

Child mortality in india essay



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Child Malnutrition and Mortality : Evidence from a Cross-Country Analysis

Abstract The Millennium Development Goals (MDGs) call for a two-thirds reduction in the mortality rate among children under age five between 1990 and 2015. Accurate and timely estimates of under-five mortality are needed to help countries set priorities, design programmes to reduce mortality, and monitor progress towards the MDG4. Developing these estimates poses a considerable challenge because of the limited data available for many developing countries and lack of agreement on the best way to calculate child mortality levels and trends.

The paper is divided into two sections. Firstly, the determinants of Child Mortality are examined. It specifically examines how child mortality is related to the household's environmental and socio-economic characteristics, such as female literacy, total fertility, per capita GDP, per capita expenditure on health care facilities, physicians available per lakh of population and population living below the national poverty line. A multiple linear regression model is used to analyze the effects of different factors on under-five mortality rate.

Reduction of Child mortality as a part of Millennium Development Goals (MDGs) has been discussed and the performance of different countries in this respect has been investigated. A household's environmental and socio-economic characteristics are found to have significant impact on child mortality. Policies aimed at achieving the goal of reduced child mortality should be directed on improving the household's environmental and or socio-economic status if this goal is to be realized. The second part of the paper deals with the performance of India in respect to Child Mortality, the

developments in the country overtime and the trends for the future. Under-five infant mortality rates in India have fallen to 73 per 1, 000 live births in 2006, from 94 per 1, 000 in 1990.

That's a 22% decline, which is extremely good news, although it still represents 1. 9 million deaths. India's success in bringing mortality rates down is due to putting a large percentage of its budget into the health and social sector, and investing in the health sector, facilities and frontline health workers.

ACRONYMS AND ABBREVIATIONS

AARR - Average annual rate of reduction
AIDS - Acquired immunodeficiency syndrome
ASFR - Age Specific Fertility Rates
CEE/CIS - Central and Eastern Europe and the Commonwealth of Independent States
CM Child - Mortality
FLR Female - Literacy Rate
GDP - Gross Domestic Product
HEPC - Health Expenditure Per Capita
HDR - Human Development Report
IMR - Infant mortality rate
MDG - Millennium Development Goal
PCGDP -Per Capita Gross Domestic Product
TFR - Total Fertility Rate
U5MR - Under-five mortality rate
UNICEF - United Nations Children's Fund
UNPD - United Nations Population Division
WHO - World Health Organization

Introduction Child mortality refers to the death of infants and children under the age of five.

About 26, 000 young children die every day, mainly from preventable causes. In 2006, 9. 7 million children under five died a 60% decline since 1960. About half of child deaths occur in Africa.

Approximately 60 countries make up 94% of under five child deaths. According to an estimate by UNICEF, one million child deaths could be prevented annually at a cost of \$US 1 billion per year (an average of \$US

1000 for each child). Child Mortality or the under-five mortality rate is the probability (expressed as a rate per 1, 000 live births) of a child born in a specified year dying before reaching the age of five if subject to current age-specific mortality rates. Policies aimed at achieving the goal of reduced child mortality should be directed on improving the country's and household's socio-economic status if this goal is to be realized. Reducing mortality and improving the health of young children has long been a concern of the international community.

Reducing Child Mortality is one of the eight Millennium Development Goals (MDGs) adopted after the Millennium Summit in 2000. Donors and development agencies, the United Nations and national governments around the world committed themselves to the goal of reducing the under-five mortality rate by two-thirds between 1990 and 2015. Country estimates of the level and trends in infant and under-five mortality are needed to help set priorities, shape policies, design programmes and monitor progress towards the MDG at the national level. These estimates are also needed at the international level to inform funding decisions for activities directed towards reducing child mortality. To be useful for the latter purpose, the country estimates must be internationally comparable.

Yet developing accurate and timely estimates of infant and under-five mortality poses a considerable challenge. There are limited data in many developing countries and a lack of agreement on how best to generate estimates from what data are available. Until recently, UNICEF, The World Bank, and the World Health Organization (WHO) produced and published separate estimates of under-five mortality rates around the world. However

the three agencies did not always use the same data sources, they assigned different weights to those data sources, and they used different methodologies to extrapolate trends. Child mortality is related to the demographic factors, economic determinants and the household's environmental and socio-economic characteristics, such as Total fertility Rate (TFR), Per Capita Gross Domestic Product (PCGDP) of the nation and Female Literacy Rate (FLR).

