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RESEARCH ARTICLE

MATERNAL AND CHILD HEALTH IN BANGLADESH: TRANSITIONING FROM MDGs TO SDGs

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ABSTRACT

The strength and resilience of a country's national health system is intrinsically linked to factors related to maternal and child health (MCH). The centrality of maternal and child health was reflected in the Millennium Development Goals (MDGs), with two of the eight goals focused on reducing child mortality (goal 4), and improving maternal health (goal 5). While progress towards goals 4 and 5 varied significantly on a global scale, during the Millennium Development period the world saw child mortality rates reduced by more than half, and maternal mortalityratios lowered by nearly half. Bangladesh is one such country that has achieved incredible progress in the reduction of child and maternal mortality (Hossain *et al*., 2014). The introduction of nation-wide community health care programs and interventions has significantly improved the health and wellbeing of women and children, providing them with accessible health services and support. However, high rates of malnutrition, and the increasing prevalence of non-communicable diseases continues to threaten the achievements made. The purpose of this systematic review paper is to examine the trend of improvement in maternal and child health in Bangladesh during the Millennium Development period (1990 to 2015), and to provide highlights and recommendations for further health programming in the country. As the world shifts from the MDGs to the sustainable development goals (SDGs), this is a particularly critical moment for countries like Bangladesh to reflect on the successes and failures that defined the MDG period. Along with sustainability of overall development, equity and universal health coverage, maternal and child health are a major focus of the SDGs. To evaluate whether Bangladesh is capable of meeting its SDG targets related to maternal and child health, this paper will review Bangladesh's progress in achieving MDGs 4 and 5 during the Millennium Development period. For clarity, maternal and child health sections are divided into three time periods: Phase I from 1990-2000, Phase II from 2001-2010 and Phase III from 2011-present.

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INTRODUCTION

With a population of more than 150 million, Bangladesh is the eighth most populous country in the world (Chowdhury et. al, 2013). Even though natural disasters and endemic poverty has hindered economic growth and development, Bangladesh has shown incredible progress in reducing maternal and child health mortality. According to the WorldBank database (2015), in 2013, Bangladesh's yearly GDP growth was 6.03%, lower than neighbouring India (6.9%). That being said, Bangladesh had more notable gains in maternal and child health when compared to its higher income neighbours (Table1).While it may seem paradoxical, Bangladesh's success in lowering maternal and child mortality given its economic constraints makes Bangladesh a very interesting global health case study.

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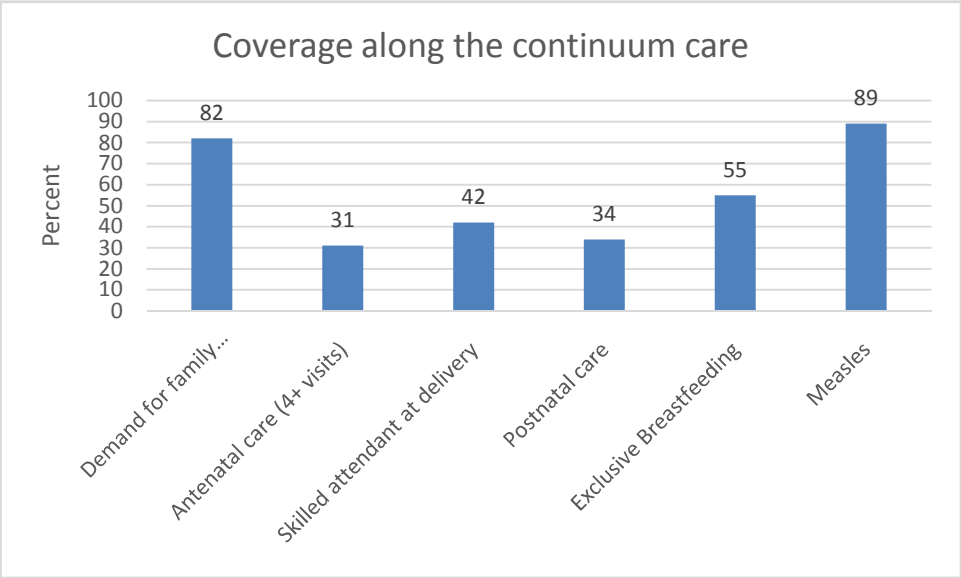
Millennium Development Goals and Sustainable Development Goals

This paper will only focus on MDGs 4 and 5, whichare respectively, reduction in child mortality and improvement in maternal health. The new sustainable development goals also focus on maternal and child health. Section 2.2 and section 3.2 of SDGs directly address the global aim of maternal and child health, illustrating the continued importance of MCH on the global health stage. This paper will provide insight on some of Bangladesh's MCH achievements, and also comment on the country's probable challenges in meeting its maternal and child health SDG targets. The evidence generated from this paper will contribute to the ongoing body of research that evaluates health outcomes in Bangladesh, and its transition to the new SDGs.

Table 1. Bangladesh's health outcomes compared to other South Asian countries (2015)

Countries	Infant mortality rate (per 1000 live births)	Under 5 mortality rate (per 1000 live births)	Maternal mortality ratio (per 100,000 live births)
Bangladesh	31	38	176
Pakistan	66	81	178
Nepal	29	36	258
India	38	48	174
Sri Lanka	8	10	30
Maldives	7	9	68
Afghanistan	66	91	396

Source: World Bank, 2015



Source: World Bank, 2011

Figure 1. Summary of maternal and child health coverage along the continuum of care in Bangladesh in 2015

Methodology

This systematic review is based on available primary and secondary journals, reports and manuals of different organization and stakeholders on MCH-related issues. The method followed for this review included searching of different websites online and collecting and reviewing published and unpublished materials on MCH interventions (Figure 2). Recent evaluations and relevant documentation of different MCH programmes were also examined. Both published and unpublished journal articles from 1990-2015 were selected including materials on relevant health systems and interventions in the public, not-for-profit, non-governmental and private sectors. Keywordssuch as maternal, child, neonatal, health, intervention, programmes, health status, Bangladesh, MDG, SDG etc. were used while searching the web.

Selection strategies

The inclusion criteria for this systematic review included: only published literature from 1990 onwards, description of well-designed methodology, research studies only based on Bangladesh. After excluding articles that do not meet the criteria, total of 49 studies were selected to be included in the current review.

