Empirical Study of Child Nutrition and Its Determinants in India

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ABSTRACT

This paper tries to find out which variables are more important in determining child nutrition, according to NFHS-4 data. The study is done to estimate the determinants of child nutrition with variables as primary indicators of child undernutrition (stunted). Independent variables are maternal variables (age during pregnancy, BMI, education, etc.) Child variables (immunization, Diet, vitamin dose received), Household variables (sanitation, clean drinking water, a family member covered under health insurance), etc are taken as independent variables. OLS regression is done to estimate the linear impact of each independent variable on determining child nutrition.

INTRODUCTION

The focus of the paper is on how maternal, household, and other child variables such as sanitation, immunization, and their impact on determining the child nutrition in India in the current scenario with the recent data published by National Family and Health Survey, 4th round. If we look into the problem of undernutrition in India through NFHS data, it gives a clearer picture of its severity. In the year 2005-6, India had 62 million stunted children, accounting for a third of the world's highest stunting burden. The new NFHS-4 data on 15 states shows that currently 37 percent of children under five in these states are stunted, so there is only a 5 percent decline in a decade. Bihar and Madhya Pradesh are worst off, with the 48 and 42 percent respectively children stunted.

Nutrition is a critical factor for determining the overall growth of the country. Undernutrition destroys human capital by affecting cognitive skills, physical development, low growth of individuals and ultimately resulting in the low economic development of the country as a whole. According to UNICEF, 2011 report undernutrition remains high in India for a long time and India has the highest number of babies with a low birth weight per year. It is a known fact that nutrition plays a very important role in human development particularly for children, girls, and women because they are the most vulnerable. Women are more

susceptible due to their biological needs, and they need more nutrition at different stages of life, like adolescence, during pregnancy, and Lactating mothers need more nutrition due to extra body requirement at that stage, failing to which will lead to a vicious cycle of undernutrition from mother to child.

The reasons behind the under-nutrition of women in India are many.The discriminatory practices, early marriage, not getting proper support for studies, less economic independence, cultural practices, and conservativeness of society towards women. These are a few important factors that play a crucial role in determining the overall (low) nutrition status of women. Indian women are expected to do heavy household work manually and assistance from male members. Apart from this, a woman in India was subjected to frequent pregnancies. Undernutrition is both the cause and effect of poverty. Primary Indicators of child nutrition are –Stunting, Wasting, and Under-weight. The government is focusing on bringing up so many schemes to reduce the level of undernutrition, gender, and inequality. The union budget of 2018 has focused on improving gender equality and has devoted more funds to the improvement of women and children in India.

LITERATURE REVIEW

Over the years, many empirical studies have been done on the determinants of child nutrition in different parts of the world. As research is done (Moestue & Huttly. 2007), did study on young Lives study in Vietnam and Andhra Pradesh State. The result showed that child nutrition is positively related to mothers', fathers', and grandmother's education, and association with grandmother's education was stronger for boys in India whereas in Vietnam child nutrition is positively related to community-level maternal literacy. This study reveals the gender-biased nutrition status of the child. (Rupal & Vijaya. 2016) used third-round data from the National Health and Family Survey. Their study finds that' stunting, apart from being determined by nutrition is also defined by cultural practices and water supply, thus showing that sanitation and improved water facilities can decrease child undernutrition up to an extent.

The study was done by (Rahman et al. 2010), with the use of data from the NHFS-3 round. The study found out that the burden of stunting was higher in children from a poor background with high rural-urban differentials. Families with higher income tend to have less undernourished children as compared to low-income families. Low malnutrition leads to high productivity, malnutrition creates a vicious circle; skewed income tends to perpetuate (Pedro. 1971). The study found that there is state-induced market failure in India, which leads to the need for gender-fair intra-household food allocations (Santosh. 2006).