The Total Fertility Rate (TFR, sometimes also called the fertility rate, period total fertility rate (PTFR) or total period fertility rate (TPFR)) of a population is the average number of children that would be born to a woman over her lifetime if (1) she were to experience the exact current age-specific fertility rates (ASFRs) through her lifetime, and (2) she were to survive from birth through the end of her reproductive life. It is obtained by summing the single-year age-specific rates at a given time. Per Capita Gross Domestic Product is the value of all final goods and services produced within a nation in a given year divided by the average (or mid-year) population for the same year. Female Literacy Rate is the percentage of educated women (aged 15 and above). Objectives of the study The aim of this study is to explore the relationship between socio-economic characteristics and child mortality. The specific objectives are: -To assess the relationship between the environment and child mortality in using the cross country data.

To make a comparison of rate of Under-5 mortality among various countries dividing them into High, Medium and Low Human Development. -To study the affect of Total Fertility Rate, Female Literacy Rate, Per Capita GDP, Health Expenditure Per Capita, Number of Physicians per lakh of population

and population below the poverty line on Child Mortality. -To analyze the reasons for discrepancy between expected and the actual relationship between these variables. -To study the determinants and trends of Child Mortality in India. Problems of the Study The environment, which sustains human life, is also a profound source of ill health for many of the world's people. In the least developed countries, one in five children do not live to see their fifth birthday, mostly because of avoidable environmental threats to health.

This translates into approximately 11 million avoidable childhood deaths each year. Hundreds of millions of others, both children and adults, suffer ill health and disability that undermine their quality of life and hopes for the future. Poverty influences health because it largely determines an individual's environmental risks, as well as access to resources to deal with those risks. Throughout the developing world, the greatest environmental health threats tend to be those closest to home. Many in these countries live in situations that imperil their health through steady exposure to biological pathogens in the immediate environment. Poverty largely determines the level of mortality in a country.

The study focuses on the major causes of child mortality. Child Mortality rates in India are still very high compared to other countries in the world. We fall in the group of Medium Human Development Countries. The Under-five mortality rate in India has fallen from 236 per 1000 live births in 1960 to 85 per 1000 live births in 2005. A fall in the mortality rate by 65% in a span of forty five years has taken place. But still our mortality levels are high.

Reducing child mortality is the fourth Millennium Development Goal, whose target is to reduce the under-five mortality rate by two-thirds between 1990 and 2015. If India is committed to achieving the MDG on child mortality, it is prudent to understand clearly the factors that are contributing to the high levels of mortality. This study therefore explores the household's environmental and socio-economic characteristics and their effect on child and under five mortality in India. Literature review There is a relatively large literature that focuses on the determinants of child mortality. A wide variety of texts and research papers were referred while preparing this report. Some of the research papers referred is as follows: Reducing child mortality in India in the new millennium by Mariam Claeson, Eduard R.

Bos, Tazim Mawji, & Indra Pathmanathan : The study documents the slowing decline in infant mortality rates in India; a departure from the longer-term trends. The major causes of childhood mortality are also reviewed and strategic options for the different states of India are proposed that take into account current mortality rates and the level of progress in individual states. The slowing decline in childhood mortality rates in India calls for new approaches that go beyond disease-, programme- and sector-specific approaches Poverty, Undernutrition, and Child Mortality: Some Inter-Regional Puzzles and their Implications for Research and Policy by Stephan Klasen University of Gottingen and IZA Bonn : This paper examines the relationship between measures of income poverty, undernourishment, childhood undernutrition, and child mortality in developing countries. While there is, as expected, a close aggregate correlation between these measures of deprivation, the measures generate some inter-regional paradoxes.

Women's economic roles and child survival: the case of India by Alaka Malwade Basu and Kaushik Basu (Institute of Economic Growth, University Enclave, Delhi-110 007, India. Delhi School of Economics, University Enclave, Delhi): This article provides evidence that women's employment, in spite of its other benefits, probably has one crucial adverse consequence: a higher level of child mortality than is found among women who do not work.

Environmental Determinants of Child Mortality in Kenya by Clive J. Mutunga, December 2007: This paper focuses on the determinants of infant and child mortality in Kenya. It specifically examines how infant and child mortality is related to the household's environmental and socio-economic characteristics, such as mother's education, source of drinking water, sanitation facility, type of cooking fuels and access to electricity. A hazard rate framework is used to analyze the determinants of child mortality.

METHODOLOGY The methodology adopted for the purpose of this paper includes collection of cross countries data on under-5 mortality from official website of WHO and the Human Development Report.

Regression was then applied on this data with the help of softwares such as Microsoft excel and Minitab various findings have been attained. Definition of the indicator: The under-five mortality rate is the probability (expressed as a rate per 1, 000 live births) of a child born in a specified year dying before reaching the age of five if subject to current age-specific mortality rates.

