# How do maternal factors contribute towards child ill health? Evidence from India

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*Abstract-* The paper investigate the impact of maternal factors on child ill health in India using the data from National Family Household Survey 2005-06. The empirical analysis exploits a cross-section structure of the dataset by regression (logit transformation) estimation of a static model taking into account the observed maternal factors and possible dimensions of child ill health. Our results explain the significant impact of maternal factors on child ill health. As a policy option, this paper argues for the improvement of maternal factors to improve the well-being of the children.

*Index Terms-* Child ill health, regression estimation, static model

## I. INTRODUCTION

In recent years, the endogenous growth theories in economics have accentuated the importance of human capital or investment in health in the process of economic growth (Lucas 1988). Alongside, there are much research evidence which empirically showed the relation between human capital and economic growth (Haldar and Mallik,2010; Howitt,2005). However, the formation of human capital largely depends on the health conditions of individuals.

For an economy as whole, children's wellbeing is very important. Children are recognised as vital for adult productivities and earning (The National Academies Press 2004). Hence, good health among the children specially aged from 1-6 years is pre-requisite for the future growth and development of a nation.

Healthy children economically benefit the nation by cognitive development, increased school participation and growth of productivity and income during adults (Belli et. al, 2005). In the absence of ill health, children can actively participate in the social activities. Healthy children induce positive demographic changes like reduction in mortality and fertility, widen birth intervals, smaller dependency ratio and as a result of all these, population growth has slowed down. Thus, prevention of children' ill health generate economic growth of a nation through improving health outcomes by various economic, social and demographic benefits (Belli and Appaix, 2003). This economic growth again strengthens the health outcomes for children as well as for adults by reducing fertility, population growth, improving the nutritional level. Figure 1 shows this circular relationship between health and growth.

**Figure1**: circular relationship between health and growth
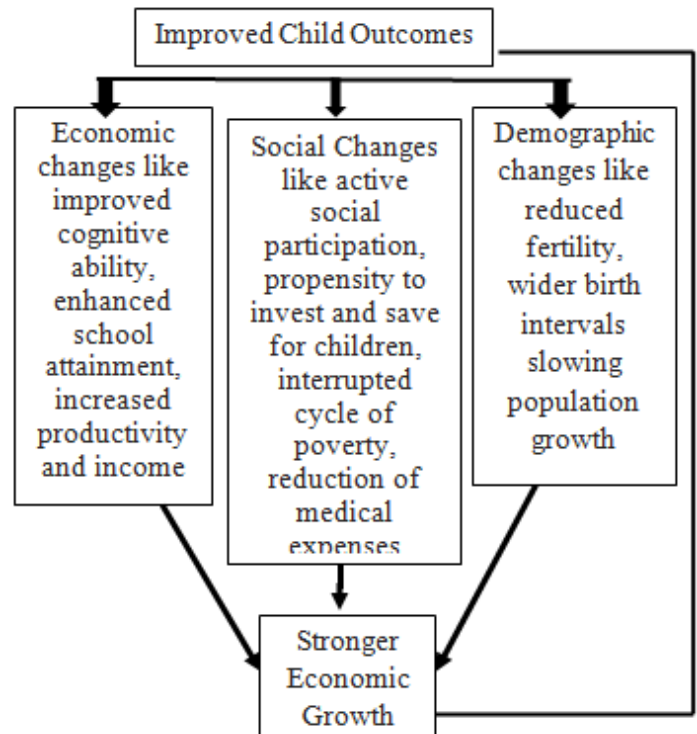


India has recorded one of the worst performances on child health[1]. In India, in the first six years of life, millions of children are trapped in undernutrition and ill health (Dreze et. al, 2007) where, more than 2 million children die each year and among those more than 20 per cent deaths have taken place within the 5 years of age (The National Academies Press ,2004). Again, one third of new born children are of low birth weight in India indicating the fact that children are suffering from nutritional deficiencies. Underweight, anaemia, still births, stunting,

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[1]The child health condition in India is relatively poorer than other neighbouring countries and many Sub-Saharan African Countries. For example, in case of the health of children ageing between 0 to 3 years, China and Vietnam outperform India (see, Ray and Sinha 2011). Again, India has higher proportions of underweight and nutrient deficient children in compare to China, Sri Lanka, Bhutan and other South Asian countries (see, Joumard and Kumar 2015). World Bank data reveals that the infant mortality rate, the under 5 mortality rates in India are much higher than the other neighbouring countries

wasting are some of the existing child health problem in India. Almost 48 per cent children are stunted, almost 20 per cent are wasted, 43 per cent are underweight and 70 per cent children are anaemic (NFHS 3).