The study done by (Arun & Jon. 2004), used data from WHO, UNICEF, and other journals. The paper majorly discussed the difference between hunger and malnutrition and suggested there is a need for a shift in thinking from food-based approaches towards feeding behavior. Poverty is an important factor but fails to explain the high malnutrition in India than Sub-Saharan Africa, which shows gender inequality and culture

also plays an important role (Neeraj. 2011). Stunting prevails because of the lack of curative health care and child underweight is strongly associated with maternal weight and health (Peter. 2008).

(Brinda & Sikha. 2005),Used IHDS data to study women's malnutrition in India between the age of (20-40), they used variables like per capita income, per capita consumption expenditure, and wealth are crucial in explaining the variations in BMI, but the impact varies across the quantiles. The result also concluded that national income played an important role in reducing child malnutrition in developing countries (Smith & Haddad. 2000). The study by (Sowmya. 2015), On Determinants of child health, Findings show that household wealth, mother's education, and community-level factors determine the socioeconomic status (SES) of the household. Low SES leads to high exposure and low resistance to diseases.

Data and Variables

Data is taken from the National Family and Health Survey-4th round (2015-16), published in December 2017.National Family Health Survey (NFHS) is a large-scale, multi-round survey conducted in a representative sample of households throughout India. There are four rounds of the survey conducted since the first survey in 1992-93. All India District level data is taken, which has 670 observations. This study uses data from children aged from age zero to five years of age of the total population of India which includes rural and urban data. It is well known that nutrition level at very initial years from birth plays a critical role in shaping the person's physical and cognitive wellbeing. Stunted, which is one of the primary indicators of under-nutrition is taken as a dependent variable. Independent variables are also categorized into three subdivisions, namely Child variables, maternal variables, and other variables (household).

Child variables are - imnzchd, which is age (12-23) months completely immunized, Brst1hr, which is under age of one breastfed within the hour of birth, tadtdt, which is under the age of (6-23) months both breastfed and receives an adequate diet, vitachd, which is under the age of (9-59) months who have received vitamin A dose in the last six months. Maternal variables are - Married before the age of 18, Women who received 10 or more years of Schooling, Women in the age group (15-19) who were already mothers or pregnant, Institutional Birth, Women whose BMI >25 Kg/m2, Pregnant women a who are anemic(<11.0g/dl), Women whose BMI <18.5 kg/m2. Household variables are- A household with improved drinking water sources, Households using improved sanitation facilities, A household with any usual member covered by health Scheme or Health Insurance.

ESTIMATION METHODS

Regression function are estimated by the OLS method and then quantile regression at(.20 .40 .60 .50 .80). We have used data from NHFS-4, which is data from a report published by NFHS in December 2017.

a) Linear Regression Estimation

According to the Gauss-Markov theorem, among all linear unbiased estimators, the ordinary least squares estimator has the smallest variance. The linear model is-

$[Stunted\ Child]=\alpha+\beta1[ImnzChd] + \beta2[vitachd] + \beta3[IB] + \beta4[brst1\ hr] + \beta5[tadtd] + \beta6[HSF] + \beta7[HWD] +\beta8[FANTC] + \beta9[Mm18] + \beta10[P1519] + \beta11[M10] + \beta12[BMI18] + \beta13[BMI25] + \beta14[A11] +\mu i$

This Gauss-Markov theorem holds only when the assumptions of classical normal regression are satisfied. the important assumption of the classical normal linear regression model is no multicollinearity. I have checked for multicollinearity and found that this model does not exhibit multicollinearity since any of the independent variables, The VIF value is not greater than 10. The other important assumption of the Classical Normal Linear Regression model is the absence of autocorrelation. Given the fact that the data period is for only one year, the possibility of the existence of any autocorrelation is nil. The other Classical Normal Linear Regression assumption condition for which we are going to test is homoscedasticity, Breusch- Pagan test was performed. The test statistics nR^2 follows $\chi 2$ distribution with 1 degree of freedom. The null hypothesis is not rejected at a 5 percent level of significance, and therefore there is heteroscedasticity present in the data.