Mortality among young children can be subdivided and categorized by their exact age at death (see Box 1). Deaths in certain age groups may have practical programme and policy implications. Neonatal mortality, for

example, is considered to be a useful indicator of maternal and newborn health and care. Box 1.

Definitions of mortality in young children, Includes deaths that occur:

Neonatal Mortality During the first 28 days of life Post-neonatal Mortality At

ages 1 to 11 months Infant Mortality Between birth and exact age 1 Child

Mortality At ages 1 to 4 years Under- five Mortality Between birth and exact

age 5 The paper majorly focuses on the determinants and measures for

combating Child Mortality in general and Under-five mortality in particular.

Methods of computation The U5MR can be calculated using methodologies

that depend on the type of data available. In practice, data can be obtained

from registration of births and deaths via vital registration systems, data

from national population census and/or data collected via household surveys.

When data collected via vital registration systems is of good quality, the

U5MR can be easily estimated by observing the survival status of different

cohorts along time and to specific ages since the moment of birth. U5MR can

be derived from household survey data using direct or indirect methods. The

direct method uses data collected on birth histories of women of childbearing

age and produces the probability of dying before age five from children born

alive.

Process for obtaining data and estimation UNICEF compiles U5MR country

estimates derived from all sources and methods of estimation obtained

either from standard reports, direct estimation from micro data sets, or from

UNICEF's yearly exercise. In order to sort out differences between estimates

produced from different sources, with different methods, UNICEF developed,

in coordination with WHO, the WB and UNPD, an estimation methodology

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that minimizes the errors embodied on each estimate and harmonizes trends along time. Since the estimates are not necessarily the exact values used as input for the model, they are often not recognized as the official U5MR estimates used at the country level. However, as mentioned before, these estimates minimize errors and maximize the consistency of trends along time. Comments and limitations (data quality) In the majority of developing countries, due to difficulties in data collection, U5MR estimates are obtained from household surveys and therefore have attached confidence intervals that need to be considered when comparing values along time or across countries. Similarly, these estimates are often affected by non-sampling errors that may affect equally recent levels and trends of U5MR.

I. CHILD MORTALITY: EVIDENCE FROM CROSS- COUNTRY DATA Worldwide the number of children dying before age five has reached a record low, falling below 10 million for the first time in 2006. This is a 25 per cent drop from the nearly 13 million child deaths in 1990. Today, the probability of a newborn baby dying before the age of five is, globally, about 7%, compared with 10% in 1990, 12% in 1980 and 25% in 1950. At least 57 countries have not reached the 70 per 1, 000 target, the Bulletin article points out.

Some countries have child mortality rates estimated to be above 200 per 1, 000 live births. They include, in order of descending rates, Niger (335), Sierra Leone (312), Afghanistan (264), Malawi (219), Guinea and Liberia (205), Guinea-Bissau (202) and Somalia (201). Seven of these eight countries are in WHO's African region, which has an average rate of about 150, vs. 88 for South-East Asia, 67 for the Eastern Mediterranean, 46 for the Western Pacific, 34 for the Americas and 18 for Europe. Analysing the cross country

experience, from the data available, it is quite evident that by far the highest rates of under-five mortality are found in sub-Saharan Africa, where underdevelopment, armed conflict and the spread of HIV/AIDS have seriously undermined the efforts to improve child survival.

The estimated under-five mortality rate exceeds 200 deaths per 1, 000 live births in ten countries in this region. In another developing region of the world, South Asia, child mortality remains relatively high. By 2006, however, three regions—East Asia and the Pacific, Latin America and the Caribbean, and Central and Eastern Europe and the Commonwealth of Independent States (CEE/CIS)—had achieved under-five mortality rates below 30 deaths per 1, 000 live births. In contrast to this, the child mortality rate in the developed world is much lower; this is, close to 6 deaths per 1000 live births. Infant and child mortality have declined in every UNICEF region since 1990, which is the baseline for the Millennium Development Goal (MDG) targets. The drop has been greater in East Asia and the Pacific, Latin America and the Caribbean, and CEE/CIS, where estimated under-five mortality in 2006 was about half that in 1990.

Over the same time period, under-five mortality has fallen only 14 per cent in sub-Saharan Africa. Achieving the MDG4 requires that the under-five mortality rate declines, on average, by 4. 4 per cent annually between 1990 and 2015. Three regions—East Asia and the Pacific, Latin America and the Caribbean, and CEE/CIS—achieved this benchmark through 2006 or came close to it, putting them on track to achieve the MDG4. In contrast, the average annual rate of reduction in under-five mortality since 1990 has been just 1 per cent in sub-Saharan Africa.

