

An exploratory note on the differences in health in the two Bengals

Zubin Shroff, Victoria Fan, Rifat Hasan, Richard A. Cash
Harvard School of Public Health, Boston, MA

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The historical separation and divergence of political institutions across the two Bengals over six decades enables us to explore the determinants of maternal and child health of this ‘natural experiment’. West Bengal and Bangladesh have both made impressive strides in improving health outcomes over the past few decades. An examination of data on maternal and child health shows that despite having a lower GDP per capita and lower levels of female literacy Bangladesh performs better than West Bengal in the provision of immunization and oral rehydration therapy. West Bengal on the other hand does better in indicators related to antenatal care and institutional delivery. This essay explores the potential impact of the structure and organization of the health delivery system among various factors including economic development and female empowerment in explaining these differences in health indicators. Further research is needed to establish definitively the roles of each of these determinants in explaining the observed outcomes.

Keywords: Bangladesh, West Bengal, child health, maternal health, comparative health systems

1. Introduction

The field of comparative health systems can enhance understanding of why countries have different health outcomes.¹ Although cross-country statistical evidence offers some insight on factors explaining population-level differences, in-depth comparative case studies are necessary to explain the role of institutions and delivery structures on health outcomes. Comparisons between societies with very different cultures, languages, and histories are limited by confounding factors. It would be particularly useful, therefore, to compare regions with historical and ethno-linguistic similarities, which have been subject to differing political arrangements and policies, such as studies on East and West Germany².

The goal of this note is to examine the potential factors including those pertaining to health systems that may explain the differential health outcomes observed in the Bengal region of South Asia. Today, this region consists of two distinct entities—the country of Bangladesh and the Indian state of West Bengal—inhabited by approximately 253 million people (with two-thirds in Bangladesh and one-third in West Bengal) (Table 1).^{3,4} This region is one of the world’s most densely populated and accounts for approximately four per cent of the global population. We describe trends and differences in maternal and child health on both sides of the border and offer possible explanatory factors, particularly those related to vertical and horizontal interventions.

Prior to the partition of India in 1947, Bengal was administered by the British Raj from Calcutta. At partition West Bengal became a state of the Indian union, while East Bengal became East Pakistan, a province of Pakistan. In 1971 East Pakistan became the independent nation of Bangladesh. Though Bangladesh and West Bengal do not share the same majority religion (the former is predominantly Muslim, while the latter has a Hindu majority), they have a similar ethno-linguistic and cultural history and literature. Given the historical separation and divergence of political institutions, a comparison of these two regions is akin to a “natural experiment” that can help to reveal causes in the differences in maternal and child health.

Table 1. Comparison of selected socio-economic indicators in Bangladesh and West Bengal

	Bangladesh	West Bengal
Overall Literacy	57.53% (BBS, 2011)	77.08% (SRS,2011)
Female Literacy	54.84 % (BBS, 2011)	71.16% (SRS, 2011)
GDP per capita 2012 (USD)	747 (World Bank)	1489 * (World Bank)
Total Health Expenditure (% of GDP)	3.7% (WHO, 2011)	3.9%* (WHO, 2011)

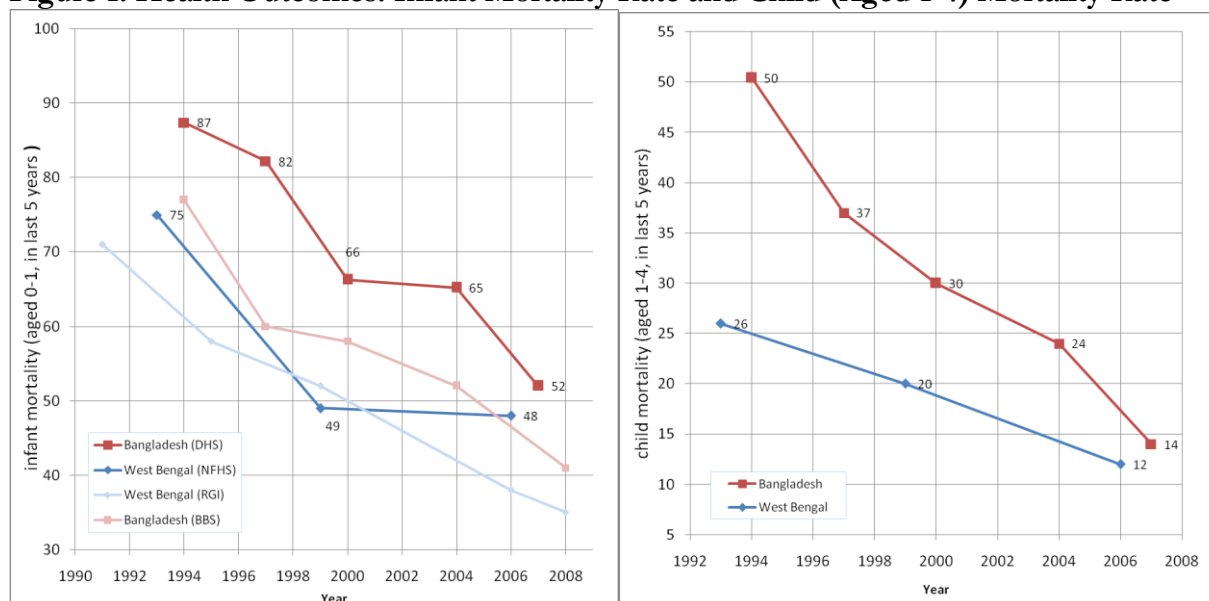
Notes: Estimates for GDP per capita and total health expenditure refer to India as a whole