MATERNAL HEALTH

1990-2000: Phase I

Annual Bangladesh demographic and health survey (BDHS) data shows that the maternal mortality rate has significantly dropped in Bangladesh since1990 to2000. According to BDHS, in 1990 the maternal mortality ratio in Bangladesh was 569 deaths per 100,000 live births–one of the highest in the world (Mitra *et al.,* 1994). Lack of emergency obstetric care, poor healthcare infrastructure for reproductive health, and other social determinants (such as low literacy rate, specifically female literacy) contributed to the high maternal mortality rate in Bangladesh. According to the1993-1994 BDHS survey, 73% of women in various stages of pregnancy did not receive any antenatal health care. During the 1990s, nearly 96% of births occurred at home, which is one the main reasons for the extremely high rates of maternal mortality during this period (Kantner*et al.,* 1996) and evidently the number of births occurred at home decreased over time. Maternal and reproductive health are intimately related since high fertility rates lead to higher risk in maternal health. According to World Bank, in 1990 the average number of births per woman were 4.5 whereas in 2000 the number of births per woman decreased to 3.2. Lower fertility rates are an indicator of development and improved reproductive health, and thus, the goals of MDGs 4 and 5.

2001-2010: Phase II

During the first decade of the new millennium, female education and empowerment began to impact the health outcomes of women and children in Bangladesh. As expected, during this period the maternal mortality ratecontinuously decreased. In 2001, the maternal mortality ratio was 320 per 100,000 live births, while in 2006 the estimated maternal mortality ratio was 290 per 100,000 live births, according to World Bank data (2015).

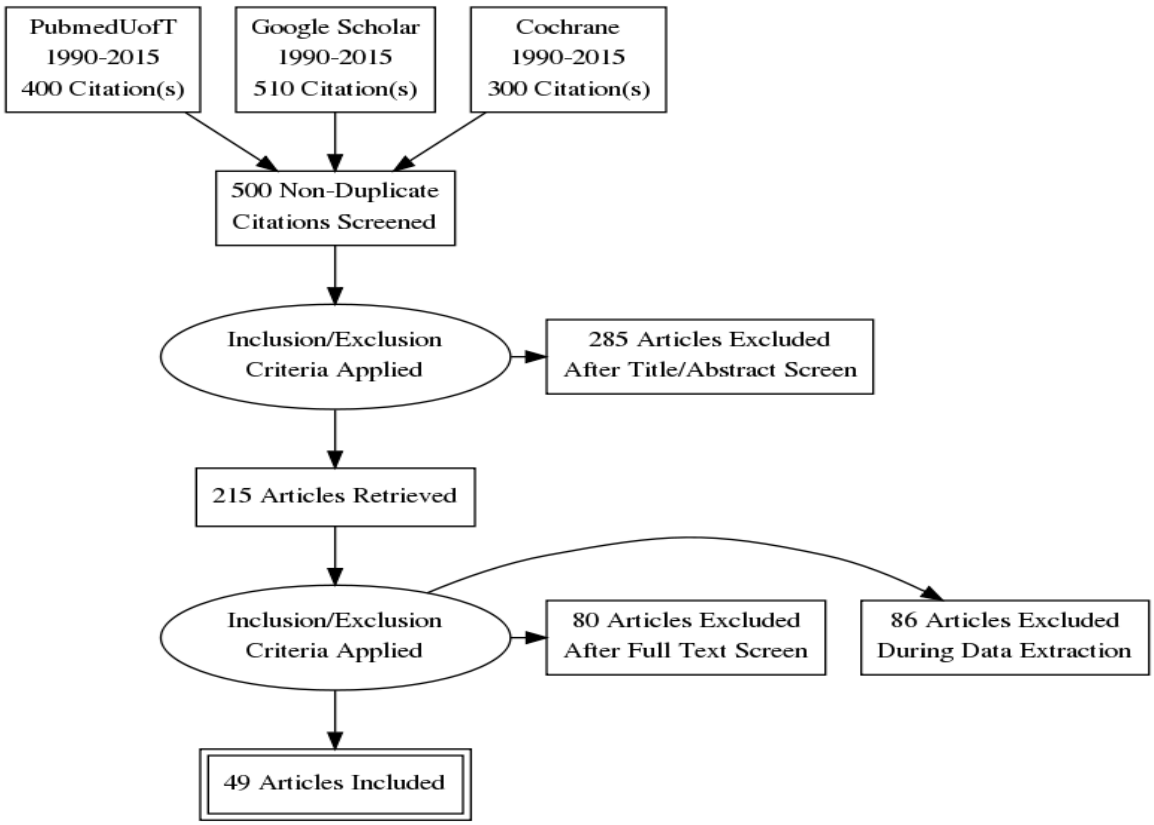


Figure 2. Overview of systematic review process

This reduction indicates that the country was making progress towards achieving MDG 5 goal by 2015. The associated factors driving this decrease are largely related to increased access to antenatal care services, as well as improved tetanus toxoid vaccination uptake by pregnant women (BDHS, 2007). Between1989-1992, the proportion of mothers who attended at least one antenatal care appointment was only 28% (Mitra *et al.,* 1994). This number nearly doubled according to 2002-2006 data, with 49% of mothers receiving at least one antenatal care visit during this time period. This improvement in antenatal care service uptakewas largely the result of community based approaches to maternal health (BDHS, 2007).One of the aims of MDG 5 was to reach the goal of 50% of births being attended by skilled personnel. Even though the number of births in a medical care facility increased in this decade (Chakrobort*yet al.,* 2003), an astounding 85% of deliveries took place athome. As a result, maternal mortality remained stubbornly high during this period. Fertility rate (births per woman) also decreased during this period of time. In 2010, the number of births per woman was 2.3 which illustrated an astounding decreased from 2000 which was 3.2 births per woman.