In recent years, under-five mortality has actually increased in a dozen sub-Saharan countries. The AIDS epidemic, armed conflict and social instability, among others, have contributed to the worsening situation for children in parts of sub-Saharan Africa. Meeting the MDG target for child mortality in these countries will require dramatic measures. The situation in South Asia and the Middle East and North Africa, lies in between the two extremes described above.

Some progress has been made, but the current rate of improvement will not be sufficient to meet the target for 2015. Much remains to be done to achieve the MDG4. It will require an extraordinary effort by the international community, governments, NGOs, civil society and others. However, effective and affordable interventions are available to prevent or treat each major cause of under-five mortality. Scaling up these proven child survival interventions has the potential to reduce infant and child mortality and help countries meet the MDG4.

The map of the world, given below shows the regional grouping of the countries, based on which the analyses given above has been done. The histogram given below gives the under five mortality rate in these regions in 1990 and 2004, as estimated by the UN. The graph also lays down the target to be achieved in terms of the under five mortality rate as a part of MDG4, by 2015. Child mortality depends on a multitude of factors. Various factors determining the socio-economic life of the households, affects the level of child mortality.

Total Fertility Rate, Per Capita Gross Domestic Product, Female Literacy Rate in a country, and the like are expected to have a significant bearing on the level of under five mortality rate in a nation. For the purpose of this analysis, data on these factors was collected for 79 countries, falling in all regions of the world. Multiple Regression was then applied to the data to obtain the nature of relationship between these variables and child mortality. The data has been attached in Appendix A (Table 1). A priori, Child Mortality is expected to be negatively related to Female Literacy Rate and Per capita GDP but positively related to Total Fertility Rate. The higher the education level among women in a country, the lesser is the evidence of Child Mortality.

Literate mothers usually give birth to healthier babies because they themselves tend to be healthier than mothers who are illiterate. In addition, literate mothers are more likely to provide their children with a healthy environment and nutritious food than are illiterate mothers, even when other conditions are similar. Also, literate mothers are likely to have more information about health-care facilities and to have more influence within the family in deciding to take sick children for treatment. These traits are likely to result in lower mortality of children at all ages under five. The higher the number of children borne by a woman in her reproductive cycle, the lesser is the chance of survival of her children.

Mortality is high for first-born children and births of very high orders and is low for births of order 2 or 3. First-order births are more likely to have a difficult birth process than later births, thus increasing the risk of neonatal mortality. In addition, first-born children are likely to be raised by parents

with limited skills and experience, possibly increasing the risk of infant and child mortality. Births of very high order may have mothers who are physically depleted at the time of conception and throughout pregnancy. They are thus more likely than other children to suffer from conditions associated with high mortality risk such as foetal growth retardation and low birth weight. High-order births are also born into families that already have a number of young children who compete for resources and parental care.

The women with high fertility rates begin their reproductive cycle quite early in life. Very young mothers may experience difficult pregnancies and deliveries because of their physical immaturity. They are also likely to have limited knowledge and confidence in caring for infants and young children. Also the greater the purchasing power of the household, as measured by the PCGDP, the higher is the probability of good pre and post natal care, i. e. reduction in the incidence of Child Mortality.

We regress CM on FLR, TFR and PCGDP, and obtain the following regression results (detailed results are given in Appendix B):

Coefficients	Standard Error	t-Stat	P-value
Intercept	3.44825	6.96580	0.000134
TFR	0.311430	0.03538	0.000431
FLR	-0.273215	0.055339	0.000272
PCGDP	-0.000600	0.000431	0.000431

273. 2155339. 72450 FLR -0. 480. 224423-2.

1430. 03538 PCGDP -0. 0060. 00043-1.

3920. 16791 The relationship between TFR, FLR and PCGDP is as expected.

There exists a positive relation between TFR and CM and, a negative relation between FLR and PCGDP and CM. All the coefficients are statistically significant, as the p values are low and close to zero. 80.

72% of variation in CM is explained by regression and 28% is unexplained. The model including the three variables affecting child mortality seems to be efficient. All the variables have the expected signs, each variable is statistically significant since the p values are very low, and the overall R² is fairly high for the cross-sectional data.

In case, instead of estimating the model with three independent variables, we estimate either of the first two (with 1 and 2 independent variables respectively), then we will be committing a specification bias, namely, the error of omitting a relevant variable(s). As a result, the coefficients of the incorrectly estimated model are likely to be inconsistent. If suppose we have regressed CM on TFR. We then use the F test to decide if it is worth adding FLR and PCGDP to the model.