2. Health Trends in the Two Bengals: 1992-2008

Child and maternal health accounts for a large proportion of the burden of disease in developing countries. We examined trends in child and maternal health over the years 1992-2008, the period for which data is available and comparable. Data was obtained for West Bengal from the National Family Health Survey (NFHS)^{5,6,7}, Ministry of Health and Family Welfare (MOHFW)⁸, and Sample Registration System (SRS) from the Registrar General of India (RGI)³ and for Bangladesh from Demographic and Health Survey (DHS)^{9,10,11,12} and Bangladesh Bureau of Statistics (BBS)¹³. NFHS and DHS data were checked for comparability and used for figures and calculations. To measure child health, infant and child mortality were used, while immunization coverage was used as a process indicator. As maternal mortality data is less reliable, coverage of antenatal care, institutional deliveries and skilled birth attendance were used as process measures for maternal mortality.

Infant and child mortality. Since 1992, both regions appear to have experienced declines in infant and child mortality (Figure 1, Appendix 1). Over the period examined, infant mortality rate (IMR) is consistently higher in Bangladesh than in West Bengal, though the gap is closing over time. For IMR, trends in government estimates for West Bengal and Bangladesh are consistent with NFHS and DHS, respectively. Child mortality for those aged one to four years appears to have decreased more rapidly in Bangladesh than West Bengal; in Bangladesh the decline was 72% from 1994-2007 while in West Bengal it fell by nearly 54% from 1993-2006.

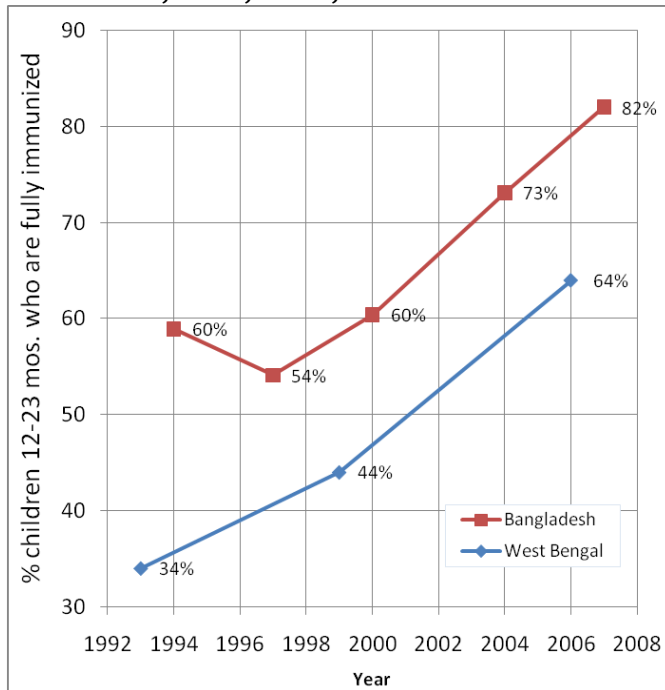
Figure 1. Health Outcomes: Infant Mortality Rate and Child (Aged 1-4) Mortality Rate



Process measures for child health. Immunization rates are consistently higher in Bangladesh than West Bengal, with a sharp upward trend after 1997 (Figure 2). These higher immunization rates are associated with a rapid decline in child mortality in the past decade, which is not surprising since a large proportion of child mortality is associated with vaccine-preventable diseases of childhood. Increased immunization rates are not as strongly associated with declines in infant mortality, since 71% of infant mortality is attributed to deaths in the neonatal period, prior to the administration of

