and Sports, 2017b). The difference between ANC 1 and ANC 4+ was more prominent in rural areas (76.5% vs 50.8%) (Ministry of Health and Sports and ICF International, 2016; Ministry of Health and Sports, 2017b).

More importantly, a noticeable number of women did not receive care during pregnancy: About 19% in 1997 and 13% in 2007 (Ministry of National Planning and Economic Development and UNDP, 2010; Department of Population and UNFPA, 2009). According to 2015-2016 MDHS, 12.8% of the pregnant women did not receive ANC by any provider with a marked urban/rural difference: About 4% versus 16% (Ministry of Health and Sports, 2017b).

The HMIS has provided ANC coverage data since 1996. According to data retrieved from the HMIS reports, a significant improvement in ANC 1 coverage has been made from <60% in 1996 to >85% in 2016 ($P<0.001$). The ANC 4+ coverage is only available from 2012. The ANC 4+ coverage slightly increased from 67% in 2012 to 72.3% in 2016 with no significant improvement (Department of Health Planning, 2014; Department of Public Health, 2015; 2017).
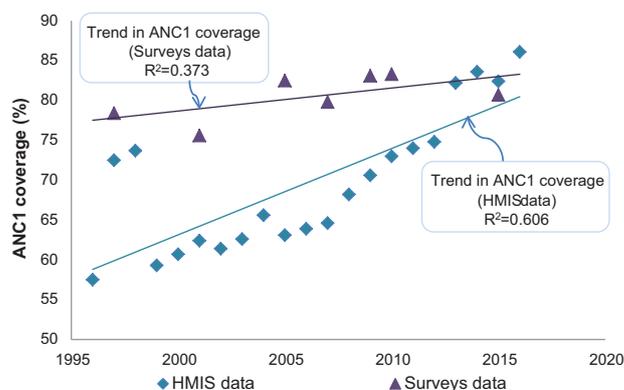
Figure 2. Trends in antenatal care 1 coverage.
Data Sources: Health Management Information System data included estimates from Public Health Statistics reports (2012, 2013, and 2014-2016); surveys data included estimates from Fertility and Reproductive Health Surveys (2001 and 2007), Integrated Household Living Conditions Survey (2009-2010), Multiple Indicator Cluster Survey (2009-2010), and Myanmar Demographic and Health Survey (2015-2016).

3.1.2. Delivery care

During the MDG era, the MMR decline in the Southeast Asia region was occurred in line with improvements in the proportion of deliveries attended by SBA (WHO-SEARO, 2016). The reduction of MMR in Myanmar also found together with increased SBA coverage (correlation coefficient; $r=-0.76$ between MMR [UN estimates] and SBA coverage [surveys data]).

The percentage of deliveries attended by skilled providers increased in the reviewed period (Figure 3). The SBA coverage as indicated in the routine HMIS revealed significant progress from 52% in 1996 to 78% in 2016 (Department of Health Planning, 2014; Department of Public Health, 2015; 2017). However, the progress measured in the surveys' data was not significant as the estimates are sparse around the (fitted) trend line. The series of FRHS reports show a gradual increase in SBA coverage 48% in 1991 to nearly 64% in 2007 (Department of Population and UNFPA, 2002; 2009). The 2005 and 2010 IHLCA gave higher estimates as 73% and 78%, respectively (Ministry of National Planning and Economic Development and UNDP, 2011). The 2009-2010 MICS data were in-between these estimates at 70.6% (Ministry of National Planning and Economic Development and Ministry of Health, 2011). Despite the high coverage reported in the earlier reports, the most recent 2015-2016 MDHS reveals a much lower coverage: Only 60% of deliveries had been attended by skilled persons, with a noticeably lower rate in the rural areas at 52.3% (Ministry of Health and Sports, 2017b).

On examination of the discrepancies between these estimates, we found that 40 selected clusters were not visited during the fieldwork of MICS because of inaccessibility due to security reasons. These sites were then replaced with other clusters of similar size. However, the situation in these new geographical areas is likely to systematically differ from the inaccessible areas (Ministry of National Planning and Economic Development and Ministry of Health, 2011). Thus, SBA coverage is more likely to be overestimated in the new areas when compared to the inaccessible areas, and as such, the overall average is exaggerated.