It can be shown that $F = (R^2_{ur} - R^2_r) / m / (1 - R^2_{ur}) / (n - k) \sim F_{m, n-k}$ follows the F distribution with m and (n-k) degrees of freedom in the numerator and denominator, respectively, where $R^2_r = R^2$ obtained from the restricted regression, and $R^2_{ur} = R^2$ obtained from unrestricted regression, m = number of restrictions imposed by the restricted regression (two in our example), n = number of observations in the sample, and k = number of parameters estimated in the unrestricted regression (including the intercept term). R^2_{ur} is 0.80727 and R^2_r is 0.7875.

Using the equation above, we get $F = 3.846$. For 2 numerator and 75 denominator, the computed F value is highly significant, suggesting that both FLR and PCGDP belong in the model. Continuing further, a few more factors seem to have a bearing on the under-five mortality rate. Income

poverty, malnourishment, childhood undernutrition, and child mortality are closely related.

It is seen that countries with highest poverty rates suffer from the worst instances of poverty. Due to lack of resources, the people are not capable enough to provide proper nourishment to the mother and the child, leading to greater chances of death. Also the level of expenditure on health by the government determines the status of health of the people in the country. There is an enormous gap between the apparent potential of public spending to improved health status and the actual performance.

Reviews of the cost effectiveness of preventive and primary curative interventions suggest that a significant fraction of under five deaths could be avoided for as little as \$10, and in many cases under \$1000, per death averted. The number of physicians also determines the efficacy of the health policy of the government. The greater the number of physicians, the lesser is the expected incidence of child mortality in the country. Table 2, (given in Appendix A) shows the data on different factors affecting child mortality in 110 countries. The countries have been grouped into three broad groups as per the classification given in the Human Development Report: High Human Development, Medium Human Development and Low Human Development.

The levels and reasons for child mortality are different in the different sets of countries. Using Minitab regression was applied on the three groups of countries separately as well as together. For High Human Development Countries, the regression equation is: $U5MR = 32.8 + 0.$

230 PL + 1.42 TFR + 0.00129 HEPC - 0.0134 P - 0.000301 PCGDP - 0.217 FLR The regression shows the expected signs of all the coefficients.

With greater poverty, U5MR is higher. Also, greater the number of physicians, lesser is the child mortality. Health Expenditure doesn't seem to have an important effect in this model. This may be because of the fact that for High Human Development countries, with already a low level of U5MR, a higher public spending doesn't reduce mortality. Mortality is not due to external factors that can be fought with spending on health, but is due to unavoidable natural deaths.

The d statistic and VIF show that the data doesn't have autocorrelation and multicollinearity. 57% of variation in U5MR is explained by regression. This low value is because of the fact that for the developed world, factors like TFR, FLR, HEPC, PCGDP etc are not much significant causes for child mortality that is attributable to natural factors. For Medium Human Development Countries, The regression equation is: $U5MR = 32.$

$5 + 0.224 PI + 18.5 TFR - 0.0248 HEPC + 0.113 P - 0.$

$00679 PCGDP - 0.493 FLR$ The regression exhibits consistent results. Here, health expenditure has a negative effect on the U5MR. Thus for Medium Human Development Countries an increase in health expenditure per capita by 1\$ will reduce child mortality rate by 0.0248.

The d statistic and VIF show that the data doesn't have autocorrelation or multicollinearity. For Low Human Development Countries, the regression equation is: $U5MR = -257 + 0.18 PL + 62.2 TFR + 0.$

161 HEPC + 2. 64 P - 0. 0234 PCGDP - 0. 681 FLR The signs of all the coefficients are as expected, except that of HEPC and Physicians. The reasons lie in the very structure and nature of the low Human Development economies. The impact of a greater supply of effective health services in the public sector on health status depends on individual demand and market supply, which varies from country to country.

Also Public monies are spent on expensive, but ineffective, curative services. The less-developed economies are characterised by rampant corruption, leakages of funds, and inefficiency. The rural-urban divide is much sharper in the less developed region, with a majority of the population residing in the rural areas. The main beneficiaries of the public expenditure on health are the people residing in the urban areas, who can take the benefit of the developed health infrastructure, and the rich, educated and the influential in the rural areas. Moreover, the awareness in the rural sectors, about the importance of health care facilities is low.