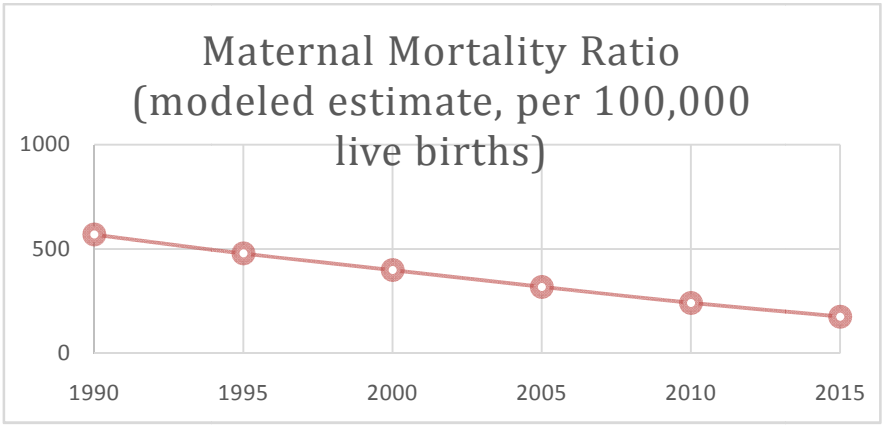
2011-2015: Phase III

According to El Arifeen *et al*. (2015) the maternal mortality ratio was 176 per 100,000 live births in 2015, whereas in 2011 it was 288 per 100,000 live births, which shows the rapid decline of maternal mortality ratio (El Arifeen *et al.,* 2015). Although Bangladesh did not reach the intended goal of MDG 5—a maternal mortality ratio of 140 per 100,000 births by 2015—it can be said that the country is still on track to reach the goal. The reduction in maternal deaths that did occur between 2011 and 2014 was largely due to an increase in the uptake of antenatal care, according to BDHS data. Antenatal care from any provider has increased by 11 percentage points from 68% in 2011 (BDHS, 2011) to 79% in 2014. Further, antenatal care service uptake from a medically trained provider during the same period has increased by 9 percentage points from 55% to 64% (BDHS, 2014). According to BDHS data from 2014, between 2011-2014, 37% of births were delivered at health facility and the number of antenatal care visits, education level, and wealth status have a positive relationship with the likelihood of delivering in a health facility. The proportion of deliveries attended to by medically trained providers doubled from 16% in 2004 (BDHS, 2004) to 32% in 2011, andincreased to 42% in 2014 (BDHS, 2014). In addition to antenatal care increases, the occurrence of postnatal checkups from a medically trained provider within two days of delivery increased from 20% in 2007 to 27% in 2011, to the level of 34% for mothers (BDHS, 2011). The number of births per woman in 2014 were 2.2, which demonstrated that there is a steady rate in fertility rate from 2010 (which was 3.2) to 2014.

CHILD HEALTH

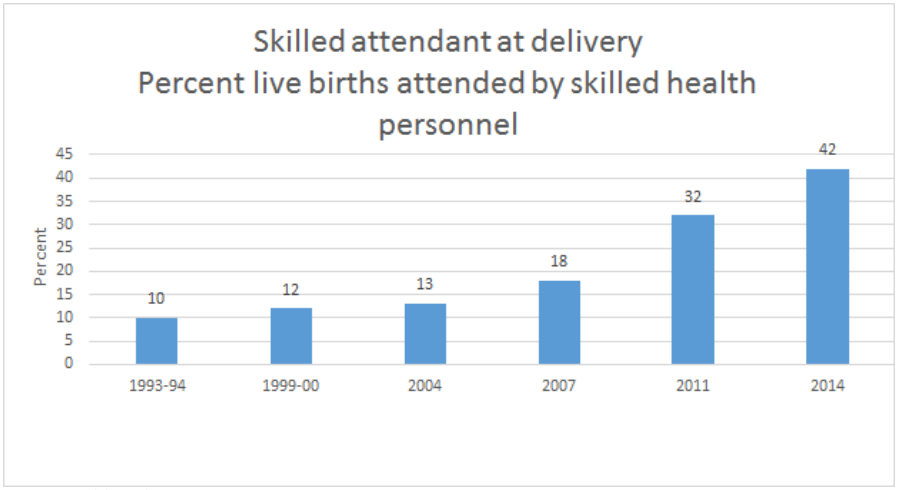
1990-2000: Phase I

Under-5 mortality rate and infant mortality rate n a given population are two indicators of child health. According to the World Bank Data of 1990, the under-five mortality rate was 143.7 per 1000 live births. In 1990, the number of infant mortality ratewas 100 deaths per 1,000 live births, one of the highest in comparison to neighbouring countries (India: 88 per 1,000 live births, Sri Lanka: 18 per 1,000 live births) (World Bank, 2015). Children's chance of survival was largely dependent on the mother's age, mother's education, as well as the household's education level since these are some of the most important socio-economic factors which influence health (Kamal, 2012).



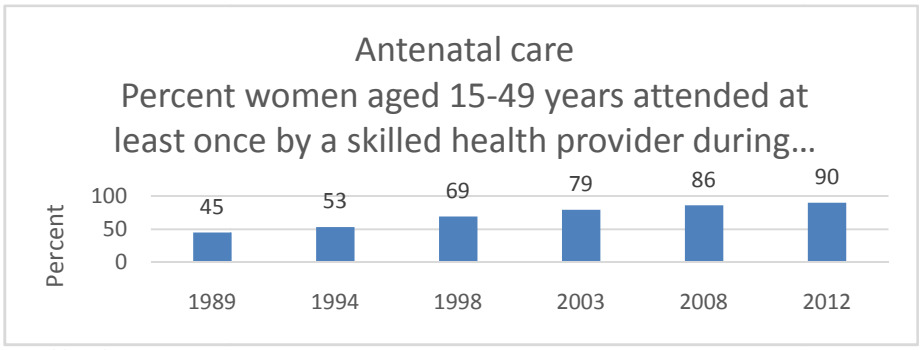
Source: WorldBank, 2015

Figure 3. Decrease in maternal mortality ratio from 1990 to 2015



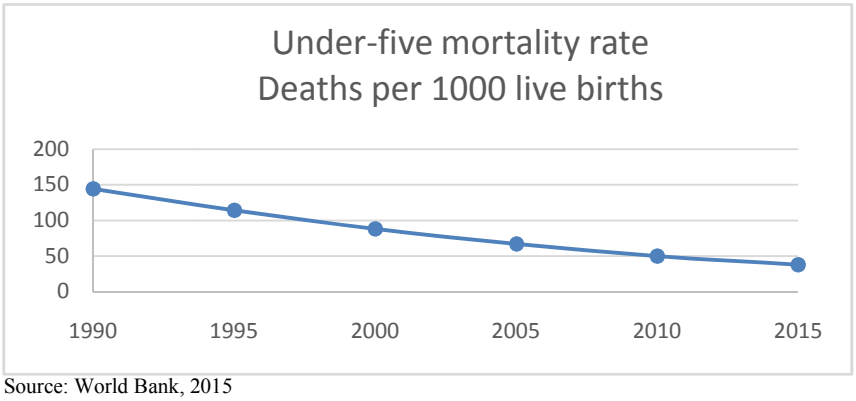
Source: WorldBank, 2015

Figure 4. The steady increase of percent of delivery attended by skilled health personnel