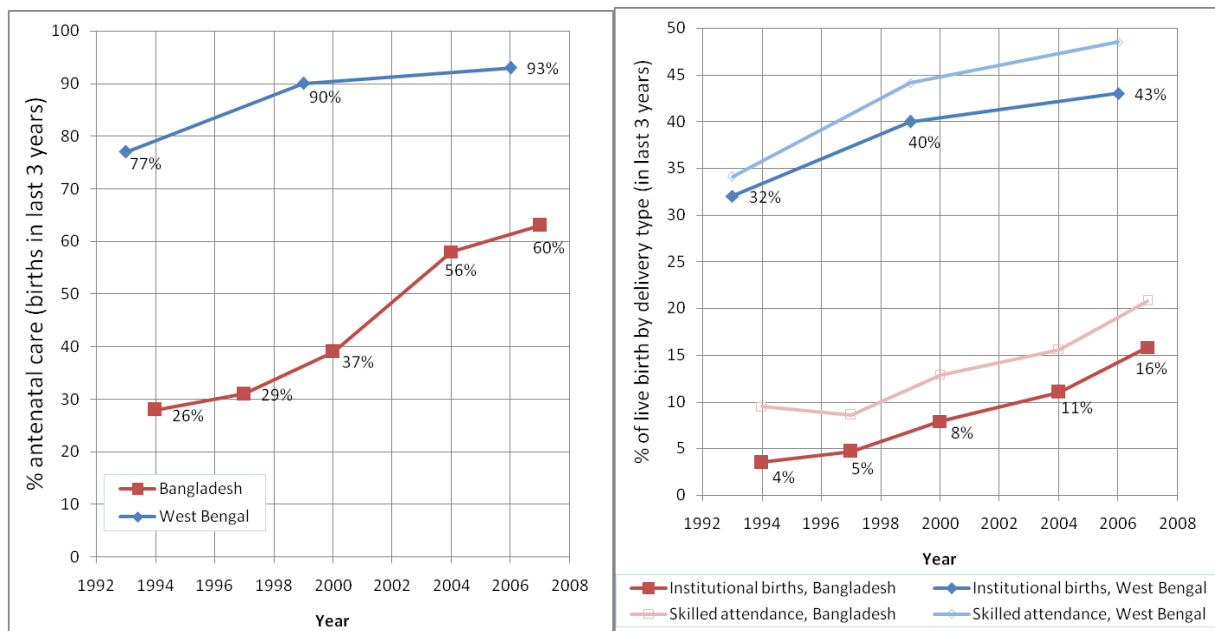
most vaccines.¹² The use of oral rehydration solution (ORS) for the treatment of diarrhea is another area where Bangladesh has had greater success. In 2007, 77% of Bangladeshi children under 5 with diarrhea were given ORS, and 20% were taken to a health provider or facility. In 2006 in West Bengal 42% of the same age group were given ORS, and 67% were taken to a health provider.

Figure 2. Process Measure for Child Health: Percent of Children 12-23 Months Immunized for Measles, DPT, Polio, and BCG



Process measures for maternal health. Trends in process measures of maternal health were consistently higher in West Bengal (Figure 3). The percent of live births receiving antenatal care (ANC) in West Bengal was one and a half times that of Bangladesh, while the percentage of births in health facilities and the percentage of births delivered by skilled attendants were 2 to 3 times higher in West Bengal compared to Bangladesh. Institutional deliveries accounted for 43% of births in West Bengal for 2006 compared to 16% in Bangladesh for 2007.

Figure 3. Process Measures for Maternal Health: Percent Antenatal Care, Percent Skilled Birth Attendance, and Percent Institutional Births



3. Discussion of possible explanatory factors

In summary, we find that Bangladesh appears to have done comparatively better than West Bengal in terms of child mortality, immunization and ORS use, while West Bengal appears to be comparatively ahead in terms of process measures for maternal health and infant mortality. What explains these differences in health? It seems that there are at least three possible factors that can account for these outcomes: health systems and delivery structures; historical economic development; and female education and empowerment.

Health systems: horizontal and vertical. For indicators that can be improved through more vertical programs such as the provision of child immunizations and oral rehydration therapy, Bangladesh outperforms West Bengal. As an example, treatment-seeking patterns for diarrhea in Bangladesh differ from West Bengal; ORS coverage is higher and facility treatment is lower in Bangladesh. Over a ten-year period (1980-1990) in Bangladesh, BRAC, a large non-government organization (NGO) undertook a nation-wide program to teach every woman in Bangladesh how to prepare ORS at home. Over 12 million households across 75 thousand villages were reached with the ORS message through a network of female village health volunteers and women's self-help groups for microfinance by 1990.¹⁴ The large-scale involvement of NGO actors, working hand-in-hand with government has enabled a high degree of success for this vertical program.¹⁵

The organization of the health system is reflected in the composition of health workers and the delivery of vaccines in immunization programs. In a nationally representative sample of 259 facility-based immunization providers in 1999 in Bangladesh, 51% were from NGOs.¹⁶ In West Bengal for

2006, 88% of all vaccinations are attributed to public-sector health facilities, while NGOs account for only 5.5% of vaccinations in urban areas and 1.2% of vaccinations in rural areas.