Despite the initiatives of the already resource-scarce governments of the less developed countries, the people are reluctant to spend time on health care and visit the professionals. They have a higher level of trust on the local treatments offered (often by the elderly in the society). The d statistic and VIF show no autocorrelation and multicollinearity. 67% of variation in the dependent variable, U5MR is due to the variation in the explanatory variables, and the rest is due to random factors. This is evident from $R\text{-Sq}(\text{adj}) = 67. \%$, which is greater than that for the High Human Development countries.

This shows that the factors like FLR, PCGDP, TFR, population below the Poverty Line etc have a larger impact on U5MR in such countries because of a higher incidence of child mortality caused by a variety of factors (other than natural). Now, for the entire set of 110 countries, when regression is applied, the equation obtained is: $U5MR = 0.7 + 0.539 PL + 26.8 TFR + 0.00011 HEPC + 0.0938 P - 0.000213 PCGDP - 0.713 FLR$ The relationship depicted is consistent with what was expected. The HEPC and Physicians have inconsistent signs because of the cross-national variation in health status.

It is incorrect to jump from some countries' good health outcomes to the conclusion that all (or even that any) of the unexplained differences in mortality are due to health policy. While it is possible that these countries' good health outcomes is due to health sector strategy, it is equally plausible that they share non-health characteristics like high levels of female education, better nutrition, more equal income distribution that explain their better outcomes. 81. % of the variation in U5MR is due to the regression, which is better than the result for the group of countries separately .

The d statistic and VIF show no autocorrelation and multicollinearity in the data. The results presented thus show that a remarkable amount of the cross country variation in health status, as measured by the under-5 mortality rate, can be explained by variation in factors not related to non-health sector policy. Approximately 80 percent of the variation in under-5 mortality is explained with income, its distribution, female education, the total fertility rate, and other " cultural" factors. Moreover, the results show that, although

The d statistic and VIF show no autocorrelation and multicollinearity in the data. The results presented thus show that a remarkable amount of the cross country variation in health status, as measured by the under-5 mortality rate, can be explained by variation in factors not related to non-health sector policy. Approximately 80 percent of the variation in under-5 mortality is explained with income, its distribution, female education, the total fertility rate, and other " cultural" factors. Moreover, the results show that, although

income alone is powerful determinant, other factors are significant determinants of under-5 mortality. In addition, higher public spending on health as a share of GDP is shown to be very tenuously related to improved health status.

The observed efficacy of public spending is several orders of magnitude lower than the apparent potential. The correct interpretation of the empirical results and their policy implications depend on three factors: cost effectiveness of public spending, the net impact of additional public supply, and public sector efficacy. Each can explain the observed results and almost certainly each contributes to explaining the low typical efficacy of actual public spending. Each has different implications for reform and which is the most important depends on the particular situation.

The target of the fourth MDG is to reduce under-five mortality by two-thirds between 1990 and 2015. Achieving this goal requires that U5MR decline by 4.4 per cent every year during that 25-year period. To reach the 2015 target set by the MDG4, the pace of change must accelerate: globally child mortality would have to decrease by an average of 9.

per cent per year from 2007 to 2015. In recent years under-five mortality has actually increased in a dozen of these countries, so that children are less likely to survive to their fifth birthday today than they were in 1990. The causes of child mortality are many. 60% of the deaths are associated with undernutrition.

Close to 1/3 of under-five children in Asia and Africa show a measurable deficit in height as a result of the under-nutrition associated with a

chronically inadequate diet combined with frequent illness. While in Asia the trend over time indicates improvement, in Africa there is no such indication. In addition to these growth deficits, there are also widespread vitamin and mineral deficiencies (VMD). Invisible to see but VMD have devastating consequences for child survival and development. It includes deficiencies in vitamin A, iron, zinc, and iodine. An estimated 127 million preschool aged children are vitamin A deficient and thus are at increased risk of death, mainly from diarrhoea, measles and malaria.

The major causes of diseases and their spread can be understood from the pie diagram given below: Fig 3: Causes of Under five mortality Clearly, Neonatal causes account for the highest proportion on the deaths among children below the age of five years, followed by pneumonia and diarrhoea. The reasons also vary across countries, which is evident from the map of the world given below, with pie charts showing the various reasons responsible for mortality. Fig 4: Causes of under five mortality by region Neonatal causes account for a significant portion of deaths all across the world. However the proportion of deaths caused by different diseases varies across different regions. In the Sub Saharan Africa, malaria is a major cause, while it is pneumonia and diarrhoea for the South East Asian region.