The IHLCA reports also show higher estimates of SBA coverage. The coverage could be exaggerated due to differences in the definition of a SBA, which varies nationally. In Myanmar, SBAs are defined to include doctors, nurses, lady health visitors (LHVs, who are experienced midwives [MWs] and supervisor of the MWs) and MWs (Ministry of Health and Sports, 2017b). The auxiliary MWs (AMWs) and traditional birth attendants (TBAs) are not included in SBA

On reviewing the survey reports with regard to their SBA definition; the IHLCA reports mentioned as "skilled personnel (doctor, nurse, or midwife), excluding TBAs" (Ministry of National Planning and Economic Development and UNDP, 2007. p. 28). The IHLCA report did not mention regarding the role of the AMW, and if AMWs were considered as SBA; the estimates for ANC and delivery by SBA tend to show a higher coverage than other reports.

Not only are deliveries supposed to be assisted by skilled persons but also the place of delivery is important to ensure safe delivery. In Myanmar, the percentage of deliveries at a health facility is much lower than that of delivery by SBA: More worsening in rural areas. According to the 2009-2010 MICS, the percentage of delivery in a health facility was 36.2% (65.2% urban vs 24.5% rural areas), while the SBA coverage was 70.6% (Ministry of National Planning and Economic Development and Ministry of Health, 2011). Similarly, when the SBA percentage was 60.2% (urban 87.8% and rural 52.3%), the institutional delivery was 37.1%: About 70.1% in urban versus 27.6% in rural areas (Ministry of Health
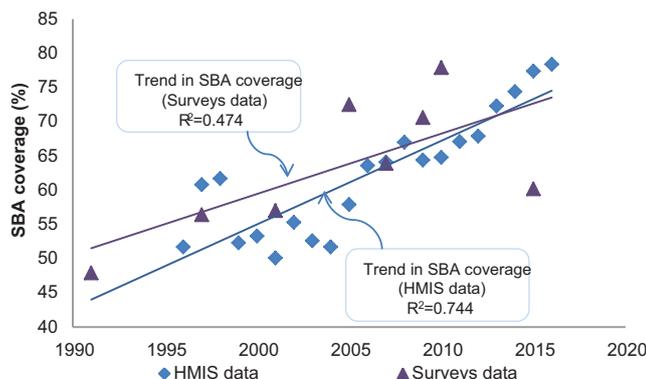
Figure 3. Trends in percentage of deliveries attended by skilled providers.
Data Sources: Health Management Information System data included estimates from Public Health Statistics reports (2012, 2013, and 2014-2016); surveys data included estimates from Fertility and Reproductive Health Surveys (2001 and 2007), Integrated Household Living Conditions Survey (2009-2010), Multiple Indicator Cluster Survey (2009-2010), and Myanmar Demographic and Health Survey (2015-2016).

and Sports, 2017b). Low institutional delivery percentages show that many births took place at home, those delivered by midwifery assistance include. It may be attributed to poor access to health facilities in rural areas due to long distances and a lack of appropriate facilities (Ministry of Health and Sports, 2017b).

3.2. Contraceptive Uptake and Fertility Decline

The inverse trend of CPR and TFR is presented in Figure 4. The contraceptive prevalence was the most promising indicator in Myanmar, showing significant progress both measured as any methods or as modern methods. Very low contraceptive use was observed in 1991 at 16.8% with only 13.6% of the women using modern methods (Department of Population and UNFPA, 2002). Furthermore, CPR continuously increased and did not vary much among different surveys. The trend lines are very steep with significant progress ($P<0.01$). The latest nationwide survey, MDHS 2015-2016 gave an estimate of CPR (any methods) as 52.2%, and CPR (modern methods) was estimated at 51.3%, showing a very low use of traditional methods (Ministry of Health and Sports, 2017b).

With an increased use of contraceptives, Myanmar has demonstrated a decreasing trend in fertility (correlation coefficient between TFR and CPR of any method=−0.71). The 1983 census revealed a TFR of 4.7 (urban 3.4 and rural 5.2), while the 2014 census reported a TFR of 2.5 (urban 1.9 and rural 2.8) (Department of Population, 2016b). Similarly, the 2015-2016 MDHS exhibited a TFR of 2.3 with 1.9 in urban and 2.4 in rural (Ministry of Health and Sports, 2017b). Despite this progress, it is important to note the TMFR. For a society like Myanmar, childbearing and contraceptive use is generally confined to married couples (Department of Population and UNFPA, 2009). At the time of the census in 2014, TFR was around 2.5, and TMFR stood at a much higher level of 5.0 (Department of Population, 2016b). The TFR and TMFR differed considerably in both urban: 1.9 versus 4.4 and rural areas: 2.8 versus 5.2 (Department of Population, 2016b).