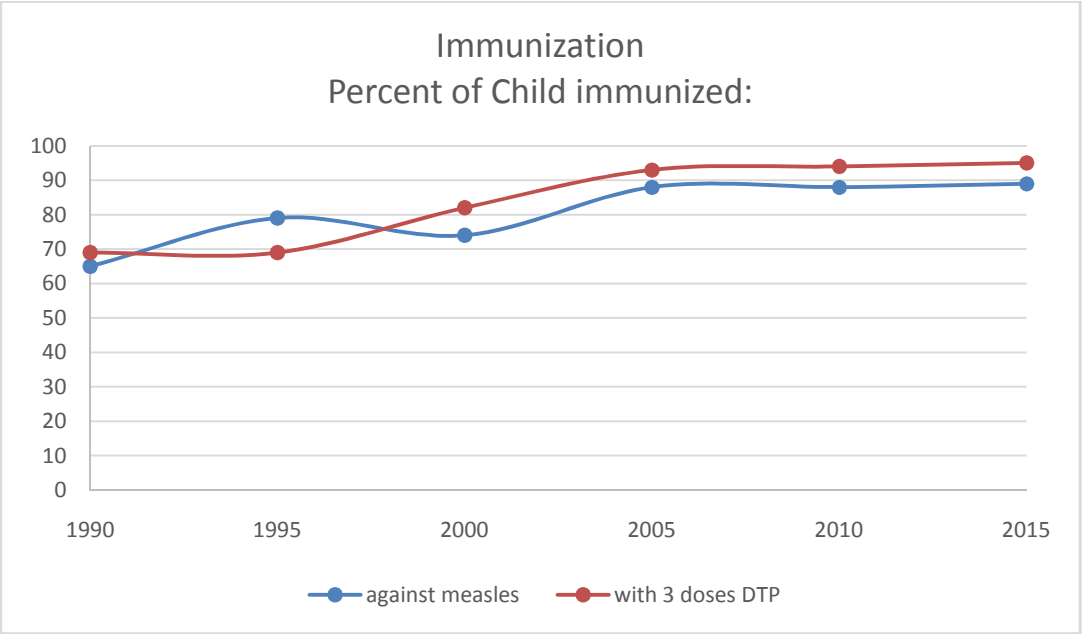
Source: WorldBank, 2015

Figure 5. Increase of women (aged 15-49 years) attended at least once by a skilled health provider during pregnancy



Source: World Bank, 2015

Figure 6. Under-five mortality rate from 1990 to 2015



Source: World Bank, 2015

Figure 7. Bangladesh's universal immunization coverage

Mother's level of education is one of the most influential determinants of child survival because it is associated with many key determinants of health including, mothers' feeding behavior, understanding of breastfeeding, care seeking behavior during pregnancy and nutrition knowledge (Guldan, 1993). According to BDHS 1990-1993, the impact of education is evident: the under 5 mortality rate was halved for children who were born to mothers who have some secondary education (90 per 1000 birth), while it was 170 per 1000 births to mothers who have no education. Further, child mortality was significantly lower in urban non-slum households than in urban slums and rural households, due to more accessibility to healthcare services, better sanitation and clean water. The expanded immunization program that Bangladesh implemented was one of the most successful public health interventions in the context of reducing child mortality rates (Jamil *et al*., 1999). According to BDHS 1990-1993, extended immunization programme (EIP efforts were seriously considered only after 1985 when the country made a commitment at the United Nations to reach universal child immunization by 1990. Full immunization among children 12–23 months old increased from a negligible proportion in 1984 to almost 60% in 1993-1994. The rapid increase in full immunization was possible due to the development of infrastructure for vaccination in both rural and urban areas, the implementation of various clinical and outreach activities and by mass social awareness campaigns (Jamil *et al.,* 1999).

2001-2010: Phase II

In this decade, Bangladesh experienced a drastic decrease in its under-five mortality rate even though malnutrition continued to be a barrier to the health and wellbeing of young children during this period (UNICEF, 2008). According to UNICEF's 2008 annual report on Bangladesh, during 2003-2006, the under-five mortality rate reduced from 88 to 65 deaths per 1000 live births, at a momentous rate of 4.3% per year. With this in mind, the under-five mortality rate would have had to decrease by only 2.6% per year to attain the MDG target level of 50 per 1000 live births by 2015. Therefore, Bangladesh was on track towards meeting the under-fivemortality MDG target. That being said, the under-five mortality rate was considerably higher in rural areas than in urban areas due to lack of access to quality health care, lack of clean water and sanitation and above all, a higher prevalence of poverty (BDHS, 2007). In addition, the nutritional status of children did not improve significantly, which is still a leading cause of under-five mortality. According to Ahmed, Ahmed, Roy and Hossain (2014), 41% of children in rural Bangladesh were underweight and 12% of children were severely underweight. These figures point to the extreme poverty, food deprivation and lack of nutritional knowledge of caregivers that characterized many regions in Bangladeshduring this period (UNICEF, 2008). More positively, 82% of Bangladeshi children age 12-23 months were fully immunized during 2002-2006, which indicates that the EIP was an effective programme to increase childhood vaccination coverage (UNICEF, 2008).

2011-present: Phase III

Bangladesh has achieved its Millennium Development Goal 4 target for under five mortality ahead of schedule. In 2015, the under-five mortality rate was 38 per 1000 live births,surpassing the aim of 50 per 1000 live births by 2015 (BDHS, 2011). For children, a postnatal checkup from a medically trained provider within the first two days of life has increased from 20% in 2007 to 32% in 2014 (BDHS, 2014; Victora *et al.,* 2015). Bangladesh continued its success inattaining universal immunization coverage during this period, with 78% of children age 12-23 months receiving all the recommended vaccinations before their first birthday. Even though malnutrition is still a public health problem in Bangladesh, there has been some improvement in child nutritional status over the past decade (Khatun *et al.,* 2012). The level of stunting among children under-five has declined from 51% in 2004 to 36% in 2014. Further, the number of underweight children has declined from 43% in 2004 to 33% in 2014 (BDHS, 2014). As a whole. Bangladesh have experienced a positive change in all child health indicator since 1990 to 2015.