Neonatal causes exist as the major reason for high mortality levels across the globe. Within the neonatal causes, sepsis, pneumonia, preterm and asphyxia are found predominantly. Since, the major cause is neonatal; the main method of prevention is breastfeeding. It is breastfeeding which when provided to the child in the first month after birth provides good nutritional value and helps build resistance against commonly seen diseases. Fig 5:

Methods to prevent U5MR with their universal coverage Other important measures to prevent under-five mortality include complementary feeding, provision of ORH (Oral Rehydration Therapy), ensuring clean delivery, vaccinations and immunizations, clean water, sanitation and hygienic environmental conditions and the like.

II. CHILD MORTALITY IN INDIA India has the third highest child mortality rate only shade better than neighbours Pakistan and Bhutan in terms of environmental threats to children's health. This, according to the World Health Organisation's classification of five mortality strata, puts India under Sear-D which denotes high child mortality among countries in the South-East Asian region. What makes India unsafe for children is the widespread and largely unchecked industrialisation causing release of dangerous levels of contamination into the environment and thereby into homes, educational establishments and even child care centres.

Graded in the WHO's publication, 'Inheriting the World: The Atlas of Children's Health and the Environment', facing the brunt are Indian children who are exposed to traditional sources of threat including wood smoke, bacterial contamination of drinking water, fluoride excess in ground water, asbestos construction materials, untreated manufacturing wastes released into landfills, pesticides and atmospheric lead emissions from combustion of leaded petrol. Laced with carbon monoxide and overdose of lead, researchers also showed that our home environment could prove possibly more damaging to infants and children than the outdoors. Under-five mortality rate in India has fallen to 73 per 1, 000 live births in 2006, from

123 per 1, 000 in 1990, which is extremely good news, although it still represents 1. 9 million deaths.

As evident from Fig5 and Fig 6, Child mortality is falling but is high till date.

Table 3: Under five mortality rates in India Year
Under-five mortality rate per 1000 live births) 1960236 1965220 1970202 1975195 1980173 1985146 1990123 1995104 200094 200585 Fig 6: Time series plot Fig 7: Trend

Analysis for U5MR in India Sex differentials in infant and child mortality reflect strong son preference in many states. Most states exhibit excess male mortality during the neonatal period but excess female mortality during childhood. The only exceptions are Tamil Nadu and Kerala. In the country as a whole, female child mortality is 40 percent higher than male child mortality.

The sex ifferentials in infant and child mortality suggest that son preference and discrimination against female children are very strong in northern states but minimal or nonexistent in southern states. Among socioeconomic background characteristics, urban/rural residence, mother's exposure to mass media, and use of clean cooking fuel are found to have substantial unadjusted effects on infant and child mortality, but these effects are much smaller when the effects of other socioeconomic variables and basic demographic factors are controlled. Mother's literacy, access to a flush or pit toilet, household head's religion and caste/tribe membership, and economic level of the household (indicated by ownership of consumer goods) have substantial and often statistically significant adjusted effects on infant and child mortality. Both unadjusted and adjusted effects of most of these background characteristics are largest for child mortality and smallest for

neonatal mortality. In general, demographic characteristics have substantial adjusted effects on mortality before age five.

The adjusted effects are not very different from the unadjusted effects (i. e. , the introduction of controls makes little difference) except in the case of birth order and mother's age at childbirth. Adjusted neonatal mortality decreases with increasing birth order, whereas adjusted post neonatal and child mortality increase with increasing birth order. The combination of effects on neonatal mortality and post neonatal mortality results in a U-shaped relationship between birth order and infant mortality, with third-order births showing the lowest mortality. Mother's age under 20 at childbirth is associated with much higher mortality of first-born children.

Among second and higher-order births, the relationship between mother's age at childbirth and mortality is U-shaped. Children born after a short birth interval, children who are followed by a next birth within a short interval, and children with an older sibling who died all experience much higher mortality before age five than do other children. Controlling for other variables does not change the effects of these factors very much. It is quite evident from the data, that measles is a major cause of deaths in India, followed by malaria and diarrhoea. Fig 7: U5MR from specific causes preventable through intervention- as percentage of deaths by cause Among variables indicating mother's health-care behaviour, mother's tetanus immunization during pregnancy has a strong association with reduced neonatal mortality. This study provides information for health planners and managers responsible for programmes to reduce infant and child mortality.

Encouraging mothers to space births by intervals of at least 24 months will greatly enhance the survival of children. Minimizing the number of births to very young mothers (under age 20) and avoiding high-order births will also substantially enhance survival chances of children during the first five years of life. Family health programmes should emphasize tetanus immunization for all pregnant mothers. They should also identify families that have already experienced infant or child death and should provide them with intensified maternal and child health services. The decline has been due to a number of factors.