b) Quantile regression

Quantile regression at (.20 .40 .50 .60 .80) For stunted child. Coefficient estimates for the 20th, 40th,50th (median),80 th quantiles. A broader picture of the effect of independent variables on the dependent variable can be obtained by using quantile regression. Quantile regression will provide an understanding of the influence of the variables at various levels of severity of the problem in the case of stunting. Quantile regression shows the relation between a set of independent variables and specific percentiles (or quantiles) of the dependent variables. Here I have taken dependent variables as stunted and Independent variables as household sanitation facilities, mother's education is 10 or more years, women married before the age of 18, Infants who were breastfed within the one hour of birth, and children who received adequate diet (main 5 variables), which are very much important in determining child's nutrition.

RESULTS

a) Results of Linear Regression

The variable ImnzChd is used to refer if a child is completely immunized, turns out to be significant in all three indicators of undernutrition (stunted), and shows a negative relationship with all three indicators, which means immunization of child plays an essential role in reducing stunting. Similarly, the child who received vitamin A dose in past 6 months, Institutionalbirth, women who received full antenatal care,

women who have received a minimum of 10 years of education, breastfeeding within one hour of birth, a child receiving total adequate diet and household variables like a household with safe drinking water, households with improved sanitation facilities also turned out to be significant with negative relationship, which shows the importance of these variables in determining child nutrition level. And the nutrition level of the child or the situation of under-nutrition can be improved up to the extent by putting efforts into improving these variables.

On the other hand, variables like women married before the age of 18, women whose age was between 15-19 years of age when pregnant or already mother, also turns out to be significant with the positive relationships with primary indicators of under-nutrition which shows an early marriage and teenage pregnancy of women also leads to an undernourished child. Because in the teenage the body of the female is not developed to fully, which put an impact on her health and ultimately affecting the health of her child as well.

Similarly, pregnant women who are anemic (<11.0g/dl), also turn out to be significant with positive relationships with indicators of undernutrition. This shows the importance of iron in the diet of pregnant women, since; iron deficiency is the primary cause of anemia in pregnant women. Body Mass Index also turned out to be significant with BMI<18.5 showing positive relation with indicators of undernutrition whereas BMI>25 indicates a negative relationship with primary indicators of undernutrition. Showing that mothers with a low BMI<18.5 have a negative impact on a child's health whereas Women with BMI more than normal have a positive effect on a child's health. Thus, can be concluded underweight 0f mothers is a matter of concern not overweight.