For those indicators primarily tied to facility care, West Bengal outperforms Bangladesh. The great differences between the two Bengals in rates of institutional delivery and antenatal care may explain the higher rates of both infant and maternal mortality in Bangladesh. In terms of health facilities, West Bengal has had consistently higher facility provision compared to Bangladesh. In 2005, West Bengal had 83 hospital beds per 100,000, while in Bangladesh there 33 hospital beds per 100,000 population¹⁷. Similarly, the doctor density per population in West Bengal is twice that of Bangladesh (54 compared to 27 doctors per 100,000 population).¹³

Economic development. Differences in health systems likely explain only part of the health improvements in the two Bengals. Economic development is a major determinant of health.¹⁸ Bangladesh has a per capita income of PPP\$1500, roughly half that of West Bengal today (Appendix 2). Differences in economic development result, in part, from their historical trajectories. Though the two regions were commonly administered for much of the British Raj, there were important economic differences between them. West Bengal, with Calcutta as its urban centre, was the industrial, financial and intellectual hub of Bengal and was noted for its jute industry. East Bengal with Dhaka as its main city was far less industrialized and provided much of the raw materials for Calcutta jute mills. Moreover, Bangladesh underwent a civil war from which many of its largest NGOs emerged including BRAC. Today, despite being a low-income country and recovering from a serious war, Bangladesh has made considerable progress in its health statistics.

Female education, fertility, and empowerment. A third explanatory factor may be the effect of female education and empowerment. Amartya Sen has emphasized the role of women's agency in development and argued that female education and empowerment are vital in the reduction of under-five mortality as well as fertility.¹⁹ Both educational levels and total fertility rates between the two regions are converging rapidly (Appendix 3). Vertical delivery of family planning has been associated with fertility declines in Bangladesh.²⁰ Improvements in female education and reductions in fertility will likely accelerate the convergence of health indicators. Fertility directly affects the lifetime risk of maternal mortality and indirectly affects infant mortality.

Future work. In this study we examine trends in maternal and child health between two regions and their possible causes. These descriptive analyses suggest a potentially important contribution of public, NGO, and private sectors to the delivery of care. Future work on this topic should involve in-depth study of the contribution of health systems, as well as economic development, female education, and other factors. Understanding why some countries are able to improve health outcomes of their populations compared to others is an essential, but an under-studied area of research.

References

- [1] The Lancet. 2008. The state of health research worldwide. *Lancet* 372: 1519.
- [2] Kohlmeier L. 1993. Health divergence during political division: East and West Germany—‘socioeconomic factors in health’. In *Europe without Frontiers: the implications for health*, eds. Normand CEM, Vaughan JP. Sussex, England: John Wiley and Sons, pp. 57-71.
- [3] Office of the Registrar General of India (RGI). *Census of India*. Website. URL: www.census.gov.in. Accessed 1 February 2010.
- [4] Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. *World Population Prospects: The 2008 Revision*. Website. URL: <http://esa.un.org/unpp>. Accessed 1 February 2010.
- [5] International Institute for Population Sciences (IIPS). 1995. *National Family Health Survey (MCH and Family Planning), India 1992-93*. Bombay: IIPS.
- [6] International Institute for Population Sciences (IIPS) and ORC Macro. 2001. *National Family Health Survey (NFHS-2), India 1998-99: West Bengal*. Mumbai: IIPS.
- [7] International Institute for Population Sciences and Macro International. 2008. *National Family Health Survey (NFHS-3), India 2005-06: West Bengal*. Mumbai: IIPS.
- [8] Ministry of Health and Family Welfare. *West Bengal State Report*. http://www.mohfw.nic.in/NRHM/Documents/Non_High_Focus_Reports/WB_Report.pdf. Accessed 11 November 2009.
- [9] Mitra SN, Nawab Ali M, Islam S, Cross AR, Saha T. 1994. *Bangladesh Demographic and Health Survey, 1993-1994*. Calverton, Maryland: National Institute of Population Research and Training (NIPORT), Mitra and Associates, and Macro International Inc.
- [10] Mitra SN, Al-Sabir A, Cross AR, Jamil K. 1997. *Bangladesh Demographic and Health Survey, 1996-1997*. Dhaka and Calverton, Maryland: National Institute of Population Research and Training (NIPORT), Mitra and Associates, and Macro International Inc.
- [11] National Institute of Population Research and Training (NIPORT), Mitra and Associates (MA), and ORC Macro (ORC). 2001. *Bangladesh Demographic and Health Survey 1999-2000*. Dhaka, Bangladesh and Calverton, Maryland USA: National Institute of Population Research and Training, Mitra and Associates, and ORC Macro.
- [12] National Institute of Population Research and Training (NIPORT), Mitra and Associates, Macro International. 2009. *Bangladesh Demographic and Health Survey 2007*. Dhaka, Bangladesh and Calverton, Maryland USA: National Institute of Population Research and Training, Mitra and Associates, and Macro International.
- [13] Bangladesh Bureau of Statistics. 2008. *Statistical Yearbook Bangladesh 2007*. Dhaka, Bangladesh: Planning Division, Ministry of Planning Government of the People’s Republic of Bangladesh.
- [14] Chen L. Beyond Rhetoric: the quest for practical success in global health. *Lancet* 2009; 374(9700):1491-1492.
- [15] Zohir S. 2004. NGO Sector in Bangladesh: an overview. *Economic and Political Weekly* 39(36): 4109-4113.
- [16] Saha T. 2002. *Bangladesh Service Provision Assessment Survey, 1999-2000*. Calverton, Maryland: National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ORC Macro.
- [17] Datanet India Pvt. 2010. *Indiastat.com*. Website. URL: <http://www.indiastat.com/default.aspx>. Accessed 12 February 2010.
- [18] Preston S. The changing relation between mortality and level of economic development. *Population Studies* 29(2):231-248.