The public health system has improved, although India being such a large country, certain states are better off than others. Measles vaccination coverage has risen over the years and stands at 65%, which is good but not good enough - we would like it to be at least at 80%. Again, the figure masks the disparities among the country's states. The southern states tend to be better off, whereas the poorer states such as Uttar Pradesh and Bihar have poorer facilities.

Another thing that has helped is breast-feeding, which helps decrease incidents of disease and diarrhoea, which is a killer among young babies. The rate in India is just over 50%. Frontline support workers are helping to support mothers at antenatal clinics, hospitals and in villages. Increased immunisations have saved lives in India India's success in bringing mortality rates down is due to putting a large percentage of its budget into the health and social sector, and investing in the health sector, facilities and frontline health workers. Worldwide, the number of young children who died in 2006 dropped below 10 million for the first time. Measles vaccinations, mosquito

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nets and increased rates of breast-feeding were said to have contributed to the fall.

However, experts say that most of the deaths were preventable and that more needed to be done. IS THE MDG4 ACHIEVABLE? The target of the fourth MDG is to reduce under-five mortality by two-thirds between 1990 and 2015. Achieving this goal requires that U5MR decline by 4. 4 per cent every year during that 25-year period. Between 1990 and 2006, however, the actual average annual rate of reduction (AARR) in under-five mortality was only 1. 6 per cent globally. To reach the 2015 target set by the MDG4, the pace of change must accelerate: globally child mortality would have to decrease by an average of 9. per cent per year from 2007 to 2015. However, the global numbers mask wide variations between and even within UNICEF regions, which are shown in Table 4. Three regions—East Asia and the Pacific, Latin America and the Caribbean, and CEE/CIS—have either achieved the benchmark of a 4.

4 per cent AARR through 2006 or come close. All three of these regions are considered to be on track to achieve the MDG on child mortality. At the other extreme, the U5MR in sub-Saharan Africa has declined by just 1 per cent annually, on average, since 1990. Sub-Saharan Africa accounts for 24 of the 27 countries that are rated as making no progress towards the fourth MDG. In recent years under-five mortality has actually increased in a dozen of these countries, so that children are less likely to survive to their fifth birthday today than they were in 1990. The deterioration in child mortality

has been most extreme in Botswana, where the U5MR has increased an average of 4.

7 per cent each year since 1990, followed by Swaziland and Zimbabwe, which have experienced average annual increases of 2.5 percent and 2. per cent, respectively. Much remains to be done to reach the MDG4.

It will require an extraordinary effort by the international community, governments, NGOs, civil society, and others. However, research and programme experience have made it clear what actions need to be taken. Most child deaths are preventable. Over half are due to communicable diseases, including pneumonia, diarrhoea, malaria, measles, and HIV/AIDS.

There is at least one effective and affordable intervention available to prevent or treat each major cause of under-five mortality. These include skilled attendants at childbirth, early and exclusive breastfeeding, immunization, vitamin A supplementation, the use of insecticide-treated bed nets to prevent malaria and oral rehydration therapy. Scaling up coverage of these proven child survival interventions has the potential to prevent most child deaths.

Table 4: Average annual rate of reduction in under-five mortality and progress towards the MDG target, by UNICEF regions

Region	Under-five mortality rate (U5MR)	Average annual rate of reduction (%)	Progress towards the MDG target***
1990	2006	MDG target for 2015	Observed: 990-2006
Required to meet MDG target: 2006-	2015	Sub-Saharan Africa	187160621. 010.

5Insufficient Eastern and Southern Africa165131551. 49. 6Insufficient West and Central Africa208186690. 711. 0No progress Middle East and North Africa7946263.

46. 2insufficient South Asia12383412. 57. 8insufficient East Asia and Pacific552918405. 1on track Latin America and Caribbean5527184.

44. 3on track Central and Eastern Europe and the Commonwealth of Independent States (CEE/CIS)532718424. 7on track Industrialized countries10633. 26. 6on track Developing countries10379341. 79.

3InsufficientLeast developed countries180142601. 59. 6Insufficient World9372311. 69. 4Insufficient *On track is defined as either: (1) U5MR < 40 deaths per 1, 000 or (2) U5MR ? 40 per 1, 000 and AARR ? 4% Insufficient progress is defined as: U5MR ? 40 per 1, 000 and 1% ? AARR < 4% No progress is defined as U5MR ? 40 deaths per 1, 000 and AARR < 1%

Improving child survival remains a major development task in India. The slowing down in India's child mortality reduction rates calls for new approaches to child mortality that goes beyond disease-, program-, and sector -specific approaches.