Table 2. Phase I: Maternal and Child health status in Bangladesh during 1990-2000

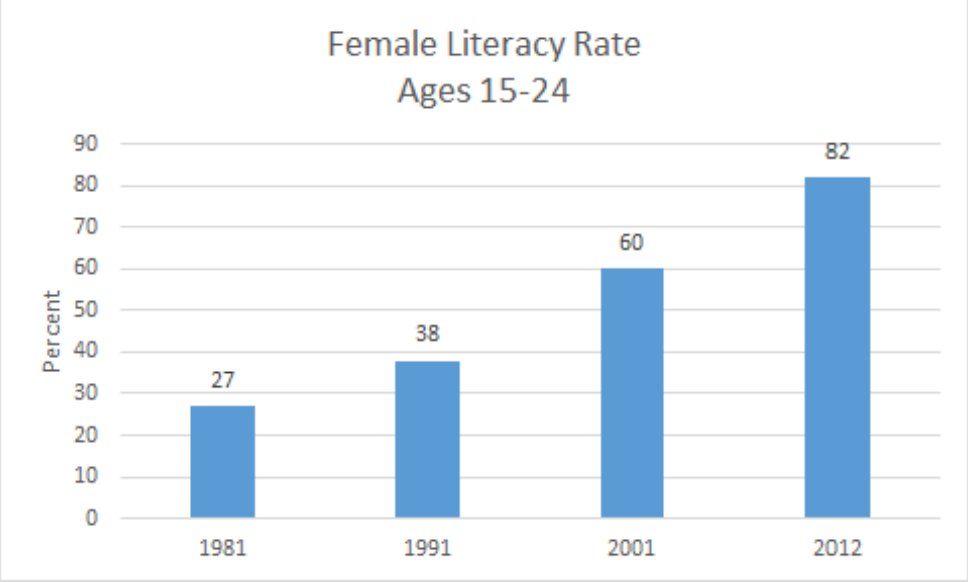
Study	Type of article	Intervention	Research topic	Key Findings
BDHS 1990-1993	Primary	N/A	Annual demography and health of Bangladesh	-Fertility rate, maternal mortality rate, child mortality rate decreased significantly -Contraceptive rate increased (2 percentage points annually)
Paul, B. K., & Rumsey, D. J. (2002).	Primary, retrospective, empirical survey research	Observational	Trained birth attendant, utilization of health facility	From 1995-1997 slightly over 11% birth occurred in health facility Determinants of utilizing health facility during child births are pregnancy related complication, followed by parents' education and income
Hossain, B.,1993	Quantitative meta-analysis	Data review	Human development trend in Bangladesh	-Female literacy rate increased in 1990-2000 decade faster than male literacy rate
Guldan, G. S., Zeitlin, M. F., Beiser, A. S., Super, C. M., Gershoff, S. N., & Datta, S. (1993).	Primary, retrospective survey research	Observational	Effect of maternal education in breast feeding practice	-direct correlation between mother's education and frequency of breast feeding
Chaudhury, A, 2005	Meta-analysis		Maternal and child health program evaluation in Bangladesh	-Community based maternal and child health programs not only help women and children health as well as men's health
Jamil, K., Bhuiya, A., Streatfield, K., & Chakrabarty, N. (1999	Meta-analysis	Policy review	Immunization programmes in Bangladesh	-Community health workers and proximity of healthcare centre determines the immunization coverage

Table 3. Phase II: Maternal and Child health status in Bangladesh during 2001-2010

Study	Type of Article	Intervention	Research Topic	Key Findings
Koblinsky, M., Anwar I., Mridha, Malay,Chowdhury, M. Botlero, R. (2008)	Secondary		Policies in Bangladesh for improving maternal mortality and maternal health	Emergency obstetric care needs to be scaled-up for universal coverage -Training more community health work should be main focus to increase antenatal care
Huq, M. N., & Tasnim, T. (2007)	Meta-analysis, Retrospective survey research		Maternal education and child healthcare in Bangladesh	-More partnership between NGO-Government will help Bangladesh to have universal coverage -Maternal education and child's well-being is correlated to each other
Bhuiyan, S, 2009	Primary	Using maternal and child handbook to observe continuum of maternal and child care	Maternal and child hand book, Continuum of maternal and child health care	Regardless of mother's age, education level and economic status, all women found using handbook is more convenient for them to track record of their and their children's health
Amin, R., Shah, N. M., & Becker, S. (2010).	Primary cross sectional study	Maternal and child health seeking behavior in three different rural areas in Bangladesh	Determinants of health seeking behavior in rural Bangladesh	Household's relative poverty status was a major determinant in health seeking behavior
Puett, C., Coates, J., Alderman, H., & Sadler, K. (2012).	Primary, cross sectional study	Community health workers, severe acute malnutrition	Role of community health workers for helping severe acute malnutrition	Effective training and efficient supervision of community health workers brought positive outcome in cases of severe acute malnutrition
Black, M., Baqui, A., Zaman, K., Arifeen, S. & Black, R. (2009).	Primary, longitudinal study	The correlation of mother's depressive syndrome and child' growth	Children's growth, maternal depression	Children of mothers with depressive syndrome are more likely to suffer from poor linear growth