Ill health of children is associated with the nutritional and socio-economic status of their mothers as mothers are considered to be the primary care givers to the infants and children in almost all societies around the world (UNDP, 1995). Mother's nutritional level, breastfeeding, adequacy and access to pre natal and neo natal care, maternal education level and their economic status as well as social status, time provided for child care, health seeking behaviour etc. are some factors through which mothers are very much related with child health. At the same time, women in India are severely deprived compared to other developing countries[2]. Here, more than one third of women of reproductive age group suffer from chronic nutritional deficiency (NFHS 3). Again, more than55 per cent of the women are exposed to domestic violence (Pahuja, 2011) and women are as half likely to be employed in compare to men in India. So, it is important to find the effect of mothers' well-being and status on child ill health.

Malnutrition among women is the most important determinants of child health. It has found that nutritional status of mother significantly associated with the nutritional status of young children Malnutrition among women leads to increased numbers of perinatal and neonatal mortality, increases the risks of low birth weight babies, still births, miscarriage etc. (Krasovec and Anderson, 1991). Literature showed that malnourished mother gave birth to a high proportion of low birth weight and stunted children (Teller et. al, 2000; Genebo et. al,1999). A woman whose Body Mass Index(BMI) was less than 18.5 (underweight) has about 30% higher likelihood of having a low birth weight baby than a woman whose BMI was greater than 18.5 (normal and overweight) (Dharmalingam, 2010). But, no negative association has been found between BMI and child wasting in some cases (Mishra and Ray, 2012).

Again, Children's ill health is one of the adverse consequences of violence against women (Ahmed et. al, 2006). Different studies revealed the adverse influence of domestic violence upon the child health (Murphy et. al, 2001, Jejeebhoy, 1998; Ahmed et. al, 2006; Ackerson and Subramanian, 2009). It has been examined that domestic violence leads to psychological stress among women, which increases the risk of poor nutritional outcomes of mother as well as children by causing anaemia, underweight and other nutritional deficiencies among children. Domestic violence has also resulted inadequate decision making power of women about the types and quantities of food, women

prepare for themselves and for their children, which finally contribute to ill health of children.

Children health is also related to working status of women. Different studies have provided inconsistent results regarding the direction of relationship between mother's working status and child health. Some literature have provided that women's work has positive influence on their child nutritional status by utilising their income for better food and better treatment of child's illness (Ukwuani and Suchindram, 2003; Engel, 1993; Jayachandra and Jarvis, 1986; Blau et. al, 1996). Again, some other studies viewed working mother as disadvantageous for the sound health of children, they showed that children of non-working mothers have better nutritional status as non- working mothers have more time available for child care i.e. children are expected to receive less attention and less nutritional food from their working mothers (Sivakami, 1997;Srivastava et. al, 2012).

Media exposure is very important for demographic as well as health changes. Mishra et. al 1999 in their study revealed that Children of mothers who are regularly exposed to mass media are less likely to be stunted, wasted and underweighted. Literature provide that mass media including radio, television and cinema are playing effective role to educate mothers about maternal and child health care services and different family planning programmes by increasing awareness and knowledge along with changes in social norms and attitude which again lead to positive health outcomes of children (Asp et. al, 2014).

Given this background, the present study attempts to answer the question whether the maternal factors has influenced child ill health in India, i.e., to examine how changes in child ill health are related to changes in the nutritional, social and economic status of mothers.

## II. DATA AND METHODOLOGY

The data are drawn from National Family Health Survey study (NFHS-3)[3], a nationally representative study conducted during 2005-06. Our sample includes grouped data for all the 29 states of India. Based on the summery of different theories, 6 variables of child health are selected to construct a child ill health index (table 1).