In relation to contraceptive use, the problem of unsafe abortions should be put into consideration. As per the findings from the 2005 maternal mortality survey, approximately 10% of maternal deaths were from abortion-related causes (MCH section, 2014). Likewise, septicemia was the leading cause of maternal mortality in 2008, while septic-induced abortion as a result of unsafe abortions was a contributing factor (MCH section, 2014). In spite of the increased trends in contraceptive use among Myanmar women, a considerable amount of unintended pregnancies end up in unsafe abortions and contributing to maternal mortality.

3.3. Regional Variation in Maternal Mortality and Fertility

Even with the existence of some controversy and discrepancies, nationwide surveys and reports provide sufficient information to present the variation in MRH indicators with temporal trends. Moreover, the 2014 Myanmar Census and the very first Myanmar Demographic and Health survey 2015-2016 provided stronger evidence to reflect the reproductive health situation up to the sub-national level. The MRH indicators with variations among different States and Regions are summarized in Table 1.
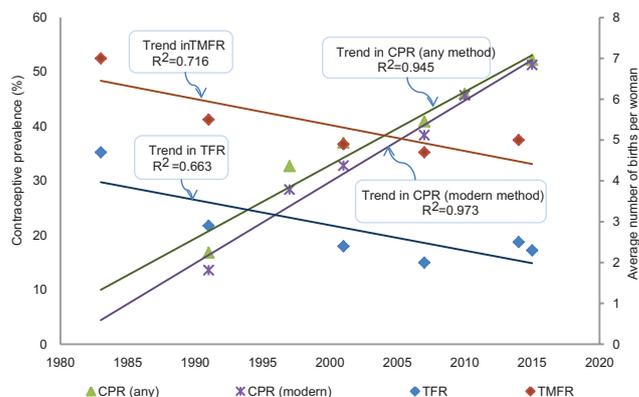
Figure 4. Trends in total fertility rate and total marital fertility rate and contraceptive prevalence of modern and any methods.
Data Sources: Contraceptive prevalence rate (CPR) (any) and CPR (modern) included estimates presented in Fertility and Reproductive Health Survey reports (2001 and 2007), Multiple Indicator Cluster Survey (2009-2010) and Myanmar Demographic and Health Survey (2015-2016). TFR and TMFR included estimates presented in FRHS reports (2001 and 2007) and Thematic Report on Fertility and Nuptiality of the 2014 Myanmar Census.

Table 1. Regional variation in major indicators of reproductive health in Myanmar.

Residence/ State/Region	MMR	TFR	CPR	ANC with SBA (ANC 1)	ANC with SBA (ANC 4+)	% of Delivery by SBA
UNION	281.6	2.51	51.3	80.7	58.6	60.2
Urban	192.5	1.91	57.3	94.9	84.2	87.8
Rural	309.7	2.78	49.1	76.5	50.8	52.3
Kachin	269.7	3.04	41.6	80	58.3	63.7
Kayah	276.1	3.51	50.6	93.3	68.8	53.2
Kayin		3.37	39.5	71.7	52.7	49.6
Chin	356.7	5	25.2	73.5	39.9	35.6
Sagaing	271	2.45	51.1	84.8	54.4	65.3
Tanintharyi	157.1	3.31	43.3	80.6	60.3	65.3
Bago	315.6	2.36	60.1	79.5	58.1	62.9
Magway	343.6	2.29	45.4	82.5	57.1	68.4
Mandalay	279.7	2.12	55.3	85.4	67	78.7
Mon	216.9	2.52	44.6	93.2	63.4	66.8
Rakhine	314.3	2.76	36.9	71.1	40.3	29.7
Yangon	213.3	1.85	60.2	94.6	84.6	82.5
Shan	278.3	3.07	46.1	68.1	46.9	46.7
Ayeyawady	353.7	2.81	55.4	78.3	57.2	50
Nay Pyi Taw	198.1	2.42	54.7	78.9	56.1	66.5
🟩	<270%	<2.5%	>50%	>80%	>60%	>65%
🟨	270-300%	2.5-3.0%	40-50%	75-80%	50-60%	50-65%
🟥	>300%	>3.0%	<40%	<75%	<50%	<50%

Data Sources: Maternal mortality ratio and total fertility rate from the 2014 Myanmar Census; contraceptive prevalence rate, antenatal care and skilled birth attendants from Myanmar Demographic and Health Survey (2015-2016).

In general, the regions with low coverages of ANC and delivery by SBA tend to have a high MMR. More importantly, the above-presented data indicate the country situation at the end of the MDG era, forming the reference for monitoring the progress of Sustainable Development Goals (SDGs).