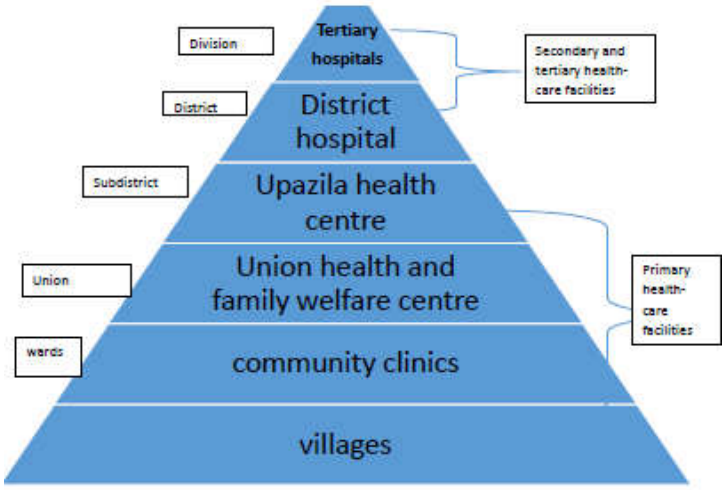
Table 4. Phase III: Maternal and Child health status in Bangladesh during 2011-2015

Study	Type of article	Intervention	Research topic	Key Findings
Ziael S., Naved, R., Ekstrom, E., 2012.	Primary, Retrospective study	N/A	Domestic violence child malnutrition	Mothers who have experienced intimate partner violence are more likely to have underweight, stunted children
BDHS 2014	Cross-sectional research	N/A	Demographics and health survey	-A sudden increase in antenatal care -Maternal and child mortality rate is on track -Malnutrition, stunting still exists
Khatun, F., Rasheed, S., Moran, A., Alam, A., Shomik, M., Sultana, M., Choudhury, N., Iqbal, I., Bhuiya, A., 2012	Primary, cross sectional study	N/A	Causes of neonatal and maternal deaths in Dhaka slums	Emergency obstetric care facilities needs to be more accessible in slum areas. Comprehensive package of services for communicable diseases during pregnancy, EOC and postnatal care
Nahar, T., Azad, K., Aumon, B., Younes, L., Shaha, S., Kuddus, A., Prost, A., Houwelling, T., Costello, A., Fottrell, E., 2012	Primary, Cross sectional study	scaling up coverage of a community mobilisation through women's groups for maternal, child and neonatal health in rural Bangladesh	community mobilisation, maternal and neonatal health, program coverage	Program coverage increases when women are involved in community mobilisation and community health programs.
Thomas, J., Yu, E., Tirmizi, N., Owais, A., Das, S., Rahman, S., Faruque, A., Schwartz, B., Stein, A.(2014)	Primary, Cross sectional research l	Observational	Correlation among Exclusive breastfeeding behavior and maternal knowledge, Attitudes and self-Efficacy	Increasing maternal knowledge, positive attitudes and self-efficacy regarding Exclusive breast feeding increase prenatal Exclusive Breastfeeding intention
Nguyan, P., Saha, K., Ali D., Menon, P., Manohar, S., Mai, L., Rawat, R., Ruel, M., 2012	Cross sectional	Observational	Maternal mental health and child malnutrition and overall health	The prevalence of maternal mental disorder is 31% in Bangladesh. Maternal mental disorders is strongly associated with children's diarrhoea and acute respiratory infections.