b) Results for Quantile Regression

Quantile regression at (.20 .40 .50 .60 .80) For stunted child. Coefficient estimates for the 20th, 40th,50Th (median), 80 the Quantiles. Here we have taken a dependent variable as data for stunted children, and independent variables as household sanitation facilities, Mother's education is 10 or more years, Women married before the age of 18, Infants who were breastfed within one hour of birth, and the children who received adequate diet. The graph below shows a clearer picture of how these variables are determining the stunting in children at different quantiles. As we can see in the graph below the effect of household sanitation facilities is slightly higher for the 80th quantile of stunted children. In the case of a mother who received education for 10 or more years and women, the Effect is higher on 40th quantile of stunted children; it follows a decreasing effect across the different quantiles. This shows mother's education plays a crucial role in decreasing child stunting. But that effect is higher in the lowest 20% wasted children. An adequate diet has a slightly higher effect on the lowest 20 percentile of stunted children. In the case of women who married before the age of 18, the effect is higher in the case of the 40th quantile. Whereas in the case of child breastfed within the one hour birth effect is higher for 20th to 40th quantile of stunted children.
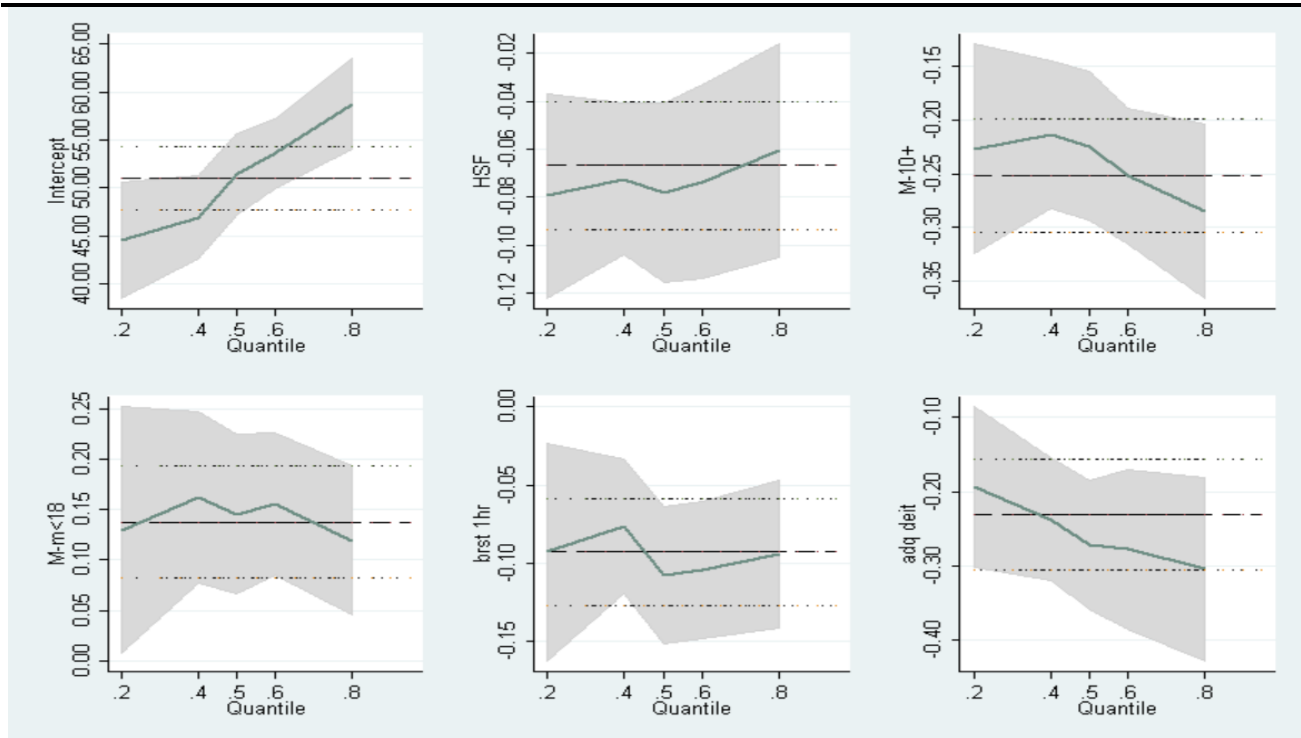
Source: Author's compilation from the NFHS -4 data

CONCLUSION

The paper tries to find out the association between primary indicators of undernutrition namely stunting, maternal, child, and household variables with the help of recent NFHS-4 round data. Empirical methods from the above result maternal variables like mother's health determine the child nutrition, education and overall well-being of the mother plays a crucial role. So, there is a need by government and policymakers to work on these areas, on improving the education level of women, awareness to stop early marriages, by launching encouragement schemes to support institutional births. Then the household sanitation and access to clean drinking water, child immunization, breastfeeding, and adequate diet are also important factors, which demand the need for more awareness to be spread among the people. The importance of these variables and just by paying small attention to this child nutrition can be improved, ultimately resulting in improved life expectancy.

The results from quantile regression show then quantile regression helps us to understand the severity of the problem in the case of stunting across the quantiles. Thus, it can be concluded that the overall nutrition level of the child is not only just determined by one factor but there are so many factors that are equally important and interlinked.

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