4. Discussion

Although Myanmar could not meet the MDG 5 target, the maternal mortally ratio was significantly reduced during the MDG era with regard to improvement of ANC coverage, CPR, and deliveries by SBA.

Myanmar country data on MMR were diverged across the data sources. The country civil registration and vital statistics (CRVS) system reported a lower MMR. The low MMR can be attributed to underreporting, as the reporting status was incomplete. And on reviewing the mortality surveys' data, the MMR was increased between the two surveys. These national mortality surveys attempted to provide MMR estimates on different periods and conducted by different agencies, but the comparability is uncertain as we could not obtain full information on the methods used for model estimation in each survey. However, the MMR estimates from these two national mortality surveys are included in the analysis for estimation of MMR by UN inter-agency group (WHO, 2018c). Regarding the census data, the Thematic Report on Maternal mortality (2014 Census) has provided some explanation for discrepancies between data sources. The estimation of the maternal mortality data presented in the World Health Statistics was undertaken by UN inter-agency group: WHO, UNICEF, UNFPA, the World Bank, and UNPD (WHO, 2015b). The estimations were carried out based on a classification of countries into having complete and reliable data, having incomplete or deficient data, and countries with no data (Department of Population, 2016a). As Myanmar belongs to the latter, the estimation had to be done using a set of covariates: Gross domestic product per capita, general fertility rate (live births per woman aged 15-49), and skilled attendants at birth as a proportion of live births (Department of Population, 2016a). The national mortality surveys data are also encompassed in the analysis (WHO,

2018c) and the random intercepts effects for countries, and regions are incorporated in the model estimates (Department of Population, 2016a). On comparing MMR, the UN estimation for 2013 was 200 per100,000 live births with a range of uncertainty from 120 to 350, and MMR of the 2014 Myanmar Census was 282/100,000 live births (95% CI: 176-387). Each estimate was found to be within the range of the other, and the difference between these two estimates was considered as not being statistically significant (Department of Population, 2016a). Thus, a trend analysis was applied to the UN estimates and the 2014 census data, which reveals a significant reduction of MMR in Myanmar.

This significant decline in maternal mortality is believed to be as a result of improvements in the coverage of reproductive health services: Care during pregnancy and delivery care by skilled health providers. Receiving ANC with a skilled person helps the women to seek services for and understand the warning signs during pregnancy and childbirth (UNICEF, 2018). Although ANC 1 coverage did not show a significant improvement, it reached the commitment expressed in the Five-year Strategic Plan of Reproductive Health (2014-2018) to attain 80% ANC coverage (MCH section, 2014). However, the ANC coverage of four visits and above (ANC 4+) was still very low, more pronounced in the rural areas as only half of the pregnant women had ANC 4+. There is a need for improvement. The WHO recommends a minimum of four ANC visits; and the recommended visits are now moving to eight contact points (WHO, 2016b). In addition to the number of visits, the correct timing of ANC attendance and the quality ANC is equally important.

Another indicator closely related to MMR that is also included in SDG targets (target 3.1.2) is the proportion of births attended by skilled health personnel. The SBA coverage in Myanmar increased to a certain extent, but did not show any significant progress and is yet to reach a satisfactory level. The Five-year Strategic Plan of Reproductive Health (2014-2018) had a target of ensuring the SBA assisted 80% of deliveries. However, the 2015-2016 MDHS reported only 60% coverage (MCH section, 2014; Ministry of Health and Sports, 2017b), and many of these deliveries did not take place in health facilities. Among the women delivered by SBA, 70% of urban women gave birth at health facilities, whereas 70% of rural women delivered at home (Ministry of Health and Sports, 2017b). The role of the enabling environment for institutional delivery has come into attention, especially in rural areas. Along with increasing institutional deliveries, some health facilities are poorly staffed and not well equipped. These conditions encourage home deliveries by skilled providers in non-conducive environments; in case of pregnancy complications, there is a high likelihood of losing both the baby and the mother. An inequitable distribution of the health workforce is often seen, even in countries with high national health worker densities (WHO, 2017). Rural and hard-to-reach areas tend to be understaffed when compared to urban areas, thereby contributing a negative effect on the accessibility to the service (WHO, 2017). This is the reality also in Myanmar.

The contraceptive prevalence in Myanmar significantly increased, both for modern and any methods. Myanmar was able to reach the target set for FP 2020 commitments, i.e., to increase the CPR of modern methods to 50% by 2015, but still need to increase more to meet the target of CPR 60% and above by 2020 (Ministry of Health and Sports, 2017b). Even though all the reproductive health services are provided in an integrated manner to ensure the continuum of care; FP services are easier to provide into the community as women are at liberty to choose suitable contraceptive methods. Being a FP 2020 focused country also reinforces Myanmar toward universal access to FP and contraceptive services.