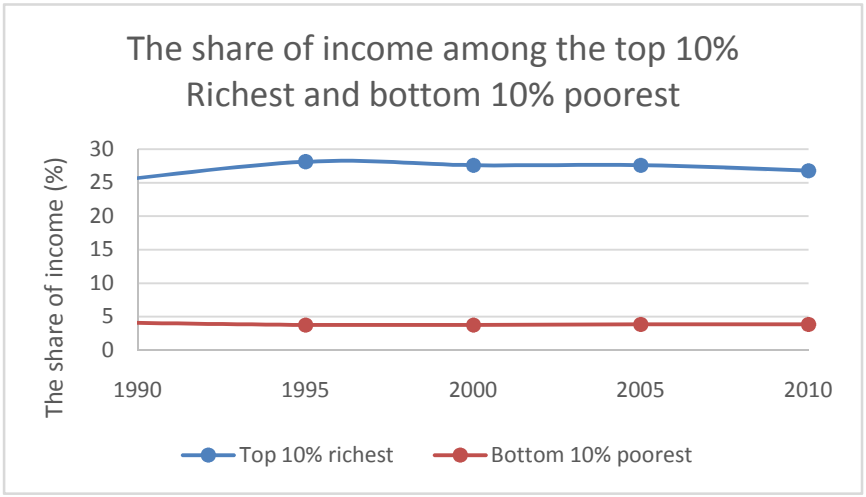
Source: Victora *et al*., 2015

Figure 8. Women's literacy rate in Bangladesh 1981-2012



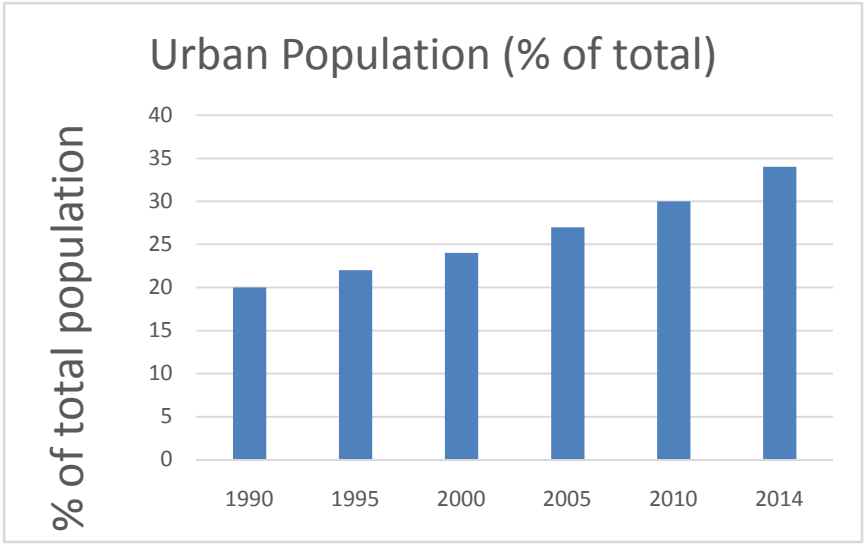
Source: Ahmed *et al*., 2013

Figure 9. Three tiered healthcare system in Bangladesh



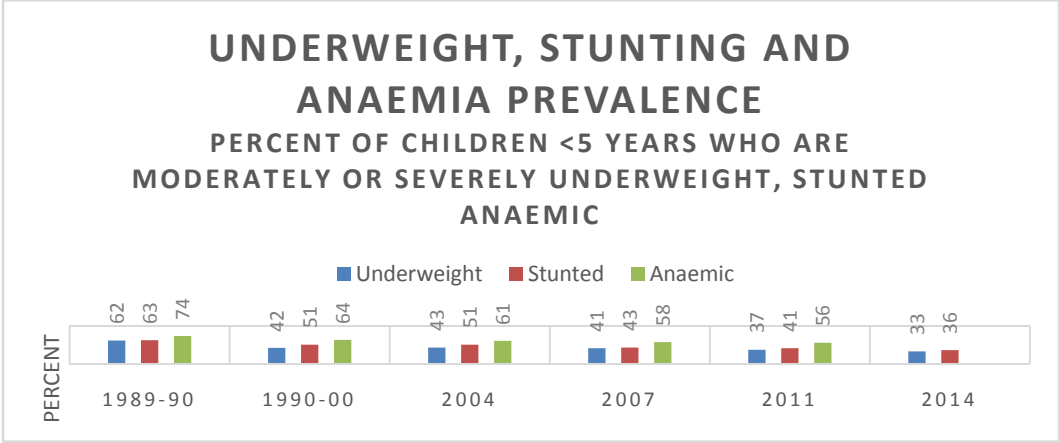
Source: Hossain, 2014

Figure 10. Trends in widening income equality among the top 10% richest and bottom 10% poorest



Source: World Bank, 2015

Figure 11. Rapid increase in percentage of urban population in Bangladesh



Source: World Bank, 2015

Figure 12. Prevalence of underweight and stunted children

DISCUSSION

From the aforementioned review, it is clear that Bangladesh has had considerable success in improving maternal and child health. The success of Bangladesh regarding maternal and child health shows that socio-demographic factors, such asgender equity, can lead to positive health outcomes. In addition, the experience of Bangladesh proves that collaboration and partnership among government and non-governmental organizations can be an effective framework for scaling-up health innovations. Further, the positive health outcomes experienced by Bangladesh illustrates that needs-based health interventions at the grassroots level can overcome the socioeconomic constraints that hinder accessibility to healthcare service. While the MDGs were sectoral, the SDGs are integrated and universal, making them much more cost effective, collaborative, participatory and efficient. This provides a favourable environment for Bangladesh to scale up its health innovations and interventions to create sustainable health systems for all. The following three tablesoutline the studies that have been done during the previously outlined three phases of maternal and child health in Bangladesh: From the systematic review, it is clear that several factors have substantially helped Bangladesh to progress towards MDG goals, including women's empowerment and women's education, the pluralistic healthcare system in Bangladesh, partnership among NGOs, external donors and government. From 1990 to 2000, most of the articles focus solely on physical health, with mental health rarely mentioned. Topics like the influence of urban slums on health were touched upon during this period, but were not adequately addressed until the later part of the decade. During 2000-2010, the social determinants of health were one of the main focuses for many researchers, and urban slums were hugely focused upon since the capital city of Dhaka was increasing at a very rapid rate. Due to the MDGs, the social and economic determinants of health dominated the research during this period. Maternal depressive symptoms were considered, but in the Bangladesh Demography and Health Survey, this topic was not discussed. Climate change also became a topic of discussion because of natural disasters, such as Cyclone Sidr in 2007, but still there is a research gap in climate change and its effects of health in Bangladesh.

Continuation of women's empowerment and scaling up of quality education

Previous research has found that Bangladesh has shown a rapid improvement in women's empowerment and women education, which is deeply intertwined with maternal and child health. According to a 1993 population trend report, literacy rates among women had increased faster than men's literacy rate because of the government's strong focus on girl's education through incentives, scholarships and funding (Hossain, 1993). According to UNICEF, between 2008 and 2012, 80% of females aged 18-24 years were literate, whereas their male counterparts it was 77% which shows the success of governmental initiatives. Most noteworthy, the rapid improvement in female literacy can be seen by the UNESCO Institute of Statistics data which shows that in 1990 the female literacy rate for girls 15 years and older was only 25.8%, whereas in 2010 it was 52.2%. Women's empowerment and girl's education are intimately intertwined. Taken together, empowerment and education have a strong correlation with improved maternal and child health, illustrated by Bangladesh's previous record of accomplishment. This association is due to the fact that when women and girls are empowered and educated, their health seeking behaviours change, which often leads to more comprehensive childcare practices. In the context of the SDG's, this association has been identified, with section five of the goals focused around women's empowerment and gender equality. As such, Bangladesh should continue to focus on women's employment and education, which will lead to even more development in maternal and child health. According to Huq and Tasnim (2007), mother's education and children's well- being are directly correlated since mother's healthcare seeking behavior, breastfeeding attitudes and nutritional knowledge depends on her education. In addition to women's education, the experience of Bangladesh over the last 25 years has illustrated the importance of empowering women in the political and economic spheres. In 1983, women's participation in economic activity was only 8%. This number climbed to 57% in 2011, emphasizing the fact that framing socio-economic and political programmes around women can have equally contribute to gains in maternal and child health (Chowdhury *et al.,* 2013). According to Chowdhury *et al.* (2013), the export-oriented apparel industry in Bangladesh has further increased women's economic participation, with women comprising more than 85% of the 3 million workers. Similarly, in the informal sector, 20 million recipients of microcredit loans are women. Also, politically, Bangladesh has had women in government for more than 20 years–more than half of its years of being an independent nation. Women occupy positions in government not only as heads of state, but as leaders of the opposition, speakers of the parliament, as well as ministers are also

women, indicating the widespread uptake of women's empowerment by the nation.

The role of NGOs

The women's empowerment initiatives and community-based health systemsthat exist in Bangladesh would not have been possible without the assistance of more than 2,000 NGOs in Bangladesh (Neufield and Sharma, 2015). Internationally acclaimed NGOs, such as BRAC and the Grameen Bank have helped Bangladesh in important aspects of maternal and child health, such as grass-roots level healthcare delivery and health promotion campaigns (Neufield and Sharma, 2015, Routh *et al*., 2004). A partnered, collaborative approach between the government of Bangladesh and NGOs has made it easier to deliver healthcare services to marginalized populations, andintegrate sectors of the healthcare system. To implement "universal health coverage for all" partnership and collaboration need to be even stronger, and outreach programmes needs to be scaled-up. The dynamic and innovative collaboration of NGO's has contributed to Bangladesh's progress in MDGs, at a low cost (El Arifeen *et al.,* 2013). In addition, the training of female community workers by NGOs in a culturally competent mannerhas further improved maternal, and child health.

