

## **What Has Bangladesh Achieved on Child Mortality after MDG implementation? : An Empirical Analysis**

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### **Abstract:**

The aim of the Millennium Development Goals (MDGs) is to encourage development by improving social and economic conditions in the world's developing countries. Among eight goals, reducing child mortality is one of them. The paper analyzes the impact of some socio economic factors and MDG on child mortality in Bangladesh. The set of variables was selected after a thorough review of empirical studies. The analysis suggests that female literacy rate and GNI more or less indicate the same relationship as expected. Whereas the number of physicians per 1000 people still remains insignificant in reducing infant mortality rates in case of Bangladesh. Using Dummy variables, the article also mentions the role of MDG (millennium Development Goal) on reducing child mortality over the period 1980-2016 and shows a comparative situations before MDG and after MDG and pinpoints the sources of difference.

**Key Word:** childmortality, millennium development goals, female literacy rate

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### **I. INTRODUCTION**

It was not so long ago that health and other measures of well-being and development were still being discounted from the discussion of development economics. All of the concentration was centered to the generation of national income. If the goal of the economic development is to generate wealth of a nation then the outlook prevalent in the 1950s and 1960s was nothing but a material-based wealth accumulation. Over the years the set of development strategies has significantly changed to address newly emerging social, political and cultural factors. According to Hoff and Stiglitz (2000), economic development is now a growth plus organizational change subject. That is, starting from a sole development goal namely GNP growth, cross-border development policies now incorporate goals up to 8 (MDG) or 17 (SDG). This explains how complex the socio-economic problems are getting each day. To cope with these ever-rising complex socio-economic problems policies have become more versatile to work with multi-dimensional development goals. For example, in this study addresses under 5 child mortality rate which is essentially an indicator of the health of children. This MDG 4 (child mortality rate) is closely associated with other socio-economic variables such as female literacy rate, number of physicians per 1000, maternal mortality, access to immunization, access to safe water, sanitation etc. Reducing child mortality along with maternal mortality is directly linked with economic growth, access to skilled health workers and poverty reduction (Veneman, 2007). The degree of interaction between these socio-economic variables is high which is why development in one leads to development in another or multiple ones.

MDG has taken as a major agenda for economic reform process in Bangladesh, which led to a distinctive pattern in socio- economic and demographic conditions. Bangladesh has recently been applauded as an exceptional health performer especially in reducing child and maternal mortality. This study finds that success in reducing child mortality in Bangladesh is remarkable since the MDG campaign started in 2000. The aim of the study is also to identify the factors behind the reduction in child mortality rate. There are many factors which cause child mortality rate but it is not possible to include all those factors due to the lack of data availability. This study includes three main factors which cause child mortality. These are: GNI per capita, female literacy rate, and the number of physicians per thousand people.

### **II. LITERATURE REVIEW**

The review of different literatures on under-five child mortality shows that a number of socio economic and demographic factors cause a significant impact on child mortality. Saurabh et al. (2013), Kundu et.al. (2013), Kateja (2007), Cleland et al. (1984) have found a significant relationship between various socio

economic factors, demographic factors by analyzing various countries census and survey data. They found that there is a long-run stable relationship between child mortality and female literacy rate and GNI per capita. Kamal (2012) investigates the effect of maternal education on neonatal mortality in Bangladesh using data from the nationally representative 2007 Bangladesh Demographic and Health Survey. He suggests that programs should be undertaken to improve female education in Bangladesh for a better chance of satisfying important factors that can improve infant survival, such as the quality of infant feeding, household sanitation, and adequate use of preventive and curative health services. Ayubi (2016) finds nearly half of all under-five deaths to be associated with under nutrition. Neonatal mortality (NM) is more associated with biological factors such as congenital anomalies and is also sensitive to proximal determinants (maternal factors, nutrient deficiency, infections and injuries) while post-neonatal mortality (PNM) is more influenced by distal determinants (education, employment, national income and income distribution). Hossienpoor et.al (2006) emphasize on improving access to clean water, sanitation and hygiene which are necessary agents leading to sufficient impact on infant survival rates. OttoSchell (2007) finds that, in order of importance, in low-income countries, female illiteracy was more important than GNI/capita. The income equality (Gini index) has been found to be an independent predictor of infant mortality rate (IMR) only in cases of middle-income countries and in high-income countries, none of these predictors was found to be significant. Mondalet. al (2017) find a positive impact of female literacy rate on reducing child mortality and also suggest to increase the opportunity of better access to safe treatment places and expansion of public health system in order to reduce the risk of infant and child mortality.

### III. THE DATA AND MODEL SPECIFICATION

In this section we provide an overview of the variables involved in this study over the period 1980 -2016.