**Table 1:** Variables for constructing child ill health index

| Low Birth Weight | The child ill health index includes percentage of children whose birth weight is less than 2.5 kilogrammes. These children are considered to be very small and are vulnerable to illness and death. |
|---|---|

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[2]In the article 'India and the MDGs towards a Sustainable Future for all 2015' by United Nations Economic and Social Commission for Asia and the Pacific, it has been revealed that the Gender Inequality Index (GII) for India is 0.563 (with 135th rank) in 2014, which is almost twice the GII (0.33) of East Asia and the pacific (EAP). Work status of women in India is very poor. Labour force participation rate of women above 15 years of age is only 30 per cent in India whereas it is higher for the other neighbouring countries like Nepal (79.9%), Bhutan (66.4%), Bangladesh (57.3) and Sri Lanka (35%).

[3]The third National Family Household survey coordinated by the International Institute for Population Sciences (IIPS) under the guidance of Government of India was conducted in 2005-06. It provides information on fertility, mortality, family planning along with other important aspects of nutrition, health and health care. NFHS-3 collected information from a nationally representative sample of 109,041 households, 124,385 women age 15-49, and 74,369 men age 15-54. The sample of the survey covers 99 percent of India's population living in all 29 states

| Stunting (height for age) | It represents the long term effects of malnutrition in a population i.e. chronic malnutrition. The index includes percentage of children whose Z score is below minus two standard deviations (-2 SD) from the median of the reference population who have low height for age. |
|---|---|
| Wasting (weight for height) | It is an indicator of acute under nutrition which occurs due to recent food deprival and illness. The index includes percentage of Children whose Z score is below minus two standard deviations (-2 SD) from the median of reference population who are considered to have low weight for age. |
| Underweight (weight for age) | It takes into account both chronic and acute malnutrition. The child ill health index includes percentage of Children whose Z score is below minus two standard deviations (-2 SD) from the median of reference population who are considered to be underweight |
| Anaemia | Low level of haemoglobin in blood causes anaemia. The index undertakes the percentage of children who are suffering from anaemia with level less than 11.0 g/dl. |
| Non-live Births | The index contains the percentage of women who had given no-live births. |

First, individual variables are converted into normalised form and then we use Factor Analysis technique to extract the factor loadings. The details of sampling adequacy test and the rotated component matrix for factor analysis are given in table 2.

**Table 2:** Measures for factor analysis

**KMO and Bartlett's Test**

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .584 |
|---|---|---|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 114.751 |
| | df | 15 |
| | Sig. | .000 |

**Rotated Component Matrix**

| | Component | |
|---|---|---|
| | 1 | 2 |
| Wasting | .792 | .132 |
| Anaemia | .816 | .305 |
| Non live birth | .000 | .883 |
| Low weight | .365 | .683 |
| Stunting | .862 | .006 |
| Underweight | .936 | .239 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Once we construct the child ill health index, we then regress the index values by taking following maternal factors as explanatory variables (table 3).

**Table 3:** Explanatory variables of regression analysis

| Prevalence of Malnourished Women | Malnutrition of mothers as measured by the poor body mass index (BMI) is considered. The study takes into account the percentage of woman whose BMI is less than 18.5 i.e. who suffer from acute undernutrition and are very thin. |
|---|---|
| Domestic Violence | It is the range of sexual, emotional and physical violence against the adults and adolescent women by their husbands as well as by other household members. In the study, percentages of married women age 15-49 who have experienced any kind domestic violence are included. |
| Working Status | Percentage of currently married women age 15-49 years who were employed for last 12 months prior to survey are included as explanatory variable in the study. |
| Exposure to Media | Percentage of women of reproductive age group 15-49 years who watch television at least once in a week is included. Only television is included as media as it is the most powerful media in India where two third mothers are illiterate. |

The statistical model (logit transformation) used to estimate the impact of maternal factors on child ill health is:

$$CIH = \alpha + \beta_1 MW + \beta_2 DV + \beta_3 WW + \beta_4 ME + \mu \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where CIH is the child ill health index, MW is percentage of women suffered from malnutrition; DV is the percentage of women experienced domestic violence, WW is the percentage of women employed, ME stands for percentage of women who had watched television at least once in a week, $\alpha$ is the intercept, $\beta_1$, $\beta_2$, $\beta_3$ and $\beta_4$ are the constant associated with the independent variables, and $\mu$ is the error term.