- [19] Sen A. *Development as Freedom*. Delhi, India: Oxford University, 2007.
- [20] Levine R. 2007. Reducing fertility in Bangladesh. *Case Studies in Global Health: Millions Saved*. Sudbury, Massachusetts: Jones and Bartlett Publishers.

APPENDICES

Appendix 1: Progress Towards MDG4 and MDG5: Bangladesh and West Bengal

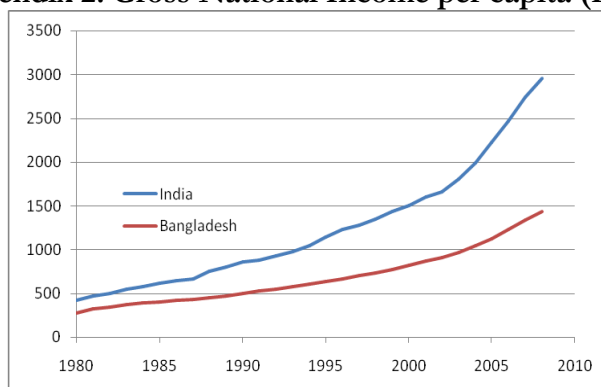
Health MDG	Bangladesh			West Bengal		
	Estimate (Year)	Estimate (Year)	% Change (years)	Estimate (Year)	Estimate (Year)	% Change (years)
MDG4 Reduce by two thirds, between 1990 and 2015, the under-five mortality rate	149.7 (1993-4)	73.9 (2007)	-51% (14 years)	107.3 (1992-3)	65.4 (2006)	-39% (14 years)
MDG5 Reduce by three quarters the maternal mortality ratio	724 (1990)	338 (2008)	-53% (18 years)	303 (1997-8)	141 (2004-6)	-53% (8 years)

Sources: DHS for MDG4; Hogan et al (2010) for MDG5 for Bangladesh and Sample Registration System for West Bengal.

References:

- Hogan M, Foreman KJ, Naghavi M, Ahn SY, Wang M, Makela SM, Lopez AD, Lozano R, Murray CJL. Maternal mortality for 181 countries, 1980—2008: a systematic analysis of progress towards Millennium Development Goal 5. *The Lancet* early online publication. doi:10.1016/S0140-6736(10)60518-1
- Measure DHS. StatCompiler. URL: <http://www.statcompiler.com/>. Accessed 1 April 2010.
- Sample Registration System. Maternal Mortality in India: 1997-2003. Trends, causes, and risk factors. New Delhi: Registrar General of India, 2006.
- Sample Registration System. Special Bulletin on Maternal Mortality in India 2004-6. New Delhi: Office of Registrar General of India, 2009.

Appendix 2: Gross National Income per capita (PPP\$)



Source: World Development Indicators 2010

**Appendix 3: Highest Educational Attainment and
Total Fertility Rate (among ever-married women aged 15-49)**