**Table 1: Data of the Key Variables**

Variables	Year			
	1980	1990	2000	2016
Under 5 Child Mortality (per 1000 live births)	198.6	143.8	87.4	34.2
GNI per Capita (USD)	352.32	407.91	526.36	1089.13
Female Literacy Rate	26.07	36.91	58.03	93.54
Physicians per 1000	0.12	0.18	0.23	0.45

*Source: Author's compilation from WDI 2017*

Table 1 provides an overview of the variables. Between 1980 and 2016 GNI per capita increased by 209.13%. From 1980 to 2016 the real GNI growth is 3.09 % for the whole period (World Bank 2017). It also shows that, in Bangladesh, the under 5 mortalities dropped from 198.6 deaths per 1000 live births in 1980 to 34.2 deaths per 1000 live births in 2016. That is, between 1980 and 2016 under 5 mortality has declined by 83%. Globally, under-five mortality rate has decreased by 56% between 1990 and 2016 (WHO 2017). Table1 provides the information regarding female literacy rate in Bangladesh for the period 1980 to 2016. Female literacy rate is 26.07 in 1980 which has increased to 93.54 in 2016. The number of physician per thousand people is 0.12 in 1980 in Bangladesh. Alternatively, it can be expressed as, for almost 8,333 people there is only 1 qualified doctor in 1980. In 2000 and 2016, the same number of doctor is available for 4,347 and almost 2,222 people. That is, an almost fourfold difference in the doctor and patient ratio is apparent for the period 1980 to 2016.

The analysis is carried out using time series data of child mortality, GNI per capita, female literacy rate and number of physicians per thousand people for the period 1980 to 2016. Data is sourced from the World Data Bank and the Bangladesh Bureau of Statistics (BBS).

The general equation of the model is:

$$\ln CM = \alpha_0 + \alpha_1 D + \beta_1 \ln FLR + \beta_2 \ln NP1k + \beta_3 \ln GNI + \beta_4 (D \ln FLR) + \beta_5 (D \ln NP1K) + \beta_6 (D \ln GNI) + e$$

Mean child mortality function for 1980- 2003:

$$E (\ln CM / D = 0, FLR, GNI, NP1K) = \alpha_0 + \beta_1 \ln FLR + \beta_2 \ln NP1k + \beta_3 \ln GNI$$

Mean child mortality function for 2003-2016:

$$E (\ln CM / D = 1, FLR, GNI, NP1K) = (\alpha_0 + \alpha_1) + (\beta_1 + \beta_4) FLR + (\beta_2 + \beta_5) NP1K + (\beta_3 + \beta_6) GNI$$

Where, CM = Child mortality, FLR = Female Literacy Rate, GNI = Gross National Income, D = Dummy Variable.

Here, D= 0 for observations in period 1980 – 2003; and

D= 1 for observations in period 2003-2016

For the general equation, outlined in the previous section, the estimated results are presented in Table 2(below)

The estimated results show that both the differential intercept and the slope coefficients of female literacy rate are statistically significant, strongly suggesting that there has been a shift in child mortality after the execution of the MDGs.

#### IV. RESULTS ANALYSIS

Table 2 Regression Result of Structural Break in Child Mortality analysis

Dependent Variable: Child Mortality (lnCM)			
Independent Variables	Coefficient	t-statistics	p-value
constant	16.30133*	15.31005	0.0000
lnFLR	-1.266743*	-3.766265	0.0008
lnNP1K	-0.110723	-1.055284	0.3000
lnGNI	-1.165196*	-11.49387	0.0000
D	-5.907910*	-2.832035	0.0083
D* lnNP1K	-0.078547	-0.264107	0.7936
D*lnFLR	1.200474*	3.523998	0.0014
D*lnGNI	0.207437	0.833144	0.4116
R-squared		0.9999452	
F-statistics		7556.742	0.000000
Durbin-Watson		1.179	

\*Means significant at the 1% level or below

$$\ln CM = 16.30 - 1.27 * \ln FLR - 0.11 * \ln NP1K - 1.16 * \ln GNI - 5.91 * D + 1.20 * D * \ln FLR - 0.07 * D * \ln NP1K + 0.21 * D * \ln GNI \dots \dots \dots (1)$$

From equation (1), we can derive equation (2) and (3), which are:

**Child Mortality regression before MDG, 1980-2002:**

$$\ln CM = 16.30 - 1.27 * \ln FLR - 0.11 * \ln NP1K - 1.16 * \ln GNI \dots \dots \dots (2)$$

**Child Mortality regression after MDG, 2003-2016:**

$$\ln CM = (16.3013 - 5.9079) + (-1.2667 + 1.2004) * \ln FLR + (-0.1107 - 0.0785) * \ln NP1K + (-1.1651 + 0.2074) * \ln GNI$$

$$\text{Or, } \ln CM = 10.3934 - 0.0663 * \ln FLR - 0.1892 * \ln NP1K - 0.9577 * \ln GNI \dots (3)$$

Here we need to run only a single regression because the individual regression can easily be derived from it in the manner indicated by equations (2) and (3).