## III. RESULTS AND DISCUSSION

The estimated results of equation (1), after adopting the tests for multicollinearity, are provided in table 1. In this estimation, the estimated coefficients demonstrate their expected signs are found to be statistically significant at one per cent level of significance. The adjusted coefficient of determination is 0.73; it implies that 73 percent of the variation in the child health index in India is explained by the explanatory variables. The F-statistic showing the overall fit of the model is also significant at the one percent level.

**Table 1: Result of the multiple regression analysis of Child ill health index**

| Variable/Constant | Estimated Coefficient | Standard Error | t value |
|---|---|---|---|
| Constant | 1.555*** | 0.227 | 6.867 |
| Malnourished Women (MW) | 0.003*** | 0.003 | 2.332 |
| Domestic Violence (DV) | 0.008*** | 0.003 | 3.034 |
| Working Women (WW) | -0.006*** | 0.002 | -2.926 |
| Media Exposure (ME) | -0.002*** | 0.002 | -2.962 |
| Adj R Square | 0.73 | | |
| F-stats (4,24) | 19.922*** | | |

*** *level of significance at 1%*

As can be seen from the table 1 above, the coefficients of malnourished women (MW) and domestic violence (DV) are positive, so it can be concluded that given other things, increase in the percentage of women suffered from malnutrition and percentage of women experiencing domestic violence in India lead to increase the child ill health.

Literature showed that low birth weight children, low weight for height children, anaemia affected children and still birth are more pronounced to the under nourished women as these mothers are physically incapable to give birth to healthy children. So, the picture is same for Indian states also, child ill health is influenced positively by the existence of nutritional deficiency among women. Again, according to prior evidence, experience of domestic violence is an indicator of low social status of women by restricting them from taking household decisions; health care decisions; decision to work and to spend money etc. With its detrimental impact on women's physical and psychological strength, domestic violence results in improper health care of themselves and their children. And the above results comprehend the fact that in India also, increases in domestic violence among women lead to increasing ill health among children.

On the other hand, negative significant relationship has been found between the percentage of working women and percentage of women exposed to media across states of India with child ill health index i.e. working status of women and media exposure of women have negative impact on the ill health of Indian children. That means working mothers have better ability to take proper care of their children in India. As working women, they contribute to the family income which can be used for better treatment of child health and may have the authority to spend their money by their will on purchasing nutritional food for their children. And regular media exposure of women results in low ill health among Indian children as literature evidence showed mass media has been playing a major role in creating awareness among people especially among women for necessary and better care of their children and it also enhances their knowledge of using different health care facilities.

## IV. CONCLUSION AND POLICY IMPLEMENTATION

The empirical analysis of this paper finds some supports for the research question posed in the paper, i.e., the maternal factors significantly affect the child ill health. It makes sense that the improved child health can be achieved by directly investing some of the programmes which improve mothers' socio-economic status including their health condition. The negative estimates of working women and women who have media exposure are counterintuitive. This finding may be due to the fact that the women who are employed have higher earnings to finance health care cost of their families as well as their children. The negative estimate of the media exposure is not surprising given that women who have better knowledge regarding health and health care facilities provide vital support to their children's health. Thus it is evident through the employability of women or through media exposure; female education can play a crucial role in improving child health condition. In particular, the health-specific education policies are most important for getting the highest benefit. Alongside, government should pay sufficient attention for nutritional status/health condition of women by providing subsidiary food items, free health check-up, etc.

Thus, the well-being of mothers' nutritional, social and economic status bear significance influence on the child ill health in India. In India, it has been studied that more than one third of women are suffered from nutritional deficiency who have a BMI of less than 18.5 indicating very thin women and similarly, about one third of women are have experienced domestic violence in

India. And only 36 per cent of India women are employed whereas it is 85 per cent for men. Same is the situation in case of media exposure of women, 35 per cent of women in India are still not exposed to any kind of media and only 55 per cent are exposed to television once in a week. But, in India where nearly 56 per cent women of reproductive age are illiterate, television and radio can play an effective role as government of India rely heavily on electronic mass media. So, in order to improve the child health, steps must be taken those are directed to decrease the domestic violence and malnutrition among women as well as increase the employment of women and increase the mass media exposure among women.

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