Pluralistic health system in Bangladesh

According to Chowdhury *et al.* (2013), Bangladesh successfully integrated health education, health promotion and curative healthcare for maternal and child health through the creation of a three-tier health care service structure for people living in remote areas (Figure 9). The primary health care service in Bangladesh consists of Upazila health complexes (UHCs) at the sub-district level, Union health and family welfare centres at the Union (collection of few villages) level, and community clinics at the village level. Together, these three tiers of healthcare provide women and children with accessible healthcare services. Recently, the government of Bangladesh has launched emergency obstetric care in primary healthcare clinics to increase the number of deliveries in health facilities (Neufield and Sharma, 2015). In addition, pluralistic healthcare services have helped to increase prenatal and antenatal care visits by pregnant women, and increased healthcare seeking behavior among women (Ahmed*et al.,* 2013). In addition to primary healthcare services, district hospitals provide secondary level care, while tertiary hospitals of various kinds in large urban areas address more complicated symptoms, such as complicated delivery. Since Bangladesh has a scarcity of health professionals, the country has trained more than 160,000 community health workers, with the help of multiple stakeholders and NGOs. This development has essentially brought healthcare to the doorstep of rural people (Chowdhury *et al*., 2013).

Challenges

Bangladesh has shown tremendous success in maternal and child health, but to achieve the SDGs more innovative steps needs to be taken. achieving the SDGs Factors such as high population density, high prevalence of extreme poverty, price inflation of food, lack of infrastructure for tackling climate change challenges, and the prevalence of non-communicable diseases threaten to constrain Bangladesh's development potential.

Widening income inequality

Due to rapid improvements in agriculture and the growth of the apparel industry, Bangladesh has experienced economic growth of 6% annually (World Bank database, 2015). Unfortunately, this has widened the income inequality, which means the income of the poorest 20% has decreased from 2.9% to 2% between 1984 to 2010, respectively (Hossain, 2014). On the other hand, the income of the richest 20 percent of the population has increased from 28.3% in 1984 to 37.6% in 2010 (Hossain, 2014). Food price inflation will increase food insecurity among low income families, which has the potential to affect maternal and child health since women and children are the most vulnerable to anaemia and malnutrition (Ferdousi and Dehai, 2014). To create a sustainable maternal and child healthcare system, the nutrition of pregnant women and children should be prioritized as it has physiological, cognitive and psychological impacts.

Rapid Urbanization

Urban slums are some of the most underserved communities because of lack of proper infrastructure and unstable housing systems. With industrial growth, Bangladesh is experiencing rapid urbanisation, with one third of city dwellers living in slums without proper sanitation or water systems (Figure 11). According to a 2007 BRAC report, 71.5% of slum areas are serviced by NGOs. This shows that government-NGO partnerships can play a role to ensure maternal and child health in slum areas. Due to a growing export industry, where 85% workers are female and most of them live in slum areas, a strong infrastructure of reproductive, maternal and child healthcare should be established.

Nutrition transitions and non-communicable diseases

Economic growth in Bangladesh has elicited a major lifestyle and diet change, which in turn, has caused increased rates of cardiovascular diseases, cancer and obesity. According to BDHS 2011, the number of overweight women surpassed the number of underweight women. The indicator of the maternal body-mass index (BMI) shows the rapid rise of obesity. According to a BRAC report on the state of food security and nutrition in Bangladesh (2013), the maternal body mass index has increased from 6% in 1996 to 25% in 2010. Urban women are more likely to be overweight because of sedentary lifestyles and diet; from 2012 to 2013, the proportion of overweight urban women has increased by 3 percentage points (BDHS, 2014). Intuitively, wealth and the proportion of overweight women are correlated, but even among the poorest one in every five women are overweight. Although obesity has increased in all sects of Bangladeshi society, underweight, stunting and anaemia are still prevalent among children under-five.

Climate change

In Bangladesh, rural to urban migration has been the source of urban growth, and has accounted for around 70% of urban growth in the city of Dhaka (Szabo*et al.,* 2015). At the same time, Bangladesh is one of the most climate-vulnerable countries in the world. Among the top 39 cities exposed to natural hazards, Bangladesh's Dhaka is listed as the 7th most vulnerable city, while Chittagong in south-eastern Bangladesh is listed as 37th (Mahmood, 2012). The risk of floods, cyclones and other natural disasters including sea level rise, is

particularly high in the delta region of Bangladesh, where environmental hazards along with poverty and lack of employment opportunities constitute push factors for migration. Lack of knowledge regarding climate change has translated to a lack of available funding to address the problem. According to Triado *et al*. (2013), climate change affects household food access, feeding patterns and overall access to nutritious food. Therefore, climate change threaten the health of women and children as they are more vulnerable to undernutrition. In 2030, it is estimated that the prevalence of diarrhoea will be 10% due to climate change related factors (Mahmood, 2012). Through the extensive literature review, it was found that there is a research and implementation gap regarding climate change in Bangladesh due to a lack of knowledge about this urgent threat.

Conclusion

In conclusion, it can be said that between 1990 and 2015, Bangladesh had astonishing success in maternal and child health outcomes. The post-MDG era will not be about sectoral achievement of goals, urging Bangladesh to scale up its programming to achieve the sustainable development goals. In this systematic review it was found that even though Bangladesh is on track to achieve the maternal and child goals laid out in the SDGs, it needs to focus more on the quality of healthcare and education, as this will ensure sustainable improvement in healthcare. To strengthen preventive and curative healthcare service delivery to mothers and children, the maternal and child care handbook could be used more widely in Bangladesh. Since Bangladesh has a pluralistic healthcare system, personal record keeping that promotes the continuum of care at each stage of maternal and child life will be beneficial to healthcare providers and users. This can be achieved by promoting the handbook as a compulsory tool for pregnant mothers. Also, urging action on non-communicable diseases among women and children, the impacts of climate change on vulnerable population, as well as the implications of price inflation and rising income inequality will need to be focused on to a greater extent. Community-based approaches to healthcare are also necessary since transportation and healthcare infrastructure are yet not fully developed, and there is still lack of healthcare professionals.

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