The improvement in contraceptive coverage also affects fertility level. Although the TFR of Myanmar did not significantly reduce on a yearly basis, it did show a decreasing trend and stood nearly at the same level as the global and regional averages (2.65 and 2.35) in 2015 (Department of Population, 2016b). However, TFR is not sufficient enough in reflecting the country's fertility situation; the TMFR which is twice that of TFR needs to be factored in as well. Increased age of first marriage and the relatively high proportion of young, unmarried women in Myanmar have also contributed to lower the average number of children per woman in the reproductive age (Department of Population, 2015).

In Myanmar, non-marriage generally results in a non-participation in reproduction; thus, the relatively high proportion of women who never married plays a significant role in the determination of fertility (Department of Population and UNFPA, 2009). According to the 2014 census, 12% of women in the age group of 50-54 were never married (Department of Population, 2016b). Furthermore, in the 2015-2016 MDHS, only 60% of women in the reproductive age group (15-49 years) were currently married; 14% of women in the age group of 45-49 were never married (Ministry of Health and Sports, 2017b). For the above-stated reasons, it is advisable to include the estimates on TMFR in future demographic and health surveys, as it was not reported in the recent MDHS.

Moreover, assessments of the fertility level in Myanmar have generally only included married women in the samples; with a consideration of the socio-cultural aspect. The same reasoning is applied to surveys on contraceptive use. On the other hand, even though contraceptive use increased among Myanmar women, many unintended pregnancies end up in unsafe abortions, which also is an important factor linked to maternal mortality. In Myanmar, abortion is legally restricted and only permitted to save the life of the woman (United Nations, 2014). This is not only the case from a legal point of view but also a cultural and religious perspective that constraints access to induced abortion.

The main challenge in analyzing and comparing reproductive health indicators from various reports is the inconsistency of the data. For example, ANC and SBA coverage data from the MICS report, as explained in the findings, and the definition of SBA in IHLCA reports are two recognizable examples which can produce different estimates. Fortunately, we get more reliable estimates at the end of MDG era, from the 2014 Myanmar Census and the 2015-2016 MDHS. Thus, all the indicators we presented were summarized in a table as the reliable estimates are available up to the sub-national level, and these can help to set priorities (WHO, 2006) by the program planners and implementers. For example, the regions having MMR of 50-250/100,000 live births indicates that problems may exist in the quality of care for labor/delivery, while the region having MMR higher than 250/100,000 live births may also have problems in access to services (WHO, 2006).

These discrepancies among the data sources also demonstrate the need for a stronger health information system for the country. The current HMIS collects data starting from the most basic unit (township) up to the national level. This routine reporting also provides an input to the country's CRVS, which is being established to be a stronger monitoring system that strengthens the existing one. As of now, the Ministry is trying to strengthen the routine HMIS using an electronic reporting system, replacing the current routine reporting, which uses paper sheets. It started in 2014 as a pilot and was expanded yearly, covering two-thirds of the nation as at the end of 2016 (Department of Public Health, 2017). It would be better to cover the whole country, to reduce contradictions between the data of different reports and to obtain reliable estimates for monitoring of SDGs.

5. Conclusion

Although the MMR in Myanmar significantly declined in 1990-2015, it failed to reach a targeted low level. Myanmar still needs to improve reproductive health services to increase ANC coverage, deliveries by skilled persons, and institutional delivery. Although the contraceptive prevalence increased significantly in Myanmar giving a reduction in TFR; there is a need to factor in the total marital fertility, which has not decreased much. Moreover, the issue of unsafe abortions is another parameter highlighting the need for contraceptive services to improve more. Paying attention to in-country differences and focusing more on the geographical and service areas with poor MRH status is a challenge that should be taken head on to reduce maternal mortality.

Author's Contributions

Myint Myint Wai conceptualized the study framework, compiled the published data from different reports, performed analysis, and drafted the manuscript. Johanne Sundby conceptualized the study framework and gave intellectual inputs to find relevant information, interpret the data, and draft the manuscript. Thein Thein Htay and Espen Bjertness contributed to finding relevant information and interpretation of the data and information. Tippawan Liabsuetrakul contributed to interpretation of the data and information. All the authors have read and approved the final manuscript.

Ethics

The data were compiled from publicly available data sources.

Availability of Supporting Data

All data are secondary data from publicly available data sources.

Conflicts of Interest

No conflicts of interest to disclose.

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