#### V. DISCUSSION

The study finds no relationship between the number of physicians and CMR before MDG, as the coefficient of linear regression line is found not significantly different from zero. The coefficient of female literacy and GNI remained significantly negative, implying an inverse relationship. Here, a 1% increase in female literacy rate will decrease the rate of child mortality by 1.2% and a 1% increase in per capita GNI will decrease the rate of child mortality by 1.16%. The slope coefficient measures the elasticity of CM with respect to FLR and GNI in this log linear regression model. As per the results, female literacy rate shows a very significant role in reducing child mortality than per capita GNI does.

GNI and the number of physicians as predicting factors of CMR are found to be non-significant for the post-MDG period, while an inverse relationship is found between female literacy rate and CMR, as suggested by a significantly negative coefficient at 1% significance level. Here, a 1% increase in female literacy rate will decrease the rate of child mortality by 0.06%. In this respect, the dummy variable approach shows the structural break and pinpoints the source of the difference. The difference is due to both the intercept and female literacy coefficients. This type of regression is called dissimilar regression.

In this regression, higher female literacy rates are found to have lowered CMR. That is, female literacy rate plays a key role in reducing child mortality in both periods. We find female education as the most influencing factor in differentiating the infant and child mortality levels within all the socio-economic factors

because mother's education is directly related with the health of a child. According to data, between 1981 and 2015, the share of literate females at total literacy rate aged 15–24 years increased from 17% to 65% (BBS 2015). This increased literacy has positive implications on improving health awareness and health seeking behavior and practices. So, two of the achieved MDG goals are directly related to the expansion of literacy. Though the number of physicians has insignificant impact on child mortality but the relationship is still negative between them. Clarke et al. (1994) found no significant association in the US counties between an index of primary care (physicians in general practice, family physicians, internists, pediatricians, obstetricians/gynecologists and nurse practitioners) and infant mortality when they controlled on a range of social structural factors including average income. Chen and Lowenstein (1985) found the expected negative correlation between physicians and infant mortality in their sample of 60 developing countries. But they did not control on GDP, so the association may not be final.

More than half of under-5 deaths are due to diseases that can be prevented or treated by easy and affordable interventions (source: WHO). So being conscious about a child's health is more important than the availability of physicians in case of reducing under-five child mortality. From the end of the neonatal period and through the first 5 years of life, the main causes of death are pneumonia, diarrhea and malaria. Malnutrition is the underlying contributing factor, making children more vulnerable to severe diseases. If a mother is conscious about her child's health, she may keep her child safe from these deadly diseases. Prior to birth, a mother can increase her child's chance of survival and good health by attending antenatal care consultations, being immunized against tetanus, and avoiding smoking and alcohol. Though before the implementation of the MDGs, there was a very strong association in reducing child mortality, but after MDG period, per capita GNI could not place any significant result. It is known that when countries have reached a high level of development, further increases in terms of income has little impact on child mortality or that mortality becomes increasingly disassociated from income per capita (Populstund, 1975). Larger increases in income may be required to reduce child mortality in countries like Bangladesh. Use of foreign aid can be of assistance if generation of income is a constraint. As, evidently aid increases gross national income in Bangladesh (Ahamad et al 2019). Female literacy (midstream) is heavily influenced by income (upstream) and is also independent of income, associated with reduced child mortality, but female literacy also mediates the effect of income on child mortality (Biggs et al., 2010). If both income and female literacy are included in the same multivariate model, the relative influence of income will be reduced and this is described as over-adjustment. The influence may even be reversed, in which case it is called the Yule Simpson paradox.

Overall, it is highlighted that the literacy of women is relatively important for both population stabilization and lower child mortality than per capita GNI. Our findings suggest that women literacy and women empowerment must be considered important. The latest report on Millennium Development Goals (2012) suggests that one of the targets of attaining gender parity in school enrolment of girls and boys has been achieved. Now it remains to be seen how far this encouraging trend is replicated in the social and economic arena of gender parity. In future, we must not lose sight of the fact that education and empowerment of women is vital to the achievement of a healthy community.

## VI. CONCLUSION

As a developing and a densely populated country, what Bangladesh has achieved is obviously praiseworthy but there are qualitative parts of it that are half done and need to be accounted properly. There is hope because there are already a lot of achievements but there is no scope of complacency because we have a long way to go. Achieving some targets is a wonderful experience, but sustaining the same is challenging. Bangladesh has the sustainable development goals (SDGs) ahead, which are a new, universal set of goals, targets and indicators that UN member states will be expected to use to frame their agendas and political policies over the next 15 years.

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